Flightfax
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AH-64 Five-Year Safety Performance Review FY16-20

In the five-year period from FY16 through FY20 (660,000-plus flight hours), 77 AH-64 Class A-C mishaps were recorded. There were 15 Class A, 14 Class B and 48 Class C with a total cost of $384.5 million in damage and injuries as well as 12 fatalities. The Class A flight mishap rate was 2.12 mishaps per 100,000 hours. The AH-64 Class A-C rate was 9.39. In comparison, the rotary-wing (RW) Class A rate was 0.95, and the A-C rate was 6.97. The Apache accounted for 18.4 percent of the RW flight hours, 35 percent of the Class A mishaps and 23 percent of the RW Class A-C mishaps. The previous AH-64 five-year period (FY11– FY15, 919,000 hours) had a Class A rate of 1.85 and A-C rate of 7.29 with five fatalities.

The AH-64E flew 34 percent of the AH-64 hours and compiled 34 percent of the A-C mishaps. The AH-64E Class A rate was 2.66 and the A-C was 8.86. The AH-64D rates were 1.84 and 9.97 respectively.

A review of AH-64 mishaps shows human error (HE) was the primary cause factor in 87 percent of the Class A mishaps and 73 percent of the total Class A-C incidents. Materiel failure accounted for 13 percent of the Class A mishaps and 17 percent of the total Class A-C incidents. Four percent were environmental related (bird strikes) and six percent were not yet reported or unknown. The following are highlights of the more frequent types of mishaps.

Controlled Flight into Terrain (CFIT) / Object Strikes

There were six terrain strikes, 10 tree strikes and five wire strikes recorded in the 77 incidents; eight of which resulted in Class A damage. Additional strikes included two main rotor blade strikes on the modernized (M)-target acquisition designation sight/pilot night vision sensor (TADS/PNVS) and two bird strikes. A review of the major mishaps for the five-year period includes:

1. **CFIT:** While conducting an area security mission under night vision device (NVD) the AH-64E contacted an abrupt rise in the terrain resulting in two fatalities and destruction of the aircraft. (Class A)

2. **Wire Strike:** While conducting a night vision system (NVS) flight in a local training area along a published nap of the earth (NOE) route, the aircraft impacted wires at 29 feet above ground level (AGL) causing significant damage to two main rotor blades, the flight control system, and pilot night vision sensor (PNVS). (Class A)

3. **Object Strike:** While conducting a day battle

handover (BH) in an AH-64D hovering at 25 feet AGL, the aircraft drifted rearward into rising terrain. The tail section of the aircraft made contact with the sloping terrain causing damage to the tail rotor, loss of directional control, and the destruction of the aircraft. The crew suffered minor injuries. (Class A)

4. Degraded Visual Environment (DVE): While conducting a night visual meteorological conditions (VMC) approach in an AH-64D, under zero illumination and brown-out conditions, the AH-64D impacted the ground and spun approximately 140 degrees about the nose of the aircraft coming to rest on its left side. A post-crash fire destroyed the aircraft. There was one aircrew injury. (Class A)

5. CFIT: While conducting a night familiarization gunnery, the instructor pilot (IP) on the controls in the pilot's (PI) (back) crew station successfully recovered from a diving rocket fire engagement. During the subsequent left 180-degree turn, the aircraft impacted the ground in a nose-low left bank at a high rate of descent. The crew suffered fatal injuries and the aircraft was a total loss. (Class A)

6. CFIT: While conducting a night hasty attack and following transfer of the flight controls at terrain flight altitude, the aircraft impacted the ground at a high rate of speed and descent, resulting in the destruction of the aircraft and two fatalities. (Class A)

7. CFIT: While conducting contour flight, the aircraft struck a hilltop, causing extensive damage to the fuselage and forcing an emergency landing. (Class A)

8. Object Strike: During a hovering illumination rocket engagement, the tail wheel struck the ground, resulting in the aircraft yawing and rolling to the right with subsequent airframe contact with the terrain. The aircraft sustained significant damage to the tail wheel landing gear assembly, tail boom section, right wing and 30 mm gun turret. The crew was not injured. (Class B)

9. Wire Strike: While performing a VMC flight at night, using NVS the aircraft impacted a set of high voltage power cables at 395 feet AGL, resulting in two fatalities and destruction of the aircraft. A post-crash fire ensued. (Class A)

10. Wire Strike: While conducting a night deliberate attack at the National Training Center (NTC), the aircraft struck wires and impacted the terrain. The crewmembers suffered minor injuries, and the aircraft was a total loss. (Class A)

11. Ground Operation: The crew was conducting engine run-up when the aircraft spun on the pad and contacted an adjacent non-operating AH-64D parked in close proximity, causing damage and minor injuries. (Class A)

12. Ground Taxi: The crew was ground taxiing to parking when the main rotor blades struck a concrete guard tower. (Class A)

13. M-TADS/PNVS: The main rotor blade dipped forward, striking the TADS/PNVS after landing in the forward area refueling point (FARP). (Class B)

Power Management

1. Power Management: Following a night departure in a power limited environment, an AH-64E decreased airspeed below the Velocity Safe Dual Engine (VSDE). The aircraft descended to ground impact and the main rotor blades struck the aircraft which caused significant damage to the canopy and MPNVS. (Class A)

2. Power Management: While executing an out-of-ground-effect (OGE) hover with a tailwind, the aircraft descended to ground contact. (Class C)

3. Wire Strike: The wire strike protection system (WSPS) cut three power lines during NOE flight. The aircraft was landed without further incident, and post-flight inspection revealed TADS damage. (Class C)

4. Ground Taxi: The main rotor system struck a concrete wall while ground taxiing. (Class B)

Maintenance Error

1. Maintenance Error: The crew was conducting a post-"500-hour phase" maintenance test flight (MTF) when the aircraft reportedly initiated an uncommanded right yaw from a five-foot hover. The aircraft contacted the ground, sustaining significant damage, and the crew conducted an emergency shutdown. Further inspection revealed that while reinstalling the No. 4 tail rotor driveshaft, the maintainers failed to apply the proper torque to the forward portion of the No. 4 tail rotor driveshaft bolts. (Class B)

2. Maintenance Error. The main rotor pitch change rod (PCR) link lower rod end unseated from the rod end bearing in flight, resulting in a catastrophic failure of the main rotor system. The aircraft was destroyed. Two fatalities. (Class A)

3. Maintenance Error. The crew reportedly heard a loud report, followed by a nose-down pitch and right yaw of the aircraft during flight. The crew executed an emergency landing on an open field. Post-landing inspection revealed the tail rotor had come off in flight due to improper torque to the tail rotor retention bolts. (Class B)

Materiel Failure

1. Materiel Failure: The No. 2 strap pack assembly failed in flight, resulting in separation of the main rotor assembly and departure from controlled flight. The aircraft was destroyed with two fatalities. (Class A)

2. Materiel Failure: While conducting hovering flight at night under zero illumination, the aircraft experienced a rapid main rotor decay, massive torque spike and audible bang caused by the nearly simultaneous slippage then sudden re-engagement of the No. 1 and No. 2 sprag clutches. The aircraft's drivetrain was severely damaged and could not maintain enough main rotor RPM to remain airborne. The aircraft impacted the ground and sustained serious damage. (Class A)

Miscellaneous

Open cowlings/lost panel incidents numbered 16 in Class C-E range of mishaps. Open cowlings were primarily associated with the engine nacelle. Tree strikes were listed in 13 Class B thru D reports. There were nine reports of Class D foreign object debris (FOD) from loss of lock fasteners, screws, and turn locks causing damage, most often striking a tail rotor paddle. A wide range of other incidents in lesser numbers also occurred. Ground contact during autorotations, bird strikes, over-temps, over speeds and over-torques. Other reports include antenna damage during landings to unimproved areas, compressor stall, hot start and inlet plug installed during start.

Summary

Ten of the 15 Class A mishaps occurred under night /NVS conditions. Three occurred while deployed and four were at the NTC/Joint Readiness Training Center. Not all of the 79 mishaps are listed above. Of note, there were eight wire strikes – three Class A, two Class C, one Class D and two Class E.

As always, HE remains the leading cause of aircraft mishaps. The mishaps are often the result of a series of errors, factors, and influences that lead or contribute to their occurrence. The ability of individuals and supervisors to identify hazards, determine control measures, and apply those controls as well as provide guidance, training and oversight reduce the probability of the occurrence of a mishap.

Conducting operations to standard in accordance with the aircrew training manual is just one risk reduction measure. Additionally, leader engagement in understanding the mission, following the mission briefing and approval process as laid out in Army Regulation (AR) 95-1, Flight Regulations, and implementing controls while elevating mission approvals to the appropriate levels when risk are higher will contribute to a reduction in errors. ■

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AH-64 CLASS A-C MISHAPS

FY	Class A	Class B	Class C	Class D	Class E	Fatal
2016	4	5	7	9	8	4
2017	2	2	8	10	10	2
2018	4	4	17	13	5	4
2019	4	1	8	11	12	0
2020	1	2	8	14	6	2
Total	15	14	48	57	41	12

RQ-7BV2 Shadow Five-Year Safety Performance Review FY16-20

The RQ7 Shadow has proven indispensable as a combat multiplier and, most importantly, a lifesaver due to their invaluable surveillance capabilities without risk to human crews. Yet, the unfettered demand and growth of the Shadow unmanned aircraft system (UAS) during the past five years has come at a cost.

