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# FLIGHTfax

Army Aviation Composite Risk Management Information


## "The Cockpit as a Battle Space"

FLIGHTfax
Army Aviation Composite Risk Management Information

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Commanding

# The Cockpit

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**Have you considered the origin of the term cockpit? There is no universal agreement as to why the term was chosen to designate the pilot station of an aircraft. It is generally agreed, however, the term comes from the nautical realm, as do many other aviation-related words.**

The original use of this term was a pit—or arena—for the sport of cockfighting. This use of the term first appears around the year 1587. In 1599, Shakespeare used it in the play *Henry V* to refer to the theater, specifically the area around the stage. The theatrical reference was Shakespeare's alone, making use of the idea of a cockfight as a performance.

The nautical sense of the term arose about 1700. It was not an open area, but rather a compartment below deck on a ship used as the sleeping quarters for junior officers. In battle, the cockpit would also serve as the ship's hospital. This term may have been chosen because junior officers strutted like roosters in front of sailors or because the area's physical resemblance to the space where roosters were kept and battled. The nautical use of the term moved to aviation about 1914, near the beginning of the age of flight.

For a long time in the 1990s, the U.S. Armed Forces Radio and Television Service ran a public service advertisement on the Armed Forces TV Network claiming the use of the term cockpit was adopted by aviators from cockfighting because both spaces were small, enclosed areas of intense activity. If this is true, then that concept of the cockpit has never been more valid than it is today.

Today's cockpits, replete with glass

# as a Battle Space

cockpit technology, battle command network technologies, aircraft survivability equipment, and digital communications, represent as busy and intense an area of battle space as exists anywhere on the modern battlefield. One attack aviator recently related to me that he used to be a pilot who operated a weapons system, but now he has become a weapons system operator who also happens to fly. Cockpit demands on individual aviators are more numerous than ever before.

The cockpit as a **battle space** is composed of a few distinct components, and these components must be synchronized and must complement one another in order for the aircraft to function properly. These components include the aviator, cockpit space (seating, lighting, etc.), flight controls, and electro-mechanical devices that the aviator uses to navigate, use the weapons systems, and communicate with other aircraft or ground stations. The best use of the aircraft as a system results from the very best integration of these cockpit components.

This issue of *Flightfax* is dedicated to discussing a few issues regarding the cockpit as a battle space. Commanders, instructors, and other aviation leaders should take some time to read through this issue and consider whether their training, maintenance, and safety programs are properly designed to take full advantage of the aircraft as a weapons system by integrating crews and cockpit components. As Army Aviators, the cockpit is a vital part of our battle space; the mastery of it will determine the outcome of the mission. ♦

**–The author may be contacted at DSN 558-3003 (334-255-3003) or by e-mail at richard.koucheravy@us.army.mil.**

# Investigator's Forum

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

# SIZE MATTERS!

**The Army has standards for just about everything. In most cases, the standard describes a minimum level of performance or criterion required to accomplish a task or meet a requirement. Sometimes a standard exists for one purpose, yet it serves as a measuring stick for many different functions. Such is the case with the Army height/weight and body fat standard. As long as a Soldier meets the Army Physical Fitness Test and screening table or body fat measures, it is assumed they are capable of serving in just about any capacity in the Army. This article describes a circumstance in which that one standard wasn't good enough to prevent the loss of a Soldier and the destruction of an AH-64D.**

The accident aircrew was supporting readiness level progression by serving as the team aircraft for tactical multi-ship and formation flight training. Everything went well with planning and preparation for the flight. This was to be a day mission with good weather in a familiar training area.

About an hour before sunset, the two aircraft joined at their home airfield and departed for the training area. The team arrived at the first landing zone (LZ) and conducted two formation flight traffic patterns. Another aircraft called inbound, so the team decided to move a few kilometers north to another LZ to practice close combat attacks (CCAs).

Upon arrival at the new LZ, the accident aircraft was flying as wingman while the team conducted multiple CCAs. After quite a few iterations of racetrack and cloverleaf CCAs, the instructor pilot (IP) in the other aircraft announced he would extend the next outbound leg to allow for a lead change. He wanted his front-seat pilot to fly as wingman for a few iterations.

The pilot in command (PC) in the accident aircraft agreed to the lead change and the crews began flying northwest. Four-and-a-half kilometers northwest of the LZ, the team descended into a valley. They continued along the valley at approximately 100 feet AGL and 120 knots with the accident aircrew now in the lead. The accident PC announced he was taking fire from his left and was breaking right in reaction to a simulated threat. Shortly afterward, he announced he was going to turn left up the draw leading back to the LZ. Watching lead enter the turn, the wing aircraft front-seat pilot saw the accident aircraft fly directly into the side of a spur just below its crest. The Apache was destroyed, and the front-seat aviator died on impact. The PC in the backseat had only minor bruising to his ribs and around his eye from the helmet display unit contact.

Everyone speculates on what may have caused an accident, and in this case, the first rumors were it was related to aggressive maneuvering at low altitude. Review of the maintenance data recorder download, interviews with the wingman crew, and the surviving PC indicated something completely different. For the 30 minutes leading up to the crash, both crews were performing realistic training as briefed, and there were no overly aggressive maneuvers. So what happened?

