Flightfax
ARMY AVIATION RISK-MANAGEMENT INFORMATION
OCTOBER 2003 ✦ VOL 31 ✦ NO 10

Emergency Procedures—know them BEFORE you need them

COMING NEXT MONTH . . . JOEY!

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

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

DASAF's Corner

FROM THE DIRECTOR OF ARMY SAFETY

A Formula for Safety...

As the final reports arrive at the Army Safety Center for 2003, the Army has lost 246 soldiers to accidents this fiscal year. These are 246 notifications, 246 funerals, and 246 families who have lost a father, mother, son, or daughter. These soldiers were in our formations and a critical part of our combat readiness. Now, they're gone. We have two enemies in this Global War on Terrorism: the "bad guys" who carry weapons and preventable accidents that are not stopped by the "good guys."

In World War II, accidents accounted for 50 percent of our deaths; in Vietnam 54 percent; in Operations Desert Shield and Desert Storm 75 percent; in Operation Enduring Freedom 51 percent; and in Operation Iraqi Freedom 28 percent. To paraphrase a quote by Dr. Scott Geller: "If you keep doing things the same way, you will get the same results." This statement is as true for your unit as it is for the entire Army.

Let's look at accidental deaths over the last 10 years. In 1993 we were losing .35 per thousand soldiers. Last year we were at .35. For 2003, we are at .39…and climbing.

The Secretary of Defense (SECDEF) has mandated a 50-percent reduction in accidents over the next 2 years. This is on our watch, and we are going in the wrong direction!

"Out of the box" thinking is critical as our Army transforms to meet the Nation's security requirements. It is important that we shift our safety strategy from "art" to "science." General Peter Schoomaker, Chief of Staff, Army, coaches leaders to use the following formula to attack tough challenges (if you're not into math…hang in there, this ain't hard):

$$f(\text{degree of operational success}) = (\text{Doctrine} + \text{Organizations} + \text{Materiel}) \times (\text{Soldiers' Skill}) \times (\text{Leaders' Influence})^{(\text{training} \times \text{knowledge} \times \text{experience})}$$

Or, simplified in a safety context:

$$f(\text{degree of organizational safety success}) = (D+O+M) \times S \times L^{(t \times k \times e)}$$

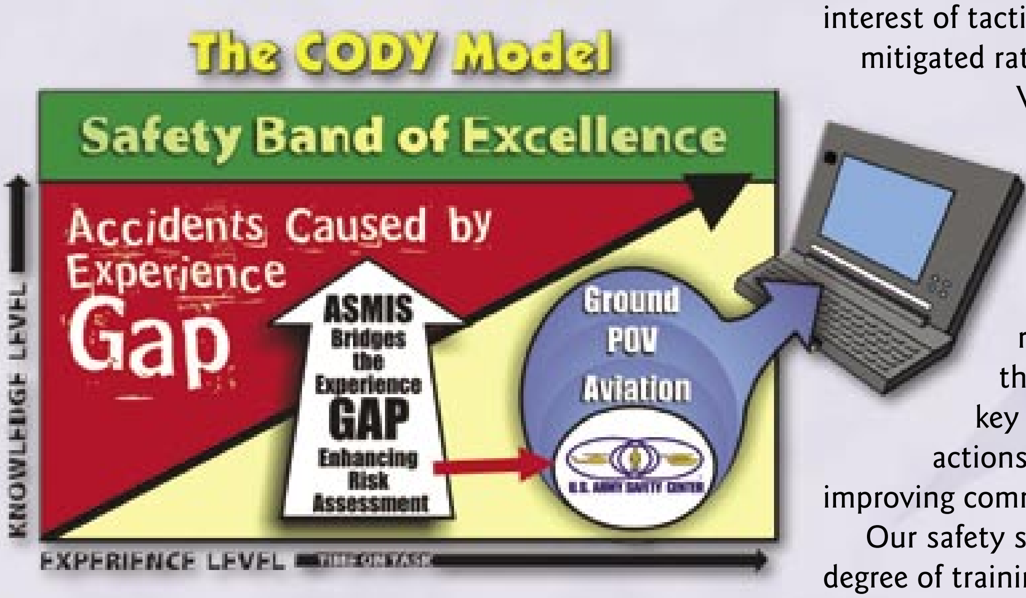
The Safety Center is developing a series of tools that will allow our Army organizations to increase the value of each of their formula's coefficients. If we work this as a team, it will result in a dramatic decrease in accident fatalities.

(D)=Doctrine. It is the foundation that guides us to execute missions safely and effectively. Several manuals, including those focused on drivers' training, are out of date. We owe our leaders updated field and training manuals that reflect the changes in our Army's equipment and operational environment. The goal is for doctrine to push us to use our full capability while accepting reasonable risks. Get the job done, but don't kill yourself doing it.

(O)=Organizations. Soldiers, leaders, and equipment need to be brought together as a combat-ready team. We must protect our combat formations by enhancing combat readiness through solid risk management. Good organizations protect soldiers on and off duty to preserve combat power through instituting proper safety programs. A death is a death, regardless of where it happens. Accidents in privately owned vehicles (POVs) and Army combat vehicles (ACVs) accounted for over 60 percent of our total fatalities this year. To attack POV accidents, the Army's biggest killer, we are now conducting centralized accident investigations the same way we do aviation and on-duty ground accidents. These teams are investigating POV fatalities to ensure organizational programs are actively reducing off-duty risks.

Additionally, the Safety Center has just fielded the first ground Directorate of Evaluation and Standardization (DES) team in an effort to help commanders evaluate their drivers' training and operation programs. Instead of being post-accident focused, we are aggressively working to identify and flag the warning signs to prevent accidents *BEFORE* they occur. As part of that vision, the Safety Center remains poised to conduct voluntary assessments for commanders who have specific safety concerns within their organizations.