In the last five-year period from FY16 through FY20, the RQ-7 Shadow program has flown 290,209 flight hours, with 198 total RQ-7 Class A-C mishaps reported. There was one Class A, (one RQ-7BV2 landed on another), 54 Class B incidents and 142 Class C's, with no injuries or fatalities reported. The Class A flight mishap rate was negligible at 0.69, being that one Shadow landed on another, the cost of the two UAS exceeded the Class A threshold. The Class B rate was 18.6 and the Class C rate was 49.0 for the last five years.

In general terms, mishaps normally fall into three causal (error) categories: Materiel failures that encompass failure of a component or system; human factors where human errors lead to a mishap; and environmental mishaps in which unknown or unavoidable environmental factors cause the mishap. Mishap causation may entail a single causation or a combination of two or more categories. Many times multiple factors within a specific category are the cause.

The five-year review of RQ-7B Shadow mishaps shows materiel failure (MF) was the primary cause factor in approximately 59 percent of the Class B-C mishaps. Human Error (HE) failure accounted for approximately 34 percent of the Class A-C mishaps and six percent were environmental related. One percent consisted of unknown or the error has not yet been reported. The following are highlights of the more frequent categories of UAS mishaps.

Materiel Failure

For UAS, MF is generally the majority mishap cause factor. Materiel failures are addressed by the program managers (PM) to improve reliability of the system and parts. This may be through design changes, product improvements or limiting exposure of existing systems to operate within limits that increase operating times. Additionally, the PM may determine maintenance actions to reduce failures or adjust component replacement hours based on failure historical data.

There were numerous MF mishaps over the past five years, to include engine failures, airborne computing equipment (ACE) box failures, electrical failures, and failure of the fuel pump or fuel system related issues to name a few. All MFs are met with support from the PM and original equipment manufacturer to either fix the issue or redesign the part to preclude materiel failure. As stated above, MF (unlike manned aircraft) is the largest failure point for the RQ-7B Shadow.

1. Materiel Failure: (Engine Failure) UAS flew for 1.4 hours with no anomalies recorded in the data. Following a brief drop of 413 rpm in the engine speed, both engine temperatures began to rapidly increase with the rotor air temperature (RAT) surpassing the maximum continuous system limitation of 170 degrees Celsius (C). The UAS was commanded to descend, and engine temperatures were responsive as engine demand decreased during descent. As the UAS leveled off the engine throttle increased and both engine temperatures immediately surged. A Tactical Automated Landing System (TALS) recovery was attempted but TALS waved the AV off due to low airspeed. The UAS was unable to maintain climb out during the wave off and began to descend below the commanded altitude. The Flight Termination System (FTS) was initiated one minute later at an approximate altitude of 185 feet above ground level (AGL). Due to the low altitude, the UAS sustained significant damage upon impact. The UAS was recovered from a wooded location on base.

2. Materiel Failure: (Engine Failure) During ground engine run, the fuel system pressure became erratic, experiencing fluctuations from 32 to 98 pounds per square inch (psi) while on the launcher. The fuel pump speed was also erratic, erroneously reporting values ranging from 0 to 8,400 rpm. The UAS was launched and approximately 16.5 minutes into the mission while in level flight, the fuel pressure sharply degraded from 56 psi down to 2 psi. In response, the fuel pressure control valve surged to 100% in an attempt to rebuild pressure but the fuel pump speed decreased to zero. Within the same time frame, the engine speed began to decrease to zero over three seconds due to insufficient fuel flow. The UAS glided for approximately six minutes and the FTS was initiated by the UAS operator (AO). The AO initiated the FTS at a calculated altitude of 461 feet AGL and the UAS was moderately damaged (Class C). The UAS was recovered.

3. Materiel Failure: (TALS Failure) A Fuse Fail appeared in the Warning/Caution/Advisory (WCA) panel. On-site reports indicate that the F4 TALS fuse had blown. The UAS was returned to base (RTB) and multiple attempts to recover the UAS with the TALS were made; however, all were unsuccessful due to the TALS inability to track the UAS for landing. The UAS unit personnel continued flying the UAS for the next seven hours attempting to land until the UAS ran low on fuel. At this time, the FTS was deployed at 1,200 feet AGL, though on-site reports indicate the chute did not properly unfurl as designed. The failure of the chute deployment resulted in the UAS gliding for a short distance before touching down the payload side first, incurring significant damage to the UAS.

4. Materiel Failure: (Fuel system failure) A Shadow 200 RQ-7BV1 aircraft equipped with an electronic fuel injected (EFI) engine and an increased endurance wing set, was conducting a mission. Approximately five hours into the mission, the fuel system pressure dropped from 48 psi to 0 psi and the UAS experienced a propulsion failure. No warnings or cautions were displayed in the Shadow 200 WCA panel prior to the failure; however, a fuse five failure alert did populate in the ground control station (GCS) immediately following the propulsion failure. The UAS was glided towards a safe location and the FTS was successfully deployed. The mishap was due to a MF of the fuel system. The root cause of the failure is a fuel delivery issue which resulted from foreign object debris (FOD) that seized the fuel pump and created a leak path.

5. Materiel Failure: (ECU Harness) Unmanned aircraft system 3049, which is a Shadow 200 RQ-7BV2 aircraft, was prepared for a mission. During preflight, all engine temperatures remained below caution levels and the engine passed all preflight checks. The UAS was launched and successfully climbed to mission altitude then continued to fly with no abnormal cautions or warnings. Twenty-eight minutes into the flight, the engine quit (uncommanded). Engine temperatures remained below system limitations and there were no signs of degradation in engine performance prior to the propulsion failure. Approximately eight minutes after the propulsion failure, the operator deployed the FTS while the UAS was approximately 461 feet AGL. The UAS was recovered and returned to the unit. The suspected root cause of the mishap is due to an intermittent failure of the electronic control unit (ECU) harness.

Human Error

Of the three categories, commanders of UAS units have the greatest influence over the HE failures. This is because supervision, training and enforcement of standards –key to reducing human error- fall directly in their lane.

What do these HE mistakes look like? They can be as small as not following the checklist, which starts an accident sequence, or they may be as large and significant as improperly installing a fuel line which directly and immediately effects a mishap outcome. An analysis of the human error failures provides details commanders can use to identify and input the appropriate controls to correct these failures. Following are several examples from mishaps:

- Fuel exhaustion due to failure to properly service the UAS prior to flight.
- Failure to load digital terrain elevation data (DTED).
- Improper lubrication as a result of oil contamination.
- Improper distance value input for landing resulting in UAS landing too close to the pedestal and striking arresting gear (AG) drum of the TALS.
- Checklist not followed or procedures not followed causing loss of UAS.

These examples demonstrate the multiple failures involved from performance-based to inadequate supervision (Human Factors Analysis and Classification System). As Soldiers execute their military occupational specialty (MOS) task, by-the-book maintenance and checklist use is a must. As we decipher these mishaps, a lack of oversight clearly stands out. Commanders reviewing these should note how important their leadership and direct involvement is to setting the example and enforcing high standards. Subordinate leaders have to take action to intensely supervise those operational task where the HEs are occurring. Commander spot checks are a good way to ensure that the right things are being done. Asking questions and verifying subordinate leaders are more involved with Soldiers conducting the work assist in reducing these mishaps. Following are some HE examples:

1. Human Error: (Fuel exhaustion) The mishap was the result of probable HE with respect to maintenance. The root cause was fuel exhaustion due to a failure to properly service the UAS prior to flight. Data review indicates that 2.3 hours into the mission, the UAS experienced issues maintaining the appropriate system fuel pressure of 48 psi. Ultimately, the system fuel pressure decayed resulting in the engine speed decreasing to zero. The fuel delivery system continually attempted to maintain the fuel pressure by increasing and decreasing the fuel pump speed indicating the fuel pump was operating properly. This data signature is indicative of fuel exhaustion which has been derived from data pulled from previous mishaps and testing.

2. Human Error: (Oil contamination) The mishap was the result of probable HE with respect to maintenance. The root cause of the mishap was an internal engine failure caused by improper lubrication as a result of oil contamination (water.) Review of the data confirmed slightly increasing engine temperatures and poor performance by the engine ultimately led to the mishap of the UAS and as a traditional TALS recovery was not possible, the FTS was executed. Since water is denser than oil, the fluid pulled from the UAS oil reservoir to the engine would have been mostly water, thus leading to poor engine performance shortly after launch.

3. Human Error: (TALS pedestal not properly aligned) The mishap was the result of HE with respect to emplacement of equipment for landing. The root cause of the mishap was due to a TALS pedestal not properly aligned with the runway centerline. This caused the UAS to land at a heading offset from the physical heading of the runway, ultimately causing the UAS to exit the runway striking an embankment. This broke the nose landing gear and separated the main landing gear from the fuselage, causing the UAS to skid on the payload before coming to a rest. Review of the TALS data showed that the UAS was following the pre-determined glide slope (GS) correctly throughout the entire landing. The TALS properly landed the UAS where it was commanded to touchdown; however, the UAS was instructed to travel offset from the physical centerline of the runway due to the improper TALS pedestal alignment. Tail winds during the landing were outside of system limitations, the probability is high that this exacerbated the mishap. Lastly, the touch down point to AG distance was greater than system limits, potentially preventing a safe recovery.