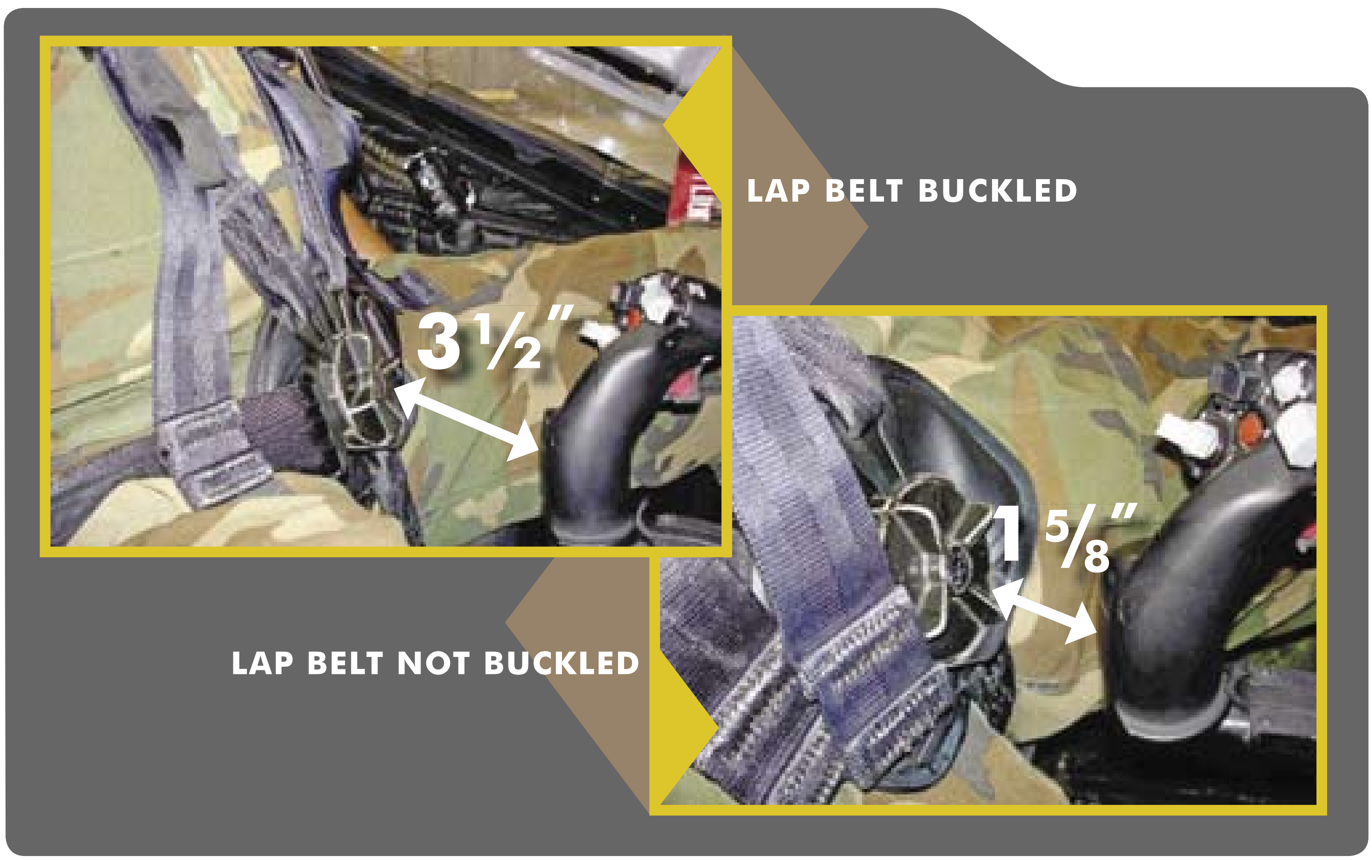
The front-seat pilot in the accident aircraft was a very large man who was more than 6 feet in height and weighed more than 270 pounds. Although he could fasten all the belts on the seat restraint, fastening the lap belt was extremely uncomfortable for him, so he often didn't do it. On this flight, the front-seat pilot's lap belt restraints were not fastened, which allowed him to slide forward and down in his seat. The board determined the pilot's position just prior to the accident allowed the PC on the controls the use of only 46 percent of available aft cyclic travel. Once he had initiated the turn, the backseat PC attempted to apply aft cyclic to steepen the turn and climb to clear the hill to the left. When he realized the aircraft was not

responding with what he thought was full aft cyclic, the PC attempted to level the aircraft and conduct a cyclic climb.  Once again, however, he could not complete the maneuver due to the front-seat pilot's forward position blocking the cyclic.

The accident investigation board determined the front-seat pilot was approximately the same size and build when he attended flight school the prior year.  The IPs at Fort Rucker, AL, were aware they had to take special precautions when flying with this aviator and remind him on numerous occasions to sit back in his seat and use his lap belts.  Even though the IPs noticed a problem with occasional cyclic interference, no one had the aviator evaluated for being too large for the front seat of the AH-64.  At the time, there were no screening measurements for an aviator scheduled for an AH-64 transition, and it was incumbent on the student's IP to determine if a special evaluation was warranted, when clearly there was a flight safety issue.

During the short time he was assigned to his first unit, this aviator had a flight canceled and received counseling by his unit IP for not wearing the lap belts just before engine start.  He also confided in peers in the unit that he routinely did not wear his lap belts and frequently had to lift his legs out of the way during control checks or when a pilot announced performing certain maneuvers.  It was evident he purposely concealed his discomfort when buckling the lap belts to keep from being eliminated as an aviator.  The PC he flew with on the day of the accident was unaware of the possible flight control issues caused by the front-seat pilot not wearing his lap belts or that other pilots had experienced flight control interference due to this aviator's size.

It would be easy to say this accident was a result of indiscipline on the part of the front-seat aviator.  He knew the standard to wear all portions of the seat restraint in flight but chose not to comply.  Unfortunately, it's not that simple.  This aviator wanted to continue flying AH-64s and also pursue his pastime of power lifting.  He never thought by not buckling his lap belt it would end up costing him his life.




It would also be easy to say the chain of command failed to take appropriate action. That's not so simple either. This aviator was new to the unit and was going to be an integral part of the team on its upcoming deployment to a combat theater. The unit needed combat crewmembers; pulling him from the cockpit would have affected their ability to accomplish the mission. The immediate leaders used a graduated response of warnings and verbal counseling to ensure he wore his lap belts. Had there been time to identify their initial efforts were ineffective, the board was certain they would have taken more serious actions.

More appropriately, it would be better to classify this tragedy as a support failure. A Soldier who was outside the norm, in the 99th-plus percentile for size, fell through the cracks and was allowed to continue in the system. The AH-64 seat was designed for the 95th-percentile male with limits at approximately 220 pounds. Add another 30 pounds for aviation life support equipment and you have the total seat design weight of 250 pounds, according to the manufacturer.

The U.S. Army Aeromedical School of Aviation Medicine, along with experts from the 110th Aviation Brigade at Fort Rucker, are evaluating the current anthropometric requirements for the AH-64 and will develop appropriate screening criteria or thresholds to help prevent a similar circumstance in the future. In the meantime, aviators in the field must be aware of how something as simple as not buckling a lap belt not only puts the individual at risk. In this case, it caused an aircraft to crash and an aviator to lose his life. Leaders should think twice when something doesn't look right to determine if they've really done all they could. Take a hard look to see what the worst possible outcome is of allowing a seemingly small deviation from a standard to continue. ♦

**–Comments regarding this accident may be directed to USACRC Operations at DSN 558-3410 (334-255-3410) or e-mail operationssupport@crc.army.mil.**

# Anthropometry

**Because of demographic changes in the population of Army pilots, changes in aviation life support equipment (ALSE), and changes in pilot requirements over the last several years, the distributions of anthropometric dimensions among pilots have changed. The last anthropometrics survey of Army Aviators was conducted in 1988—18 years ago.**

Because females are relatively recent additions to the pilot population, most existing Army Aviation clothing, individual equipment, and rotary-wing cockpits were designed based on male anthropometric data. Increasing representation of women in the aviation population has introduced a greater variation in body types to be accommodated in clothing and cockpits.

The cockpits of most aircraft are developed using measurements based on a normal distribution curve of the population sampled. On several aircraft, the seating is either not adjustable or has limited adjustability, therefore making the distribution curve even narrower. As new anthropometric standards are developed for newer aircraft, modifications to existing standards should be developed.

Anthropometry does not only apply to ergonomics or comfort when in a cockpit; it has a direct effect on the safety of today's aviator. Within the past year, there was one Class A accident (see "Size Matters" on page 4 of this issue) in which a fatality is directly related to an excessive abdominal point which resulted in a loss of full aft cyclic.