(M)=Materiel. The goal is to "engineer out" hazards in the equipment our soldiers use to train and fight, so leaders don't have to "train them out." The Safety Center has a responsibility to assist the acquisition process and is placing renewed emphasis toward this common goal. I recently visited an installation regarding some safety concerns with the Stryker. Drivers and TCs were comfortable with the idea that "*mobility=survivability*," or rapidly moving on the battlefield as a form of protection. From their perspective, adding 8,000 pounds of reactive armor made the Stryker top-heavy and more difficult to maneuver. However, the reactive armor is needed for urban operations; so in this case, we must "train out" the hazard. The acquisition process is very effective at engineering out hazards, but in the interest of tactical operations, some risk is mitigated rather than eliminated.



While doctrine, organization, and materiel all have a role in the safety equation, it is the actions of our soldiers and their leaders that reduce risks where the rubber meets the road. Hence, the Safety Center has focused its key initiatives at influencing soldier actions, empowering leaders, and improving communication between the two.

Our safety success is influenced by the degree of training, knowledge, and experience of soldiers and leaders. As you can see in the Cody Model, we cannot influence experience levels—experience equals time at the tasks. We can, however, fill in the "experience gap" by providing soldiers and leaders the knowledge they need to reduce risk. We will field the beta version of the Army Safety Management Information System (ASMIS) this month to provide a user-friendly, automated way to assess risks for aviation, ground, and POV missions. Furthermore, ASMIS will suggest control measures to reduce risk and educate soldiers by providing them examples of past accidents during similar missions. The knowledge provided by ASMIS educates the leader on his soldiers' risks and inspires dialogue between each level of leadership. The goal is to ensure effective control measures are used.

In addition to the variables in the Army Chief of Staff's formula, we find the Degree of Dialogue (d) between senior leaders, first-line leaders, and soldiers to be a key ingredient in the safety formula. This dialogue should be "3 levels deep" and can be done through a combination of guidance, coaching, and supervision early in the risk mitigation process. We suggest that dialogue be added as an exponential factor in the effectiveness of Leader Influence (L):

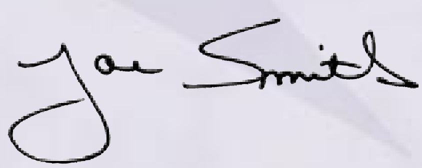
$$F=(D+O+M) \times S \times L^{(t \times k \times e \times d)}$$

For those who hate math, stay with me for a moment. If there is no dialogue between senior leaders and their soldiers (d=0), then the value of leader influence, regardless of the leader's training and experience, equals one (L=1). Because of the geometric relationship between leader influence and safety success, the formula demonstrates that leaders have ***NO*** effect on safety unless they talk to their soldiers during the mission planning process. Historically, this has proven to be true in all facets of soldiers' lives, both on and off duty. "***YA GOT TO COMMUNICATE!***"

(T)=Training. Safety and operational training are extremely important to the effectiveness of the organization's safety success. Simply avoiding risks is not safe. Challenging training with tactically and technically proficient leaders present increases the value of T, exponentially increasing the long-term safety success of the organization. In the long term, risk aversion is not effective risk mitigation.

At the Safety Center, we refuse to be stagnant. We are aggressively making use of proven processes, industry's best practices, and technological advances to help you succeed in reducing fatalities. But, as the formula emphasizes, ***YOU are the key element in reducing accidents***. Achieving the SECDEF's mandate of reducing accidents by 50 percent over the next 2 years is not only possible, it's necessary to winning the Global War on Terrorism. ★

Keep your leader lights on!



Emergency Procedures—know them BEFORE you need them

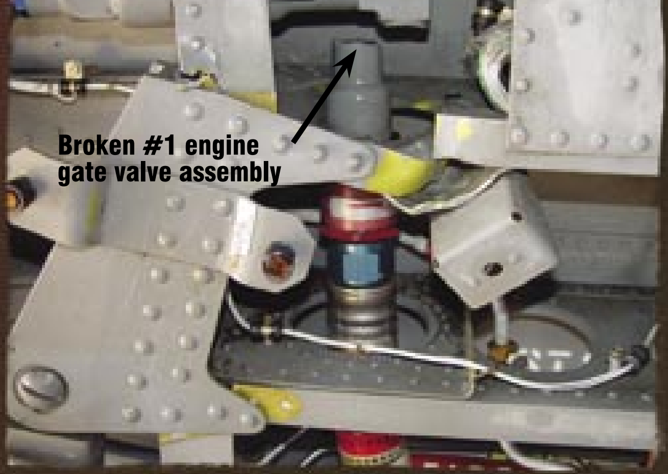
"Icarus, my son, I charge you to keep at a moderate height, for if you fly too low the damp will clog your wings, and if too high the heat will melt them. Keep near me and you will be safe. Beware, dear son of my heart, lest in thy new-found power thou seekest even the gates of Olympus...These wings may bring thy freedom, but may also come thy death."

—Daedalus to Icarus, after teaching his son to use his new wings of wax and feathers

We all know how the story ends. Icarus flew too close to the sun and the wax holding his wings together melted from the heat, causing him to fall to his death and drown in the sea. His father, Daedalus, might have been a famous architect, inventor, and master craftsman, but he forgot one thing—the importance of emergency procedures for his new invention, and maybe even a little crew coordination. Both are essential to successfully handle an in-flight or on-the-ground emergency, and it's important to fully understand your emergency procedures (to include those WARNINGS, CAUTIONS, and NOTES) *BEFORE you need them*!

Fortunately, we have published aircraft emergency procedures for almost any emergency. Have an emergency? "Piece of cake," you say. "Just break out the checklist and use the call-out and response method, right?" Well, it's not always that simple, and you may not have time before your wax melts to get to that checklist. Let's take a closer look at

The ultimate cause of this accident was determined to be human error as a result of several factors, including training, unit standards, crew coordination, and risk management. The application of the incorrect emergency procedure contributed to the severity of damage to the aircraft.



another story and see if there is a moral to this one as well.