4. Human Error: (Failure to deselect the engine kill toggle) The UAS passed all preflight checks and was successfully launched with no issues noted or abnormal warnings reported. Approximately 1.1 hours into flight, a control station transfer was initiated. Within one second of the transfer, a command to cut the engine was sent to the UAS and the engine rpm began to roll off to zero. The UAS immediately began to descend as the UAS AO directed the UAS towards the predetermined ditch point. In route to the ditch point, the UAS continued to lose altitude, ultimately impacting the terrain. The mishap of UAS was the result of HE with respect to procedure. The root cause of the mishap was a failure to deselect the engine kill toggle switch in the primary GCS prior to a control station transfer from the UGCS.

5. Human Error: (TALS emplacement) The mishap of UAS was the result of HE due to emplacement. Review of the data indicates that the TALS pedestal briefly tracked the UAS using a reflection of the UAS signal causing the TALS to miscalculate the UAS's actual position and make commands based on the inaccurate location of the UAS. This caused the UAS to gain altitude prior to engine cut. When the engine cut, the UAS was approximately 10 feet AGL which ultimately led to a hard landing causing damage to the UAS and payload. Reports from the field indicate that the mishap flight of the UAS was the very first recovery at this location with this particular TALS. Photo documentation received of the site setup after the mishap showed the TALS pedestals along the runway were staggered and not in a straight line parallel to the runway centerline. Since the TSS recovering UAS was further back, the line of sight (LOS) was temporarily blocked during the landing resulting in a multi-path event. Past data reviews have confirmed that a multi-path event can occur when the LOS becomes temporarily blocked during a landing event due to staggered pedestals.

6. Human Error: (Pinched oil line) The mishap of UAS was the result of HE with respect to maintenance. The root cause of the incident was oil starvation due to a failure to properly install the center wing onto the fuselage resulting in a pinched oil line. During the post mishap physical inspection, the presence of two creases in the oil line which connects the oil reservoir to the oil pump was visible, indicating that the oil line was pinched while the UAS was assembled. When an oil line becomes pinched, it will prevent oil flow from the reservoir to the oil pump and ultimately starve the engine of oil.

All of the following mishaps were attributed to HE. These HEs could be avoided with proper procedures and maintenance being executed. These errors occurred REPEATEDLY over the past five years. A thorough review of the following errors should assist leaders with ensuring the proper training and oversight is implemented to reduce the mishap occurrences from HE:

- Failure to load DTED due to not following the checklist.
- Oil starvation due to improper procedures.
- FOD in the pitot tube due to improper procedures.
- Incorrect TALS setup.
- Failure to check lithium battery due to not following the checklist.
- FOD in fuel pump due to improper procedures.
- Landing with tail winds out of limits due to failure to follow the checklist.
- FOD in center wing due to improper procedures.

Environmental

According to Department of the Army (DA) Pamphlet (PAM) 385-40, Army Accident Investigations and Reporting, environmental factors can be divided into those which could not have been avoided, and those which could have been avoided or precautions implemented to reduce or eliminate its adverse effects on personnel and/or equipment. An environmental deficiency should not be assessed as a causal factor if it was known and could have been avoided before the accident. Unknown or unavoidable environmental conditions, such as wind shear or severe turbulence, are rare occurrences that are addressed through detailed planning and established guidance on operating in adverse conditions.

The environmental category also includes electromagnetic environmental effects (E3), formerly known as electromagnetic interference (EMI), which is a recognized potential accident cause factor, and should be thoroughly evaluated during all UAS accident investigations to determine whether it influenced the operation of the equipment involved.

1. Environmental: (Unforecast winds) Initial indications from the instruments showed a head wind on approach. At 300 feet AGL, there was a change in wind direction indicating a tail wind but within limitations. Approximately one second prior to decision point, indications changed to a tail wind greater than 5 knots outside of limitations. As a result, the UAS experienced a hard landing and broke the front landing gear upon impact. This caused damage to the prop and payload camera and communications relay system antennas.

2. Environmental: (Unforecast winds) The data indicates the suspected root cause of the mishap was a result of environmental conditions related to unforecast tail winds just prior to landing. The variable winds at decision point gave way to an 8-knot tail wind, pushing the UAS off the TALS GS. The UAS bounced multiple times, clearing the AG and barrier net ultimately impacting a handrail causing significant damage to the UAS.

Summary

Of the three categories, MF, HE, and environmental, MF is the leading cause of RQ-7B mishaps. These failures are being tracked and are being addressed by the PM and manufacturer to reduce them. The second leading cause of Shadow mishaps is HE and is totally preventable. Human error failures are often the end result of a series of errors, factors, and influences that lead or contribute to their occurrence.

The ability of leaders and Soldiers to identify hazards, determine control measures, and apply controls as spelled out in the risk management publication can turn HE into a memory for UAS operations. Leaders must provide guidance, training and oversight to reduce the probability of the occurrence of a mishap. Poor leadership, training and lack of maintaining a standard for acceptable performance lead to poor operational performance.

A successful training program, enforced through command supervision and implementation of risk mitigation controls, sets high standards and produces high-quality task completion. There is no place for short cuts in Army aviation operations. Command emphasis can and will reduce HE failures. ■

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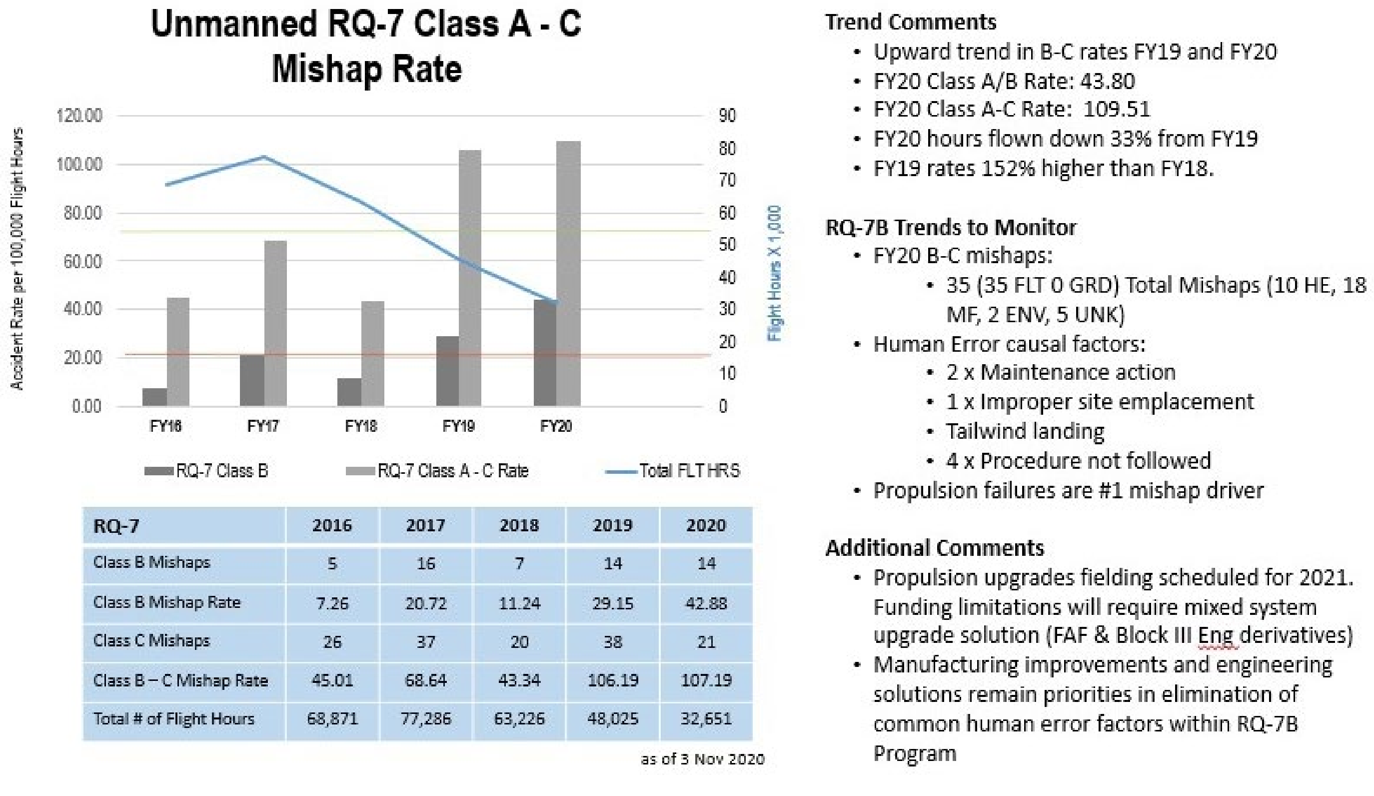


RQ-7	2016	2017	2018	2019	2020
Class B Mishaps	5	16	7	14	14
Class B Mishap Rate	7.26	20.72	11.24	29.15	42.88
Class C Mishaps	26	37	20	38	21
Class B – C Mishap Rate	45.01	68.64	43.34	106.19	107.19
Total # of Flight Hours	68,871	77,286	63,226	48,025	32,651

as of 3 Nov 2020

Trend Comments

- Upward trend in B-C rates FY19 and FY20
- FY20 Class A/B Rate: 43.80
- FY20 Class A-C Rate: 109.51
- FY20 hours flown down 33% from FY19
- FY19 rates 152% higher than FY18.