**Anthropometric standards**

There are some concerns with the enforcement of anthropometric standards in today's force. These concerns are based upon ICD9 M700, revised September 2004:

• Individuals with a short sitting height may not be able to see over the instrument panel.

• Individuals with a short leg length may be unable to apply the full range to the foot pedals with sufficient force.

• Individuals with a short arm length may be unable to reach crucial instruments or circuit breakers.

• Individuals with too long a sitting height often sit in hunched positions or must tilt their head forward to avoid the cabin ceiling; this reduces their range of vision, increases fatigue during long missions, and puts them at greater risk of significant spinal injury during heavy G-loading (e.g., ejection or crash).

• Individuals with an excessive leg length, normally present in those with an excessive sitting height, may interfere with full range of motion of the foot pedals and increase discomfort.

**Today's standards**

• **Total arm reach (TAR) less than 164 cm.** Individuals are evaluated in the pilot's station, as well as the copilot's station, to determine if they can safely reach all switches and flight controls and operate controls through full motion. Emphasis is placed on determining if the individual can reach those switches and circuit breakers which are necessary for safe flight. This evaluation must be completed in all go-to-war, rotary-wing aircraft (UH-60, CH-47, AH-64D, and OH-58D).

• **Total leg length (crotch height) of less than 75 cm** (as evaluated above).

• **Sitting height in excess of 95 cm.** Individuals are evaluated in the pilot's position of the OH-58A/C to determine if they can safely sit in the aircraft and reach the flight controls while in a normal sitting position.

**ABDOMINAL POINT, ANTERIOR:**
**The most protruding point of the relaxed abdomen of a seated subject.**

Individuals are checked for helmet contact on the overhead greenhouse and to make sure their shins are not hitting the instrument panel with full pedal movement.

**Waivers**

Anthropometric waivers are available for aviators. Exception to policy for initial flight applicants may be considered if a full cockpit evaluation has been conducted by the Directorate of Evaluation and Standardization. Class 2 waivers for failure of anthropometric standards for rated personnel are usually recommended, provided they have demonstrated full adaptation to the designated aircraft. Cockpit evaluations are best performed in accordance with Fort Rucker-established guidelines. A flight surgeon may do the initial evaluation with a unit pilot or standardization instructor pilot if the TAR is equal to or greater than 159 cm. If the TAR is less than 159 cm, the only accepted in-cockpit evaluation will be completed at Fort Rucker. All evaluations will be conducted with an ALSE vest and helmet.

Other miscellaneous waivers are also available in accordance with ICD9 2780 for overweight aviators. Occasionally, the flight surgeon will encounter an individual whose weight exceeds the design limits of the aircraft (i.e., exceeds seatbelt or shoulder harness designs or exceeds seat crash protection limits). Those aircrew members who exceed allowable body fat percent standard, excluding DAC/contract pilots, will be administratively suspended from flight duties. Those individuals who weigh over 250 pounds, or are otherwise determined to exceed safety limits of the aircraft, will be recommended for termination from flight duties. Individuals who are overweight become a flight safety issue when body shape affects manipulation of aircraft controls, safe aircraft egress, or wear of safety (ALSE) equipment.

**IHADSS concerns**

When the Integrated Helmet and Display Sight System (IHADSS) helmet was built to specifications, the Army test pilots found it to be too tight and unacceptable. A quick survey (Sippo, Licina, and Noehl, 1988) of 500 Army attack helicopter aviators revealed head sizes exceeding existing design specifications. This data, coupled with continuing fielding fit problems, led to a follow-on $1.6-million effort in the design and fielding of an extra-large IHADSS helmet size. Subsequent helmet designs, such as the HGU-56/P, have taken into consideration and accommodated the small evolving female aviator population of the Army, as well as the large male population.

**Conclusions**

The Army should conduct a new anthropometric study using Army Aviators who are currently serving in the Regular Army, Reserve, and National Guard. The data being used today is outdated; measurements are only taken of crotch height, TAR, and sitting height. Furthermore, this data is taken only upon entry into flight school.

Measurements *should* be taken annually during a flight physical to ensure aviators are fit to fly their assigned aircraft. A weight and abdominal point standard also needs to be established. Abdominal point, anterior measurement, is a critical factor in the OH-58 and the AH-64 because of the limited distance between the cyclic and the abdomen. This distance is further limited by the Air Warrior vest and body armor. Additionally, the fit and sizing of IHADSS helmets needs to be reviewed.

One Army Aviator had an accident because he didn't have full cyclic travel due to his body size. To protect our combat power, a new standard must be established to ensure the proper design and manufacture of cockpits, ALSE, and crashworthy seats for the aircrew of tomorrow's fighting force. Doing so will help keep aviators safe and will allow them to "Own the Edge!" ♦

**–The author may be contacted via e-mail at donald.perry.wilds@us.army.mil.**

# Keyboard Selection: A Ha

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# Worklo

**The Army is currently using and designing helicopters that have enhanced digital capabilities, allowing the crew to access more battlefield information than ever before. However, this huge leap in available information and enhanced situational awareness can mean a greater burden of responsibility and potentially higher mental workload for the aircrew. In future aircraft, managing and sending digital messages is a new task which calls for a large amount of pilot attention and workload, requiring the pilot to remain focused "inside" the cockpit. In several tests conducted in different Army aircraft, the Army Research Laboratory's Human Research and Engineering Directorate has identified typing messages as a high-workload task in the digital cockpit that requires considerable visual attention.**

Two basic types of keyboards have been examined for use in Army aircraft: the alphabetic- and QWERTY-style keyboards. The alphabetic keyboard is arranged with the letters in alphabetic order, starting in the upper left corner. The alphabetic layout is currently being used by most digital Army helicopters. The QWERTY keyboard is the standard keyboard most of us use daily with our computers. The name "QWERTY" is derived from the first six letters on the left hand side, top row of the keyboard.

The QWERTY keyboard was created by Christopher Sholes in the late 1800s and has been the most widely used keyboard since. The legend behind the QWERTY keyboard was Sholes created this layout as an alternative to the alphabetic keyboard to slow down typists so their typewriters wouldn't jam as often. However, the truth is Sholes varied common combinations of letters on opposite sides of the keyboard in order to minimize jamming the typewriter. This design had an additional effect of creating an efficient typing method which allows users to alternate hands more often.

This legend has sparked a long debate over which keyboard is faster and more efficient. Multiple studies conducted over the past 50 years comparing the two keyboard styles show the data entry time using a QWERTY keypad can be 40 to 80 percent faster than on an alphabetic keypad. This large advantage of the QWERTY keyboard is attributed to the different techniques used to locate letters on the keypad. When using a QWERTY keypad, the user locates characters visually, normally starting from the top or middle of the keypad. When locating characters on an alphabetic keypad, the user relies on both visual scanning and mentally determining where the letter is located in the alphabet. This additional cognitive task is partly responsible for the increased data entry time associated with the alphabetic keypad.

Another contributing factor for the

# rdware Solution to High

# ad in the Digital Cockpit

overwhelming advantage of the QWERTY keypad is the familiarity that most of us have with this layout. In today's world, most of us use a QWERTY keyboard on a daily basis when we use our personal computers. The experience we have with this keyboard would be difficult to overcome with any other keyboard design.