Once upon a time, a CH-47 crew was performing a Fast Rope Insertion/Extraction System (FRIES) mission with 17 Army and U.S. Navy Special Operations Forces (SOF) ropers on board. During the deceleration for the fast rope task, the aft ramp of the aircraft struck the ground hard enough to force the ramp up into the hydraulic struts. The impact caused bending of a sheet metal airframe structural former on the left side of the aircraft.

This bending caused the #1 engine gate valve and mounting bracket to break, spraying fuel in the cabin and on the passengers near the aft ramp. It also created a large fuel vapor cloud due to the rotor wash over the aft ramp. The break in the fuel line fitting immediately starved the #1 engine of fuel, causing it to spool down. The aircraft rebounded slightly and, knowing they now had an emergency situation, the crew leveled the aircraft at about 20 feet above ground level (AGL). The #2 engine immediately began to spool up to meet the now single-engine power demand. The flight engineer (FE) told the pilot (PI) there was a fuel leak and to shut down the #2 engine.

Without hesitation, the PI not on the controls immediately shut down the #2 engine by pulling the #2 engine control lever (ECL) to the STOP position. But he didn't stop there: he then pulled the #2 engine FIRE PULL handle. Oops! This action essentially created a dual engine-out condition, and the rotor RPM began to decay very rapidly. The pilot in command (PC) continued to level the aircraft and applied cushioning collective pitch as the aircraft settled in a forward motion to the ground.

Due to the extremely low rotor RPM, which inhibited the interposer droop stops from engaging in time to prevent rotor droop and subsequent contact of the blades with the fuselage, the synchronizing driveshaft and tunnel cover area received extensive damage. (The interposer blocks are centrifugal force-generated stops that begin to engage at 88.5 percent rotor RPM and are fully engaged at 66.5 percent rotor RPM. They could not position in time due to the rapidly decaying rotor RPM as a result of the induced dual engine-out condition.)

Incorrect emergency procedure

Let's analyze this accident in a little more detail. After the #1 engine quit as a result of fuel starvation from the ruptured valve, the #2 engine began to spool up to meet the single-engine power demand. The operating engine did exactly what it was designed to do. This resulted in an increase in engine noise in the aft section of the aircraft, and the FE mistakenly told the pilot that the #2 engine had a fuel leak and to shut it down. Easy to do when fuel is being sprayed all over the back ramp with hot exhaust plumes just off the back! The PI, hearing the excitement in the FE's voice, immediately shut down the #2 engine without positively confirming the #2 engine was, in fact, the one that failed. He didn't cross-check cockpit indications such as torque, gas turbine speed (N1), power turbine inlet temperature (PTIT), engine oil pressure, etc. Technical Manual (TM) 55-1520-240-10 contains the following caution about emergency

CAUTION

When in-flight shutdown of a malfunctioning engine is anticipated, positive identification of the malfunctioning engine must be accomplished to avoid shutting down the wrong engine.

engine shutdown.

Misdiagnosing the emergency after the impact and subsequent shutdown of the good engine were the primary causes of the extensive damage, since the rapid rotor decay prevented the interposer blocks from positively engaging and preventing the rotor droop. This is a classic example of a minor accident that suddenly turned into a more serious situation as the result of an improperly executed emergency procedure. Had the crew correctly diagnosed the emergency, a single-engine landing and shutdown most likely would have allowed the interposer blocks to engage properly, and also would have prevented the resulting structural damage to the top of the fuselage.

In this case, misdiagnosing the emergency was the difference between a minor accident and a Class A accident. No one was seriously injured in this accident but, like Icarus, the results could have been tragic. The fuel leak created a large vapor cloud that easily could have ignited from sparks or hot exhaust. Once on the ground, the crew did an excellent job of evacuating the aircraft.

Anyone who has even a few hours of flight time knows that an actual aircraft emergency definitely will test your wings. It's important to know your emergency procedures BEFORE actual emergencies occur.

What about those emergencies that don't have a listed emergency procedure? Those are the times where pilot judgment and experience come into play. The single-most important consideration is aircraft control, and all procedures are subordinate to this requirement.

Knowing your emergency procedures

Emergency procedures should be discussed as a part of every pre-mission planning event. For instance, if there is a possibility of encountering marginal weather during the mission, it might be prudent to discuss briefly what procedures you will execute in the event you encounter inadvertent instrument meteorological conditions (IIMC). Don't wait until you suddenly find yourself in the clouds to discuss IIMC recovery procedures.

What will you do when you unexpectedly experience an engine failure with a sling load or execute an approach in known brownout or whiteout conditions? It is critical that everyone understands their responsibilities once the dust or snow cloud engulfs the aircraft. When will you execute a go-around? Be sure to discuss how you expect your fellow crewmembers to communicate during an actual emergency. Don't wait until the actual emergency—it might be too late!

Passengers are critical to your emergency procedures as well. Don't forget to brief your passengers on the use of emergency equipment such as fire extinguishers or how to use survival equipment.

The moral of this story is simple. You must instinctively know your emergency procedures and understand the rationale behind the underlined steps, as well as the details of NOTES, CAUTIONS, and WARNINGS associated with emergency procedures.

During an actual emergency, you might not have time for the checklist. Only *you* can know your emergency procedures. Do you study them only when you have a check ride? Have you really committed them to memory? Commanders should make sure their unit standardization program includes an effective no-notice evaluation. Make use of the simulator and always include emergency procedures during all simulator scenarios. A simulator is the only place you can press the PAUSE button and rehearse the emergency procedure over and over. A real emergency doesn't allow such a luxury. Remember—know your emergency procedures BEFORE you need them! ♦

Fly Safe!

