Flightfax
ARMY AVIATION RISK-MANAGEMENT INFORMATION
MAY 2003 ✦ VOL 31 ✦ NO 5
CH-47 Safety
Performance Review
PLUS:
Sustaining Performance in Combat...
Is this one place where drugs and flying can sometimes mix?

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

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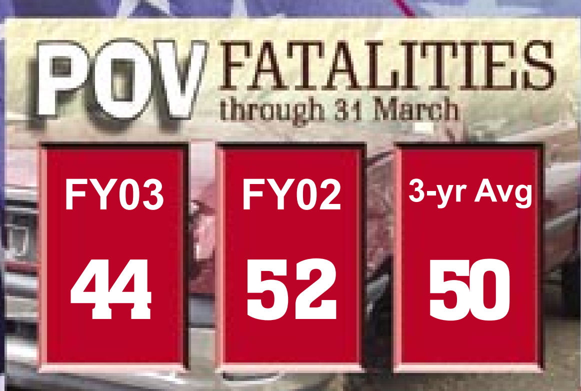

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James E. Simmons
Brigadier General, US Army
Commanding

DASAF's CORNER

from the Director of Army Safety

Remembering Heroes and Keeping Future Ones Safe

By: BG James E. Simmons

Traditionally, we associate the month of May with the unofficial onset of summer's fast-paced activities. We also designate in May a time to pause and reflect on the enduring legacy of our armed forces: their service and sacrifice. Appropriately on Memorial Day each year, we remember those great Americans who have died in battle to preserve for us a heritage of individual freedom and opportunity.

The courage, patriotism, and personal sacrifice of our fallen heroes have made it possible for freedom to be preserved. And we have each in the course of our own service to this nation seen evidence that freedom can never be taken for granted, nor is it ever easily preserved.

As we reflect with pride and gratitude on those members of our armed services who have made the supreme sacrifice in preserving our liberty, we are also extremely conscious of today's continued uncertain and dangerous world. Preserving that freedom for future generations of Americans requires that each of us who wear the uniform renew our commitment and personal resolve to ensure that we, too, are always ready to heed our Nation's call.

While there is none who could doubt that we are today the greatest Army ever fielded, we must not forget that our readiness can be easily degraded by needless losses that result from accidents. Accidental losses of personnel and equipment can and do take a tremendous toll on our resources and seriously impact our combat readiness.

I urge each of you to be exceptionally vigilant in managing risks on and off duty as we head into the summer months. Traditionally, the summer season is characterized by a surge in accidents and injuries—especially heat-, traffic-, and water-related injuries. So let's use extra caution and exhibit responsible behavior in all that we do.

Not just on one special day in May, but often, we owe it to our fallen comrades to pause and appreciate their tremendous sacrifices. And we owe it to our families, our units, and our friends to slow down the off-duty activities we may jump into now that the harsh winter months are over. We should carefully identify the hazards and put controls in place that will prevent injuries. The consequences of failing to do so can be tragic.

Our Army needs each of us—America's current and future heroes—healthy and whole to help execute our Nation's mission of preserving freedom for our future generations.

Train hard; be safe!

James E. Simmons

Spotlight:

CH/MH-47 Safety Performance Review

By: Charisse Lyle

Since fiscal year (FY) 1998, there have been 73 CH/MH-47 Class A through C accidents. These accidents cost the Army $118,849,295 and resulted in 10 fatalities and 23 serious injuries. The most dramatic increase is the Class A accident rate. In the previous 4 years, there was only one Class A accident; however, in FY 2002 alone, there were seven Class A accidents. Thus far this FY, the Army has experienced three more Class A accidents (all involving Operation Enduring Freedom (OEF) in Afghanistan). Highlights of the Class A through C accidents follow.

Over-water operations

During this timeframe, there was a catastrophic accident that illustrates the danger of

encountering spatially disorienting illusions when flying over water without a visual horizon reference.

Scenario:
During a night vision goggle (NVG) over-water formation flight at 100 feet above water level and 130 knots indicated airspeed (KIAS) in deteriorating weather conditions, which restricted a visible horizon, the pilot of the trail aircraft rapidly closed on the lead aircraft. The pilot-in-command (PC), who had been heads-down in the cockpit conducting mission management on the multifunction display (MFD), took the controls and executed an abrupt evasive maneuver to avoid contact with the lead aircraft and lost control. The aircraft descended and impacted the water in a 16-degree, nose-down attitude at 157 KIAS. The aircraft was destroyed, and all 10 personnel onboard were fatally injured.

In the scenario above, the pilot (PI), who was originally on the controls, became spatially disoriented and informed the PC of his condition. It is suspected that the PC, who had been heads-down in the cockpit, also became disoriented and lost control when he assumed the controls and executed the evasive maneuver. A combination of factors would have induced disorientation: the lack of visual cues in the over-water environment, the deteriorating weather, and the loss of cues from the lead aircraft's covert lighting.

There were two additional factors that may have contributed to the flight crew's disorientation. The PI's flight controls were coupled to the flight director system in a lateral axis (waypoint coupled), which may have further contributed to his right drift and subsequent spatial disorientation. Also, the PC may not have had immediate reference to his vertical situation display (attitude indicator and radar altimeter display) since he was performing mission management functions on his MFD prior to assuming the aircraft controls.