So why is the alphabetic keypad being used in most digital Army helicopters? There are several reasons the alphabetic keypad is considered the best choice for Army Aviation applications. First, some believe the QWERTY is only more efficient for two-handed typing on full-size keyboards. However, results from a series of studies in which users typed on a Personal Digital Assistant (PDA) with a stylus showed improved performance and preference using the QWERTY layout. Participants typed about twice as fast with the QWERTY layout and significantly preferred it over alphabetic and all other layouts. This supports the contention that the QWERTY keypad should be used as the default design even if users can only type with a single finger.

Another reason some people prefer the alphabetic-style keyboard for aviation applications is they feel it is easier to use on smaller keypads. However, results from a study using reduced-sized keyboards showed performance was 80 percent faster on a QWERTY layout compared to an alphabetic layout. Participants also recorded an overwhelming preference for QWERTY, regardless of previous keyboard experience. It is noteworthy that these findings are over 20 years old. Given the wide proliferation of personal computers over the past 20 years, it is a safe assumption that user preference would currently be even stronger for a QWERTY layout.

In many cases, alphabetic keypads are used in Army Aviation due to the geometric challenges Army aircraft place on designers—often limiting the use of a rectangular-shaped QWERTY keyboard. There are, however, commercial off-the-shelf products available that successfully integrate the QWERTY design into a small, easy-to-use interface.

The bottom line is empirical evidence clearly favors the QWERTY layout under a number of situations: two-handed typing on normal and smaller keyboards, one-finger typing on a keyboard, and stylus typing on a PDA. While the existing research strongly supports the use of QWERTY keyboards in a variety of situations, no current research exists that studies human performance using alphabetic and QWERTY keyboards in Army aircraft. We believe the use of a QWERTY keyboard in Army helicopters would be a human factors enhancement that has the potential to significantly reduce pilot workload, potentially resulting in reduced pilot error and optimizing the time available to fly the aircraft rather than managing digital communication. ♦

**–Both authors are Department of the Army Civilians employed at Redstone Arsenal, AL, and can be contacted at thomas.havir@us.army.mil and josh-kennedy@us.army.mil.**

# Digitization and on the 21st

LTC ANDREW T. LIEBEKNECHT
ARKANSAS ARMY NATIONAL GUARD

**In today's Joint atmosphere, the use of computers is not just a requirement for the young; it's a necessity that must be taught to all personnel who are operational within the Army.**

What is the Army Battle Command System (ABCS) and what does it do for the Army Aviator? What does ABCS mean to Army Aviation? ABCS has changed from the stovepipe grouping of individual systems of yesterday to the integrated, migrating, and vital information-sharing system of today. The Army needs timely and accurate information, and the digitized systems of today provide the springboard.

Some of the systems fielded today are the Theater Battle Management Core System, Maneuver Control System, Tactical Airspace Information System, Advanced Field Artillery Tactical Data System, All Source Analysis System, Air and Missile Defense Workstation, Command and Control for the PC (C2PC), FalconView, Aviation Mission Planning System, and Automated Deep Operations Coordination System.

In today's battle space, digitization is a reality and is mandatory for all warfighters operating within the combat zone at all levels of command. Computer literacy is needed to sift through enormous quantities of information in a timely manner. Basic computer skills, as well as typing skills, are also required.

**IN TODAY'S BATTLE SPACE, DIGITIZATION IS A REALITY AND IS MANDATORY FOR ALL WARFIGHTERS OPERATING WITHIN THE COMBAT ZONE AT ALL LEVELS OF COMMAND.**

More information and publications than ever before are online (Internets, Intranets, Extranets, Secure Internet Protocol Routers or SIPRNET, etc.), and digitized information will continue to grow in scope as we strive to create a paperless organization. Some of the systems use wireless technology while others are hardwired, greatly increasing the speed of current information networks.

The near real-time interactivity of the individual warrior with the commander is a reality with the advent of glass cockpits, electronic kneeboards, and touch-screen computers in

# Fighting Century Battlefield

tactical operation centers (TOCs), military vehicles, and aircraft.

Situational awareness improvements have increased in the past few years. As intelligence and significant activity reports are received and confirmed within the TOC, computers are the fastest and best way to distribute information and to ensure a relevant and accurate common operating picture (COP). Users providing digital overlays with reports have become a necessity for ease, standardization, and punctuality of operations. This process enables maps from the lowest levels of command to look just like the maps of the highest headquarters without the "stubby pencil" transference mistakes of yesteryear.

In aviation, the air tasking order (ATO) and air coordination order (ACO) are digitized to provide a manageable format for viewing prior to a flight. The amount of data on the ATO/ACO has continually grown as the military operates in more joint environments, with the addition of Army Aviation, unmanned aircraft systems, and other airborne platforms.

Across the military, the lengthy and oftentimes time-intensive Military Decision Making Process (MDMP) of old is rapidly being condensed. The use of e-mail and collaborative Internet-based, chat-type programs have led to the need for a faster, more streamlined MDMP. The need for near real-time operations is a must because the processors are not immediate.

Some personnel are concerned about security of networks. Others fear with so much information available, information overload might become a problem or higher headquarters may be tempted to micromanage operations. Situational awareness does not necessarily constitute micromanagement, and today's leaders must ensure the correct level of leadership engages at the right level. This means a higher command might recommend one course of action but stay hands-off in other situations, thus allowing the proper level of command to make "the command decision." This is a viable concern for commanders at all levels and needs addressing when dealing with digitization and the implementation of standing operating procedures and the updating of our ever-changing world of doctrine.

Digitization is a good thing, and we must continue forward with the goal to rapidly process data to provide our warriors in the field the best edge in combat. In the future, all briefings will likely come off of the current COP or CTP, which could spell the eventual demise of other presentation-type applications in the TOC. There are those who have not utilized or seen these systems in action, and they need to get into the 21st century fight. ♦

***"The God of War hates those who hesitate."***
*–Euripedes*

**–LTC Liebeknecht wrote this article while attending Aviation Safety Officer Course 05-004 at Fort Rucker, AL. He may be contacted at andrew.t.liebeknecht@us.army.mil.**

# THE NEW EMERGENCY GPS RECOVERY PROCEDURE: TASK 2050

**Since the start of Army Aviation operations in support of the Global War on Terrorism, Army Aviators have operated in many countries without navigational aids, radar, or approved instrument procedures. This situation requires a recovery procedure in the event of inadvertent instrument meteorological conditions (IIMC). In the absence of an approved instrument approach procedure in a combat theater, aviators developed their own procedures using a non-certified global positioning system (GPS). As theaters of operation expanded, many approaches were developed by different units without applying a common standard such as the Federal Aviation Administration's (FAA) terminal instrument approach procedures (TERPS).**

To ensure warfighters have a contingency procedure to perform in the event of inclement weather during combat operations, the Directorate of Evaluation and Standardization (DES), in coordination with U.S. Army Aeronautical Services Agency (USAASA), wrote a task to standardize the development of a recovery procedure. The task is now known as Task 2050 in the new aircrew training manual (ATM), *Develop an Emergency GPS Recovery Procedure.*

Soon after the new ATMs were in the hands of warfighters, it became apparent the development of the recovery procedure task was difficult to understand and overly complex. DES sensed this problem and quickly redesigned the task to provide commanders with an emergency GPS recovery procedure using a simplified technique.