—LTC Mike Cumbie, Aviation Systems and Accident Investigation Division, DSN 558-9858, (334-255-9858), e-mail robert.cumbie@us.army.mil

After the Crash

Karen Fleming-Michael
U.S. Army Medical Research and Materiel Command

After an Army helicopter crashes, safety investigators meticulously search to find the chain of events that caused the accident. But when an accident involves an aircraft's life support equipment, another lesser-known team springs into action as well. Seats, seatbelts, helmets, survival vests—these are just a few of the items the Aviation Life Support Equipment Retrieval Program (ALSERP) team from the U.S. Army Aeromedical Research Laboratory (USAARL) examines after crashes.

When an investigation team from the U.S. Army Safety Center (USASC) is deployed to an accident site, investigators look for ALSE-related issues in an attempt to paint the entire picture of the accident. If something with the ALSE doesn't look right or is suspect during the course of the investigation, that component is shipped to the ALSERP team. On occasion, an ALSERP team will deploy to the accident site to inspect the equipment as well. On average, USASC investigators send ALSE to the ALSERP team in about 25 percent of accidents.

ALSERP investigators look at a wide variety of ALSE gear, including individual protective equipment such as flight helmets, to determine why a particular injury occurred (e.g., head blows to a helmet). They also examine pieces of the aircraft to see if they responded as they were designed in a crash sequence. The ALSERP team's findings are then included in the final report that is catalogued at the USASC.

In existence for more than 30 years, ALSERP's mission is simple: to make a very dangerous job safer. When conducting an investigation, ALSERP experts take many different factors into consideration. Take, for instance, aircraft paint schemes. All aircraft are configured differently, and paint schemes reflect whether it is a night vision compatible cockpit or cabin or a basic trainer. If a helmet has yellow and black paint on it, then the experts can conclude the pilot hit the doorframe of a certain aircraft. But if he spots yellow paint only, either the pilot went up or the top of the cabin came down, because that's where the yellow knob for the fuel cutoff is located.

One of the things USASC investigators try to determine is how the accident sequence unfolded and what G forces were involved in the impact. The ALSERP team members provide that link. Based on what they see in the ALSE, certain determinations can be made and, sometimes, conclusions already drawn can be confirmed. Using the helmet example, if it appears there was an apparent blow to one of the helmets, ALSERP's information might confirm autopsy results.

When they do find a problem, the ALSERP team tries to initiate a fix before one more injury is incurred or life is lost. Their philosophy is that something can always be learned from a crash. If they see the start of a trend, then they chase it.

Take, for instance, the new Infantry cloth-sided boot that recently entered the supply system. The Army had experienced survivable accidents where the aircrew had to run through up to an estimated 6 inches of fuel in jungle boots. When the crewmembers lifted their feet, the separation between the foot and the boot's sole created suction and essentially pulled the fuel to the bottom of the boot. Upon stepping down, the fuel would gush out and turn the crewmembers into "human wicks." The ALSERP team recognized this and, thanks to their championing of rigorous protection requirements, the new and safer boot has been approved for use.

ALSERP traces its roots to the Vietnam War, when Army Aviation medicine identified fire as the number one cause of death in helicopter crashes. Data analysis conducted at the USASC's predecessor, the U.S. Army Board of Aviation Accident Research (USABAAR), identified that rigid fuel systems caused helicopters to ignite during crashes. In response, the Army revamped the fuel system to be more crashworthy and ballistically resistant. The self-sealing fuel tanks and lines found on today's helicopters can take a 20mm round and not significantly spill fuel. Tanks containing flammable fluids also are designed to break away from the aircraft and automatically seal, so there is no significant spill.

After fixing the fuel tank issue, the ALSERP team set out to remedy any problem that worked its way to the top of the list as a primary cause of significant trauma or death in crashes. Research showed that older helicopters—UH-1s, AH-1s, CH-47s, OH-58s, and OH-6s—impacted the ground at a rate of 28 to 32 feet per second. In these accidents, the aircrew inevitably died from massive internal injuries. Working with industry partners, ALSERP experts developed seats with load attenuators (built-in shock absorbers) to prevent both death and spine trauma. Today's UH-60 is designed to afford survivable protection at a 48 feet-per-second impact velocity.

Helmets, too, have been a program focus. The ALSERP team created crushable ear cups for helmets to prevent the skull fractures that resulted from rigid cups not giving when aircrew heads flailed during a crash. Crushable ear cups are now standard in all of Army Aviation, as well as Air Force, Navy, Marine Corps, Coast Guard, and Bureau of Land Management rotary-wing crews. Though protecting the skull through helmet improvements was undertaken to save lives, the changes now allow aircrews to avoid concussive injury as well.

What about that smart-looking survival vest you just picked up from the ALSE shop? It didn't get that way overnight. Improvements in survival vests show ALSERP's handiwork. Vests issued even as little as 20 years ago held all the needed survival equipment,

(Photos by Scott Childress, Graphics Editor, USAARL)

Top Photo: Joe Licina verifies that a NOMEX flight jacket, which burned during a helicopter crash, protected the crewmember who wore it.

Bottom Photo: Joe Licina examines a crewmember seat from a UH-60 that tore during a crash in Hawaii several years ago. Licina works for ALSERP, which examines safety equipment involved in aircraft crashes.

but that was about it. Modern vests not only hold all the necessary survival equipment, but also are sturdy enough and built so a hook can be attached to a crewmember if they need to be lifted out of an accident.

The world scene and face of combat is ever-changing, and the ALSERP team continues to work on survival vest updates. Lessons learned from operations in Grenada, Somalia, and Iraq show aircrews are going down "in the middle of the fight." The need to provide immediate protection from the enemy, which is translated to personal fire power, has become evident. The decision to increase the amount of ammunition in the survival vest has created concern for the ALSERP team, because they need to determine where to place extra bullets so they don't injure the aircrew in a crash.

