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OH-58D Safety Performance Review

This edition of *Flightfax* continues the five year safety reviews with a look at the OH-58D. Challenges associated with a single-engine aircraft are evident. However, many of the types and causes of mishaps span all airframes and can be used to increase awareness in your unit independent of any particular type of aircraft.

Also found in this issue: DES discusses IMC flying in the AH-64, my thoughts on transferring experience, input from a USAF member for the *Flightfax* Forum, and a Blast from the Past. Please note the back page - there were no reported Class A thru C manned aircraft mishaps in the month of August.

Until next month, fly safe and manage your risk levels!

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OH-58D Safety Performance Review

In the nearly five-year period FY10 - present (630,000+ flight hours), 74 Class A - C OH-58D mishaps have been recorded. There were 14 Class A, 3 Class B, and 57 Class C with a cost of $106 million in damage and injuries; there were 16 fatalities. The Class A flight mishap rate per 100,000 hours was 2.21. Review of these mishaps shows that human error was the primary cause factor in 52 (71%) of the incidents, materiel failure accounted for 15 (21%) with 5 (7%) unknown or not yet reported with a cause factor. There was one reported bird strike. Of note in Class A mishaps, materiel failure was a primary cause factor in 7 of the 14 mishaps. Highlights from some of the more frequent types of mishaps:

Engine Failure/malfunction

Engine failure or malfunction played a role in five Class A and five Class C mishaps.
Summaries of selected engine malfunction mishaps include:

Scenario 1 *ECU failure*

While conducting a daytime, multi-ship, Readiness Level progression flight in an OH-58D, at 80 knots and 400 feet above ground level, the OH-58's electronic control unit (ECU) failed in flight. The ECU experienced an overspeed failure on the power supply board, which resulted in an overspeed power supply fault. This triggered an erroneous overspeed solenoid activation, which resulted in the fuel supply being reduced to the engine. The rotor RPM rapidly decayed, resulting in a low rotor RPM condition, a rapid descent, and catastrophic impact with the ground. One crew member was fatally injured, one crew member was critically injured, and the aircraft was destroyed.

Scenario 2 *Engine chip light followed by engine failure*

While conducting a route security/reconnaissance mission at 90 knots and 150 feet above ground level, the aircraft experienced an in-flight engine failure. The pilot in command was forced to execute a low-level autorotation to a level, plowed field. The aircraft was destroyed and the two crew members sustained serious injuries.

Scenario 3 *Fuel check valve failure*

During a general maintenance test flight, the OH-58D's fuel boost fail caution light illuminated, followed by low fuel pressure warning. The low rotor audio was activated, followed by an engine failure indicated by an engine out warning. The maintenance test pilot (MTP) descended in a power off autorotation and impacted the ground. The MTP and non-crew member were not injured. The aircraft was damaged.

Scenario 4 *FADEC failure*

While the OH-58D was in cruise flight at 90 KIAS and approximately 1,200 feet AGL in Full Authority Digital Electronic Control (FADEC) auto mode, a FADEC failure occurred. This caused the aircraft's fuel flow to remain fixed at a cruise power setting, requiring execution of the emergency procedure for FADEC manual operation. As the crew attempted a precautionary landing, the aircraft crashed and both crew members sustained fatal injuries.

Scenario 5 *FOD*

Crew experienced a partial engine failure during a maintenance test flight and landed. Inspection revealed that the engine compressor had ingested a mirror that was apparently left in the plenum chamber resulting in in-flight anomalies and partial power loss.

Scenario 6 *Engine oil cooler*

Aircraft was performing a combat aerial recon mission and experienced a high oil temperature light with smoke and fumes in the cockpit. Engine cooler failed causing the engine to catch fire and conduct of an immediate landing.

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Object Strikes

There were three wire strikes recorded in the 74 incidents, two resulting in Class A damage and four fatalities. Additional incidents included one mid-air collision (four fatalities), one tail rotor tree strike, one aerostat tether and a bird strike. Summaries include:

Scenario 1 *Mid-air collision*

While performing night vision goggle training in an OH-58D at 220 feet AGL, aircraft #1 maneuvered toward a HLZ where another OH-58D, aircraft #2, was operating. Aircraft #1 impacted the left rear quadrant of aircraft #2 causing both aircraft to crash. All four crew members were fatally injured and both aircraft were destroyed.

Scenario 2 *Wire strike*

While conducting terrain flight navigation in the local flying area, the pilot struck a set of high power lines. The aircraft's left skid caught the lines, it rolled left, and descended into the trees. The impact fatally injured the two pilots and destroyed the aircraft.

Scenario 3 *Wire strike*

While conducting night vision goggles, live-fire weapons training at approximately 110 feet AGL and 90 KIAS, the OH-58D(R) struck a set of wires and crashed. The two crew members were fatally injured and the aircraft was destroyed.