The revised task uses a simple concept of calculation which meets or exceeds TERPS requirements. The calculation is the basic A + B = C, in that A = known obstacles, B = obstacle clearance criteria (TERPS), and C = the minimum altitude for the applicable segment. The task is further enhanced by the use of simple diagrams to illustrate the TERPS obstacle clearance requirements. The figure shown on the next page is one of five figures that will be incorporated into Change 1 of all the ATMs, due out in late summer 2006.

The ATM task allows anyone designated by the commander to develop the approach. The task was designed to be accomplished by an instrument examiner (IE), but remains simple enough for any pilot-in-command (PC) to complete.

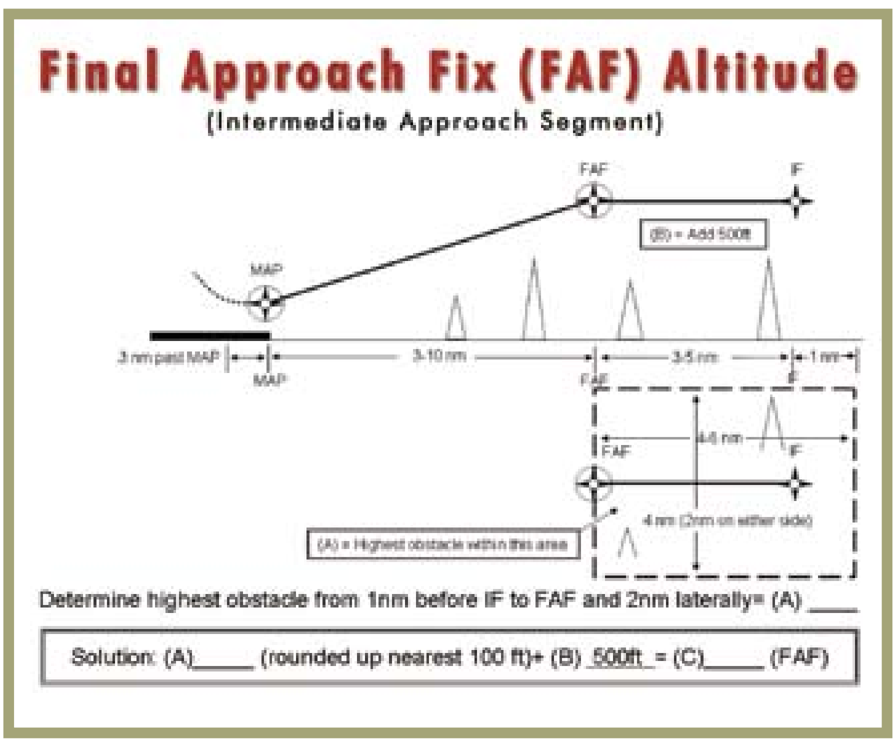
The new Army Regulation (AR) 95-1, dated 3 February 2006, addresses a unit's need for an emergency recovery procedure as a contingency plan for IIMC. Furthermore, this regulation requires the use of USAASA-approved instrument procedures that currently exist in theater when planning for

# Message 06-03

this contingency. A problem arises when units are operating in an area that does not have an approved instrument procedure or the approved procedure is too far away to facilitate its use as a contingency. When this occurs, units will develop a procedure in accordance with (IAW) ATM Task 2050 and use it for training under visual meteorological conditions (VMC) or as an actual emergency procedure during unforeseen inclement weather.

Additionally, this emergency recovery procedure is only authorized to be flown when the situation prevents the use of an instrument procedure with an approved navigational aid, such as the instrument landing system (ILS), very high frequency omni-directional range (VOR), tactical air navigation (TACAN), or non-directional beacon (NDB). Flight into IMC, which violates FAA, host country, or International Civil Aviation Organization regulations, will be considered deviations as a result of an emergency per AR 95-1, paragraph 1–6, and will be reported per paragraph 2–13.

Since all modernized helicopter ATMs have Task 1180, *Perform Emergency GPS Recovery Procedure,* a base task, units are required to fly a GPS recovery procedure. To meet the requirement of Task 1180, units will be required to develop an emergency GPS recovery procedure (Task 2050) and limit its use to VMC. The use of the recovery procedure for IIMC will be limited since aviators are required to fly an instrument procedure with an approved navigational aid such as ILS, VOR, TACAN, or NDB.




When units develop the emergency GPS recovery procedure, the first O-6 in the chain of command with mission-risk approval authority must approve the procedure. IAW AR 95-1, this authority will not be further delegated. The risk associated with the recovery procedure will be mitigated through the mission approval and risk mitigation processes and will be further defined in unit standing operating procedures. The use of the simplified task will assist in mitigating the risk of obstacle clearance since the new task meets or exceeds the TERPS criteria.

The focus of DES remains on the warfighter. Furthermore, we seek to ensure our Soldiers have the required tools to safely complete our wartime mission while minimizing risk associated with the many complexities in the highly technical field of Army Aviation. As always, we look forward to any recommendation that will enhance our warfighting capabilities. Any questions or recommendations regarding this article or Task 2050 may be directed to CW4 James K. Scala, DES-Cargo, at (334) 255-1564 or james.scala@rucker.army.mil. ♦

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# Aeromedical Corner

Important information from the medical community.

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APO AE 09354

**The "Aeromedical Corner" is a new addition to Flightfax. It's designed to provide you with professional updates from the medical community. Future topics include Survival Medicine for the Aircrew," "Night Vision Techniques," "Vector DZ (malaria, leish, etc.)," and "Having Trouble Remembering those Emergency Procedures," among many others.**

# OPERATIONAL STRESS:
## COLLECT A MIND FULL AS YOU PASS GO!

**Many of you have played the game of Monopoly®. It's certainly a friendly game, riddled with entrepreneur spirit. Picture the later stages of this game when the real estate is all claimed and green houses have turned into red hotels. You have successfully secured a stack of $500 bills on the table. Stress mounts with each dice roll as players embrace bankruptcy. The only safe places on the game board are Jail, Free Parking, or Go. The burned-out look stretches across the last bankrupt-withdrawn face. You have outlasted them all!**

You now sit alone at the game table. The crushing reality of survival or victory falters as you consider the next steps of moving on. Five hundred dollar bills dangle from your belt loops and your red hotels dominate the game board. Many of life's hard-earned achievements or well-fought struggles are finite in their rewards. In the same sense, many of life's mild and extreme stressors that shape our human existence are, at best, transient. The analogy of a game approaching stress to the degree of combat stress is cavalier and insensitive, but it does open the discussion that stress has common threads. The purpose of this aeromedical article is to define levels of stress and put them in context with combat stress.