New equipment also passes under the watchful eye of ALSERP experts. The team rigorously examines every proposed change to aircraft safety equipment to predict possible consequences. When a proposal to install cockpit airbags came about, which seemed logical given airbags' effectiveness in vehicle crashes, the team urged caution. The environment in Army aircraft, however, is vastly different from that in the family minivan. One potential problem is that if an airbag were to deploy in an aviation accident before the pilot's body flails, night vision goggles (NVGs) will stay in place. The NVGs normally break away from the helmet when the human body flails in an accident sequence, but the airbags possibly could force the NVGs into the face without that crucial movement. Whatever protection is designed into new airframes or equipment must be approved with the certainty that a new hazard is not created with its implementation.

Whatever the need, whatever the call, the dedicated professionals of ALSERP and USAARL have answered the challenge. Do your part and have your gear inspected and updated regularly. Your crew and your Army are relying on it! ♦

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Flight Helmet Success Story

A recent accident indicates the need to re-emphasize the importance of aviation life support equipment (ALSE) and the value of ALSE training. While we often hear stories of ALSE failures due to lack of maintenance or other problems, most of the success stories, such as the following, go unnoticed.

The mission was to execute an approach to exfiltrate a ground force from a military operations urban terrain (MOUT) site. While flying a day mission as Chalk Two in a flight of two aircraft, an MH-60L inadvertently struck an obstacle and suffered severe damage. The aircraft went into a series of violent vertical vibrations that ended with the main transmission module being torn from the aircraft. Fortunately, the crewmembers were properly wearing their HGU-56/P helmets, all of which took some impact and protected the crew's heads from serious injury. The PI's and PC's helmets were both badly damaged with the PI's being the worst (see photo). The two crew chief's helmets were undamaged. Luckily, the PC and the two crew chiefs didn't experience any head injuries. The PI suffered a concussion but will be flying again soon. The investigation board and the U.S. Army Aeromedical Research Laboratory (USAARL) believe that the PI would have suffered a permanent head injury, or worse, if he had been wearing any variant of the SPH-4. Chalk up a saved life to the "Darth Vader Helmet." *(Editor's note: The PI's and PC's helmets were forwarded to USAARL for further analysis.)*

PI's helmet, left seat, knocked unconcious

Proper wear, fit, and maintenance required

The HGU-56/P helmet can't protect you unless it's maintained, fitted, and worn correctly. It is imperative that flight crews preflight their helmets and flight gear. No one has more at stake than the person who is counting on his or her flight helmet for protection. Helmets with discrepancies should immediately be taken to the unit ALSE maintainer for correction.

The Army's desire is for you to always have the best helmet available, but to never have an opportunity to prove it. If the worst does happen, your life could depend on your ALSE. It can happen to you! Be prepared every time you fly—careful inspection, fitting, and proper wear of your helmet will maximize protection for the most important and most

PC's helmet, right seat, no head injury

vulnerable part of your body: your head.

Deploying ALSE

Just one more note. The old axiom "train as you fight" applies to the ALSE program. For those deploying overseas, a major lesson learned from Desert Shield/Storm concerned ALSE. If you leave the ALSE program (and the ALSE shop) in garrison when you deploy to the field, your transition to combat will suffer predictable consequences.

Weak ALSE programs can contribute to the severity of injuries incurred during accidents or lessen the chances of survival should your crewmembers be faced with a survival situation. Members of your unit, as well as your commander, expect you to identify and eliminate problems before they result in injury or damage. ♦

—LTC W. Rae McInnis, Aviation Systems and Accident Investigation Division, U.S. Army Safety Center, DSN 558-9851 (334-255-9851), e-mail william.mcinnis@safetycenter.army.mil

Storage of Personnel Distress Flares as Part of ALSE

Bruce Williams
Aviation Branch Safety Office

1. Packaged flares should be stored in the unit arms room or other approved locations.

- The approved location must meet the explosives safety requirements of Department of Army (DA) Pamphlet (PAM) 385-64 and security requirements of Army Regulation (AR) 190-11.
- The storage location does not require an explosives safety site plan; however, it does require an explosives storage license IAW DA PAM 385-64, Chapter 9.
- Flares can only be stored with other compatible ammunition and explosives (AE) as identified by DA PAM 385-64, Table 4-3.
- A fire extinguisher (minimum of 1 each) should be immediately available in case of fire.
- Other hazardous materials must not be stored together with the flares or any other AE.
- Packaged flares need to be secured and access-controlled to prevent unauthorized access in accordance with (IAW) AR 190-11.
- Packaged flares need to be accounted for IAW AR 710-2 and DA PAM 710-2-1.

2. Flares located in survival vests.

- Vest should be secured IAW AR 190-11, TM 55-1680-317-23&P and/or other applicable accountability regulations and local policies.
- Maintain accountability IAW DA PAM 710-2-1 and/or other applicable accountability regulations and local policies.
- A fire extinguisher (minimum of 1 each) should be immediately available in case of fire.
- Other hazardous materials should not be stored together with, or near, the vests containing flares or any other AE.

3. References:

- AR 95-1
- AR 190-11
- AR 385-64
- AR 385-95
- DA PAM 385-64
- DA PAM 710-2-1
- TM 55-1680-317-23&P
- FM 1-302
- FM 1-508 ♦

—Bruce Williams, Aviation Branch Safety Office, Fort Rucker, AL, DSN 558-1950/3000 (334-255-1950/3000)

All Things Considered

CW2 Derek S. Goodrich
ASOC 03-003

The mission, cross-country flight in Pakistan, was now becoming routine. Our flight of four CH-47s was to depart under night vision goggles (NVGs) and take supplies to Kandahar, Afghanistan. Crew selection is always an important part of pre-mission planning, and I was paired with a senior aviator that had just been signed off as an NVG pilot in command (PC). The decision was made that our aircraft would be lead because we both were NVG PCs.