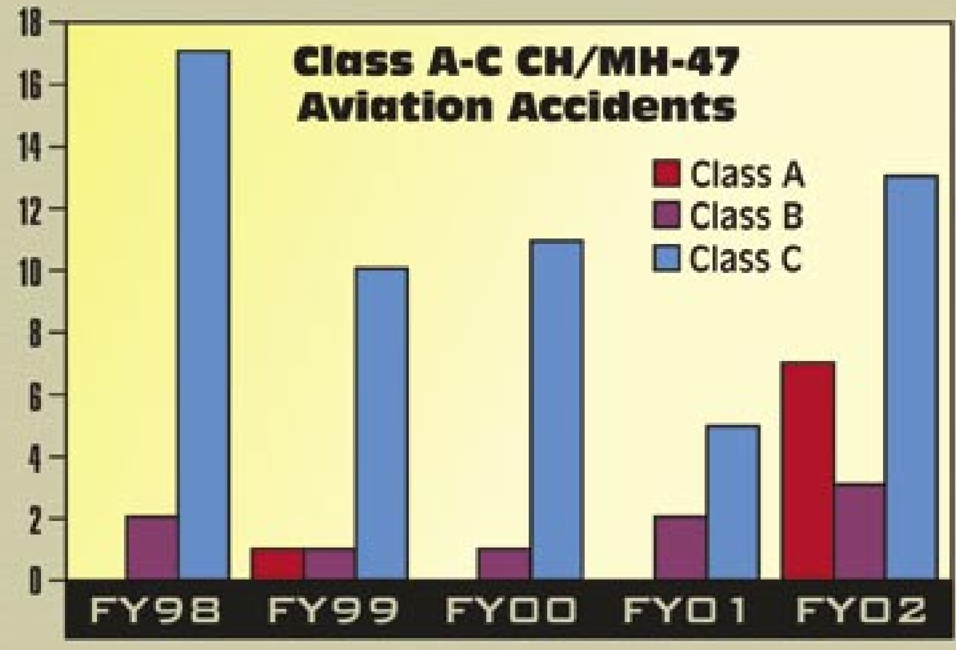
Brownout conditions

There were five accidents involving landing in brownout conditions. All of these occurred in FY 2002, and four of these five (80%) occurred in Afghanistan during OEF. Eighty percent of brownout accidents involved NVG missions.

In one accident, landing gear damage was incurred by a hard landing. In another, spatial disorientation occurred as a result of rotor-induced brownout, and the aircraft drifted right.

In three of these cases, the aircraft landed on an undetected hazard. In one, the landing gear was damaged when the main and aft right landing gear settled into an unseen depression in the desert in brownout conditions.

In another case, the non-rated crewmembers identified hazards at the intended landing



spot and directed the pilots to move forward approximately 50 feet. Near touch down, the anticipated brownout occurred. The aircraft completed a normal limited visibility approach with forward and down movement. During the ground roll, the aircraft's right landing gear struck an unseen obstacle that had been obscured by several inches of dust, causing the right rear landing gear to collapse into the ramp.

In the third case, the left-front landing gear settled into an irrigation ditch (see scenario below). Conditions compounding this hazard were blowing dust, lack of terrain contrast and definition, and full moon illumination that washed out detail. The irrigation ditch was not depicted on any topographical map and, due to the nature of the operation and the tactical situation, a day reconnaissance of the landing zone (LZ) had not been conducted.

The challenging environment in Operations Enduring Freedom and Iraqi Freedom presents many aviation hazards, particularly with respect to brownout conditions. Aircrews can help mitigate the risk by briefing crew responsibilities for a brownout contingency prior to flight. Although not always feasible, this hazard can be mitigated by treating problematic unimproved landing areas to reduce the amount of dust. Combined Land Forces Command has issued guidance on how to deal with extreme dusty conditions in unimproved landing areas. It can be found on the SIPRNET web site at **http://www.swa.arcent.army.smil.mil/sections/c7**.

Scenario: A flight of three CH-47s was executing an NVG multi-ship terrain flight approach into a dirt airstrip. The plan was for Chalk 1 to land at a beacon approximately midfield with a 200 to 300 meter separation between aircraft. The PC of Chalk 3 saw the first two aircraft kicking up heavy dust clouds, backed off, and increased separation to avoid the majority of the dust from the first two aircraft. The PC then identified a clear LZ and proceeded to complete the landing. The aft landing gear first contacted the ground. The PC then lowered the collective to place the front landing gear on the ground, prepared to place the flight controls to neutral and apply the brakes. The right front landing gear settled into an irrigation ditch that was 24 to 27 inches wide and 18 to 24 inches deep. The right-front gear separated from the aircraft at the attachment point and the aircraft settled to the right. The blades on the forward head impacted the ground, the aircraft pivoted approximately 270 degrees, and came to rest on its right side just short of the approach end of the dirt airstrip. The aircraft was destroyed and 16 personnel were injured.

Pinnacle landing

There was a Class A accident during this timeframe that occurred when executing a pinnacle landing.

Scenario: While conducting a day terrain flight approach to land at a pinnacle site, the crew of a CH-47D landed the aircraft on its aft landing gear. The aircraft appeared to stabilize on the gear, but then the ground collapsed. The aft wheels fell down the slope, causing the aft rotor system to contact the ground. As a result, the aft pylon separated from the aircraft and the aircraft entered a series of left yaws, rolls, and pitching moments. The aircraft came to rest nearly upright at the bottom of the pinnacle, facing approximately 180 degrees from its original heading. The aircraft was destroyed in the post-crash fire, and two crewmembers received minor injuries.

Controlled flight into terrain

A problem frequently experienced in Operations Desert Shield and Desert Storm resurfaced in

one accident in Afghanistan—collision with a sand dune. In this Class A accident, the trail aircraft of an NVG multi-ship flight, flying low-level at cruise airspeed, struck a sand dune, causing major aircraft damage and injuring a crewmember. The airborne sand, featureless terrain, and sand dunes prevalent in the area of operations present a hazardous environment for NVG operations.

In December 1990 an Army multi-agency team, sponsored by the Director of Army Safety, was formed to develop controls to mitigate this risk. NVG test flights were conducted in Southwest Asia to determine optimum airspeeds and altitudes for conditions encountered in Operation Desert Shield. The flights were conducted by four highly experienced pilots: two instructor pilots from Fort Rucker and two pilots assigned to Operation Desert Shield aviation units. The results of that effort were used to develop the information contained in the *Aviation NVG Desert Training and Operations Planning Guide*, dated February 1991. This document can be obtained at **http://safety.army.mil**.