RQ-7B Trends to Monitor

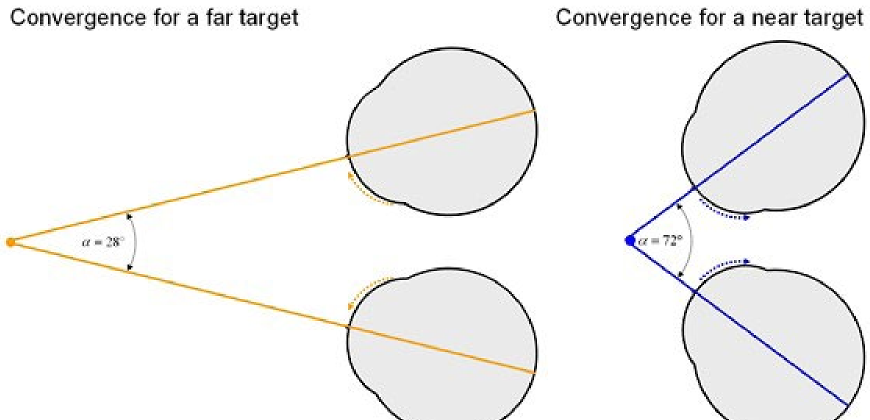
- FY20 B-C mishaps:
  - 35 (35 FLT 0 GRD) Total Mishaps (10 HE, 18 MF, 2 ENV, 5 UNK)
- Human Error causal factors:
  - 2 x Maintenance action
  - 1 x Improper site emplacement
  - Tailwind landing
  - 4 x Procedure not followed
- Propulsion failures are #1 mishap driver

Additional Comments

- Propulsion upgrades fielding scheduled for 2021. Funding limitations will require mixed system upgrade solution (FAF & Block III Eng derivatives)
- Manufacturing improvements and engineering solutions remain priorities in elimination of common human error factors within RQ-7B Program

Night Vision Goggle (NVG) Depth Perception

We know that flying at night is a challenge and NVGs help, but only solve part of the problem. NVGs help you to see in the dark, but most people don't know that they also cause other problems. Wearing NVGs interferes with your normal distance estimation and depth perception. Think about where you are looking when you're flying at altitude. Most of the time, you are looking pretty far away from the aircraft. The distance estimation and depth perception in this mode of flight does not present a problem. It's when you get close to the ground that it becomes a problem, especially in low-contrast environments. Let's talk about how.



Convergence

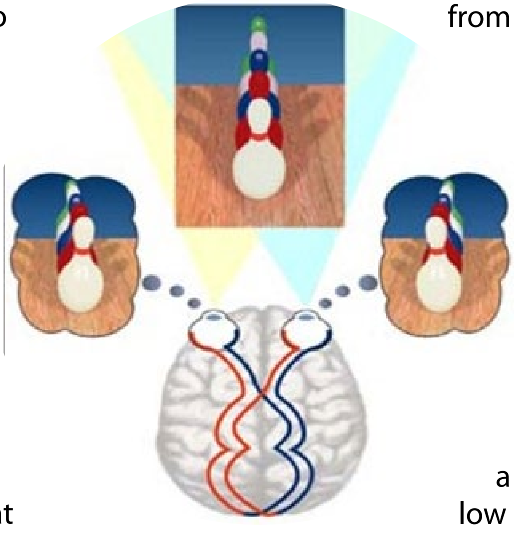
Distance estimation

The distance estimation and depth perception are two different tasks, but since they are completed at the same time and using the same tools, they are commonly lumped together. Distance estimation tells how far away an object is from the viewer. Depth perception provides information about that object's location in relation to other objects in the viewing area. Distance estimation and depth perception cues are easy to recognize when crewmembers use central vision under good illumination. As light levels decrease, however, the ability to accurately judge distance degrades and aviators become vulnerable to illusions. Crewmembers can better judge distance at night if they understand the mechanisms of distance estimation and depth perception cues. Distance can be estimated using individual cues or a variety of cues. Crewmembers usually use subconscious factors to determine distance. They can more accurately estimate distance if they understand these factors and learn to use other distance cues.

Depth perception: Where is it in relation to everything else?

There are two zones of distance estimation and depth perception – near zone (10m and less) and far zone (beyond 10m). The primary difference is the tools the brain uses to solve the problem. At 10m and closer, the brain uses binocular cues to determine where an object is in relation to the viewer. Beyond 10m, the brain changes to the monocular cues to resolve the problem. Monocular cues are the same cues your brain uses to determine where things are on a movie screen for example, or in a picture. These cues are learned and can be improved with intentional practice. NVGs interfere with binocular cueing when objects are in the near zone. Binocular cues depend on the slightly different view each eye has of an object. Binocular perception is of value only when the object is close enough to make a perceptible difference in the viewing angle of both. Distances are usually so great in forward flight that these cues are of little value. Study and training will not greatly improve them. Binocular cues have the greatest impact near the ground (hover, takeoff and landing). The binocular factors of convergence and stereopsis are involved with depth perception.

Convergence measures the difference between the physical angles between the two eyes. The information provided by convergence is very limited at distances beyond about 30 feet. Stereopsis combines and compares the pictures provided by the two eyes. The differences between the two images provide distance and depth information. This is also only minimally useful beyond 30 feet. Convergence and stereopsis are the same when wearing NVGs as when unaided. The brain compares convergence and stereopsis information to the mechanical focus torque of the lens of the eye to provide reliable distance and depth information. Significant discrepancies in any of the information result in the inability to determine distance or depth.



Stereopsis

Problems start showing up when NVGs are added to the mix. The eyepiece lens assembly on NVGs is adjustable, allowing the operator to focus the eye on the image intensifier. Since the image intensifier is too close for normal focusing, the optics in the eyepiece lens assembly make the eye thinks it's focusing on an object about six feet away. If the object the aviator is looking at is significantly farther away than that, the brain has great difficulty figuring out how far away it actually is.

Consider this scenario: You are sitting at a 10-foot hover. You look at the ground, approximately 20 feet away. The brain notes that convergence indicates 20 feet. Stereopsis is also correct for 20 feet. The ground is in focus, and the 'focus setting' of the eye is correct for 20 feet. The brain then decides that the ground is, in fact 20 feet away. Put NVGs on. Convergence and stereopsis are both correct for 20 feet – the problem is focus. The focus on NVGs is normally set to 50m (165 feet), optical infinity for the objective lens assembly. The ground is 20 feet away. The focus setting on the lens in the eye is correct for six feet. These numbers are too far apart for the brain to resolve. As a result, the aviator completely loses any sense of where the ground is. This is the reason that the first time a new pilot picks up a helicopter under NVGs, their 10-foot hover is typically around 30 feet – the aviator can't figure out where the ground is and is very sensibly staying away from it.

During flight training, we resolve this problem in two ways – by retraining the brain to use monocular cues at binocular distances and by using in-eye displays (e.g., head-up display (HUD)). This training, like all training, is perishable and is one of the key reasons for NVG currency requirements. It is also the reason it is critical to use a HUD display if possible. In very low contrast environments, such as a desert, the level of contrast in the ground is so low that it becomes very difficult to resolve enough information to use monocular cues effectively. An aviator hovering near the ground loses confidence and starts hunting for it. This can result in the landing gear contacting an object on the ground and induce dynamic rollover. Minimizing hover time near the ground and use of an in-eye display will significantly reduce the likelihood of an accident.

Understanding why these problems occur and how to avoid them will reduce training time and reduce accident rates, saving lives. ■

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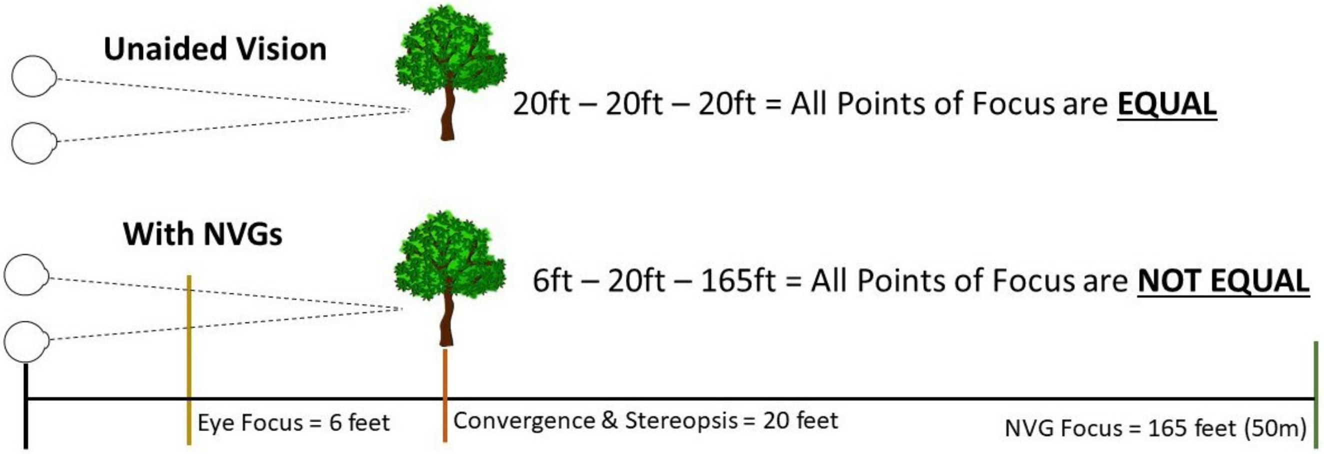
Night Vision Devices Branch Chief
DAC Stephen R. Hooper
Night Vision Devices Deputy Branch Chief



Real-Time Risk Management for Aviation Operations

As aviation professionals leading, piloting, and crewing Army aircraft, we religiously complete the paperwork and assessments that contribute to the mission brief process. We ensure that all i's are dotted and t's are crossed. This process enables us to have a mutual understanding of the mission risk and helps us manage it through control implementation and information dissemination. Mission planning, briefing, and control implementation should produce safe operation and mission completion, but we must make sure we train and implement real-time risk management (RM) also. The real-time RM training should provide aircrews with the academic and hands-on experience to reduce the risk to mission and force once in mission profile.

