Number 40 August 2014

Flightfax®

Online newsletter of Army aircraft mishap prevention information

AH-64 Safety Performance Review

This edition of *Flightfax* highlights the leading causes of AH64 accidents Army-wide over the past five years both during combat operations and in garrison training. Ask yourself the question; do I operate in similar mission profiles and could these situations apply to me? We encourage you to discuss these hard lessons learned by others during your pilot's briefs and classes in order to understand the causes and circumstances under which they occurred. Use these scenarios for practice in the simulator, and exercise good crew coordination by discussing before every flight, what each crewmember should do if you find yourself in a similar circumstance.

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

LTC Mike Higginbotham
Aviation Director, Future Operations
US Army Combat Readiness/Safety Center
email: michael.d.higginbotham.mil@mail.mil

AH-64 Safety Performance Review

In the nearly five-year period FY10 through present (960,000+ flight hours), 73 Class A through C AH-64 mishaps have been recorded. There were 17 Class A, 12 Class B, and 43 Class C with a cost of $187.2 million in damage and injuries; there were five fatalities. The Class A flight mishap rate per 100,000 hours is 1.68. Review of these mishaps shows that human error was the primary cause factor in 70% of the incidents; materiel failure accounted for 25% and 5% was environmental/unknown (two Class C bird strikes and two unknown/not yet reported - one Class B, one Class C). Highlights from some of the more frequent types of mishaps:

Power Management

Power management/aggressive flight maneuvering was involved in six of the 12 Class A human error accidents. There were also two Class B and two Class C mishaps. These mishaps demonstrate a lack of understanding and poor decision making while operating in high altitude/heavy gross weight conditions where power margins are limited. Crew situational awareness is the main risk mitigation for this type mishap. This includes proper pre- and in-flight mission planning, crew understanding of power requirements, monitoring environmental conditions that affect aircraft performance, and maintaining appropriate safety margins in challenging conditions. Summaries of some of the power management mishaps include:

Scenario 1

While conducting a visual meteorological condition, night vision system approach in an AH-64D to a pinnacle/ridgeline helicopter landing zone at 12,200 feet mean sea level, the aircraft's airspeed decreased below effective translational lift while airspeed decreased below effective translational lift while still in an out-of-ground effect condition. The aircraft's rotor RPM decreased and the aircraft settled and impacted the terrain. The aircraft was destroyed and the two crew members were injured.

Scenario 2

While conducting a reconnaissance mission in mountainous terrain, the pilot made a tight right turn and the aircraft decelerated to 34 knots true airspeed and 70 feet above ground level. When the rotor RPM drooped, the aircraft did not have enough airspeed and altitude to maintain powered flight. The aircraft descended into a steep walled canyon and impacted the ground. The aircraft was destroyed, one crew member sustained fatal injuries and one crew member sustained serious injuries.

Scenario 3

Crew reportedly experienced a tail wind and airspeed/rotor droop, once airborne from refuel, followed by loss of tail rotor effectiveness. Aircraft descended to ground impact, rolled and came to rest on its left side. Crew was able egress with minor/superficial injuries.

Scenario 4

During take-off from a FARP, a AH-64D conducted a take-off in OGE conditions without OGE power available. Upon decent of the aircraft outside of the FOB perimeter, the aircraft encountered brown-out conditions and impacted the ground in a wadi. The impact caused damage to the right front strut and right wing of the aircraft.

Object Strikes

There were six tree strikes recorded in the 73 incidents, two resulting in Class A damage. Additional object strikes included three aerostat tethers (Class B), and one wire/cable strike (Class A). Examples of aircraft object strikes include:

Continued on next page

Continued from previous page

Scenario 1
Aircraft was Chalk 2 in a flight of two, conducting mission training when it descended into a wooded area and crashed. Crewmembers were extracted with treatable injuries, aircraft reported as destroyed.

Scenario 2
While conducting NVS confined area operations, aircraft drifted into trees. Aircraft came to rest on its side with potential class A damage.

Scenario 3
Upon completion of a day, low-level and contour flight, the crew shutdown the aircraft and executed a post fight inspection. Their inspection revealed a vegetation “strike” to all four tail rotor blades and the stabilator. The exact location and time of the tail rotor strike was unknown. (Class C)

Scenario 4
While conducting a day, nap of the earth flight at 50 feet above ground level and 111 knots true airspeed, the accident crew struck a one-inch ferry cable that was strung across the river. The aircraft struck the cable midway up the forward windscreen, bisecting the gunner station, and severely damaging the forward canopy. The pilot-in-command was fatally injured.

Maintenance error

Scenario 1
While reinstalling the Number 5 tail rotor drive shaft, the maintainers failed to apply the proper torque and conduct follow-on inspections to the Number 5 tail rotor drive shaft bolts. Consequently, the Number 5 tail rotor drive shaft vibrated and caused the aft hanger bearing coupling to shear. The aircraft crashed, causing significant damage to the airframe.