Sling load operations

There were 13 accidents involving sling load operations. Over two-thirds of these sling load accidents involved inadvertent release of the external load, and over half of these (9) were attributed to definite or suspected materiel failure. Materiel fixes have since been implemented to correct the failures that caused these accidents. Materiel fixes have also mitigated the risk of crew-induced inadvertent load releases. There were no reported Class A-C accidents after FY 1998 attributed to a flight engineer or crew chief accidentally activating a cargo release switch.

Concerning the remaining four sling load accidents: two involved pilot error (not maintaining a stationary hover during the hook-up); one involved main rotor blade damage of a sling-loaded UH-60 aircraft during an aerial recovery flight; and in the last accident the load tipped, dumping the hook-up team from atop the load.

In-flight part or component detachment

There were six accidents where an external aircraft component or part came loose from the aircraft during flight. One of the six resulted in foreign object damage (FOD) to the aircraft. Over 80 percent (5) of these cases involved a jettisonable cockpit door.

Definite or suspected materiel failure of the copilot jettisonable cockpit door was involved in four of these accidents. Boeing Service Bulletin, #CH-47-02-1009, dated 1 July 1995, addresses the potential for failure of the CH-47D door latch plates and pins and provides specific inspection procedures to identify impending failures. This is currently being addressed by AMCOM.

Human error was suspected in one of the five in-flight cockpit door detachments. It is suspected that the crew chief inadvertently moved the right cockpit jettisonable door release handle with some part of his body or with shop towels when cleaning up approximately 14 quarts of lubricating fluid that had leaked from the forward transmission into the right side cockpit area. During the subsequent flight at 130 KIAS with strong crosswinds, light-to-moderate turbulence and aircraft vibrations, the remainder of the upper locking device actuated sufficiently to cause the door to depart the aircraft.

Aft swashplate bearing failure

There was one Class A accident, which occurred in FY 2002, involving an aft swashplate bearing failure. In this case, the failure occurred during run-up and resulted in the aft rotor blades striking the tunnel cover and control tubes. Safety-of-Flight Message (SOF) CH-47-03-0, published in October 2002, imposes inspection and maintenance requirements to prevent future mishaps. This problem is currently being addressed by Boeing.

Droop stop failures

There were five droop stop failures reported during this timeframe with the most recent occurring in FY 2001. These were caused by improper installation of the droop stops or related components. SOF CH-47-01-02 (dated 14 February 2002) provides specific information on proper installation of the droop stop.

Cooling fan drive shaft failure

There were two accidents (both occurring in 1998) involving the oil cooler fan shaft in the combining transmission area. This is a previously identified problem currently being addressed through SOF message CH-47-00-07, dated 26 September 2000, which imposes flight restrictions, additional preflight inspection procedures, and a recurring inspection every 100 flight hours.

Rotor overspeed

There were three reported rotor overspeed mishaps. Two were caused by an engine or power plant starter drive bearing failure. In both cases, arctic temperatures were cited as contributing to the bearing failure. The other mishap involved failure of the No. 2 engine actuator, electro-mechanical, which induced the power turbine speed (N_2) to suddenly increase, resulting in overspeed of the rotor RPM.

Engine overspeed or overtemp

There were four accidents during this timeframe that involved engine overspeeds or overtemps. One of these involved an N_2 actuator failure that resulted in a high-side failure on the #2 engine during a health indicator test (HIT) check. This was identified as a recurring problem with the T55-L-712 engine, which will be fixed with the fielding of the T55-L-714 engine.

Landing gear collapse

There were three instances of landing gear collapsing due to materiel failure. In one accident, the left swivel housing assembly broke at the pivot point to the landing gear drag link. This was attributed to a lack of lubrication. The ports used to lubricate the housing were not drilled to a depth that allowed grease to reach the intended components. This long-term lack of lubrication caused the sleeve bearings to seize and fail. Inadequate instructions were cited as the root cause for this failure, which has since been corrected.

Rotor wash

There were four accidents involving rotor wash during takeoff or landing, which resulted in damage to equipment or personnel injury. A soldier refueling another aircraft in icy conditions was injured when he was knocked down by the rotor wash of a departing CH-47D. The flight engineer had failed to notify the PC that there was a refueling operation being completed to their rear. In another case, the CH-47D's rotor wash resulted in oscillation of the main rotor blades of a parked UH-60 aircraft. The crew failed to maintain sufficient clearance from the parked aircraft.

Summary

Army Aviation units deploying to Southwest Asia are facing many aviation hazards. Awareness of the hazards associated with past accidents and implementation of risk controls to mitigate these hazards will help prevent future accidents. ■

Editor's note: This review covers FYs 1998 through 2002 (as of 21 March 2003).

—Charisse Lyle, Operations Research and Systems Analysis Division, DSN 558-2091 (334-255-2091), charisse.lyle@safetycenter.army.mil

Army Aviation units deploying to Southwest Asia are facing many aviation hazards. Awareness of the hazards associated with past accidents and implementation of risk controls to mitigate these hazards will help prevent future accidents.

Sustaining Performance in Combat

Is This One Place Where Drugs and Flying Can Sometimes Mix?

By: Dr. John A. Caldwell

The sun was just rising as I sat in my helicopter waiting to take off on my first combat mission. Was I prepared? I felt alert, but I knew I was tired. How long had it been since I had gotten any sleep? How long would this day be? As I waited for clearance, I tried to remember how all this had started.

Two days ago I was TDY looking forward to a night of shipboard operations training. It was approximately 1600 when I finished the preflight inspection. I had only been awake since late morning and was ready for the evening's training. Then things changed drastically; I received a message instructing me to return to my home base immediately.