Scenario 4 *Aerostat tether strike*

Aircraft was in a flight of two when it contacted the tether of an unlit aerostat. Post-flight inspection revealed no damage to the aircraft, but evidence of the strike (plastic sheathing on one blade.) Class C damage reported to the aerostat system.

Scenario 5 *Tree strike*

Aircraft contacted a tree canopy with the tail rotor system during NOE training. Post-flight and subsequent maintenance inspections revealed that one tail rotor blade required replacement as the result of damage.

Power management/maneuvering flight

Scenario 1 *Failed to arrest descent*

While engaging enemy combatants during a Quick Reaction Force mission, the pilot in command maneuvered the aircraft at a high airspeed below a recoverable altitude at a high rate of descent and impacted the ground. The aircraft tumbled through a tree line, coming to rest over 100 meters from initial impact. The two pilots were fatally injured and the aircraft was destroyed.

Scenario 2 *Power management*

While in a turn during the conduct of a reconnaissance and security operation, the crew allowed the airspeed to become too slow to maintain altitude without increasing the collective. The aircraft could not sustain level flight in the turn and an excessive descent rate developed from which the aircraft could not be recovered. The aircraft crashed and was destroyed. One pilot received serious injuries.

Scenario 3 *Downwind takeoff*

While attempting a NVG take-off with a slight tail wind (< 5 knots) the aircraft flew into the lead aircrafts rotor wash culminating into a settling with power condition. In response, the PC attempted to terminate the takeoff, clear of the obstacles adjacent to the HLZ. The aircrew lost visual reference with the ground as a result of browning out and ultimately impacted an obstacle adjacent to the HLZ. Extensive damage to the aircraft occurred. The aircrew received only minor injuries.

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Scenario 4 *Power and Dust*
Crew was conducting take-off during NVG environmental training when they experienced dust conditions (at mast-torque limit). Aircraft entered an uncontrolled descent and contacted the ground hard. Aircraft came to rest upright but sustained separation of the tail rotor and vertical fin.

Materiel failure

Scenario 1 *Loss of tail rotor thrust*
While conducting aerial support to troops in contact, the aircraft experienced a loss of tail rotor thrust. The aircraft developed a rapid and uncontrollable right yaw rate with a vertical descent at 4,000 feet/minute and impact force of 23G's. The aircraft was destroyed and both crew members sustained fatal injuries.

Scenario 2 *Servo malfunction*
During the conduct of an OH-58D NVG/N evaluation, while hovering forward in a confined area with the IP on the flight controls in the left seat, the right flight control hydraulic servo malfunctioned and jammed and would not allow the pilot to apply aft cyclic. The aircraft nose low attitude could not be corrected and the aircraft impacted the ground causing severe damage to the aircraft and one minor injury.

Scenario 3 *Fire in flight*
While in flight at approximately 80 knots during daylight conditions, the crew of the lead OH-58D identified smoke which was accompanied by several failures due to AC power loss. Trail aircraft confirmed smoke and fire from the engine compartment. The fuel differential pressure switch input fuel line burst and sprayed fuel onto the AC generator causing AC power loss and ignition of fuel in the engine compartment fire. Crew completed an emergency landing and shutdown. The aircraft incurred extensive engine and structural damage. There were no injuries. Closer examination of the fuel line shows that the fuel line ruptured near the bend and failed toward the input connector.

Scenario 4 *Running landing*
During the ground run of an approach to a running landing the forward cross-tube of the OH-58D helicopter broke. A fatigue crack that had developed over an unknown period of time on the inside bottom portion of the right mounting bracket reached a point of critical failure. The weight of the aircraft came to rest on the main assembly of the lower WSPS causing minor structural damage. There were no injuries.

Miscellaneous

Scenario 1 *Trim switch versus laser switch*
During a NVG training mission in an OH-58D flying at 1,800 feet MSL, the pilot mistakenly actuated the engine's RPM trim switch located on the pilot side collective. As a result, the aircraft lost altitude and impacted trees during the landing. The aircraft sustained catastrophic damage from a post-crash fire, with no significant injuries to the crew.

Scenario 2 *Foreign object damage*
Crew experienced a partial engine failure during a maintenance test flight and landed, conducting an emergency shutdown. Inspection revealed that the engine compressor had ingested a mirror that was apparently left in the plenum chamber, resulting in in-flight anomalies and partial power loss.

Scenario 3 *Hot start*
OH-58D start was initiated with a weak battery. Hot start ensued with temperature reaching 1,174 degrees Celsius requiring engine replacement.

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Scenario 4 *Failure to follow the checklist*
While conducting aircraft run up for a combat mission, the crew split the checklist after the radar altimeter check. During the FADEC system check the PC failed to return the system switch to the AUTO position resulting in an overspeed.

Training

In training related incidents there were 16 Class C and 1 Class B mishaps related to FADEC manual mode operations generally related to overspeeds. There were four overtorques during the conduct of SEF/autorotations. Six overspeeds occurred during run-up/FADEC system checks.