Scenario 2
During the conduct of a precautionary landing following detection of smoke/fumes in the cockpit, the collective position did not correlate to the torque output of the engines. At some point during the landing, the rotor head was out of position and not being driven by the transmission and not responsive to collective input. The aircraft impacted the ground in a level roll attitude, approximately thirteen degrees nose up, and with approximately nine Gs of force sustaining major structural damage and injuries to the co-pilot gunner in the front seat. Suspected over-torque of the main rotor hub nut retention ring at the factory created improper pre-loading of the bearings and lead to a catastrophic bearing failure and over-heating of the static mast. The heating event on the mast lead to the rotor head separation (held only by the PC-links).

Scenario 3
While conducting a maintenance test flight, top end check at 9,200 ft AGL, the wire bundle supplying 115VAC power to the Nitrogen Inerting Unit was chafed causing an electric arc with the frame. The wire bundle failed due to improper installation in that the wire bundle was in contact with the frame without chafe tape installed. The electric arc allowed hydraulic fluid in the vicinity to heat up and exceed its flash point and ignite, causing damage to the hydraulic fluid line and airframe.

Materiel failure

Scenario 1
Crew was participating in night operations when they detected smoke odor in the cockpit caused by a #2 generator bearing failure. While conducting an emergency landing, the crew experienced electric power outage in the cockpit and loss of night vision systems. During the unaided landing to

Continued on next page

Continued from previous page

a dusty environment, the aircraft's main rotor blades contacted the ground with the aircraft coming to rest on its side.

Scenario 2

Crew was conducting night, NVG/hood training when they encountered un-commanded control input at a 5-foot hover. Aircraft main rotor system contacted the ground and the aircraft sustained class A damage.

Scenario 3

While on the ground at 100 percent rotor rpm, 17 percent engine torque, after the collective was placed in the full down position, the AH-64D experienced a high cycle fatigue failure of the mast base support assembly. The main rotor system and mast tilted forward, causing the main rotor to impact the forward fuselage. The mast contacted the ground and rotated in front of the aircraft, causing the rotor blades to strike the forward fuselage and copilot/gunner (CPG) cockpit area. The main rotor system and mast assembly came to rest forward and left of the fuselage and the aircraft came to rest on the right weapons pylon rocket pod. The CPG was fatally injured and the pilot in command was seriously injured.

Scenario 4

During a day reconnaissance mission, a catastrophic failure of the main rotor system occurred in flight. The aircraft crash resulted in two fatalities.

Miscellaneous

Scenario 1

Aircraft encountered reduced visibility and IMC conditions and initiated a climb to avoid known obstacles. The Pilot not on the controls (PI) announced there was terrain to the left. The Pilot on the controls (PC) made a slight right hand turn to avoid terrain on the left and inadvertently struck terrain on the right. Forward motion never ceased, and the crew continued to maneuver the aircraft in an attempt to clear the remaining obstacles. Aircraft broke out of the clouds (VMC on top) and proceeded back to base for landing. (Class C)

Scenario 2

Aircraft experienced an Nr exceedance (132%) during descent for landing to the FOB. Crew was able to land w/o further incident. AED confirmed component-replacement requirement/Class B damage.

Scenario 3

#1 Engine nacelle was observed to be in the open position and damaged during aircraft refuel. Crew did not properly verify latches on the nacelle were properly latched. Nacelle required replacement.

Scenario 4

During flight using Night System (FLIR) in support of an operation, the Co-Pilot Gunner's Power Lever malfunctioned and initiated lockout without an input from the Co- Pilot Gunner. As a result, the main rotor peaked at 111% and #2 engine peaked at 131% as the crew initiated the emergency procedure for an Np overspeed. The crew safely recovered the aircraft, and conducted an emergency landing at home base with no injuries. The Power Lever malfunction was caused by an "orange gooey substance" (suspected spilled soda) which had gotten into the Pilot Quadrant Assembly. The foreign substance prevented the Power Lever from securely setting in the fly position and led to an uninitiated lockout condition. The fact that a liquid (suspected soda), at some point prior to this flight, had been spilled on the Power Lever Quadrant in the Pilot's station,

Continued on next page

Continued from previous page

and had not been reported or properly cleaned is what led to the unsafe flying conditions and root cause of the emergency.

Scenario 5

Crew of aircraft #1 was conducting assault training with a sister ship when it collided with aircraft #2 whose crew was conducting aerial RECON of an objective in the vicinity. Both aircraft crash-landed but crewmembers suffered no significant injuries. Collective damage to both aircraft reported at the Class A level.