We took off at 1730 and arrived at home base around 2230 when we discovered the entire unit was busy preparing for immediate deployment.

All preparations were completed around 0030 the next morning. We were told to go home and get some rest and be back at the airfield by 0500. With so much to think about, I barely got an hour of sleep.

Everyone was excited and anxious the next morning as we (and our aircraft) were being flown aboard a fixed-wing to our destination. I tried to sleep, but just couldn't.

After arrival, we received an intelligence and threat briefing and began the mission planning and map preparation. At 2000, we were waiting to depart to the forward staging base on the transport aircraft.

Coordination meetings were conducted during the flight. At midnight, I was finally in my seat. I was tired, but restless. Again came the anxiousness. I knew I needed some sleep, but I just couldn't, so I did my best to relax.

We landed at the forward staging base around 0230 and immediately began unloading and preparing our aircraft. By 0600 we were awaiting takeoff clearance. In the preceding 46 hours, I could remember really sleeping for only 1 hour.

As it turned out, I would not sleep again until approximately 2200 that night, when I collapsed in exhaustion. My first day of combat had added another 16 hours of wakefulness, bringing the total to 62 hours. I couldn't help wondering what I would have done if the mission extended any further before I could get some sleep.

Does this scenario sound familiar to you? If so, you're not alone. If not, it could become very familiar in the near future since the U.S. has once again entered battle. Unfortunately, sleepiness and fatigue are common even during peacetime; but in combat the situation becomes much worse.

Operational demands lead to dangerous levels of sleep deprivation as anyone who has ever been deployed can tell you. The "real world" causes of fatigue and the problems associated with being overly tired are of particular concern for the military, but what can we do about it? Is there a place for stimulants (sometimes referred to as "go pills") in our armament of fatigue countermeasures, or should we rely only on other strategies? Before you decide what you will do when the "crunch" comes, consider the information presented here.

Military sustained operations are a tactical necessity, despite some of the problems they can cause

U.S. superiority on the battlefield, in part, stems from our ability to maintain pressure on the enemy by making them fight around-the-clock. By keeping up a 24-hour-a-day operational tempo, we can virtually guarantee enemy forces will suffer from severe sleepiness leading to procedural errors, sloppy judgment, poor planning, and a general inability to react properly to rapidly changing situations. This, of course, gives us the tactical advantage, but only if we guard against severe sleepiness ourselves.

Severe sleep loss creates serious problems

Although predictions about the exact effects of fatigue are difficult to make, most researchers agree that fatigue-related performance and alertness decrements follow a fairly reliable time course. Studies have found certain mental abilities decline about 30 percent after one sleepless night and 60 percent after two nights without sleep. It is also predicted soldiers lose about 25 percent of their ability to perform useful mental work for every 24 hours without sleep. Clearly, 3 to 4 days of sleeplessness produces virtual debilitation of personnel in the operational environment. This raises serious concerns since FM 22-9 makes clear "Soldiers in continuous operations can expect to be deprived of extended regular sleep, possibly any sleep, for as long as three to five days."

What are the strategies for dealing with operational fatigue?

■ **Natural strategies**. Emphasizing proper work/rest management is certainly the first line of defense against fatigue, and the Army rightfully places a great deal of emphasis on this approach. However, when the intensity of combat reaches a certain point, it can be very difficult to properly control work and sleep periods, and this can lead to a huge problem with on-the-job fatigue.

If a full 8 hours of sleep is impossible but there is some time for limited sleep, naps are a great compromise. Naps should be long enough to provide at least 45 continuous minutes of sleep, although longer naps (2 hours) are better. Just make sure at least 15 to 20 minutes of "wake-up time" are allowed immediately following the nap to overcome post-sleep grogginess that can interfere with performance.

■ **Drug strategies**. At various times in our military history, the Army has relied on go pills (stimulants) to maximize aviator safety and effectiveness while accomplishing difficult missions. Go pills can counter high levels of operational fatigue in intense sustained operations. After every other measure has been tried, stimulants should be considered since their feasibility is not dependent upon creating comfortable sleep quarters in the middle of the desert (or next to an active runway). Also, their effectiveness does not depend on making complex modifications to work schedules in order to ensure everyone works only 8 to 12 hours a day (and gets at least 8 hours of sleep). Caffeine and amphetamines are two possible options.

■ **Caffeine**. Caffeine seems best suited for sustaining alertness in relatively short periods of continuous wakefulness (i.e., 37 hours), but caffeine may not be appropriate for longer sustained operations (i.e., 64 hours or more). Typical users should be aware that the effectiveness of caffeine could be reduced by the chronic consumption of moderate to high amounts of caffeine in drinks, foods, or medicines. Clearly, caffeine is a widely-used and effective stimulant. Every day Americans consume caffeine in all sorts of products, coffee (100 to 175 mg per cup), soft drinks (31 mg), and tea (about 40 mg), as well as in some over-the-counter medications. For instance, just one tablet of Excedrin® Extra Strength contains 65 mg of caffeine. The minimum amount of caffeine recommended to sustain alertness in sleep-deprived people is 200 mg, although higher doses will be necessary for very sleepy people. Currently caffeine (in the form of foods and beverages) is the only stimulant or 'go' substance an aviator can use without restrictions.

■ **Amphetamines**. In the 1940s and 1950s, the military began performing research that showed amphetamines were effective for restoring or maintaining the performance of sleep-deprived people at or near normal levels. These pills can have significant abuse and addiction potential if not used properly, but the military has successfully used amphetamines (under carefully controlled conditions) for years. For instance, the Air Force authorized the use of amphetamines to sustain the performance of sleep-deprived pilots as early as 1961, and dextroamphetamine (Dexedrine®) continues to be authorized under Air Force policy for certain prolonged aviation operations today. In addition, a February 2003 Army Aeromedical Policy Letter has authorized limited use of Dexedrine as a countermeasure for severe aviator fatigue (see **http://usasam.amedd.army.mil/AAMA/policyLetter.htm**).