Mission briefing is defined in Army Regulation (AR) 95-1, Flight Regulations, as part of the mission approval process. Throughout this process, the aircrew conducts detailed planning, risk assessment, and risk mitigation, which are later reviewed by the briefing officer. The briefing officer is responsible for ensuring the thorough evaluation and crew comprehension of the elements. Lastly, the final approval authority reviews the mission validity, planning and risk mitigation; then authorizes or disapproves the flight or operation in accordance with (IAW) the commander's policy.

Upon receipt of mission approval, the crew departs. At this point, the mission should be completed as briefed, modified, or cancelled with return to base (RTB). The precise mission planning, approval process, and risk mitigation factors should remove the possibility of a mishap. But only if crews are trained and utilize real-time RM. Failing to train and implement real-time RM in the unit aircrew training program (ATP) leaves aircrews operating in diverse and very hazardous environments without the proper RM tools to help them make better decisions while in mission profile.

Real-Time Risk Management

What is real-time RM? There is a lack of input in regulations, pamphlets, doctrine, and the Aviation handbook on talking "real-time" RM. Army Techniques Publication (ATP) 5-19, Risk Management, touches on the fact that it is a leader imperative that every Soldier be taught the five step RM process and is trained well enough that they can individually use real-time RM on and off-duty. Yet there is no solid definition of what real-time RM is other than real-time being addressed in AR 385-10, The Army Safety Program, as a period less than 15 minutes.

Taking a look at ATP 3-04.11, Commander's Aviation Training and Standardization Program, it solidifies the RM effort is primarily aimed at the pre-mission stages of planning and identifying risk. Paragraph 4-18 states:

"Managing risk is a leader responsibility. At the ACM level, PCs, ACs, AMCs, and mission briefing officers (MBOs) are the principal risk managers. The MBO is especially critical during the RM process. Planning must incorporate consideration for known hazards and must address appropriate control measures to minimize exposure to such hazards. RM occurs throughout all phases of mission planning and depends on leaders at all levels to successfully mitigate risk. RM responsibilities are not complete until the mission debriefing is complete. To meet these responsibilities, leaders—Identify Controls. Controls start with PCs and/or AMCs as they identify initial risks and put initial controls in place. MBOs have the responsibility to further refine and emplace controls based on assessment of obvious and hidden risks. Commanders, who are always a key part of this process, will issue controls and guidance to leaders. Leaders at all levels, including MBOs, must make sure guidance is understood and can be implemented throughout the mission."

The application of RM is an inclusive process, those executing an operation and those directing must both participate and it doesn't stop at the end of the mission brief or with briefed hazards and controls. Following aircraft starter engagement, RM becomes real-time RM and as such crews should be trained and exercised on executing real-time RM. Failing to train crews on managing real-time RM for situations or hazards confronted during real-time execution of their mission (i.e., unforecast weather conditions, enemy threats, aircraft malfunctions, and mission variations) leaves many possible errors to happenstance and creates higher possibilities for a mishap to occur or mission failure.

Overcoming the Deficiency

Maybe real-time RM training is deficient and corporately we don't execute it well is because we aren't training it and don't brief it. When it isn't addressed in the Aviation Handbook at a minimum, this is a major red flag. To be effective, we have to include in doctrine, standard operating procedures (SOP) and training programs the procedure/process aviation crews should use when confronted with an inflight risk that wasn't briefed or minimally briefed. As aviation crewmembers know, there are always additional hazards confronted when executing combat or combat training missions which could not be foreseen during the mission briefing and planning. This is the imperative to build real-time RM training programs and situational training exercises (STX) into the ATP.

In addition to training leaders and aircrews to conduct real-time RM, the aviation enterprise should consider providing tools which can assist leaders and aircrews with informational products or quick reference cards that can assist in understanding possible threats to mission and force (think Flight Reference Card for real-time RM). The Bowtie Risk Management Methodology displays an example of how to identify cause, prevention barriers, and recovery barriers to preclude escalation or increase risk of mission failure and/or a mishap from mission planning through the execution phase (See Figure Real- time risk management, below). Mission planning encompasses preparation, briefing, risk mitigation, approval, and execution (based on RM of known hazards). Perhaps we overlook the execution phase, which starts at starter engagement and is where real-time RM begins as aircrews contend with unknown/forecast hazards. The example below provides leaders and crews that may encounter reduced ceilings and visibility with RM details for prior to flight briefing and inflight real-time decision support options while expressly highlighting the undesired states and consequences.

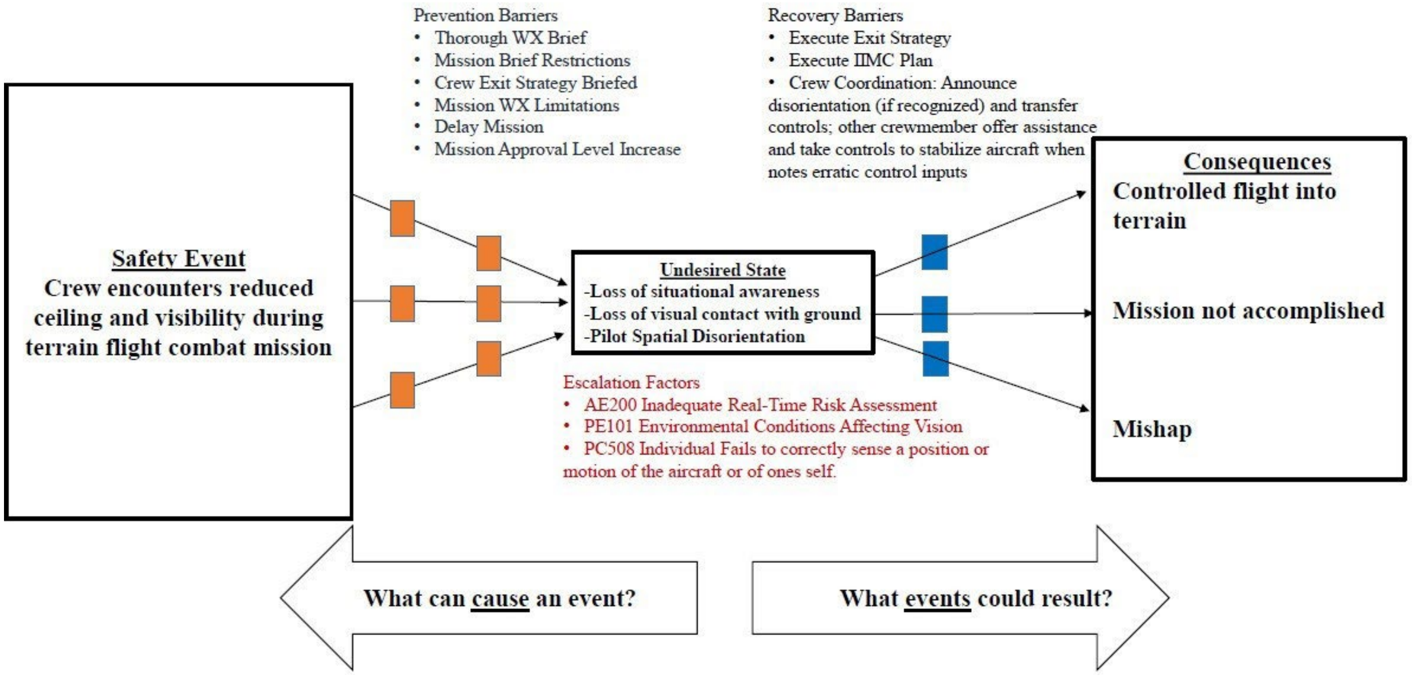
Aviation real-time RM decision training can ingrain in aviators and crewmembers the ability to make better decisions while in the execution phase and understand they have the authority to implement the risk control necessary to prevent the mishap that is possibly facing them, as in the example impacts to continuing ahead into poor weather. Leaders must convey that flight crews are fully supported should they need to abort, modify, or hold within a mission for risk reduction purposes.

Leaders must train crews individually and collectively so when executing missions and the crew/crews run into that situation where risk start to inch upward, and the air mission commander (AMC) or the pilot in command (PC) (single-ship operations) has that first thought of this wasn't briefed or planned for, they immediately reassess the risk using real-time RM and make the call to continue mission or move back to a safe holding point where the AMC or PC can contact higher for a re-brief with the current conditions or if necessary abort the mission and RTB.

Efficient training and continual reinforcement have ingrained planning, briefing, risk mitigation, and mission approval into aviation leader and aircrew actions. Further effort should be focused on training leaders and aircrews to execute managing the real-time risk during mission execution. Aviation training programs should ensure our crews are trained and prepared to conduct risk decisions while in mission profile. Crews must understand that continual risk mitigation, inclusive of aborting the mission, is a must. We must break away from the misconception that RM and decision-making are completed prior to engine starter engagement. The plan is just the starting point for managing risk. ■

Aviation Division
Directorate of Assessments and Prevention
United States Army Combat Readiness Center

Real-Time Leader Tool



Helipads

Countless times, I've heard the question asked about who is responsible for the inspection of helipads located on Army installations and what criteria is used? Let us first understand what a helipad is, how we are to utilize them properly, and what needs to be done to maintain them. In accordance with (IAW) Army Regulation (AR) 95-2, Air Traffic Control, Airfield/Heliport, and Airspace Operations, a helipad is defined as a prepared area designated and used for takeoff and landing of helicopters (includes touchdown, hover point, and landing lanes). On any given installation, you may find multiple helipads constructed using different design criteria. Some helipads may have the appropriate marking and lighting while others may just be a slab of concrete with no markings or lighting. It is critically important that any area, designated as a helipad, is inspected to ensure safe operations.