Summary

Thirty-two (44%) of the events occurred under N/NVS conditions. Thirty-four (47%) occurred in OEF/OIF. Not all of the 73 mishaps have been listed. Missing are several open cowlings, inlet covers left in place during start, single-engine over-torques from attempted aircraft movement with a PL pulled back, Np/Nr overspeeds due to DECU malfunctions or training, etc. As with all types of airframes, human error continues to be the primary cause factor in aircraft mishaps. Addressing human performance issues relating to training and proficiency, maintaining standards – at both the individual and supervisory level and demonstrating discipline and professionalism in required tasks help ensure successful mission accomplishment.

	AH-64D CLASS A – C Mishaps			
FY	Class A	Class B	Class C	Fatal
2010	3	3	7	1
2011	3	3	18	1
2012	3	3	8	1
2013	1	0	4	2
2014	7	3	7	0
Total	17	12	44	5

"A crude measure of the right thing beats a precise measure of the wrong thing." John Carver

Lockout May NOT be the Solution

DAC Charles W. Lent
Directorate of Evaluation and Standardization
U.S. Army Aviation Center of Excellence
Fort Rucker, Ala

Since 2005, a tactic, technique and procedure (TTP) has been slowly gaining acceptance in the UH-60 community that may not be the correct response in all decreasing rotor situations. The mission requirements in Afghanistan have forced H-60 aircrews to perform missions at the limits of aircraft engine performance. Most Army aviators have not experienced these environmental conditions, which require an understanding of engine gas generator speed (N_G) and fuel flow limiting.

Although the operator's manual includes information on turbine gas temperature (TGT) limiting, there is little information on fuel flow and N_G limiting. Because TGT is the only method of engine limiting mentioned, pilots may believe that bypassing the TGT limiting function of the Electronic Control Unit/Digital Electronic Control Unit (ECU/DECU) will always offer additional power. It is critical for aviators to understand the conditions that cause the engine limiting before placing an engine in lockout.

The General Electric (GE) T700-series engine limits maximum torque available in one of three ways: TGT, N_G or fuel flow. Typically, H-60 pilots have been trained to rely on TGT as the best indicator of aircraft power. Until recently, most H-60 pilots flew missions in environments in which TGT was generally the engine-limiting factor. When limited by TGT, bypassing the ECU/DECU limiting function would allow the pilot to increase torque by 2 to 4 percent beyond the dual-engine limiter. When operating in cold environments (below 0 C), the T700-series engine may reach an N_G or fuel flow limit before a TGT limit. Below minus 20 C, the engine will always be N_G limited and TGT will not reach the dual-engine limiter value.

Here is the danger. Pilots who rely only on TGT and fail to consider N_G or fuel flow limitations when determining the additional power beyond the maximum torque available may be in for a nasty surprise. That additional power may not be there, a situation that could delay a successful recovery or escape plan. The current charts in the operator's manual, tabular data and the integrated performance aircraft configuration (IPAC) software do not specify whether the maximum torque available figure is TGT, N_G or fuel flow limited. However, all give an accurate maximum torque available value regardless of the limiting factor.

Power Limited Approaches and the Value of Escape Routes

Rotary-wing aircraft supporting Operation Enduring Freedom (OEF) are often required to take off and land at high gross weights in power-limited situations. Anytime a pilot determines he is in a power-limited situation, it becomes even more imperative to have an executable escape plan for the entire takeoff or landing sequence. A limited power situation is not a go/no-go event since conditions such as wind, turbulence, pilot control input and power required for the deceleration for landing aren't precisely predictable and aren't factored into torque values. Variables may change during the takeoff or landing, causing pilots to exceed the planned and calculated power limit. It is critical while conducting landings during TGT, N_G or fuel flow limited power situations that an escape must be executed whenever a rotor droop occurs or anytime power is in question.

Continued on next page

Continued from previous page

Limited power margins should be an indicator to the pilot in command as to whether to attempt the maneuver. As the margin between power available and power required becomes smaller, the quality and necessity of an executable escape plan should be the determining factor in deciding to conduct an approach. Issues such as power to overcome wind, turbulence, downdrafts and deceleration must be factored into the maneuver. Climb/descent power available must be determined before beginning the maneuver and the ability to execute an escape at any point is critical. Where power requirements may be marginal and cannot be accurately calculated, it may be necessary to verify power available by applying power at the same conditions as the landing zone (LZ) before the approach.

When conducting limited power approaches, Task 1011 of the aircrew training manual (ATM) states: "Determining aircraft performance using tabular data, requires that aircrews update performance data when there is an intent to take off or land when operating within 3,000 pounds MAX ALLOWABLE GWT OGE and when there is an increase of 1,000 feet pressure altitude and/or 5 C from the planned PPC." Currently, the only method of calculating the data to meet this standard is the tabular data located in the operator's checklist or by using the charts in the operator's manual. During the next revision of the ATM, Task 1011 will be updated to include the use of IPAC software to derive values.