Not all stress is bad. As leaders, you are challenged to establish a command environment where stress is performance enhancing, not debilitating. Performance and stress are related in the form of an inverted U-shaped curve. Optimal performance is achieved at the top of the inverted U. In low-stress situations, individual senses are deprived and boredom sets in place. In high-stress situations, adaptation measures become overwhelmed and anxiety sets in place. Individually, stress curves are formed based upon education (knowledge) and experience. As leaders, you must recognize your Soldiers' stress levels to assist in performance optimization.

Stress on an acute level is characterized as intense, brief episodes of work where factors of fear of failure or fear of physical harm are paramount. The burnout with acute stress is demonstrated by loss of accuracy with detailed tasks, high distractibility, and unprofessional flying. An aircrew preparing a second or third iteration of a mission change that includes a less-frequented forward operating base as a last stop on a 4-hour night vision goggle flight is an excellent example of acute stress.

Although not as intense as acute stress, chronic stress may last for months to years. The burnout with chronic stress is demonstrated by trouble with superiors or peers, insomnia, depression, and excessive destructive behavior (i.e., alcohol or tobacco). Also known as operational stress, chronic stress best characterizes our level of stress here in Afghanistan.

Combat stress exceeds all stress levels and does not end when the stress is removed. Elements of combat stress are unique because the sensory inputs from all sources (sight, sound, hearing, etc.) are so immediate and extreme that the brain is overwhelmed in its function. As the event is re-lived, the images are more permanent in the Soldier's mind, and a syndrome of post-traumatic stress disorder might follow.

The DOD textbook *War and Emergency Surgery,* 2004 edition, outlines where resources and tactical situations allow the application of the Battle Space Integration Concept Emulation Program mnemonic is effective in mitigating combat stress. **(1) Brief:** interventions last 3 days or less with food, rest, and reconditioning. **(2) Immediate:** do not delay treatment.
**(3) Central:** rally mutual support from within the unit.
**(4) Expectant:** reaffirm return to duty will follow after brief rest.
**(5) Proximal:** do not evacuate or remove the Soldier from the unit area. **(6) Simple**: address the stress response openly with NO analytical or psychotherapy session.

▲ **CW3 Bill Castle, aviator, reporting to the TOC after 6 hours of "ring route" flight.**

▲ **CW3 Robert Tyler flies with "stress buddy."**
▶ **Chaplain (CPT) Brett Perkuchin discusses stress reduction with SPC Jesse L. Bonner.**

**Guidelines to follow when modulating stress**

- Good general physical fitness with an adequate, moderate diet
- Limit self-imposed stress with late-night computer use, caffeine, or tobacco abuse
- Obtain a minimum of 6 hours of daily continuous sleep
- Modify work conditions to maximize productivity
- Honor the Afghan Aviation Procedure Guide in all measures, to include special attention to total duty and flying time
- Develop high levels of confidence and proficiency through realistic training
- Exercise all elements of your faith
- Stay connected with family and loved ones

Remember, stress impacts performance and builds with each dice roll. While here in Afghanistan, we pass Go" every day! Take steps to modulate stress. Regarding all stress levels, seek the assistance of unit leadership, the chaplain, or the flight surgeon. ♦

*Editor's note: For more information on combat and operational stress control, check out "A Soldier's Guide to Deployment-related Stress Problems" on U.S. Army Center for Health Promotion and Preventive Medicine's (USACHPPM) Web site:* ***http://chppm-www.apgea.army.mil/dhpw/Population/combat.aspx.***

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# Three Points of

CW2 MICHAEL PRACHT
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**It was a cold, blustery November morning on the flight line. I was only a few weeks out of flight school and eager to impress my command and instructor pilots (IPs) in the UH-60 Air Assault Company. So far, I had two flights under my belt with good remarks from two different IPs. We had just started a field exercise, and I found myself on the battle roster with our top IP to continue readiness level (RL) progression. I could not have found a better chance to impress.**

One of the first tasks required before any flight is to conduct a preflight inspection of the aircraft. Preflight inspection should be an easy task, right? We do it every day for weeks on end during flight school, and I studied the books diligently so I knew each system inside and out.

We arrived at the aircraft with our crew chiefs to prepare the aircraft for the day's mission. We made a plan of action on how we were going to do the preflight. I would go up top and preflight the flight controls, rotor head, engines, and auxiliary power unit. The IP would stay down below and preflight the cockpit, cabin, fuselage, and tail rotor.

Before starting the preflight, the IP gathered the crew together to explain a few things unique to the cold environment we were in. He explained moisture in the early morning air collects on the fuselage and freezes due to the cold temperatures. Surfaces become frosty, icy, and very slick. He emphasized that walking around and climbing on the aircraft was hazardous due to the ice. I replied, "Roger! I got it! That could definitely be a career ender if I fell from the top."

I proceeded around to the side of the aircraft and up I went. I followed the checklist (as should any eager, young pilot in RL training) and came to the part of checking the hydraulic flight deck. The top of the aircraft was a little frosty but otherwise not slippery. It was, however, quite cold outside. I was wearing a Gortex jacket, thermal underwear under the flight suit, and nice, thick leather work gloves to protect my hands from the cold metal. I was perched on the edge of the top surface in a kneeling position so I could reach the latches that lock the hydraulic deck access cover to the airframe.

External fixator approximately one month post-surgery.

# Contact

## DID YOU KNOW?

Falls are the leading cause of work-related injuries and fatalities in construction accidents nationwide, and are ranked as second in general industry. According to the Bureau of Labor Statistics (BLS), most work-related injuries and fatalities are on the decline. However, the number of fall-related injuries and fatalities is increasing, accounting for more than 13 percent of the total number of fatal work injuries. In the United States, approximately 3 fall-related fatalities occur each working day.

From an Army perspective, injuries to Soldiers and civilians sustained from falls can significantly impact resources and hinder mission capability. Protecting the workforce is a responsibility shared by everyone, at all levels of the organization. However, it is you—the leader—who makes a unique contribution to job safety in that you are aware of the skills, physical condition, capabilities, and limitations of your people. You know the job and have the authority to inspect, correct, and direct. No one is in a better position to prevent accidental falls in the workplace than you.

After unlocking the first latch, I leaned over to unlock the second latch. Maintaining a good hold of the airframe with my right hand, I leaned back to grasp the wire strike support to slide the cover open. I closed my hand around the support, or so I thought. With the thick gloves and hurrying to impress, I failed to realize I did NOT have a hold of the support. Consequently, I let go of the airframe with my right hand and proceeded to fall backward off the aircraft.

I flailed my arms in cartoonish fashion to no avail, trying to grab a hold of something. The funny thing is, when you realize you are in a bad situation, time really does slow down. As I twisted around to see where I was going to fall, two thoughts came to my head. The first was a story I heard some time before about a CH-47 crewmember falling from the top of an aircraft, bouncing off the fuel nacelle, then landing on his feet. The second thought was I would not be as lucky; this was going to hurt! I suffered a bruised rib and a severely broken right wrist, requiring an external fixator and surgery to repair. Thankfully, after many months of healing and therapy, I regained enough use of my wrist to continue my aviation career.