Ownership and Responsibilities:

Most helipads on Army installations are owned by the installation/garrison and when designed, are considered real property. The installation/garrison commander should ensure these helipads are safely maintained and inspected. If the helipads reside on an airfield/heliport, the airfield division chief/commander/manager will operate and maintain facilities to meet Army mission requirements, including force projection, sustainment and protection support IAW AR 95-2. Not all installations are the same and you may find that local helipads are owned by a higher command and managed at the local level. Designation, re-designation or non-base realignment and closure of Army airfields (AAF)/Army heliports (AHP), helipads, and landing zones (LZ) must be coordinated with Headquarters (HQ), United States Army Aeronautical Services Agency (USAASA) and approved by Deputy Chief of Staff (DCS), G–3/5/7.

Inspections and Responsibilities:

The Army and Air Force provide for three types of helipads—Visual Flight Rules (VFR) helipad; limited use helipad; and Instrument Flight Rules (IFR) helipad. At the foundation, each one has the same inspection criteria but requirements increase when you add capabilities such as IFR. For example, an IFR helipad requires certain lighting criteria a VFR helipad does not. Unified Facilities Criteria (UFC) 3-260-1, Airfield and Heliport Planning and Design, speaks of the fourth type of helipad, which is the elevated helipad. Elevated helipads require different criteria because of their location but are still classified as either VFR, limited use or IFR.

There is no all-in-one inclusive checklist. The airfield commander/manager must develop a daily/annual airfield/heliport inspection checklist and tailor the checklist to their respective helipads. There are multiple resources available that can assist in developing local checklists. Appendix C, D, and E of AR 95-2 provides guidance related to obstacle clearance, pavement, marking criteria, and lighting for helipads and is a great starting point in developing a helipad inspection checklist. Training Circular (TC) 3-04.16, Airfield Operations, Table A-3., provides a helipad assessment checklist that lists a few items to survey during an inspection of a helipad. Field Manual (FM) 3-21.38, Pathfinder Operations, offers additional guidance aircrews can use to conduct surveys of helipads at landing areas (parade fields, Landing Zones (LZs) that are used for helicopter operations that may not meet design criteria listed in applicable UFCs. Keep in mind that a survey to determine if an area is suitable for helicopter operations is quite different than an inspection to determine if the helipad meets applicable safety criteria.

An airfield obstruction (AO) survey is scheduled on a recurring five-year cycle and is required for AAF/AHPs that have Army instrument approach procedures (IAPs). AO surveys are required to obtain obstruction and topographic data to support the development and maintenance of Terminal Instrument Procedures (TERPS) and flight

inspections. Installation/garrison commanders are responsible for ensuring AO surveys are completed every five years. Failure to complete AO surveys when required may mandate (for safety reasons) cancellation of TERPS serving that aviation facility until the AO survey can be completed and evaluated.

Correction of Discrepancies:

Reporting discrepancies and/or hazards to the appropriate agencies for correction is critical. Ensure all discrepancies are documented and monitored until corrected. Updated status of discrepancies will be provided at the airfield safety council meeting. A summary of the inspection will be provided to the installation/garrison commander. If there are repairs that will take some time, ensure to issue a notice to airmen (NOTAM) explaining the issues with the helipad and the length of time the restriction is in effect.

Summary:

The next time someone asks you to conduct a survey/inspection of a local helipad, proceed with caution! Do not make the mistake of assuming that all the helipads are safe for landing. "Asking isn't checking, checking is checking."

Understand that a survey of a helipad is not an inspection. If an inspection checklist does not exist, develop one. Do your research to determine who owns it and what type of helipad you are working with. Inspections are more than checking lights and obstructions and could be very in-depth. The references listed below are a great start to better understand what is required for helipad inspections and surveys. ■

References:

AR 95-2 Air Traffic Control, Airfield/Heliport, and Airspace Operations

FM 420-1 Army Facilities Management

FM 3-21.38 Pathfinder Operations

TC 3-04.16 Airfield Operations

TM 5-826-4 Marking of Army Airfield-Heliport Operational and Maintenance Facilities

UFC 3-260-1 Airfield and Heliport Planning and Design

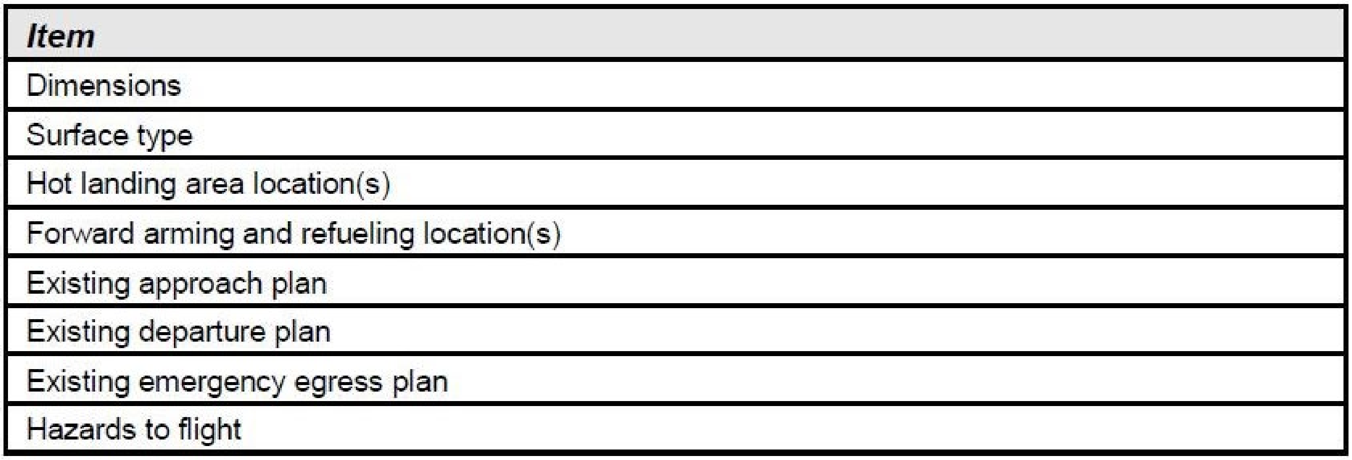
UFC 3-260-2 Pavement Design for Airfields

UFC 3-260-04 Airfield and Heliport Marking

UFC 3-535-01 Visual Air Navigation Facilities

CW4 Robert Moran
Aviation Accident Investigator
Aviation Division
Directorate of Assessments and Prevention
United States Army Combat Readiness Center

Table A-3. Helipad assessment checklist



Item
Dimensions
Surface type
Hot landing area location(s)
Forward arming and refueling location(s)
Existing approach plan
Existing departure plan
Existing emergency egress plan
Hazards to flight

Mishap Review: OH-58D Failure to Fully Execute Emergency Procedure

During a night vision goggle (NVG) training mission, in an OH-58D, flying 1,800 feet mean sea level, the pilot (PI) mistakenly actuated the engine's RPM trim switch located on the pilot-side collective. The instructor pilot (IP) failed to execute the complete emergency procedure resulting in the aircraft descending and contacting trees with a low rotor RPM. The aircraft sustained catastrophic damage from a post-crash fire, with no significant injuries to the crew.

History

On the day of the mishap, the IP reported for duty at approximately 1000 and the PI at 1300. The IP completed the mission brief/Risk Assessment Worksheet (RAW), and it was signed by the mission briefing officer. The flight was briefed as a single aircraft, day aircrew training manual (ATM) training/evaluation. The mission brief listed the flight as ATM training, with no flight conditions annotated. The facility commander approved the mission brief/RAW.

The mishap PI was scheduled for a day training flight prior to her NVG readiness level (RL) progression flight. Following completion of the day training flight the PI transferred her flight gear to the mishap aircraft and completed the preflight. The crew met at the aircraft at 1740 and the IP confirmed the preflight was completed. The crew conducted run-up, performed a communications check with flight operations, and departed the airfield for NVG progression training at 1810.

The accident crew departed to the northwest and reported outbound with flight operations, approximately four nautical miles northwest of an Air National Guard Base. After reaching their next reporting point, the crew traveled northwest approximately seven nautical miles before the aircraft's altitude started to deteriorate. Unknown to the PI, she beeped the rotor RPM down which gave indications of an engine underspeed failure. The IP completed two of the four underlined steps of the engine underspeed emergency procedure, and then skipped to the non-underlined procedures resulting in the aircraft descending into the trees. The accident aircraft impacted the trees approximately 23 minutes into the flight. The crew had minor injuries and the aircraft was destroyed by a post-crash fire.

Crew

The IP had 2,367 hours in MTDS and 2,559 hours total time. The PI had 173 hours in MTDS and 255 hours total time.

Commentary

The aircraft rotor RPM decreased due to the PI mistaking the RPM trim switch for the infrared laser switch, resulting in an engine underspeed condition. This is in contravention to Training Circular (TC) 3-04.44, Page 4-3, Night and NVG Considerations. The IP while conducting an emergency procedure, on an OH-58D for low rotor RPM, failed to fully execute the required emergency procedure. That is, the IP completed two of the four underlined steps of the engine underspeed emergency procedure. This is in contravention to the OH-58D Operator Manual (Technical Manual (TM) 1-1520-248-10, dated 30 April 2013), paragraph 9-15, page 9-15.