Landing Zone Sequence a Proven Procedure

The Directorate of Evaluation and Standardization, in coordination with U.S. Army Forces Command and 21st Cavalry Brigade, have been involved in training units before deployment to Afghanistan in these limited power situations. The High Altitude Mountain Environmental Training (HAMET) package includes mountain flying considerations, power management, multi-aircraft and night vision goggle operations. It also includes an LZ sequence that is used for all approaches, simulating marginal power and includes terrain analysis. Originally adopted from the High Altitude Aviation Training Site program of instruction taught at Eagle, Colo., it is an invaluable and proven technique for determining margin available versus power required, a vital consideration when conducting limited power operations. Although trained in mountainous conditions, the techniques can apply to takeoffs and landings in any limited power environment. The next revision of the H-60 ATM will include the following procedure:

LANDING ZONE SEQUENCE

1. **ENVIRONMENTAL**

-Note temperature at LZ.
-Note pressure altitude of LZ on altimeter setting of 29.92.

2. **SUITABILITY**

-Size, slope, surface, long-axis, obstacles.

3. **POWER REQUIREMENTS**

-Tab data/IPAC Max OGE wt ________
-A/C wt (zero fuel wt + fuel) ________
-Difference (+/-) ________
-Percent torque (TQ) (+/-) ________
-Max TQ (Verbalize) ________
-Hover TQ (Verbalize) ________

Continued on next page

Continued from previous page

4. **WIND**
-Assessment of the direction and velocity of the wind by cockpit indicators, visual indicators, GPS, last known forecast wind, or flight maneuvers.
-Analysis of terrain, trees, buildings and their effects upon wind creating updrafts, downdrafts, headwinds, tailwinds, crosswinds and demarcation lines from a large scale down to the touchdown point.

5. **ROUTE IN/OUT /ESCAPE**
-Wind should dictate route in, out and escape.
-In calm wind, use the route that affords the best escape.

6. **LOW RECONNAISSANCE**
-Verify wind by using cockpit indicators.
-Ground track versus heading.
-Airspeed versus true airspeed (convert IAS to TAS to make this step accurate).
-A/S versus TQ versus VSI (vertical speed indicator).
-Verify escape.
- Verify touchdown point and suitability.

7. **APPROACH/TAKEOFF**
-Predicted TQ for approach, hover and takeoff. This is an adjustment of the hover TQ, considering level surface and zero wind.
-Expended TQ is the highest amount of TQ used during any part of the maneuvering, approach and takeoff.
-Actual TQ is the amount of TQ to hover.
-If there is a difference between TQ values, discuss why.

Conclusion

In summary, the GE T700 engine limits maximum torque available in one of three ways: TGT, N_G or fuel flow limiting. Pilots must have an understanding of the conditions that cause each type of limiting and should rely on the maximum torque available figure derived from the IPAC software, operator's manual or tabular data when determining maximum power available. Pilots should not focus on TGT as the sole indicator of engine power below 0 C when operating with a T700 engine. Nor should they make the false assumption that placing an engine in ECU/DEC lockout will offer additional power in all environmental conditions. The torque increase of 2 - 4 percent gained when the T700 series engine limits by TGT and is placed to lockout must be secondary to having an accurate knowledge of power margin available and an executable escape plan during limited power approaches. Reprinted from *Knowledge* magazine, June 2011 issue.

> "Our greatest weakness is habit. Our most lethal foe is routine."
> Craig E. Geis

Mishap Review: UH-60 Ground Taxi

While ground taxiing to parking at a civilian FBO, the UH-60A's main rotor contacted a 25 foot light pole resulting in significant damage to the aircraft. Chalk 2, two civilian fixed-wing aircraft, and an Air force jet were also damaged by flying debris. There were two injuries to FBO personnel.

History of flight

The mission was a day VFR multi-ship formation training flight involving two aircraft. The purpose of the flight was to conduct formation training, LZ/PZ reconnaissance, VMC flight maneuvers, FARP operations, and a local area orientation. The crews reported for duty at 0700L for the 1015L planned departure. The crew completed their mission planning and conducted an air mission brief at 0915L followed by the crew brief and run-ups at 0940L. Reported weather was clear with unlimited visibility throughout the entire phase of flight. The crew briefed the mission as low-risk mission and the company commander approved the mission.

The flight departed at approximately 1015L en route to the planned training location. At approximately 1220L, both aircraft landed for hot refuel. Following refuel the aircraft departed for the second phase of their planned training.