The effects of dextroamphetamine have been studied extensively in the laboratory and in the field. Walter Reed Army Institute of Research demonstrated a single 20-mg dose could return alertness and cognitive performance to near baseline levels and maintain this recovery for 7 to 12 hours, even after 48 hours of total sleep deprivation.

A Canadian study showed a single 20-mg dose temporarily prevented performance decrements in volunteers kept awake for approximately 34 continuous hours and restored the performance of volunteers deprived of sleep for 48 continuous hours.

Three U.S. Army Aeromedical Research Laboratory (USAARL) studies determined multiple 10-mg doses of dextroamphetamine sustained the performance of helicopter pilots throughout 40 hours without sleep, and a fourth USAARL study showed dextroamphetamine maintained the flight performance of UH-60 pilots even after 58 hours of continuous wakefulness.

What is the bottom line?

Fatigue will be a problem in combat because of the intensity and unpredictability of wartime missions. Obviously, the best way to prevent fatigue on the job is to ensure everyone gets 8 hours of sleep before the mission even starts. If this isn't possible, naps are a good alternative. Remember that solid crew-rest planning is the best way to optimize alertness!

However, combat operations (*not* training in peacetime!) may dictate the use of pharmacologic agents to enhance the performance of aircrews. Safe, effective medications exist, and are aeromedically approved. For more info, contact the Command Surgeon at the U.S. Army Safety Center (334) 255-2763. ■

—Dr. John A. Caldwell, U.S. Air Force Research Laboratory, Brooks City-Base, TX, e-mail: john.caldwell@brooks.af.mil

Investigators' Forum

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

Gremlin Light—Do We or Don't We?

Does a recurring flashing master caution light mean you should plan on landing as soon as possible or just ignore it like you did the time before and hope there's no real problem?

The mission was a fast rope insertion and extraction system (FRIES) training event. While en route to the landing zone (LZ) at 1000 feet mean sea level (MSL), the pilot-in-command (PC)—who was not on the controls—observed the MASTER CAUTION light illuminate. A scan of his multifunctional display (MFD) indicated an AFT SHAFT PRESS LO warning light. That warning required the pilot to execute the "LAND AS SOON AS POSSIBLE" emergency procedure.

Up to this time, the pilot (PI) was on the controls. The PC immediately announced the emergency to the crew and took control of the aircraft. The PC then radioed flight lead to advise him of the situation and that they were initiating a precautionary landing. The PC broke formation and decided to land in a farmer's field. The aircraft made one final turn to extend final as the aircrew prepared to land.

Meanwhile the PI, at the request of the PC, was checking the MFD POWER TRAIN page to verify the emergency. According to the MFD, all systems were normal! At the same time, the flight engineer announced that there were no abnormal indications on the maintenance panel other than the AFT SHAFT PRESS LO warning light.

After turning onto final, the PC announced that he was going to extend his approach beyond the farmer's field to a more suitable location. At approximately 150 feet AGL, the crewmember in the right cabin door announced "Wires, wires, wires!" At the same time, both pilots and the left gunner saw the wires.

The PC immediately reduced the thrust in an attempt to fly under the high-tension power lines. As the aircraft flew beneath the wires, the bottom strand caught the aft rotor. The PC continued his approach, landed, and completed an emergency engine shutdown, also engaging the rotor brake.

Due to the nature of the emergency, the aircrew did not conduct an LZ recon prior to initiating their final approach. Given these conditions and the common knowledge that wires are difficult to see, none of the crewmembers saw the wires until the aircraft was about to strike them. The result was an accident that cost more than $60,000.

So why did this accident happen? Was it a human, materiel, or environmental error? Was the crew driven by the fear factor to get the aircraft on the ground? Was it a failure to maintain airspace surveillance, or was it a gremlin that caused the aircrew to inaccurately diagnose the problem and react to a nonexistent emergency?

Let me emphasize that this article is not an attempt to find fault with the aircrew. My intent is to demonstrate

how a misdiagnosed problem has the potential to produce catastrophic results. Unfortunately, misdiagnosing emergencies is a recurring problem.

We have all heard stories about crews misdiagnosing illuminated firelights as real fires and causing a panicked descent from altitude. We have also heard about crews shutting off the wrong engine, power lever, or fuel control when it was the other engine that should have been shut off. These are not rare events. In fact, the 1997 "Wrong Engine" study was prompted by a UH-60 accident that involved misdiagnosis. The study pointed out that misdiagnosis was one of the highest problem areas for pilots.

The study also asked pilots what caused them to move the wrong lever. Nearly half of these aviators (111 of 224) indicated they acted as the result of a misdiagnosis of an aircraft condition.

Lessons learned

The pilots' primary concern is flying the aircraft. When on the controls, a pilot must continually scan around the aircraft, particularly during emergencies. Improper scanning and inadequate crew coordination plays a major role in many wire-strike accidents. Crewmembers must provide the pilot on the controls with accurate information on the aircraft's condition and help spot any dangerous obstacles.

Understanding emergency procedures means knowing what happens to the aircraft with every action you take and accurately diagnosing emergencies based on the indications from the aircraft's systems. In this incident, two of three systems did not indicate abnormal readings, so was there ever a real emergency? If confronted with a similar in-flight emergency situation, what would you do? ■

Editor's note: This accident is currently under investigation.