Scenario 1 *FADEC manual*
Aircraft touched down hard during a demonstrated FADEC manual approach. Damage reported to the skids (spread) and airframe.

Scenario 2 *FADEC manual*
Crew was recovering from a FADEC training approach to a hover. PI in left seat rolled throttle in the wrong direction (down), and simultaneously increased collective pitch once the Low Rotor Warning tone was heard. As the aircraft descended the IP applied all remaining collective before the aircraft came in contact with the ground. Aircraft landed hard resulting in spread skids, destroyed antenna and damage to underbelly.

Scenario 3 *Autorotation*
During autorotation the pilot on the controls observed his airspeed decreasing to 55 knots and adjusted his attitude to increase airspeed. The pilot made a rapid collective application to arrest the rate of descent prior to impact resulting in an overtorque.

Scenario 4 *Degraded visual environment*
While conducting environmental training under night vision goggles the pilot on the controls (P*) lost visual contact with the ground. The aircraft made contact with the ground on its tail stinger and rocked forward onto the skids. The lower WSPS embedded itself into the ground causing the aircraft to come to a sudden stop. There were no injuries. The sudden stop combined with the hard landing caused the rotor system to flap down and make contact with the upper WSPS. The aircraft's main rotors, rotor hub and engine were also damaged.

Summary

18 (24%) of the events occurred under N/NVG conditions. 34 (47%) occurred in OEF/OIF. Not all of the 74 mishaps have been listed in the scenarios. Missing are additional FADEC manual operations, an open cowling, one fratricide Class C, one blade delaminating, hot starts, a whiteout, and a .50 cal. ricochet on a range. More detailed information, for accident prevention purposes, may be obtained by your safety officer through the Risk Management Information System (RMIS) on the safety.army.mil website. Registration is required.

	OH-58D CLASS A – C Mishaps				
FY	Class A	Class B	Class C	Class A Rate	Fatal
2010	4	0	11	2.53	4
2011	5	1	16	3.49	5
2012	3	0	14	2.22	6
2013	1	1	8	0.98	1
2014	1	1	8	1.06	0
Total	14	3	57	2.21	16

A Bucket Instead of a Rag

The Simple Trick to Transfer Experience

Thoughts from an Aviation Task Force Commander

In my position as the Aviation Director within the U.S. Army Combat Readiness / Safety Center, I have had the incredible opportunity to speak with the leaders and Soldiers within many of our combat aviation brigades. Over the course of many conversations about safety and risk management with brigade and battalion commanders, company commanders, senior warrant officers, senior NCOs, and Soldiers, the almost universal safety concern is low Soldier experience levels combined with reduced leader-to-led rations given current HRC manning policies. This poses a very challenging Catch-22 situation for commanders because they need to generate enough aviation flight OPTEMPO to train their aviators, but increasing OPTEMPO may be beyond the capability of their aviation maintainers. If we reduce flight OPTEMPO to focus on aviation maintenance training, we decrease proficiency for the aviators. If we focus only on generating OPTEMPO to train aircrew, we put aircraft maintenance at risk for possible mistakes. It is a difficult balance to strike. While this specific example is aviation centric, this concept applies universally to any Army formation.

I faced a similar circumstance as an Aviation Task Force Commander deployed to RC-South, Afghanistan. The unit's aviation maintenance company was very junior and only manned at 70% for many reasons. Given the high OPTEMPO required to support the CJTF and SOF, we were very concerned about proper maintenance practices. The command group discussed at length how to position leaders correctly to supervise maintenance and how to build experience on the junior maintainers.

One afternoon, the CSM and I were walking past one of the clamshell hangars, and we noticed a group of Soldiers clustered around the front left strut of a CH47F. Naturally, this piqued our curiosity and we moved to investigate. Once at the aircraft, I saw an aircraft mechanic with a rag and tools in his hand, the panels around the left front strut removed to service the brakes, and a large puddle of hydraulic fluid on the ground. Not very happy with the scene I was looking at, I began to dig into why and how this event occurred. First question was "where is your IETM and are you following the procedure correctly." The Soldier immediately pointed to his open aircraft notebook computer with the IETM manual open to the task. Next question was show me the steps in the task and what step were you on when the fluid leaked. He walked me through his actions until he got to step #9 in the task which states "Catch leaking fluid in a container or rag. Wear gloves." The immediate investigation revealed the Soldier followed the procedure in the book correctly.

As I finished watching the Soldier demonstrate his actions after reading the maintenance task, the CH47 TI arrived at the aircraft. When I asked him about the procedure and the amount of hydraulic fluid that leaked, he nonchalantly stated that you definitely need more than a rag to catch the fluid. It was normal, depending on the residual pressure within the system, for quite a bit of fluid to leak when the brake fitting was loosened. It was at this moment that I had my epiphany about experience.