At 1335L the two aircraft landed at a commercial field for refuel with the accident aircraft (Chalk 1) leading into parking at the FBO ramp. While positioning into their parking spot, Chalk 1's main rotor system contacted a 25-foot light pole located on the edge of the parking ramp. The collision severely damaged the accident aircraft main rotor system, drive train and engines. Chalk 2 sustained minor airframe skin damage and FOD to the #1 engine. Flying debris damaged an Air Force jet and two civilian fixed wing aircraft. Injuries occurred to two FBO employees, one an abrasion to the right calf, and the other a broken foot.

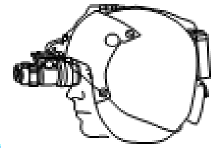
Crewmember experience

The IP had 900 hours total flight time, with 190 NVG and 200 combat. The PI had 290 hours total time, with 58 NVG. There were no non-rated crewmembers in the back.

Commentary

The accident investigation determined that while maneuvering to parking, the crew failed to properly scan resulting in failing to detect and avoid the light pole at the edge of the ramp. Additionally, the IP was distracted as he attended to tasks inside the cockpit.

DEPARTMENT OF THE ARMY
NIGHT VISION DEVICES BRANCH
110th AVIATION BRIGADE
FORT RUCKER ALABAMA 36362-5000



ATZQ-ATB-NS 25 July 2014

MEMORANDUM FOR U.S. ARMY COMBAT READINESS/SAFETY CENTER, BLDG 4905, FORT RUCKER, AL 36362

SUBJECT: Light Emitting Diodes (LEDs) and NVG Compatibility

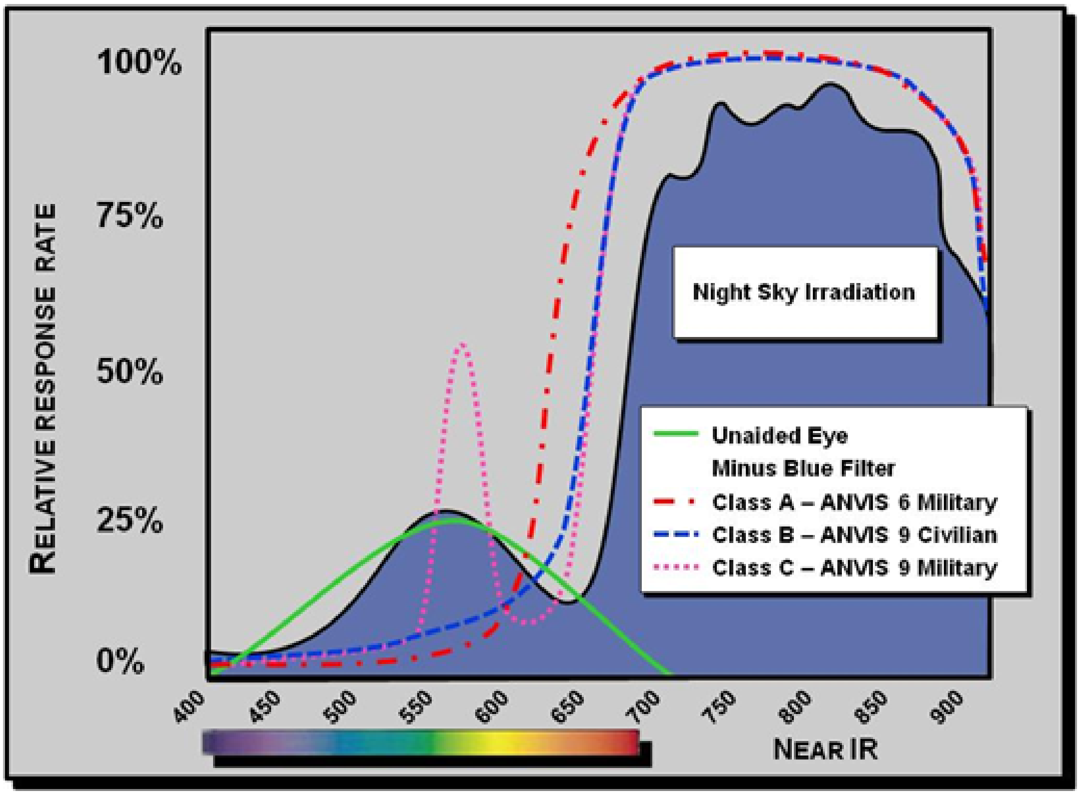
1. The rapidly increasing transition from incandescent lights to Light Emitting Diodes (LEDs) has caused a significant amount of concern in the aviation community since obstructions identified by LED beacons are much more difficult to detect, as are aircraft using LED position lights. There is a trend to convert to LEDs for obstacle illumination because LEDs are more energy efficient with much lower operating cost than incandescent lights. LEDs have a narrow emission band and do not emit unused infrared (heat) energy like incandescent or fluorescent lights.
   a. An incandescent light emits approximately five times the visible wattage in waste infrared energy. Much of this infrared energy is detectable by NVGs, which are sensitive into the near-infrared spectrum. LEDs, by contrast, emit barely one-fifth of the visible wattage in waste infrared energy. This makes obstruction lights much less visible by NVGs, even in open and unlighted terrain. The most significant hazards occur in dense urban environments.
   b. Consider the following illustration: A 1,500-foot tower in an urban environment is illuminated using a 1,000-watt incandescent bulb. A pilot using NVGs will see 1,000 watts of light and, because the NVGs see into the near-IR portion of the spectrum, the majority of the 5,000 watts of waste heat, producing the unaided equivalent of a 6,000-watt bulb. Now assume that the tower operator converts the obstacle light to an LED. The NVG-equipped pilot will now see 1,000 watts of visible light plus only 200 watts of waste heat, for a severely reduced visual signature equivalent to a 1,200 watt light. Most street lights in North America use 250-400 watt street lights. Assume a 250-watt street light (non-LED). The pilot's NVGs encounter 250 watts of light plus 1,250 watts of heat, for a 1,500 watt equivalence. Since the relative brightness of the LED-equipped tower is only 1,200 watts, it disappears in the city lights.
2. The other substantial change involves the color of the lights and how those lights are filtered by the NVGs for cockpit use.
   a. The objective lens of NVGs contains a "minus-blue" coating. This is a special coating on the objective lenses that reduces interference from NVG-compatible instrument panel and supplemental cockpit lights. It makes the ANVIS "blind" to this lighting so that glare does not interfere with viewing outside the aircraft. The minus blue filter is the primary difference between ANVIS-6, military ANVIS-9 and civilian ANVIS-9 (F-4949) NVGs. As shown below, light becomes harder for NVGs to detect as it gets closer to the purple end of the visible spectrum. The minus blue filters used in the military and civilian ANVIS-9 block more light than those used in the ANVIS-6. This is primarily due to the requirement to block the light from the red Head-Up Displays and full-color Multi-Function Displays used in those cockpits.
   b. Obstruction lighting is designed around the human visual response. Human visual response ranges from approximately 400 to 700 nanometers (nm), while normal NVG response to light energy occurs