—For more information about this accident, contact MAJ Ron Jackson, Aviation Systems and Accident Investigation Division, U.S. Army Safety Center, DSN 558-3754 (334-255-3754), ronald.jackson@safetycenter.army.mil

Integrating A Fall Protection Strategy

By: Frank McClanahan

She looked up at the clock and noticed that it was already 5:30 p.m. She thought to herself as she took the dinner rolls out of the oven that Bill must be running late. Suddenly she heard the phone ring. She reached over and grabbed the cordless unit to answer it. On the other end of the receiver, she heard her husband's supervisor. "Mary? This is Tom. Bill slipped and fell from the top of a Chinook helicopter. He's in the Medical Center now with a broken left leg and arm."

This is not the kind of phone call a supervisor wants to make, nor is it the kind of call a loved one wants to receive. But unfortunately, because falls are one of the most common workplace accidents, phone calls such as the one described above have become more commonplace. According to the Bureau of Labor Statistics, falls are the second-leading cause of workplace deaths and the third most common cause of work-related injuries throughout the nation. In fact, recent statistics indicate that 808 workers died in 2001 as a result of workplace falls. This is a 10% increase over 2000 levels.

Army ground accident experience over a 6-year period, fiscal years (FYs) 1997 through 2002 reveals that the categories of human movement; maintenance, repair, and servicing; and materials and passenger handling have yielded the largest number of fall-related accidents. Army Aviation accident experience, FYs 1993 through 2002 indicates 27 recordable accidents involving falls from helicopters (see tables below).

Leadership within the Army is fully aware of how injuries to soldiers, civilians, and government contractors can have a significant impact on resources and mission capability. They are also aware that many of our day-to-day tasks closely mirror those within the civilian sector. Because the nation has identified fall-related workplace accidents as such a significant problem, Army leaders have directed that hazards associated with falls be identified and assessed, and that controls be developed and implemented to prevent fall-related accidents.

FALL-RELATED GROUND ACCIDENTS FY97-FY02
Human Movement: 142
Maintenance, Repairs, and Servicing: 108
Materials and Passenger Handling: 56

FALL-RELATED AVIATION ACCIDENTS, FY93-FY02
AH-64 Apache: 8
CH-47 Chinook: 7
UH-60 Black Hawk: 6
UH-1 Iroquois: 3
OH-58 Kiowa: 2
AH-1 Cobra: 1

OSHA has levied citations against government contractors performing aviation maintenance at some Army installations for violation of the 1910.23 (c) (1) standard, which states: **"Every open-sided floor or platform 4 feet or more above adjacent floor or ground level shall be guarded by a standard railing (or the equivalent as specified**

in paragraph (e)(3) of this section) on all open sides except where there is entrance to a ramp, stairway, or fixed ladder." Other Army facilities have also been cited for violation of the 1910.23 standard, as well as 1910.26, *Portable Metal Ladders*, 1910.27, *Fixed Ladders*, 1910.29, *Manually Propelled Mobile Ladder Stands and Scaffolds (Towers)*, and 1910.67, *Vehicle-mounted Elevating and Rotating Work Platforms*.

Commanders must develop a plan of attack to deal with fall hazards that exist within workplaces under their purview. Step one is to conduct thorough job hazard analyses of workplace operations in order to identify where potential fall hazards exist. Step two is to increase the awareness of personnel who work in the identified areas. Step three is to develop a strategy to eliminate or control the hazards. The following recommended control measures, in order of importance, should be considered as a possible strategy for dealing with identified workplace fall hazards:

(1) Elimination. Remove identified hazards or hazardous work practices (e.g., lower devices or instruments such as meters or valves to the worker's level) whenever possible. This is the most effective control.

(2) Substitution. Substitute or replace the hazards or hazardous work practices with those that are less hazardous (e.g., prefabricate structures on the ground in lieu of erecting the components at heights in excess of the applicable standard).

(3) Isolation. Isolate or separate the hazards or hazardous work practices from personnel (e.g., installation of a guardrail at an opening or leading edge).

(4) Engineering controls. When hazards cannot be eliminated, substituted, or isolated, use engineering controls to control the risk (e.g., pre-drilled holes for attachment of fall arrest systems to attach anchorage connections).

(5) Administrative controls. This includes measures or practices designed to reduce the risk of personnel falling (e.g., post warning signs or restrict certain areas).

(6) Personal protective equipment (PPE). Consider PPE only when other control measures are not practical, or as a means to provide a secondary level of fall protection.

No one is in a better position to prevent accidental falls in the workplace than commanders. Simply use the information provided above to integrate the requirements of OSHA fall protection standards contained in parts 1910, *General Industry*, and 1926, *Construction*, into existing safety programs. ■

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[References: *Fall Protection Training* by Valerie Overheul, www.ishn.com, and *September 11 Attacks Skew Statistics on Workplace Fatalities*, www.snipsmag.com.]

To Bury a Son

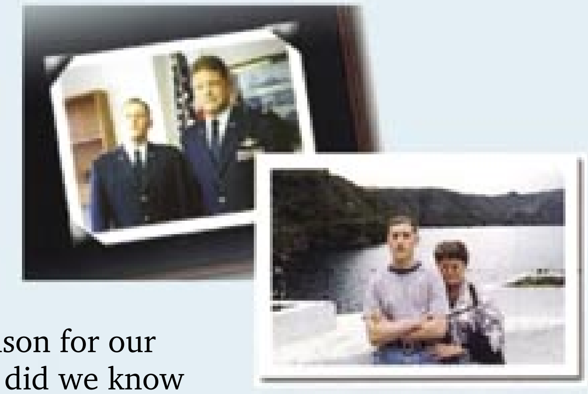
Alex, the only son of Lt. Col. Ron and Dina Hatfield, liked to hunt, hike, and collect coins. But mostly, he loved to fly. That's his father's fault. His dad is an Air Force pilot, so flying was in Alex's blood. He lived to fly. Ironically, that's also how he died.