Our flight departed just after sunset and headed north toward Afghanistan. We always flew at altitude while in Pakistan to avoid small-arms fire, but when we crossed the Afghanistan border we descended to terrain flight altitude. Once inside Afghanistan, the weather began to deteriorate and visibility steadily decreased due to blowing sand. The zero-illumination conditions and blowing sand made artificial lighting useless, and actually became a hindrance.

Despite the conditions, we picked our way through the sand dunes to Kandahar. After landing, I went to talk with the other crews about the return trip. After having a conversation with a friend who suggested that we make the flight at 500 feet above ground level (AGL), I returned to tell the other pilots the change in plans.

During our run-up procedures, the briefed PC decided that it would be too risky to fly at an altitude of 500 feet in Afghanistan. Instead of arguing, I decided that we had made it in and we would make it back out the same way. I briefed the rest of the flight on the most current change. We departed Kandahar with no problems for the return trip.

We had been flying for about 15 minutes

fear in the CE's voice, I tried to calm him down by telling him not to worry about the ramp. However, I was not expecting his next transmission: "Clay was on the ramp." Clay was our flight engineer (FE), and I knew there was no way he could survive what had just happened.

A decision had to be made quickly, as hard as it was; we now had the task of saving the remaining five lives on board the aircraft. We made a radio call to the rest of the flight to inform them that we had impacted the ground and during the impact, we had lost our FE. The other aircraft volunteered to remain in the impact area to search for Clay. The weather continued to deteriorate and, while conducting a brief search, two more aircraft in the flight almost slammed into the ground.

at 125 feet AGL when it became impossible to see the desert floor in the zero illumination and blowing sand. I was on the controls, and the other pilot was calling out altitude using the radar altimeter. I looked at the radar altimeter and saw that our altitude had dropped to 100 feet. I put in a small amount of power to start a climb and noticed the radar altimeter read 80 feet. The next thing I saw was the radar altimeter at 8 feet.

At this point a crewmember began yelling that he had terrain out the cabin door. I immediately applied maximum power and aft cyclic, but there was a huge impact much like a car accident. The rotors lit up as the sand flew in the air from the impact. We both struggled to maintain control of the aircraft after striking the ground. No one saw it coming and we weren't sure if it was over, but within seconds I regained control of the aircraft and returned to level flight.

Just as we returned to level flight, a call came over the intercom from our crew chief (CE) in the back that the ramp was missing. With our hands full flying the aircraft—to include eight caution capsules and inter-flight communications, among others—losing a ramp didn't seem like much of a problem. Hearing

We decided to make our way back to Kandahar and while en route, a damage assessment was made: All four landing gear were ripped off, as was the ramp; both main fuel tanks were cracked; and the aircraft structure was bent in two places. We also had multiple fuel leaks and no utility hydraulic system.

Thankfully, there was good news. On our way back, the CE began yelling that we still had Clay. What? The CE spotted him hanging in his harness underneath the aircraft. He had done what was briefed and had hooked his tail to the aircraft floor, not the ramp. The remaining three people in the back tried to pull Clay back into the aircraft, but were unable to get him in. I knew that with the blowing sand, we never would be able to get him if we put him down.

We made an emergency call to tower, explained our position, and told them to have an ambulance waiting for us at the end of the runway. As we approached the runway we had to be extremely careful—we couldn't land because we didn't have any gear, and we didn't want to cause any additional injuries to Clay. We lowered him to the runway, and the CE cut Clay's restraint.

After Clay was rescued, we hovered down the runway and were instructed to hover until a landing pad could be constructed. Ground support personnel and fellow pilots built a landing pad out of Air Force pallets. I was able to get the aircraft on the pallets and shut it down without further incident. As it turned out, we'd hit a 150-foot wall of sand on the back side of a river valley. We didn't descend; rather, the ground came up and we never saw it.

Lessons learned

When I think back on that night, there were many things we could have done to have helped us avoid this situation. I want people to learn from what we went through because no one died. This was not a training mission, so I wanted to make sure this mission was accomplished, and so did the rest of the crew.

This incident could have ended tragically, and I would venture to say we were about 4 feet from that ending. Zero-illumination operations are what we train to fly in and learn to love due to the concealment that darkness provides. But when flying over very low-contrast terrain, combined with blowing dust and sand, special considerations must be taken, including possible adjustments to altitude and airspeed. When I left Afghanistan, no NVG flights were allowed if illumination was below 23 percent. I'm not sure this restriction is the answer, but it has helped.

We all, as Army aviators, want to complete our missions successfully and safely. We must do whatever it takes to complete the mission, but don't let things stack up against you to the point that an accident happens. Remember that the mission can be changed without canceling it. If you have the luxury of flying with a crew in the back of the aircraft, LISTEN to them. Without the quick thinking and decision-making abilities of our crew, we would have lost a life in our accident.

The final point I would like to mention is that Clay hooked his tail to the aircraft floor and not to the ramp, just the way he had been taught. If he would have done otherwise, well, I don't want to think about that. All things considered, we were very lucky. I hope my experience will help others recognize when conditions warrant a change of mission. ♦

—CW2 Derek S. Goodrich wrote this article while attending the Aviation Safety Officer Course, ASOC 03-003, U.S. Army Aviation Center, Fort Rucker, AL. CW2 Goodrich is a CH-47 pilot stationed in Korea. He may be contacted by e-mailing derek.s.goodrich@us.army.mil.

Learned a lesson lately?

We don't have to learn our lessons the hard way—through accidents. We can also learn from close calls, near misses, and minor mistakes—both our own and those of others. This column is an opportunity for us to share experiences with each other. They can be long or short, recent or from the past.