What did I learn from this experience? First, you should always maintain three points of contact when working in high places. In short, one hand for you, one hand for the helicopter. Second, you should slow down and think about what you are doing. There is no need to be in a rush, unnecessarily compromising safety. Finally, nothing could make your command more unimpressed than failing horribly to conduct one of the simplest of tasks. ♦

*Editor's note: This Soldier is fortunate; he's able to tell the tale. Another Soldier wasn't so lucky when he fell off his CH-47D. Read the PLR on page 22 of this issue. For more information on fall protection programs, check out the "Leader's Guide to Fall Protection" on the CRC Web site:* ***https://crc.army.mil/guidance/best_practices/LEADERGUIDE-FP04.pdf***

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# Litefax What Were They Thinking?

CHRIS FRAZIER
STAFF WRITER/EDITOR

## PASS INTERFERENCE

It's almost an absolute certainty an aircraft will suffer some type of foreign object damage in its lifetime. From misplaced rags being ingested into the engine to kamikaze bird strikes through the chin bubble, there are a myriad of things that can spell disaster for an aircraft and its crew. But a water bottle?

While at flight idle, the pilot of an MH-6J Little Bird attempted his best Tom Brady impersonation and hurled a water bottle to the crew chief (CE). Unfortunately, this wannabe QB threw more like Marcia Brady, and the bottle was batted down by one of the aircraft's main rotor blades before reaching the CE.

As the Army's only light assault helicopter, the MH-6J is designed to be a tough … well, little bird, but it isn't impervious to short-sighted pilot action. The aircraft was shut down and the blades inspected. Maintenance determined the rotor blade in question was indeed unserviceable and replaced it. After some time on the injured reserve list, the aircraft was returned to service.

## ABOVE THE RIM

Keeping with the sports theme, we now move to basketball. We all like a game of one-on-one. Most of us, however, would probably wait until we lace up our high tops before hitting the court. But for one UH-60L pilot, the phrase "crash the boards" took on a whole new meaning.

While ground taxiing, the pilot's poor court vision resulted in a failure to maintain adequate clearance with a basketball goal located to the right of his aircraft while clearing a parked UH-60 on the left. As a result, the aircraft's rotor blades struck the basketball goal's backboard and supporting hardware, causing extensive damage to the blades. Luckily, the blades missed the tip path plane of the parked UH-60.

Investigators determined the pilot's actions were actually a result of overconfidence, not an uncontrollable urge to get "above the rim." The day before the mishap, the crew had covered the same ground taxi route without incident. However, at that time, the parked UH-60's main rotor blades were at a different angle, creating a wider gap between it and the basketball goal.

According to investigators, the instructor pilot's (IP) and the right-side CE's crew coordination techniques were lacking. The IP, who was focusing on what was going on inside the helicopter, failed to coordinate sequence and timing.

Adding to the IP's inattentiveness, investigators say the CE failed to clearly communicate and provide aircraft control and obstacle advisories. As the aircraft closed in on the basketball goal, the CE's comment to the pilot was, "It's going to be close." Consequently, the pilot on the controls didn't acknowledge the basketball goal as a hazard and taxied right into it.

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# News and Notes

Keeping crewmembers informed…

## SURVIVAL RADIOS

Per Communications Electronics Command, the Army has NOT authorized the use of the PRC-112B or PRC-112G radios. Any unit that has bought these two radios with unit funds are on their own for all support. The only radios authorized by the Army are the PRC-112, PRC-112C, and PRC-112D.

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## CORRECTION

In the February 2006 *Flightfax* article "Our Aviation Brigade is Deploying OCONUS, What Boots Can We Wear?" we incorrectly listed the Bates Desert Model #EO1129 tan boot as being authorized for aviators to wear. Unfortunately, this boot has not been approved for any Soldier to wear. We're sorry for any inconvenience this has caused.

# Accident Briefs

Information based on preliminary reports of aircraft accidents

## Class A

**AH-64**

*D Model*

• While the aircraft was at a hover next to a hangar, metal siding separated from the exterior of the hangar and was ingested into the main rotor system. The aircraft landed hard, fully collapsing the right strut and causing damage to the tailboom, rotor system, and fuselage.

**UH-60**

*L Model*

• Aircraft experienced a high-dust condition during landing, contacted the ground, and overturned on its right side. Aircraft sustained damage to the main and tail rotor systems, main landing gear, and undercarriage.

### AH-64

*D Model*

• **Class B:** The crew was conducting a single-engine roll-on landing during ATM training when the aircraft contacted the airfield approach lights, resulting in a hard landing. Damage was reported to the tail wheel and tailboom.

• **Class C:** Aircraft experienced a No. 1 engine overspeed and an associated main rotor underspeed condition.

• **Class C:** Aircraft experienced an overtorque (131 percent for 1 second) during a simulated single-engine failure.

• **Class E:** During power lever reduction, the No. 2 engine fire light illuminated. The crew performed an emergency engine shutdown and a single-engine approach and landed without further incident. (Late Report)

• **Class E:** During runup and taxi, the pilot experienced a vibration in the pedals. Maintenance replaced the input flange, and the aircraft was released for flight. (Late Report)

### CH-47

*D Model*

• **Class C**: Aircraft landed hard during a training flight for dust landings. The rear left landing gear was damaged.

• **Class E:** Flight crew noticed the No. 2 hydraulic fluid level was low and initiated landing for further investigation. On short final to landing, the No. 2 flight hydraulics caution illuminated, and the crew noticed fluid dripping from the aft pylon region. The aircraft landed safely with no damage. The hydraulic fluid line was replaced and the aircraft returned to service. (Late Report)

• **Class E:** After landing, the crew determined the No. 1 flight hydraulic pump had failed. Maintenance replaced the hydraulic pump, and the aircraft was returned to service. The exact cause of the failure is unknown, but it is suspected the filter housing was overtorqued during last installation. (Late Report)

• **Class E:** Approximately 5 hours into the mission, while picking up an external load, the right-seat pilot experienced lateral control binding. The pilot transferred the controls to the pilot in command (PC) in the left seat, who felt control binding in the lateral axis. The PC placed the sling load back on the ground and landed the aircraft. (Late Report)

### MH-60

*K Model*

• **Class B:** A Soldier fell 20 to 40 feet to the ground after exiting the aircraft before it touched down.

*L Model*

• **Class B:** Aircraft contacted a light pole on the airfield while ground taxiing. Damage was reported to the main rotor blades and one tail rotor blade. In addition to the light pole, a parked civilian aircraft suffered damage from flying debris. The Soldier ground guiding the taxiing aircraft also sustained minor scrapes from flying debris.

### OH-58

*C Model*

• **Class B:** Aircraft experienced an engine overspeed following takeoff and landed without further incident.

*D(I) Model*

• **Class C:** Aircraft experienced an NP spike (124 percent for 2 seconds) during a full authority digital engine control (FADEC) maintenance check from a hover with throttle at 100 percent.