Continued on next page

Continued from previous page

from about 645 nm to 930 nm with the peak sensitivity occurring between 660 to 850 nm. Aviation NVGs are only minimally responsive to light below about 645 nm.

c. Aviation Red lighting ranges from about 610 to 700 nanometers (nm). Additionally, current regulation allows for the performance characteristics for red obstruction lights to be measured in white light



then calculated based on manufacturer-provided values for the glassware, allowing some uncertainty about the actual wavelengths produced. NVGs approved for civil aviation (having a Class B Minus Blue Filter) are only sensitive to energy ranging from 665 to about 930 nm. Because LEDs have a relatively narrow emission band and do not emit infrared energy like incandescent lights (above), it is quite possible for them to meet regulatory requirements for Aviation Red but be below the range in which NVGs are sensitive. As a result, a red-orange LED can appear red to the human eye and meet the requirements for Aviation Red, but still not be visible to aircrews wearing NVGs.

3. In general terms, NVG users should be aware that LED lighting systems falling outside the combined visible and near-infrared spectrum of an NVG (approximately 665 to 930 nm) will not be visible to their goggles. This includes aircraft lighting systems as well as obstruction lights. This is a problem in higher light conditions, when the contrast between the light sources and the background is reduced, as well as in lower light conditions, when towers and other obstructions are less visible, regardless of lighting.

4. Risk Assessment/ Risk Management: Institutionally, the US Army has identified that LED obstruction and aircraft lighting is a hazard to flight operations when using NVGs. It has instituted the control measure of training every aircrew member regarding these hazards during their initial entry training, and it is included as information in the ANVIS Operator Manual. It is incumbent upon the commander of each unit to identify the LED illuminated flight hazards in their area of operations and brief their aircrews. As of the date of this memorandum, there is no comprehensive, current database available to the aviator which

Continued on next page

Continued from previous page

differentiates between obstructions illuminated by incandescent versus LED lighting. There is also no mention in operational risk management tools relating to NVGs and obstruction lighting.