When missions start out failing to meet the standard due to leadership not ensuring the proper elements are executed properly, the results can be catastrophic. In this mishap, leadership failed to ensure proper mission planning, mission briefing, and that actual risk to mission and force were identified on the RAW. When leadership doesn't enforce the standards, it is very easy for the unit to fail to execute their mission task in accordance with regulations, the ATM, and standards. In this instance, the PI had flown a day training mission followed by a night/NVG RL progression without those risks being addressed. Leaders must understand the mission and the risk to properly brief on the entire mission with appropriate leading questions to ensure the right topics are covered and the right tasks are executed. A few probing questions by a leader concerning the mission and the RAW can bring to light the actual mission conditions and additional risks that should have been addressed. At this point, the leader can then make a valid decision on implementing risk controls and ensuring the RAW reflects the actual assessment values. Maintaining standards in Army aviation operations depends on leaders meeting the standard. The established mission briefing process gives leaders the tool to manage the mission, the risk and put risk approval at the appropriate level, leaders just have to use the process. ■

Class A - C Mishap Tables

Manned Aircraft Class A – C Mishap Table										as of 9 Dec 20
	Month	FY 20					FY 21			
		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities
1st Qtr	October	2	2	3	0		0	0	9	0
	November	1	0	2	2		2	3	6	7
	December	1	1	2	3		0	0	2	0
2nd Qtr	January	0	0	5	0					
	February	1	0	5	0					
	March	0	2	4	0					
3rd Qtr	April	0	1	1	0					
	May	0	0	6	0					
	June	0	0	6	0					
4th Qtr	July	0	2	8	0					
	August	1	2	6	2					
	September	0	2	7	0					
	Total for Year	6	12	55	7	Year to Date	2	3	17	7
	Class A Flight Mishap rate per 100,000 Flight Hours									
	5 Yr Avg: 0.95	3 Yr Avg: 1.01		FY 20: 0.63			Current FY: 1.40			

UAS Class A – C Mishap Table									as of 9 Dec 20
	FY 19					FY 20			
	Class A Mishaps	Class B Mishaps	Class C Mishaps	Total		Class A Mishaps	Class B Mishaps	Class C Mishaps	Total
MQ-1	5	2	3	10	W/GE	3			3
MQ-5	0	0	0	0	Hunter				
RQ-7	0	14	21	35	Shadow		1	3	4
RQ-11	0	0	1	1	Raven				
RQ-20	0	0	1	1	Puma				
SUAV	0	0	0	0	SUAV				
Other	0	0	1	1	Other				
UAS	5	16	27	48	UAS	3	1	3	7
Aerostat	3	0	0	3	Aerostat	0	0	0	0
Total for Year	8	16	27	51	Year to Date	3	1	3	7
UAS Flight Mishap rate per 100,000 Flight Hours									
MQ-1C Class A	5 Yr Avg: 8.40		3 Yr Avg: 5.71		FY 20: 4.82		Current FY: 19.72		
RQ-7B Class A-C	5 Yr Avg: 67.23		3 Yr Avg: 78.53		FY 20: 107.19		Current FY: 109.33		

Forum

Op-ed, Opinions, Ideas, and Information

(Views expressed are to generate professional discussion and are not U.S. Army or USACRC policy)

Bad Weather Bad Assessment

If you have been in aviation long enough, you probably have given it what some refer to as "the old college try." Somewhere in the back of your mind, you knew that you probably shouldn't execute the mission, or even attempt, but you did regardless. We tend to do this because getting the mission done is part of our job. I can remember in Iraq this same exact thing happening. It was one of those typical Iraqi weather days, the dust just hangs in the air and visibility was down to just about zero.

In the last four days we had the same type of weather and all flight missions had been cancelled. Everyone was becoming restless and itching to get back in the air. Like any normal mission day, we received our mission brief as well as our weather brief. The outlook did not look good. We were briefed that flight conditions are at the minimum required and were not expected to improve. Everyone knew we were not going and would have to cancel, but all the pilots came together regardless and talked about our options. After much debate, everyone except for me agreed that we needed to just give it "the old college try". The senior pilot in the flight convinced everyone that we need to show the command that we made an attempt even though we knew we could not complete the mission. We were able to brief our chain of command on the phone that the weather was marginal and wanted to make an attempt to fly the mission. To my amazement, the command signed off the brief. I could not believe that it made it through the briefing process. Our leadership was not with us at our location because we had been under operational control of another command at our forward operating base with no operation or maintenance support. We were pretty much on our own. Reluctantly, we took off and made it to the end of the runway. The weather was worse than what the weather briefer gave us. We were insane for even trying to make an attempt.

I learned a couple of great lessons that day that still influence my decision-making process. Our mission risk assessment was never fully briefed considering the weather would have put us in the high category and we did not meet minimum visual flight rules weather. Somewhere the briefing process broke down and we were able to obtain a brief and a final approval. Not sure to this day how we managed to get a brief approval with the conditions as they were. It hinged on our ability to shop for weather until we found something that would work for us. Shopping for weather is a clear sign for failure. The most senior warrant and pilot was the one who was pressuring the rest of us to fly. I allowed myself to be pressured into flying in conditions that I was not comfortable with, let alone smart. Making bad decisions can lead to accidents and fatalities, which is why it is important to learn from previous experiences and other people's mistakes. ■

CW2 Heidi Rota

Blast From The Past: *Articles from the archives of past **Flightfax** issues*

Flightfax

Volume 3 Number 19 • October 1974

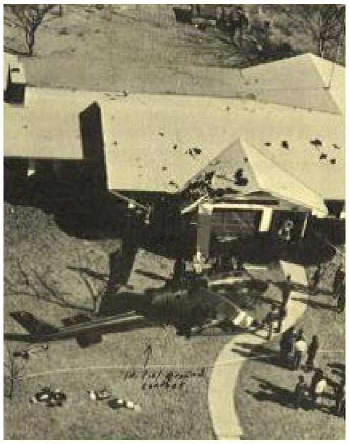
Preflight Without Light

The purpose of the mission was to ferry four aircraft to a static display with instrument training enroute. The flight consisted of two UH-1, one OH-58, and one AH-1G. All pilots received a briefing from the mission commanders the day before the mission. Preparation began immediately following the briefing, and included the cleaning and preflighting of the aircraft.

The pilot, without the help of the copilot, supervised all mission preparation for the aircraft. He performed the preflight inspection while the aircraft was being washed and the aircraft departed the flight line at 1615 hours.

After washing the engine and transmission, the cowlings were left open to permit the aircraft to dry. A crew chief, one of the last to leave the aircraft that evening, closed the cowlings.

The pilot arrived at the flight line at 0545, supervised the installation of weapons and conducted a walk around inspection without the use of a flashlight or a checklist. The copilot overslept and when he arrived at 0640, he boarded the aircraft after the run-up had been completed. The AH-lG was assigned the number three position in a four-ship diamond formation.



Takeoff was at 0655 and the formation climbed out to an altitude of 1,900 feet on a heading of 150 degrees, and airspeed was 80 knots. At that time, both pilots heard a loud noise and experienced a slight right yaw of the aircraft. This was a result of the left engine cowling being torn free and striking the tail rotor and the 90-degree gearbox then separated. The copilot informed the lead aircraft that they had a problem. A right turn was started to return to the airfield and during this turn, airspeed dissipated and the aircraft would no longer streamline. The nose pitched down and the aircraft began to spin. The copilot lowered the collective, reduced the throttle to flight idle and transmitted a Mayday call. The aircraft was losing altitude and spinning rapidly. The pilot took the controls and at about 150 feet above ground level turned on the landing light. Airspeed was very slow at this time and he saw the front of a house and a concrete walkway. He increased the collective to full pitch and the aircraft fell almost vertically for the last twenty feet. One main rotor blade sliced through the front gable of the house and the other main rotor penetrated and remained wedged in the house. The aircraft sustained major damage but no fire occurred. Both pilots sustained back injuries but were able to exit the aircraft unassisted.

This accident once again proves the necessity for thorough preflights. The pilot in command and the copilot failed to perform a proper preflight inspection of the aircraft during the hours of darkness, thus ensuring that all cowlings and latches were secured. Reason: The pilot felt that the preflight performed late in the afternoon on the previous day would suffice and that a walk-around inspection, conducted without a flashlight the next morning, was all that was required. The copilot did not assist in the preflight.

An unsafe factor present but not contributing to this accident: The most experienced pilot was not designated as pilot in command. The copilot initiated the emergency actions. Reason: The copilot's reactions were based on his knowledge of emergency procedures and previous aviation experience. ■

Mishap Briefs #96

Information based on preliminary reports of aircraft mishaps reported in November.