The young Soldier performed his task exactly according to the book, yet we did not get our desired outcome. The experienced Soldier knew, probably from making this same mistake in the past and that even though the maintenance manual outlines the procedure, there are sometimes additional steps one has to perform to ensure a safe outcome. A bucket instead of just a rag.

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The lesson I took from this event is that we needed some type of method to shepherd the lesser experienced Soldiers through every task so that we transfer experience through instruction instead of "trial and error." The way I solved this problem is that I made it a reportable event to a first line supervisor anytime anyone did something for the first time. The first time performing a maintenance procedure, the first time driving to a location on the base, the first time a pilot flies to an established HLZ, etc. This report serves as the trigger for the leader to take special precaution in this circumstance, and to assign the Soldier a mentor to shepherd them through the task. An experienced maintainer to teach a maintenance task, an NCO that has driven on the base to all locations, or the pilot that has flown to the HLZ and knows the landing direction and obstacles.

Unit manning levels, large populations of inexperienced Soldiers, and low leader-to-led ratios will become the normal in the post conflict era and during our end-strength manning reductions. We need solid methods to build the experience of our Soldiers, and the first step is identifying what specific experiences Soldiers don't have. By making "this is my first time for …." a reportable event, we can clearly identify when we need to implement additional steps to shepherd them through the process. I have seen the results. I know this works.

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	Manned Aircraft Class A – C Mishap Table									as of 17 Sep 14
	Month	FY 13					FY 14			
		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities
1st Qtr	October	1	0	7	0		0	0	2	0
	November	0	1	5	0		3	0	5	0
	December	2	1	0	0		1	0	3	0
2nd Qtr	January	0	0	6	0		3	1	4	4
	February	0	0	2	0		1	0	3	0
	March	2	1	5	6		0	3	0	0
3rd Qtr	April	1	1	6	2		1	1	5	0
	May	0	0	6	0		3	1	2	2
	June	1	1	4	0		2	0	6	0
4th Qtr	July	1	0	6	0		2	0	5	0
	August	1	1	9	0		0	0	0	0
	September	0	1	3	0				2	
	Total for Year	9	7	59	8	Year to Date	16	6	37	6
	Class A Flight Accident rate per 100,000 Flight Hours									
	5 Yr Avg: 1.34		3 Yr Avg: 1.31			FY 13: 0.81			Current FY: 1.66	

AH-64s Flying in Instrument Meteorological Conditions - A Culture Change

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The mission of the attack helicopter has not changed, however the tools to accomplish it have. Instrument meteorological conditions (IMC) is defined as a flight category that describes weather conditions requiring pilots to fly primarily by reference to instruments, and therefore under Instrument Flight Rules (IFR). A large percentage of AH-64D pilots are uncomfortable with instrument conditions. Outside of an APART instrument evaluation, IMC or IFR is infrequently uttered within the community. When was the last time an AH-64 pilot executed a Standard Instrument Departure, an ILS approach, intersection holding or flew in IMC? The resounding answers would be "back in flight school" and "never in an AH-64."

Since entering the inventory in 1997, the AH-64D has been restricted from flight into IMC. This has resulted in a generation of aviators who consider instrument flying as an emergency procedure. Instrument flying is often viewed as a recovery option should weather deteriorate, or given consideration annually during an evaluation. The fact is, the AH-64 community has not had a stake or purpose in prioritizing IMC flight. Understandably, we have neglected flight into IMC and IFR, however; the negative connotation associated with "instruments" must change.

The era of VFR only flying is ending, as AH-64E fielding is well underway. The E model enters service as a fully certified IMC aircraft. It possesses dual VORs, and is ILS/ RNAV capable (en route RNAV with version 4.0 software, est. FY15). With new expanded capabilities comes an inherent responsibility. The attack standardization community must now place a greater emphasis on equipping aviators to fly into IMC.

One cannot expunge the past seventeen years, however it is possible to correct our faults. How do we do this? We need to make a concerted effort to mitigate the risk of our newfound opportunities (IMC flight) while simultaneously instilling confidence and building proficiency.

The first step in the evolution requires updating our SOPs and Mission Risk Assessment Worksheets (MRAW) to emphasize instrument flight in the Aircrew Training Program. The fact that we can now legally fly into IMC does not mean we should without restrictions. Units should implement control measures to ensure we do not rush to failure. For example, consideration should be given to imposing specific weather minimums and pilot experience in order to fly into IMC. Also, MRAW values should reflect the increased risk associated with IMC flight and crew experience. As crew confidence and proficiency is gained, units should reassess control measures and amend them as necessary. That said, human nature dictates that a person will rarely perform tasks that are outside their comfort level. Control measures need not be so stringent as to make training and building proficiency unattainable or unrealistic.

Second, a greater importance must be placed on instrument tasks during RL progressions. Traditionally, if an aviator could perform his/her instrument tasks to standard once, it met the standard for what we do. We need to separate ourselves from the "good enough" mentality and embrace proficiency. A robust instrument centric phase (academics, LCT and flight) that dedicates more time and resources will serve as a foundation that will pay dividends in the end.