By: Lt. Col. Ronald L. Hatfield

*<**REWIND**><**STOP**><**PLAY**> The color blue. Two men in military dress. Seven in the morning. I'm on vacation... hotel room. Doesn't make sense. Blink hard, shake the sleep away. Check again. Peephole fish-eye view. The color blue... two men in military dress outside the door. Not a dream. Icy flush, blood turns cold. Can't breathe, weak knees, shaking. Not a dream. Can't find my pants. Wait, mistake... can't be! Not a dream. Dina, get up. Check again. The color blue. Open door, chaplain's cross, solemn voice. "Are you the parents?" "Yes we are!" "On behalf of the Secretary of the Air Force, I regret to inform you" ... not a dream... "died from injuries"... muted scream... "sustained during an aircraft training accident near Silver Hills, AL." Dina's muted mantra echoes mournful... "Ron, what does it mean, what does it mean?" Pacing ... heart racing, lost. "What does it mean?" Wife's ashen face, cradled in my hands. Mother's eyes, fearful, tearful, bleeding, pleading... "What does it mean?" What to say, no soft words... "Dina, Alex is dead." Not a dream.*

*<**PAUSE**>*

Sept. 28, 2000, Beau Rivage Hotel, Biloxi, Miss. This is how my wife Dina and I started our day. Our only son, Alex, was dead only four months into his Air Force career. A 22-year-old second lieutenant in the initial stages of strike/fighter navigator training at Naval Air Station, Pensacola, Fla., we had just spent three wonderful days with him. A visit to see him was the reason for our vacation. Little did we know when we said good-bye 2 days earlier that it would be the last time we would see him.



Alex was really into computers, and we really enjoyed computer war-gaming together. He also liked to collect coins, hunt, shoot (marksmanship), and hike. He was fearless when it came to doing new things.

But most of all, Alex loved flying ... my fault. I started my Air Force flying career in 1978 and continue it today as a T-1A Jayhawk pilot. Alex and I passed countless hours swapping stories and sharing dreams. My fondest memory of Alex is when I commissioned him as a second lieutenant in May 2000. Joining the Air Force to begin his flying career was such a desire of his, and to see that goal realized and to be the one to make it official was awesome.

Alex was almost done with the familiarization phase of his program, the hands-on flying phase, a mini-pilot training, if you will. He had his checkride and a night flight left before he moved to the back seat of the T-34C for navigator qualification. He never made it to the night flight.

Alex and his instructor doubtless had no clue of the events about to unfold. I imagine they stepped to the jet full of anticipation and jazzed about the chance to turn jet fuel into noise. Alex was effervescent when it came to flying.

I didn't know his instructor pilot (IP), but Alex had flown with him before and liked him immensely. He was, by all accounts, a fast burner. A seasoned pro with 1,300 hours in the P-3 and nearly 600 hours in the T-34C, he was the latest IP of the quarter for the squadron.

The course rules for Alex's checkride called for pattern work followed by aerobatics and area work. The pattern work and aerobatics appear to have gone well. Then came the spin. No one knows for sure, but it would have been next in the profile, and the radar tapes have a classic spin signature.

From spin entry to ground impact was just under a minute. With no ejection seat, the minimum altitude for bailout in the T-34C is 5,000 feet above ground level. That gave Alex and his instructor 25 seconds from entry to the decision to get out. With no cockpit voice recorder, no one knows why the spin recovery attempts were unsuccessful. Post-crash investigation showed the aircraft systems to be working normally at ground impact.

The decision to jump was delayed too long. The instructor pilot bailed out 1.2 seconds from impact, and Alex followed .5 seconds later. The arming lanyard for his parachute never reached its full 6-foot extension. He died from blunt force trauma associated with ground impact.

Alex had 13 hours in the T-34C, counting his last flight. I have 5,400 flying hours and not a scratch—not even a serious in-flight emergency worth mentioning.

As a father and an IP, the accident raises a lot of questions for me. Dina and I will never know in this lifetime what really happened on that airplane that day. The one thing I do know is no one planned it that way.

Students sometimes brief me that we don't need to check local notices to airmen because we aren't planning a full stop. Wrong answer! Stuff happens; things change. The Army has a great saying: "No plan ever survives first contact with the enemy." We have, in our business, a lot of enemies: the weather, complex systems that pick the absolute worst time to get cantankerous, birds with an AMRAAM missile wanna-be complex, busy airfields, you name it.

For me, my worst enemy watches me shave every morning. I'm absolutely terrified of my own weaknesses and work hard to eliminate them on a daily basis. As a brand new lieutenant, I read a lot of aviation books. One of them had a quote that has colored my approach to flying for 25 years: "I am not afraid of the known ... it is the unknown that scares me, for in the end, it is the unknown that will kill me," which is why I strive to know everything there is to know about my airplane. For those of you who have flown with me, you know I live by this creed.

I can never be over-prepared or know enough. If you don't have the answer to "what if" before it happens, when it does you'll almost certainly find yourself behind the power curve. For me, I'm a creature of habit. If I do it right every day, no matter how trivial or routine the mission, I should be ready when things go south. You will play to the level you practice, and every mission should be practice for the day you have to play for real. Teach your students the same lesson.

Perfection is not possible, but that doesn't mean it isn't a worthy goal. Have your "A-game" on every day; I beg you. You never know when you will need it.

*<**FAST FORWARD**><**STOP**><**PLAY**> Honor guard, unfurled flag. Snap, fold. Snap, fold. Blue triangle, white stars. Slow salute, white gloves. "On behalf of a grateful nation"... ready, aim, fire!... 21 reports break the silence. Haunting wail of taps... not a dream. Left to right, four jets fly by. Only three remain. One climbs, lifting higher. Bright sun, autumn sky... the color blue. <**STOP**>* ■

—Lt. Col. Ronald L. Hatfield is the 32nd Flying Training Squadron Assistant Director of Operations at Vance Air Force Base, Okla., where he flies the T-1A Jayhawk. In addition to Alex, the Hatfields also have three daughters.