5. Recommendations:
   a. Do not rely solely on NVGs for obstacle detection. LED-lighted obstructions or aircraft may be difficult or impossible for NVG-equipped aircrews to detect. Viewed unaided, however, the lights in the flight environment reassume their accustomed relationships. It is therefore imperative that aircrews periodically cross-check the NVG view of their flight environment with unaided vision.
   b. Exercise caution not to out-fly visibility. Use extra caution when flying near obstacle areas and to report any hazardous sites as appropriate.
   c. Ensure flight navigation information is accurate and current. Ensure navigation equipment is updated and fully functional.
6. References:
   a. FAA SAFO 09007 Night Vision Goggle (NVG) Advisory Pertaining to Certain Red Color Light Emitting Diodes (LED) 6 Mar 09
   b. FAA Engineering Brief No.67D Light Sources Other Than Incandescent and Xenon For Airport and Obstruction Lighting Fixtures 6 Mar 12
   c. FAA Advisory Circular 20-74 Aircraft Position and Anti-collision Light Measurements 29 July 71 (current)
   d. FAA Advisory Circular 150/5345-43F - Specification for Obstruction Lighting Equipment 12 Sep 06
   e. US Army Aeronautical Design Standard ADS-74-SP US Army Aircraft Lighting, 19 Dec 2008.
   f. MIL-STD-3009, Lighting, Aircraft, Night Vision Imaging System (NVIS) Compatible, 2 Feb 01.
   g. TM 11-5855-313-10, Operator's Manual For Aviator's Night Vision Imaging System (ANVIS) AN/AVS-6(V)3, Aug 14.
   h. NVESD Test Report Analysis of Resolution vs. Light Level Performance for Class A ANVIS vs. Class B ANVIS Rev 2, 28 Feb 05.
   i. US Army Night Vision Systems Guide Rev 2, Dec 13.
   j. Special thanks to Dr. Bill McLean at USAARL for additional spectral response information for Class A, B and C filters, 7 May 14.
7. The information in this memorandum is releasable without restriction.
8. POC for this memo is the undersigned at 334-255-9515, usarmy.rucker.avncoe.mbx.atzq-atb-ns@mail.mil.

//Signed//
KEITH BARKER
CW4, USA
NVD Branch Chief

The U.S. Army Combat Readiness/Safety Center recommends this memo for inclusion in your unit reading file.

Class A – C Mishap Tables

	Manned Aircraft Class A – C Mishap Table									as of 27 Aug 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	4	0
	May	0	0	6	0		3	1	2	2
	June	1	1	4	0		2	0	5	0
4th Qtr	July	1	0	6	0		2	0	4	0
	August	1	1	9	0					
	September	0	1	3	0					
	Total for Year	9	7	59	8	Year to Date	16	6	32	6

UAS Class A – C Mishap Table									as of 27 Aug 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	5		4	9
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	9	14	20	43

There was little margin for safety. 17 Jan 1990 *Flightfax*

There was nothing unusual about the mission. Two UH -60s would transport two M102s and 14 passengers to a firing point for an artillery training raid. Each aircraft would carry seven passengers and slingload an M102. After arriving at the landing zone, they would set down the M102s, land and unload their passengers, then proceed to a laager area. When firing was completed, the aircraft would return to the LZ, pick up the passengers and M102s and return to the PZ.

The morning of the mission, the air mission commander (AMC) briefed the aircrews, and the aircraft proceeded to the PZ, arriving at 1000 hours. Each aircraft carried a crew of three.

The passengers boarded and the M102s were slingloaded. When the lead aircraft attempted to hover, the pilots saw that the aircraft go-no-go criteria for power had been exceeded, and the load was set down. When the second aircraft attempted the same maneuver, the results were the same. The crews decided to remain on the ground with the aircraft operating and burn off fuel to reduce their gross weight.

After enough fuel had been burned off, the crews repositioned their aircraft to a northerly heading to take advantage of the wind. This time when the aircraft picked up their loads, the go-no-go criteria were acceptable.

The trail aircraft took off first and circled, waiting for the lead aircraft. Then the lead aircraft took off and linked up for the flight to the LZ.

The flight was uneventful. Arriving at the LZ, the lead aircraft made a high recon to determine suitability of the LZ, wind direction, and the appropriate landing direction. Performance planning for the LZ indicated the aircraft would be operating at or near maximum power available, and landing into the wind would be of utmost importance.

The planned landing direction was 320 degrees. Winds appeared to be from the west, but the AMC called the control tower about 10 miles north of the LZ to get a reading on the wind. He was told the wind was 240 degrees at 4 knots. The pilot of the lead aircraft planned his approach for a landing direction of 240 degrees and began his approach.

The lead aircraft came to a hover at 30 - 40 feet over the LZ, with 0 knots IAS. The M102, on its extended sling, was about 10 feet above the ground. The aircraft hovered for 10 - 15 seconds, then the pilot felt it start to descend, and he increased power. Main rotor rpm decreased to 80 percent, and the aircraft began yawing to the right as it continued to descend. Then the low rotor audio sounded. The PIC took the controls, reduced power, and attempted to increase airspeed, but the aircraft yawed farther to the right.