*D(R) Model*

• **Class B:** Aircraft sustained damage during live-fire training. Multipurpose submunition

**PRELIMINARY LOSS REPORT 06092**

**FALL FROM CH-47D INJURES 1 SOLDIER—ACCIDENT**

A Soldier suffered a permanent partial disability when he fell from an aircraft while performing maintenance in Southwest Asia. The 37-year-old sergeant had climbed on top of a CH-47D to take a hydraulic oil sample while the aircraft's rotor blades were slowly turning.

A rotor blade struck the Soldier in the head, knocking him off the aircraft. He was evacuated to a hospital, where he was diagnosed with paralysis below the waist. The Soldier, who was wearing his flight helmet at the time of the accident, is currently on life support.

*Editor's note: Complete texts of all PLRs are available on the CRC Web site at* ***https://crc.army.mil/***. *You must have an AKO username and password to access the PLR site.*

fragments damaged one main rotor blade and the upper mast-mounted sight shroud during a running fire engagement.

• **Class C:** Aircraft experienced NP spike (123 percent for 5 seconds) during a FADEC system check.

## UH-1

*V Model*

• **Class B:** A loud bang was reported, followed by an engine failure. The crew executed an autorotation. Postflight inspection revealed hard-landing damage to the aircraft.

## UH-60

*A Model*

• **Class C:** The auxiliary power unit cover separated from the aircraft during flight, causing damage to the tail rotor system.

• **Class E:** Upon departure, the fire light on the master caution/warning panel illuminated, along with the No. 2 fire handle. The instructor pilot took the controls and landed the aircraft. The crew performed the emergency procedure for a fire on the ground. The aircraft was shut down with no visible damage. (Late Report)

• **Class E:** Prior to a night vision goggle training flight, the landing light was checked for operation. The landing light came on but would not turn off from either crew station. Maintenance was called to investigate. Approximately 5 minutes after operation of the landing light, it exploded, shattering the lens and throwing glass shards out in front of the aircraft. No injuries were sustained and the mission was terminated. (Late Report)

*L Model*

• **Class B:** Postflight inspection revealed damage from a suspected hard landing.

• **Class D:** During flight, a bird struck the center windscreen. The windscreen was severely damaged but remained intact. The aircraft was flown back to base without further incident, repaired, and returned to duty. (Late Report)

• **Class E:** During preflight inspection, the aircrew discovered the fuel bypass button of

**DID YOU KNOW?**

**Since FY02, there have been 14 Class A through C Army Accidents where a Soldier fell from an aircraft while performing maintenance.**

**Don't let this happen in your formation. Since details on this accident are limited at this time, the following tactics, techniques, and procedures target aviation maintenance slips, trips, and falls from aircraft in general:**

**√ Reinforce with your maintenance personnel the importance of waiting until blades and rotors have stopped turning and are tied down before mounting aircraft.**

**√ Annex E, Safety, of FM 3-04.500 (1-500), Army Aviation Maintenance provides units with specific steps to take to ensure that maintenance operations are conducted safely.**

**√ Always maintain three secure points of contact when working on elevated surfaces or performing maintenance on an aircraft.**

the No. 1 engine had popped. (Late Report)

## C-12

*D Model*

• **Class E:** The maintenance test pilot (MTP) was conducting a maintenance test flight for flap re-installation. When the landing gear was retracted, there was still a red light in the landing gear handle, indicating an incomplete retraction of the gear. The MTP returned to the airfield, where maintenance personnel adjusted the gear up switch. The aircraft was returned to service.

• **Class E:** During climb out from the airfield, the No. 1 engine forward cowling came loose. The cowling caused a jam in the reverse portion of the power levers, which broke the cannon plug to the torque transducer. (Late Report)

• **Class E:** During cruise flight at 16,000 feet MSL, with an outside air temperature of –4 °C and the windshield heat in the normal position, the outer pane of the copilot's windshield cracked. The crew completed the emergency checklist and notified air traffic control. Landing was completed without further incident. (Late Report)

## C-31

*A Model*

• **Class E:** During engine runup checks, the No. 2 low torque pressure switch failed. The aircraft did not pass the auto feather check. The crew taxied back to parking and maintenance personnel were called. Maintenance replaced the No. 2 low torque pressure switch, and the crew continued the mission. (Late Report)

• **Class E:** During straight and level flight, the No. 2 engine gearbox low oil pressure light illuminated. The crew secured the No. 2 engine and landed single-engine at the airfield. Inspection of the No. 2 engine air compressor revealed a broken oil line fitting/connection, which resulted in an oil leak and low oil pressure. (Late Report)

## EO-5

*C Model*

• **Class D:** During a daily inspection, maintenance noticed damage to the leading edge of the right flap between the No. 3 and 4 engines. There were feathers and blood, indicating a bird strike. Maintenance replaced the flap. (Late Report)

• **Class E:** The No. 3 fuel tank quantity dropped to 500 pounds approximately 1 hour into the flight, accompanied by a fuel low light. After several attempts to transfer fuel into the No. 3 tank, the tank quantity continued to decrease or stay near 500 pounds, so the aircrew returned to base. Maintenance of the No. 3 fuel system revealed a broken wire associated with the fuel transfer system. (Late Report)

# ARMY AIRCRAFT LOSSES FY02 TO PRESENT*

| | HOSTILE/NON-HOSTILE | COST |
|---|---|---|
| AH-64A/D | 8/41 | $1.03B |
| U/MH-60L | 6/21 | $185.2M |
| C/MH-47 | 5/11 | $567.6M |
| OH-58D | 8/21 | $181.2M |
| Total | 27/94 | |

*As of 11 Apr 06

# UNMANNED AIRCRAFT SYSTEM

## RQ-11

• **Class C:** Aerial vehicle (AV) crashed after the AV operator lost the GPS video feed during flight due to a power loss.

• **Class C:** AV operator lost the computer link with the aircraft while in flight. The aircraft subsequently crashed at an unidentified location.

## RQ-7B

• **Class B:** Aircraft reached 3,000 feet AGL and experienced a generator failure on the warning panel. The AV operator regained full control of the aircraft and initiated emergency procedures. While proceeding to the tactical automated landing system (TALS) recovery site, the aircraft battery bus voltage fell below allowable system limits. The flight termination system was not deployed. The aircraft was in TALS at approximately 700 feet AGL. The aircraft was a total loss.

• **Class B:** The AV experienced ignition failure during flight, immediately followed by an engine failure. The recovery chute was deployed and the aircraft impacted the ground.

• **Class B:** The AV experienced a sudden fluctuation in RPM, followed by ignition failure. The recovery chute failed to deploy during engine failure procedures and the AV crashed.

• **Class C:** The AV experienced an uncommanded deployment of the recovery chute, stalled during the launch sequence, and impacted the ground.

**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, contact the CRC Help Desk at DSN 558-1390 (334-255-1390) or by e-mail at helpdesk@crc.army.mil.**


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Own the Edge through Composite Risk Management
own the EDGE
Composite Risk Management
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