This article is reprinted with permission from *TORCH* Magazine, March 2003.

NEWS & notes

Update on the New Boot

Since the December 2002 and February 2003 issues of *Flightfax* when we told you that the CG, U.S. Army Aviation Center, waived the "All Leather Boot" regulation in AR 95-1 allowing the wear of the Air Force's Desert Flyer's Boot and the Army's new Combat Infantry Boot, the phone calls and e-mails have been pouring in. The following updated information is provided:

As a reminder, the December 2002 article explained the sand-colored, Air Force-designated Desert Flyer's Boot (Belleville 790) was approved for wear by Army Aviation personnel. The February 2003 article explained the all-black Combat Infantry Boot (Belleville 700) was also approved for wear by Army Aviation personnel. The good news is both boots met the same rigorous testing and both are deemed safe for flight. The bad news is neither boot is immediately available for units to order.

"So when can I order the Combat Infantry Boot for my unit?"

All of the production effort for the Combat Infantry Boot is going to initial issue stock. The earliest this boot may be available through GSA, Clothing Sales, or through the Defense Supply Center Philadelphia (DSCP) is late this summer or early next fall. National Stock Numbers (NSNs) have not been published for the Combat Infantry Boot as of this writing.

"What about the Desert Flyers?"

The Desert Flyer's Boot is already in the supply system, but unfortunately it is on indefinite backorder. All of the production effort for this boot is going to deployed personnel and deploying units. It is unknown when this boot will be available for normal requisition. NSNs may be found at the following DSCP web site: **http://ct.dscp.dla.mil/catalog/pgcs/02702.html.**

"Hey, I heard these are GREAT boots and I really want a pair. Do I have any other options?"

Both boots have been manufactured by the Belleville Shoe Company for several years. Retailers who sell Belleville products may have these boots on their shelves. More information may be found at the Belleville Shoe Company web site: **http://www.bellevilleshoe.com/**. ■

—POCs: COL Ellis W. Golson, Director of Combat Developments (DCD), Ft. Rucker, AL, DSN 558-3203 (334-255-3203), GolsonE@rucker.army.mil; and MAJ Tom Fugate, Aircrew Systems Branch Chief, DCD, DSN 558-3816 (334-255-3816), thomas.fugate@rucker.army.mil

Oops

In the March 2003 *Flightfax* article, "2002 AAAA Winners!" we incorrectly reported the Overall Winner and Combat Category Winner on page 18. The correct winner is 3rd Battalion, 101st Aviation Regiment, Fort Campbell, KY (not 2nd Bn as previously mentioned). We regret this error and congratulate the 3rd Battalion on a job well done. ■

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

AH-64

A Model

■ **Class B**: Aircraft drifted while at a hover and struck a tree(s). The aircraft began to vibrate excessively. The crew landed immediately and conducted emergency shutdown procedures. The four main rotor and tail rotor blades were destroyed in the accident.

■ **Class C**: Aircraft was at 400 feet above ground level (AGL) and traveling at 100 knots when the crew encountered a flock of birds, resulting in multiple strikes. After landing, the crew discovered a dent on the #1 engine de-icing cowling, dents on the tail rotor blade, and damage to a main rotor blade tip cap.

D Model

■ **Class E**: The #2 engine of an AH-64D incurred an overspeed condition (N_p: >119%) during contractor maintenance test pilot training. The engine subsequently failed and was followed by a main rotor system overspeed (N_r: 120%).

MH-47

E Model

■ **Class C**: The aft transmission vertical shaft OIL PRESSURE LOW caution light illuminated in flight. The crew landed as soon as possible to a nearby onion field. During the approach, the aircraft fuselage and aft rotor system contacted a wire just prior to touchdown. The crew landed and shut down the aircraft without further incident. Damage to the aft transmission and two aft rotor blades was discovered during post-flight inspection.

OH-58

D Model

■ **Class C**: Aircraft rotor blades contacted trees while at an out-of-ground effect (OGE) hover during Hellfire gunnery training. The crew landed the aircraft without further incident.

DR Model

■ **Class C**: Aircraft experienced a Full Authority Digital Electronic Control (FADEC) failure warning with audio while at a 3-foot hover from refuel to parking. The engine oversped to 124 percent N_p for 6 seconds during throttle reduction and activation of the FADEC AUTO/MAN switch. The aircraft was shut down without further incident.

■ **Class C**: Aircraft engine and rotor system oversped (146 percent for 1 second and 135 percent for 2 seconds, respectively) during touchdown from hovering autorotation.

■ **Class C**: Aircraft incurred engine and suspected rotor system overspeed conditions (125 percent for 4 seconds and 124 percent, respectively) while in manual throttle operation.

UH-60

A Model

■ **Class B**: Aircraft made contact with a metal light pole while ground taxiing with a ground guide. The four main rotor blades and three tail rotor blades were damaged in the accident, which also caused foreign object damage (FOD) to a hangar and a civilian aircraft inside the hangar.

■ **Class C**: During dual engine start, the aircraft auxiliary power unit (APU) failed. The instructor pilot (IP) advanced the #1 engine power control lever. When the generators came online, the #2 engine turbine gas temperature (TGT) was 980 °C and peaked to 1008 °C. The IP performed emergency engine shutdown procedures.

L Model

■ **Class A**: Aircraft crashed during a nap-of-the-earth orientation flight with nine passengers and four crew onboard. The aircraft was discovered during search and rescue efforts after having been reported overdue. The aircraft was totally destroyed; 11 of the 13 personnel onboard sustained fatal injuries and the other 2 suffered serious injuries.

WHEN FLYING IN THE FACE OF RISK

- Bird Strike
- Wire Strike
- Tree Strike
- Thunderstorms
- Lightning
- Dust or Snow
- FOD

Use Risk Management