Share your lessons learned with all of Army Aviation by sending your "War Story" to *Flightfax*:

- U.S. Army Safety Center, ATTN: *Flightfax*, Bldg. 4905, 5th Ave., Fort Rucker, AL 36362-5363
- **Flightfax@safetycenter.army.mil**
- Fax DSN 558-3003 (334-255-3003), ATTN: *Flightfax*

NCO CORNER

MSG Shane Curtis
U.S. Army Safety Center

A Push in the Night

The mission for our CH-47 aircraft started out as a combat support night vision goggle (NVG) flight into Iraq during the first Gulf War. The aircraft tail number and crew were selected and, at the last minute, a crewmember change was made. I was assigned as flight engineer (FE), and for whatever reason, my regular crew chief, Tom, didn't make this flight with me. Tom and I had worked together for the past year. We knew each other's every move, and we knew our duties as a crew.

On this particular night the pilots performed their pre-flight inspection, checked the logbook over, and briefed us on what we were doing and where we were going. The mission went well until the flying part was over and we returned around 0130. As the blades coasted to a stop, I was ready to jump upstairs and start the post-flight inspection. The new CE wasn't thinking along the same lines. He was ready to start putting on the blade ropes and was looking forward to tying down the aircraft. As soon as I got up on top of the aircraft, he rotated the blades. He didn't announce the blade rotations, because he thought the reason I went up top was to put the blade ropes on.

At the very last second, I heard the sound of the drive shafts turning. It was dark outside and I knew if the drive shafts were turning, the blades had to be turning. The fact that I couldn't see anything scared me. In a split second, it was like something from the dark reached out and pushed me. I didn't have time to grab onto anything to break my fall, but it wouldn't have mattered anyway—there was nothing to grab.

I remember having two hits on the way down: First, slamming into the top of the right-side forward auxiliary fuel tank, and then the ground. I landed flat on my backside, still holding a flashlight in my hand. I guess I made some noise during my fall (I can remember saying a few choice words on the way down), and hitting the top of the fuel cell made a good thumping noise too. People came from everywhere once I was on the ground, and it didn't take long to get me to the medic station.

Our battalion flight surgeon was on-site in less than 20 minutes. He quickly discovered that I had broken my tailbone during the fall. He said, "I know it hurts, Sarge. Don't try to move, much less walk. I would give you something for the pain, but I can't." He explained there was no pain medication I could take and still perform my flying duties. In effect, I'd be grounded. The unit still had missions to fly, and we were already short on crewmembers because of increased personnel requirements. Our missions required three crewmembers in the back of the aircraft; a normal crew required only two.

Lessons learned

The new CE and I thought we had done everything right that night, but what we didn't do was discuss what actions to take post-flight. Being used to my regular CE, I failed to ensure the new CE for this flight knew what I was doing. What happened? Crew coordination broke down. Everyone in the crew must understand his or her duties and responsibilities in the order that they should be performed. We must talk! We must ensure that each crewmember is actively involved in the mission planning process and understands mission intent, as well as operational sequence.

I hope my experience with crew coordination, or should I say, lack of crew coordination, will be a wake-up call to everyone in Army Aviation. We shouldn't *assume* actions the other crewmembers will make, as well as they shouldn't assume actions we're going to make. Crew coordination is a must for soldiers to be able to complete their jobs and do so in the safest manner possible. ♦

—MSG Shane Curtis is an Aviation Systems Safety Manager for the CH-47 at the U.S. Army Safety Center.
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ALSS Update

The following information is an update for the Aviation Life Support Systems (ALSS) from the Naval Air Technical Data and Engineering Service Command (NATEC).

■ **Crew chief hardware connection**: Called the Pear Quick Link, this hardware is used to interface the current crew chief tether to the AIRSAVE vest. Purchase from Wichard, Inc., 47 High Point Ave., Portsmouth, RI 02871; 401-683-5055, FAX 401-683-5077, **www.wichard-usa.com**, click "Climb Safety & Rescue," then click Mallon Rapide, Pear series P. Part #P070SS, $5.10 each.

■ **Crew chief tether assembly**: An NSN is being assigned for the crew chief tether as part of the AIRSAVE system. Defense Supply Center, Philadelphia, PA; DSCP expects NSN by Sep 03.

■ **Safety restraint tether (SRT)**: Climb High, 135 Northside Dr., Shelburne, VT 05482. Provide: (1) the item number, (2) quantity, (3) shipping address, (4) credit card number for billing, and (5) contact phone or e-mail information. SRT Item #SS1DR, price is $2.60 each. Orders can be e-mailed to Hannah@climbhigh.com with a copy sent to info@climbhigh.com. For more information contact Hannah Davidson, Climb High, Inc., 802-985-5056 or FAX 802-985-9141.

■ **Carabiner**: Seattle Manufacturing Corp., 6930 Salashan Parkway, Ferndale, WA 98248; 800-426-6251 or 360-366-5534, FAX 360-366-5723, **www.smcgear.net**, click "aluminum carabiners," part #17002, cost $9.30 each; purchase 50 or more and the cost is $6.25 each. Item will have an NSN assigned in Sep 03.

Hardware for harness quick release

Installation of leg strap quick-release fittings are at the option of the assigned aircrew and will be performed at the organizational maintenance level.

MATERIALS REQUIRED

Quantity	Description	Reference Number
2	Ejector Snap	68D37721-3
2	V-ring	59C381
As Required	Sealing Compound	F-900 Torque Seal (color optional)
As Required	Ink, Black, Washproof	TT-AI-542

Note: The ejector snap costs $26.04 and the V-ring $4.67. It can be ordered through the Naval Supply System or direct from Capewell Life Support, 105 Nutmeg Road South, South Windsor, CT 06074; 860-610-0700, ext. 3398, or FAX 860-610-0120, **www.capewell.com**.