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Third involves changing how we look at instrument sustainment training. Instrument Examiners (IEs) must actively and routinely participate in the training of all aviators within his/her unit. In general, PICs and IPs train instruments and IEs evaluate. The drawback to this approach is an aviator rarely flies with an IE. An aviator should fly with an IE throughout the year, and not just on his/her APART Instrument Evaluation / RL Progression. In addition, IEs must be proactive in developing and standardizing beneficial training and realistic evaluation scenarios. Consider integrating instrument flying into daily operations. Some methods of incorporating instruments into daily operations could include mandating that every mission/ATM flight will be concluded with an instrument approach or including instrument topics into weekly pilots' briefs. Get creative. The bottom line is that without a change to the status quo, instrument proficiency is unlikely.

Fourth, ATP commanders must emphasize the importance of instrument proficiency. ATP commanders should increase 7120-R series flying hour requirements for hood/weather and tailor task iterations to the individual aviator. Changes need not be extreme, but the point needs to be made that instrument flying is a priority within the ATP.

Finally, a comprehensive no-notice evaluation program is a valuable tool that allows commanders to monitor aviator proficiency. No-notice programs should place a greater importance upon hands-on instrument evaluations (preferably in the aircraft under IMC). Evaluations in the LCT are beneficial, but it is only simulated. There is no better barometer to determine proficiency than a hands-on evaluation in the aircraft under IMC.

Our paradigm shift creates more issues than our aviator's requirement to "re-learn" IFR/IMC flight. Units must take a hard look at their LCT DAC/contractor IOs. Civilian IOs often function with little supervision from unit SPs/IPs, however; they interact with our aviators on a regular basis. IAW AR 95-1, DAC and contractor IOs will be trained and evaluated as necessary to meet the requirements of their job description or statement of work and shall be IEs (if they conduct instrument training or evaluations). An IE must also evaluate them annually. Unit IEs need to oversee and conduct periodic checks to ensure realistic and appropriate training is being conducted. If IOs are not providing beneficial instrument training, we are squandering a valuable asset when it comes to building instrument flight proficiency.

Employing a crawl, walk, run mentality to IMC flight, we will recover from instrument atrophy in the attack community. If we make it a priority, we can begin to instill confidence within the community to safely fly into IMC. Updating our SOPs to reflect the reformed mindset, emphasizing instrument tasks during RL progressions, tailoring the 7120 series, getting IEs more involved in sustainment training and conducting no-notices in actual IMC will assist us in changing how our community perceives IMC/IFR. Train, sustain, evaluate, and implement control measures.

-- CW4 Glen Blanche ***may be contacted at (334) 255-2532, DSN 558***

Safety – it never ends. There is always something more to accomplish.

Pressures of Making Mission

It would be untruthful to say that all aircraft accidents can be eliminated. As long as a human is piloting an aircraft, accidents and incidents will happen and mistakes will occur no matter how much training and resources are put into safety and training programs. That being said, accidents and incidents can be greatly reduced by focusing on proper training and safety programs. Human error continues to be the primary factor in aircraft accidents. In FY 11-14 there was 60 Class A flight mishaps with 80% of these accidents due to human error overall. Of these accidents nearly 57% of the 60 accidents occurred in combat with an 86% human error rate. These numbers reflect the enormous pressure of mission success in a combat environment.

When an aircraft accident occurs, an aircraft investigation team evaluates the scene and crew in great detail. Pilots behind the controls are normally the main focus during an investigation. An accident investigation team will break down all aspects of those pilots to include crew mix criteria, experience, training and personal lives, just to name a few. Pilots have problems just like everyone else, their minds may be on all sorts of topics while at the controls. Normal problems such as marriage, money, kids, health are things that all of us worry about at various times in our lives and the pilots at the controls are no different. Pilots need to know their personal limitations, that is usually found with experience and time. I am a different pilot than I was 20 years ago. There had been times in the past when I was so tired I shouldn't have been flying. The drive to make a mission happen was my motivation, but it could have been my downfall. I can honestly say I nearly fell asleep one night while on the controls of a helicopter in combat in the middle of the night. After that particular flight I re-evaluated my sleep schedule and coffee became my best friend.

When pilots start out they are normally hesitant but eager to learn like most type "A" personalities. But as time goes on they become braver, taking more risks when it comes to factors such as bad weather conditions. But after a bad day or experience most pilots learn to evaluate each flight more carefully, looking harder at weather briefs and their crew mix. I was told two important lessons from pilots that had a lot of flight time. Always look at every flight like a lawyer, meaning ensure you have checked all the requirements needed for that flight. These items may include a proper risk assessment, a current weather brief and a proper preflight, just to name a few. The second item that was told to me is there is a fine line between brave and stupid. Taking unnecessary risks can lead to catastrophic results. All pilots need to evaluate themselves from time to time, remembering that there are many people that will be affected if an accident where to occur. The effect on a unit or, more importantly, the families involved are limitless.