UTILITY

H-60

L Model

- During a resupply mission, the aircraft crashed in the vicinity of an island in a deployed location. There were five United States Army Soldier fatalities and one injured Soldier. The injured Soldier was medically evacuated by air ambulance. (Class A)
- During a four-ship air assault mission, Chalk 4 inadvertently had two cargo door windows jettisoned when a passenger grasped the emergency window jettison handle while repositioning. The two windows entered the rotor system. The aircraft landed safely without any changes to the flight characteristics and shutdown. Two main rotor blades were damaged beyond limits. (Class C)

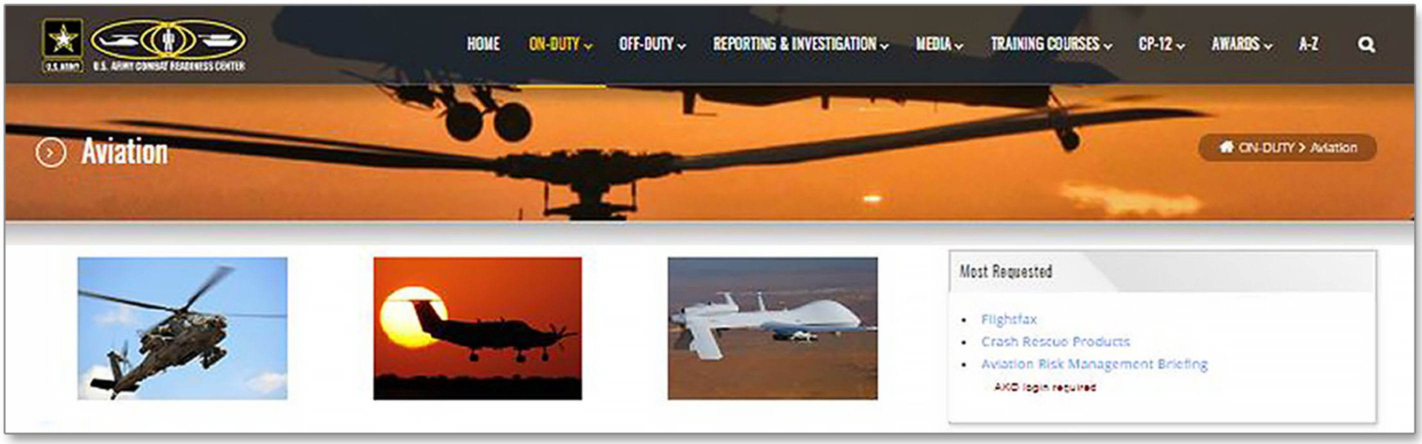
FIXED WING

C-26

E Model

- During taxiing, the aircraft's right main landing gear (MLG) and the nose wheel rolled from the paved taxiway onto the taxiway shoulder. The aircrew applied brakes and shutdown the engines to prevent the airplane from continuing farther off the taxiway. All four of the right engine propeller blades struck the saturated wet soft grass and ground leaving a 4 to 5-inch scar in the dirt. (Class C)

Visit the U.S. Army Combat Readiness Aviation Division at: https://safety.army.mil/ON-DUTY/Aviation



Flightfax

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AVIATION STANDARDIZATION, SOUND FAMILIAR?

Training circular (TC) 3-04.11, Commander's Aviation Training and Standardization Program, in conjunction with Army regulation (AR) 95-1, Flight Rules, establishes the requirements for the unit's aircrew training program (ATP). If a conflict exists between the TC and AR 95-1, the guidance in AR 95-1 supersedes the TC. It also establishes requirements for aviation training and prescribes requirements for the aviation standardization program. The TC helps aviation leaders, trainers and evaluators at all levels develop, manage, and administer a comprehensive commander's aviation training and standardization program by providing requirements for aviation units to improve and sustain proficiency and readiness in aviation skills. The publication also provides approved standardized practices and procedures that allow units in the field to manage and execute a standardized aviation training program. It concludes by providing guidance on the management of flight records.

To stay alert to the critical role standardization plays in aviation operations, let's take a quick look at some key topics.

Key Word Distinctions:

These six words must be understood in aviation operations:

- **Will, shall, or must** indicate a mandatory method of accomplishment.
- **Should** indicates a preferred, but not mandatory, method of accomplishment.
- **Can or may** indicates an acceptable method of accomplishment.

These words emphasize important and critical instructions that are integrated into aircrew tasks as required—

- **Warning.** A warning is an operating procedure or a practice, which if not correctly followed, could result in personal injury or loss of life.
- **Caution.** A caution is an operating procedure or a practice, which if not strictly observed, could result in damage to or destruction of equipment.
- **Note.** A note highlights essential information of a non-threatening nature.

Self-Start Provision:

Self-start allows commanders the ability to train a task or start a training program in which the unit is not currently trained. Commanders may utilize a self-start provision if the unit is not current on NVDs to reestablish currency.

New Equipment Training:

When formalized training is determined to be required, DOTD approved training materials will be used. Training materials will be available at https://www.us.army.mil/suite/page/691190 and click on the "TSP" button.

Unmanned Aircraft Crewmember:

Unmanned aircraft crewmembers (UACs) perform duties directly related to the in-flight mission of the unmanned aircraft. The UAC is responsible for the following:

- Controlling the flight of a UAS or the operation of its mission equipment.
- Remaining tactically and technically proficient as an aviation crewmember (ACM), including executing individually tailored self-development plans to meet designated goals. The individual operator should have the ultimate goal of achieving aircraft commander (AC) status.

5 Questions

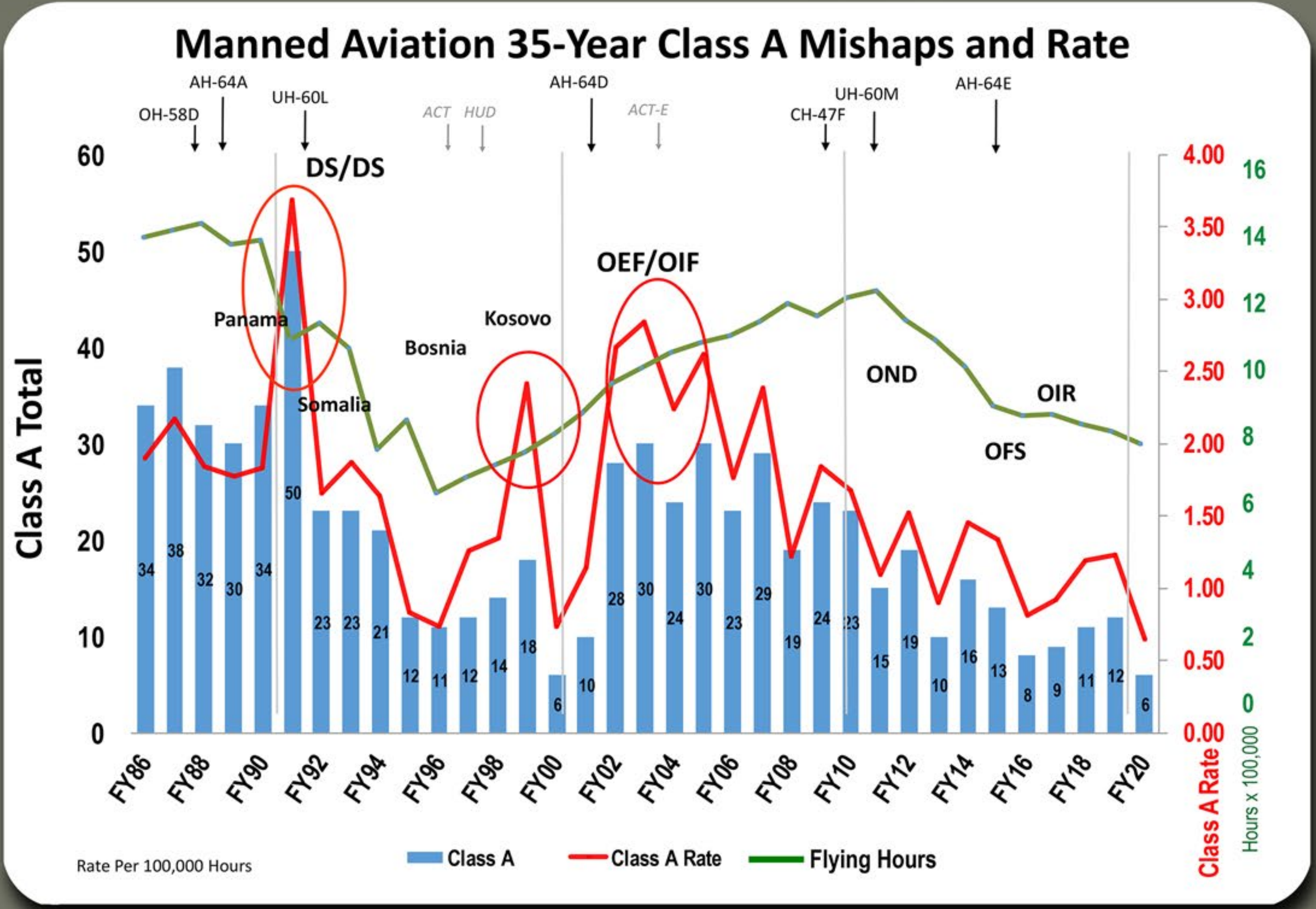
1. What circular establishes requirements for unit ATPs?
2. Will indicates a preferred, but not mandatory, method of accomplishment. Yes / No?
3. Self-start provision can be used to start a training program for NVD currency. True / False?
4. Where can you find DOTD training support materials?
5. The commander is responsible for tailoring UAC self-development plans to achieve AC. Yes / No?

ARMY AVIATION

Driving the Point Home

Keep the Mishaps Down by:

- Executing "by the book" maintenance
- Managing the transition
- Reducing the turbulence during transition
- Training the mission briefers
- Enforcing and training to standard
- Selecting the right crew for the mission
- Effective unit environmental training program
- Realistic risk management at the right command level


Manned Aviation 35-Year Class A Mishaps and Rate

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