Both the pilots attempted to release the load, using the cargo hook release switch, but the load wouldn't release. The switch was pressed three times, and the crew chief could see the hook opening and closing, but the sling didn't release. The PIC told the crew chief to manually release the load. But as the crew chief reached down to release the load, the pilot and PIC pressed the emergency cargo hook release switch, and the load released. Once the load was released, the aircraft regained power, and the crew flew to the LZ and landed.

When the crew of the trail aircraft saw the MI02 from the first aircraft lying on its side in the LZ, they made a go-around to the south and landed at the base of the hill on which the LZ was located.

One of the artillery battery commanders was in the LZ as the lead aircraft made its final approach. He later told the crew that when the aircraft was on short final, the wind was turbulent and

Continued on next page

appeared to be coming from behind the helicopter (from the east).

The aircraft performed as predicted by the performance planning charts in the operator's manual, but the crew had allowed only a slim margin for safety-too slim as it turned out.

The ground commander had made a mistake when he briefed the AMC on the weight of the M102. It weighed 3,475 pounds, not 3,300 pounds as he had said. The scales tipped even further against a safe operation when the wind at the LZ suddenly shifted, creating a tailwind condition. The aircraft required more power than was available and it began losing altitude.

When the aircraft started descending, the pilot increased collective. That only aggravated the situation. The collective increase further decayed rotor rpm, resulting in loss of tail rotor effectiveness. The aircraft spun to the right with the M102 still attached. A wheel on the M102 struck the ground and the load had to be released to save the aircraft.

There were other factors that might have made a difference in the outcome of this mission.

- The small LZ was located on a pinnacle at 7,100 feet. The size and location of the LZ did not permit use of ground guides and the aircrews were unable to contact the ground unit on the briefed radio net.
- Smoke would have given the aircrew a reliable indication of wind direction for their approach. However, ground guides or smoke would not be available when performing an artillery raid without an advance party during wartime operations.

In a mountainous area such as this, where wind directions are known to shift abruptly, a 1,000-pound reduction in maximum allowable gross weight would have provided a greater margin for safety by giving the aircrews a power reserve to be used in case adverse environmental conditions were encountered. •

For your consideration…AH-64 loss of NVS (from actual events)

Event 1: Without power to the number two AC Bus, the aircraft's Flight Management Computer (FMC) failed, Backup Control System (BUCS) failed and the crew member's night systems capabilities were lost. As a result, the pilot in command had to execute a night unaided landing to a dusty, unimproved/desert environment which resulted in the pilot landing with a right bank angle allowing the main rotor blades to contact the ground and the aircraft rolling onto its right side.

Event 2: Both the TADS and PNVS video immediately stopped so both crewmembers donned their night vision goggles (NVG). Upon donning NVGs, the crew was able to maintain aircraft control.

Keep those goggles handy!

Selected Aircraft Mishap Briefs

Information based on Preliminary reports of aircraft mishaps reported in July 2014.

Observation helicopters

OH-58D 

-Crew experienced an in-flight anomaly while at a hover which prevented application of aft cyclic. Aircraft landed hard with damage. (Class C)

OH-58C 

-During engine start temperature exceeded 1,000 degrees C. (Class C)

Attack helicopters

AH-64D 

-On movement from refuel point, aircraft descended to ground impact. Rolled, and came to rest on its left side. (Class A)

-Post-flight revealed transmission access panel missing. Damage to two main rotor blades and two tail rotor blades. (Class C)

Cargo helicopters

CH-47F 

-Aircraft was on climb-out at 150 feet AGL 40 KIAS when all 3 cargo hooks reportedly opened and released the M777 howitzer sling-load. (Class A)

Fixed Wing Aircraft

C-26B 

-Aircraft experienced a hard landing during a training flight. Damage reported to the landing gear, prop and runway light. (Class C)

Unmanned Aircraft Systems

RQ-7B 

-Crew received generator and ignition FAIL warnings during flight. Recovery chute was activated at 500' AGL at a suitable area for recovery. (Class C)

-Crew reported loss of engine power during flight. System descended below altitude for recovery chute deployment and crashed sustaining major damage. (Class C)

-UAS was in a landing phase under TALS when it reportedly initiated an uncommanded pitch-up of the nose until it was near vertical/perpendicular to the TALS station at which time the engine failed. UAS then entered a nose down attitude until ground impact. (Class B)

-System was in a landing phase when it experienced an uncommanded control input and crashed resulting in damage. (Class C)

Subscribe to Flightfax via the Aviation Directorate Website: https://safety.army.mil/atf/

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

U.S. ARMY COMBAT READINESS/SAFETY CENTER

Online newsletter of Army aircraft mishap prevention information is published by the Aviation Directorate, U.S. Army Combat Readiness/Safety Center, Fort Rucker, AL 36322-5363. DSN 558-3530. Information is for accident prevention purposes only. Specifically prohibited for use for punitive purposes or matters of liability, litigation, or competition.