There are many external pressures that can effect a crews mind set beyond their own personal lives. Being part of a unit that has a toxic environment can cause all kinds of issues. This not only affects flight crews but affects the maintainers as well. Good leadership has a huge impact on a unit's safety program. It is important for leadership to remember that they are not only affecting the Soldiers but they are affecting the families in the unit as well. This is a trying time for Army leadership, with the current draw-downs and poor promotion rates in all ranks across the board, it is making things difficult to keep unit moral and readiness up.

The civilian sector has been impacted by human error as well. The Federal Aviation Administration (FAA) has made it mandatory that all new pilots hired by the airlines have at least 1,500 Hours of flight time. This rule took affect due to the fact that it was found that some crews had not been adequately trained and lacked the necessary experience for the airline industry.

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In conclusion, all pilots at every level in their careers need to self-assess themselves each time they step onto an aircraft. Leadership must create an atmosphere within a unit that promotes both safety and training programs. It is important that leadership listen to the smart individuals around them.

Everyone involved needs to remember what far reaching impacts accidents can create not only to the personnel involved but the families as well. I lost one of my best friends nearly five years ago to an aviation accident. I have been unable to remove his cell phone number from my contact list. It reminds me of what is important.

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UAS Class A – C Mishap Table as of 17 Sep 14

	FY 13					FY 14			
	Class A Mishaps	Class B Mishaps	Class C Mishaps	Total		Class A Mishaps	Class B Mishaps	Class C Mishaps	Total
MQ-1	5	1	0	6	W/GE	6		4	10
MQ-5	2	0	3	5	Hunter	1	1		2
RQ-7	0	4	10	14	Shadow		11	11	22
RQ-11					Raven			1	1
RQ-20	0	0	6	6	Puma			1	1
YMQ-18									
SUAV					SUAV				
Aerostat	2	3	1	6	Aerostat	3	2	3	8
Total for Year	9	8	20	37	Year to Date	10	14	20	44

"If people concentrated on the really important things in life, there'd be a shortage of fishing poles." - Doug Larson

How to Demo a New Helicopter Brownout system with a Smartphone and a Cardboard Box

The challenge to fixing helicopter brownout may not be dusty landing zones, but cloudy thinking. Twenty years and 5,000 flight hours ago, I was hovering my HH-60 (with great effort) looking inside, using only the crappy ball and stick fighter HUD mimicking hover cues. I remarked to my copilot: "Great, we have Pong. When do we get Tron (the first home video game, and the first 3D computer graphics movie and game of the same name)?"

Two groups of us saw the solution was obvious. One looked at the video screen as a video game. We just needed to turn our GPS and RADALT information into a second generation wireframe video game: "Land the Helicopter." After all, millions of people were landing virtual helicopters in their living rooms. Our computers were plenty fast to synch the real chopper with the simulation. The crazy idea was to make a helicopter landing system simulate a landing helicopter.

The other group saw the solution not as a new way to use 3D simulation, but as a way to apply old fighter heads up display methodology. They won. So for the last 20 years, we have taken the helicopter's 3D position and turned it into lots of abstract balls, noodles, sticks, digits and pseudo-analog needles; all competing for space in the middle of my screen like a spoonful of lucky charms sloshing around as I hover over the dark ocean.

A Matter of Perspective:

As anyone who has ever played a helicopter video game, you know you fly via first person view, but you land via third person "off your tail" view. That's for the simple reason that you can see both the helicopter and the landing spot in the same frame and scale. You might as well call this takeoff and landing mode.

Here is an easy way to envision what this might look like. You need a Smartphone (or tablet, camera, etc. with video screen), a cardboard box, a stick about 1-2 feet long, and an LED keychain light. Cut a hole in the lower bottom of the box for the camera to view the scene.

Now put your head into the box and see a first person view that doesn't allow you to see the helicopter and the LZ at the same time. Try setting the camera down accurately on the far edge of a table or chair. It isn't really possible. The textbook answer would be to fill the screen with all sorts of abstract references for you to translate.

Now mount the light out on the stick, pointing straight down. The light simulates a helicopter with its landing light on. This tells the helicopter's 2D ground location and its altitude via the size of the circle.

Now turn the room lighting dim enough to see both the room and the light spot from the viewfinder. Notice that not only can you land the "helicopter" with extreme precision, you can also hover at an exact height by keeping the circle a precise size – all without any translation.

The display system would be a Tron-style ground grid to represent the ground and the horizon. The virtual helicopter body would be minimized to avoid clutter. The virtual landing light would be a "laser circle" with indexes for height, and/or an adjustable index for your desired height.

There you go – a system that not only allows you to land your helicopter in a brownout as easy (probably easier) as a video game, but the "game" is also designed for accurate high altitude zero visual reference hovering.

And speaking of old solutions, an RFID tag system that displays the position of moving objects such as boats or swimmers would solve our other big hovering challenge.