Snap and setter information

M370 Snap Setter: $225 each for iron, or $235 each for aluminum. The four part numbers are:

LIFT THE SPOT ITEM

1. PN190000W74B - SK50 HBR POST STD MIL TEFL (BS-10413-3C) BLACK DOT POST

2. PM420000359B - SK 50 HBR STUD MIL LIFT SPO (BS-18303-3C) BLACK DOT STUD

3. PQ910000359B - SK 50 HBR SOCKET MIL LTS (XX-18201-3C) BLACK DOT SOCKET

4. PM99G340906B - 24 HBR CAP EYE 359/359 (XE-18103-3C) BLACK DOT CAP

OMNIDIRECTIONAL SNAPS

1. POST SAME AS ABOVE

2. PX240000359B SK50 HBR SOCKET MIL STD TE (XX-10224-3C) BLACK DOT SOCKET

3. PK870000359B SK50 STUD ROLL MIL (BS-10370-3C) BLACK DOT STUD

4. PJ460000906B - 24SK50 CAP EYE MILL (X2-10127-3B) BLACK DOT CAP ♦

—POC: Shane Bearly, General Manager, Index Fasteners, Inc., Ontario, CA, 909-923-5002, FAX 909-923-5322, www.indexfasteners.com

Editor's note: The above information was provided by Erich AmRhein, U.S. Army Natick RDT&E Center, Natick, MA, DSN 256-5450 (508-233-5450), erich.amrhein@us.army.mil. For more info, log on to the Air Warrior Web site, ***https://airwarrior.redstone.army.mil.***

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

AH-64

D Model

■ **Class A:** During a maintenance test flight, the intermediate gearbox temperature warning came on in the cockpit. The gearbox failed while at an out of ground effect (OGE) hover. The aircraft crashed in an upright position and was destroyed. Both pilots received serious injuries. Investigation is ongoing.

■ **Class C:** While on a down-wind approach, the aircrew reported a 10-second aircraft vibration, followed by a hot metal odor and "APU FIRE" audio warning. The aircraft was landed without further incident, and the post-flight inspection revealed an APU clutch failure. The APU clutch, fuel pump, drive shaft, and anti-flail device were damaged in the incident, with possible structural damage to the catwalk area.

■ **Class C:** Contract crewmembers were conducting an engineering test flight to complete the AH-64D Lot 7 software baseline verification test (SBVT) software regression test. While at a hover, the APU FIRE light illuminated, and the aircrew smelled smoke and felt a vibration. The crew then executed a precautionary landing. Inspection revealed the APU power takeoff (PTO) clutch had failed and the #7 drive shaft had sheared. The aircraft was ground transported to the factory and secured for investigation.

CH-47

D Model

■ **Class E:** During four-wheel taxi, the power steering master CAUTION light illuminated. The aircraft was lifted to a hover, and the swivel switch was cycled in an attempt to lock the swivel. After several attempts the swivel lock still would not engage, and the aircraft was landed and shut down without further incident. The power steering actuator was replaced.

MH-6

J Model

■ **Class D:** While at flight idle, the pilot attempted to toss a water bottle to the crew chief. The bottle flew in the air and hit one main rotor blade. The aircraft was shut down, and an inspection of the blades was performed. Maintenance determined one rotor blade was unserviceable and replaced it. The aircraft was returned to service without further action.

M Model

■ **Class E:** During manual full authority digital electronic control (FADEC) operations training, the rated student pilot experienced trouble modulating the throttle smoothly and allowed the power turbine speed (N_2) to climb above limits. The instructor pilot (IP) attempted to press the FADEC control reset but could not avoid the overspeed. The exceedance was 109.6 percent for 2.5 seconds. The aircraft landed without incident and returned to service after maintenance inspection.

OH-58

A Model

■ **Class C:** The aircraft was parked on a ramp when another aircraft hovered by and blew a door off of the parked aircraft.

DR Model

■ **Class B:** Aircraft impacted a tree and other vegetation during a local orientation flight, resulting in a hard landing. No other details were provided.

■ **Class C:** Aircraft sustained a 122-percent mast torque reading for 30 seconds during a landing sequence with a left-quartering tailwind. The transmission, mast, tail rotor driveshaft, and gearbox required replacement.

UH-60

L Model

■ **Class D:** One blade tip cap contacted a tree branch during nap-of-the-earth (NOE) flight during a situational training exercise (STX). The pilot flew the aircraft to the pickup zone (PZ) and declared a precautionary landing. During the post-flight inspection, a 4- to 5-inch hole was found on the top leading edge of one blade tip cap. In addition, a small ¼-inch dent was discovered in a second blade tip cap. One tip cap was replaced, and the second was repaired. The inspections were completed with no additional damage found, and the aircraft was returned to fully mission capable (FMC) status.

A Model

■ **Class A:** While conducting night vision goggle terrain flight, the aircraft descended to a sandbar to conduct hoist training when the aircraft struck two cables suspended across the river. After contacting the cables, the aircraft descended aft and impacted the stabilator in the riverbed. The aircraft subsequently rolled left and settled on its left side in the river. No personnel were injured in the accident.

■ **Class E** (FOD): During #2 engine start, the auxiliary power unit (APU) failed. The #1 engine was shut down. It was discovered that a K-dry paper towel was covering the APU inlet screen.

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). There have been numerous accidents in Kuwait and Iraq since the beginning of Operation Iraqi Freedom. We will publish those details in future Flightfax articles.**

Don't Whine About Chapter Nine!!!

The AH-64 crew performed the appropriate emergency procedures, landed safely, and egressed the aircraft just prior to it being consumed by fire. See *"Know Your Equipment"* article from July 2002 *Flightfax*.

While flying over water, an OH-58D crew experienced a loss of tail rotor components. They executed the emergency procedure and completed what witnesses called a "perfect autorotation." The crew then swam out of the aircraft and were rescued.

Instructor pilots always say Chapters 5 and 9 are non-negotiable. The crews of these aircraft are glad they are. Proper diagnosis of emergencies and execution of the right procedures saved these crews from injury or death!