These solutions have been around for 20 years. We really should take a break from emulating Top Gun fighter HUDS. Maybe solving what is essentially a helicopter simulation problem should be done by displaying a simulated helicopter.

Lt Col Robert Haston, USAF, Camp Lemonier, Djibouti

Perceived or real... urgency can kill (Aug 1992 Flightfax)

The medical company was formed on 1 April by combining three detachments from one state with one detachment from another state. On 23 May, the company received notice that they were to be activated for a duty assignment in the Middle East. On 29 May, unit personnel were ordered to report to their mobilization station on 2 June.

Following an emotional farewell, members of one of the detachments departed for their mobilization station with six aircraft. However, because of weather, they were forced to return their aircraft to home station and report to their mobilization station without the aircraft. Another six aircraft from a second detachment departed their home station only to get weathered in en route. Personnel from this detachment were forced to leave their aircraft at an en route station and also report without their aircraft.

These crews were safety-oriented and made good decisions. They knew it would be unsafe to push on in adverse weather. However, this was not to be the last time that weather would hamper this unit during its mobilization.

Mobilization

During the next 2 weeks, the entire unit processed for mobilization while checkrides were given and crew mix for the deployment to port was established. A couple of days after reporting to the mobilization station, crews were sent to recover the aircraft left at the en route station. They were to relocate all aircraft to another station where a modification work order (MWO) installing erosion tape to the leading edges of main and tail rotor blades was to be completed by a contractor. Port dates and locations as well as the completion date for the MWO installation changed several times during this short period. A requirement received from FORSCOM was for all 12 aircraft to be on the docks at the port at 0800 on 16 June. Based upon the projected 13 June completion of the MWO, the unit elected to deploy to port in one day – 14 June.

Crew assignments were made on 12 June. The next afternoon, all flight crews boarded a bus for the trip to the flight facility where the MWO was being performed. As projected, test flights following the MWO were completed on 13 June, and the crews pre-flighted all 12 aircraft late on the same day. The crews completed route planning and conducted air mission briefs that night. Crewmembers stayed at a local hotel or commuted home if they lived nearby, with orders to report to the flight facility at 0600 hours on 14 June for a 0700 departure.

Deployment

The 12 aircraft were divided into three flights of four aircraft each. The planned 0700 takeoff on 14 June was delayed for over an hour because of en route weather. The lead flight finally departed at about 0845 and arrived at designated refueling points as planned. The first legs of the flight were uneventful. However, due to weather near one refueling point, the flight route was changed. All three flights diverted to a new refueling point without any further weather problem en route. The lead flight arrived at the last scheduled refueling point at about 1900 and encountered some difficulty in refueling. There was only one refuel point, so an extended time was required for refueling. The crews obtained a weather update that stated VFR through arrival time with IFR weather forecast for the following 2 days. So the flight decided to continue even though it was now dark.

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At about 2000, the unaided flight (their night vision goggles had already been packed and shipped to port) departed the refueling point. During this last leg of the flight, Chalk 2 was having problems with its radios and on occasion could not receive the lead aircraft's radio transmissions. Chalk 3 would relay what the lead aircraft was saying.

About 2105, Chalk 1 encountered instrument meteorological conditions (IMC) and called for IMC breakup procedures. As briefed, Chalks 1 and 3 conducted inadvertent IMC breakup procedures. Chalk 2 never acknowledged the IMC breakup call and visually went under the cloud layer and turned 180 degrees. Chalk 4 followed Chalk 2, and during the turn, the Chalk 4 crew saw airport lights and called for Chalk 2 to follow them. Chalk 2 never acknowledged this call either. It cannot be determined whether Chalk 2 heard the IMC breakup call or the call from Chalk 4 concerning the lighted airport to the north.

While Chalk 4 continued its turn and approach to the airport, the crew heard radio transmissions they attributed to Chalk 2. The first call seemed to be the pilot calming the PC. In later calls, the pilot sounded more anxious and seemed to be trying to take control of the aircraft. The last sound was described as three or four beeps from the emergency locator transmitter.

According to ground witnesses, Chalk 2 was at a high hover, appeared stable, and had its lights on. Chalk 2 then flew at low level and slow speed toward a dark wooded area. At 2110, Chalk 2 hit numerous trees, entered an 80- to 90-degree left roll, and disintegrated. All three crewmembers were killed.

Analysis

After descending from altitude to avoid night IMC, the crew lost control of the aircraft and crashed while flying low level over an unlit wooded area with no visible horizon. The cause of control loss could not be determined. However, it is suspected that one of the pilots became spatially disoriented and a struggle developed over the controls. The crew had never flown together before this cross-country flight, and as a result of the breakdown in crew coordination and communications, the aircraft crashed.

Other factors were present in this accident that did not directly contribute to it; however, if left uncorrected, they could adversely affect the safety of future operations.

• **Urgency.** Members of the unit perceived an excessive sense of urgency toward getting the aircraft to port for overseas deployment. Flight leads and unit standardization personnel were hesitant to stop before arriving at port. It was perceived that the established time for aircraft arrival and loading could not be met if a weather delay was incurred. Consequently, the unit flew longer and later than normal and in worsening weather conditions.

• **Time and equipment.** Sufficient time and aircraft were not available between the date the unit was activated and the date of the accident to conduct required evaluations of new unit members in accordance with the aircrew training program. The best possible aircrew mix was accomplished by unit safety, standardization, and command personnel, using available data. However, data on the new pilots was limited because they had flown with unit IPs only once or twice. Pilots from the detachments were mixed to attempt unit integration. Most of the crews in the flight had never flown together before this cross-country flight.

Additionally, once the unit was activated, they had no support agency. When they were directed to move their 12 aircraft to port, they did not have sufficient current publications and maps to

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equip each aircraft as required by AR 95-1 and there was not enough time to acquire them.

The 11 days from the date the crews reported to the unit were not sufficient time to adequately prepare for deployment. With so many tasks to be completed in such a short time, unit personnel quickly went into a hurry-up mode. Therefore, the unit did not perform a complete mission risk assessment and plan for all contingencies. The hurry-up situation created an atmosphere of urgency. Time was not allowed to plan for unexpected weather delays or for adherence to minimum altitudes and visibilities. Had ample time for complete flight planning been available, the mission risks could have been reduced.

• **SOP directives.** The unit SOP-directed minimum en route altitude was not followed as required by the unit mission briefing sheet. Minimum altitude as stated in the SOP was 500 feet agl. Two of the four aircraft crews in the flight stated that they had descended to 300 or 350 feet agl. It may be that this happened because the unit was new and most of their reading files, regulations, and other non-personal documents and equipment had already been shipped to port. This resulted in a portion of the unit having no access to much of the unit safety and standardization data. All unit personnel should have been aware of the contents of the unit SOP pertaining to their area of operation. And once aware, good flight-crew discipline should have ensured compliance with the 500-feet-agl rule.

• **Weather.** During the weather check for the flight to the port, unit pilots were informed that 15 and 16 June would be the worst weather days to fly. With that thought in mind, the pilots departed on the 14th in three flights of four aircraft each. But because of the unexpected en route delays, the flights fell behind their planned arrival time. As a result, the lead flight did not leave the last refuel stop until 2000. Well after dark, the unaided flight departed on the final leg of flight.

Once the flight started encountering unforecast clouds at flight level, they decided it was closer to port than to return to the last refuel point. At this time, the flight fully believed their aircraft had to be in port that night and allowed that thought to influence their judgment. Under adverse weather conditions, they decided to push on.

• **Command pressure.** Not only did the crews feel pressured to get to port that evening because of forecast poor weather conditions for the next 2 days, they also felt pressured by their higher command. Previous instances of canceled passes and prompting to hurry, hurry had already occurred during the mobilization.

Summary

During their activation, the crews used good judgment and didn't push on when they encountered adverse weather. One detachment returned to their departure station, and another stopped at an en route station. However, during the deployment, they allowed a sense of urgency to cloud their judgment. Whether it's real or perceived, a sense of urgency is a risk to safe operations . Commanders must ensure that unit personnel are informed that common sense and good judgment should never be sacrificed because of a real or perceived sense of urgency.

Selected Aircraft Mishap Briefs

Information based on preliminary reports of aircraft mishaps reported in August 2014.

Unmanned Aircraft Systems

MQ-1

-System impacted mountain terrain during climb-out. System was destroyed/not recovered; total loss reported. (Class A)

-Operators received OIL PRESSURE and ENGINE-OUT indications during flight. System was crash-landed at an identified location and recovered as a total loss. (Class A)

RQ-7B

-UAS was on post-landing roll-out when the controllers reportedly lost link with the TALS. It subsequently veered into the arresting gear system on the runway, resulting in cumulative damage. (Class C)

-Operators experienced loss of power/link with the UAS during training flight at approx. 934 FT AGL, followed by loss of engine power. Recovery chute was unable to be deployed prior to loss of link but the last tracked grid location was identified and system was recovered. (Class C)

-UAS experienced an uncommanded engine failure during the landing phase and impacted the ground 60 feet short of the landing strip. UAS became airborne and came to rest again of the northern edge of the landing strip. Damage reported to the nose landing gear, center wing, antenna and payload. (Class C)

-Personnel were conducting flight training when they experienced a right elerudder FAIL warning during a landing-approach. Commander directed deployment of the recovery chute after failed attempts at landing from another control station. (Class C)

-Operators experienced loss of engine power during operation of the UAS. Recovery chute was deployed and system was recovered with damage. Fuel pump cited as preliminary loss of power. (Class C)

If you have comments, input, or contributions to Flightfax, feel free to contact the Aviation Directorate, U.S. Army Combat Readiness/Safety Center at com (334) 255-3530; DSN 558

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