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Chinook Safety Performance Review

In the five-year period FY15-FY19 (over 365,000 flight hours), the H-47 series aircraft had 41 Class A-C mishaps recorded. There were 5 Class A, 2 Class B, and 34 Class C with a cost of over $52 million in damage. Thankfully there were no fatalities. The Class A H-47 flight mishap rate per 100,000 hours was 1.37. The Class A-C H-47 flight mishap rate was 8.21. Breakdown by category (i.e., Flight, Flight-Related, Ground) showed that 30 of the 41 mishaps were Flight and the remaining 11 were categorized as four Flight-Related and seven aircraft Ground mishaps. In comparison, the H-47 Class A and Class A-C rate falls between the H-60 Class A and A-C (1.09 and 7.13 respectively) and the H-64 with Class A of 2.11 and A-C of 9.06. For Class A mishaps human error was the primary causal factor in 4 (80 percent) of the incidents with materiel failure accounting for 1 (20 percent). For Class A-C mishaps with a reported causal factor, human error was the cause factor in 68 percent of the mishaps and material failure was 26 percent. Environmental factors (e.g., bird strikes) were reported in 6 percent of the cases. Of the 41 incidents, there were seven with unknown or unreported cause factors. Highlights from some of the more frequent types of mishaps follow:

Engine failure/malfunction

- Enroute to an airfield the No. 1 and No. 2 Fuel Tank Low caution lights illuminated. While on downwind in the traffic pattern following a 35-degree right bank and 9 degrees nose down attitude the No. 2 Fuel Pressure Low Caution light illuminated. Fourteen seconds later the No. 2 engine failed with an accompanied low rotor. Aircraft landed without incident. (Class C)
- During the engine overspeed test, the engine reached 1,000 degrees Celsius (C). The crew executed normal shutdown procedures without further incident. (Class C)
- Aircraft experienced No. 1 engine turbine gas temperature (TGT) exceedance of 1,100 degrees C for 12 seconds during the shutdown. (Class C)

- During the pre-flight inspection, damage was noted to the No. 1 engine air inlet housing. The engine sustained foreign object damage (FOD). (Class C)
- Aircraft experienced an over-torque condition (125.8 percent for 1.92 seconds) following a gas producer (NG) over-speed of 111.5 percent of the No. 2 engine during the hover check. (Class C)
- During engine start (ECL placement to - FLIGHT from the GROUND position), the ENG 2 FADEC FAIL caution light illuminated, resulting in NG and TGT exceedance. (Class C)

- Aircraft was hovering in a forward arming and refueling point (FARP) site when the No. 2 engine flamed out. While landing, the No. 1 engine was over torqued with possible over temperature causing Class C damage. (Class C)

External loads

- The crew was attempting to release the aircraft's sling load when the front hook reportedly failed to release immediately. The load was subsequently dragged by the aircraft's forward momentum and sustained damage as a result. (Class C)
- During connection of a 155mm Howitzer for sling load operations, the aircraft sustained damage from a Howitzer stabilizing arm which contacted the aircraft ramp, resulting in sheet metal damage to the lower edge of the ramp. (Class C)
- During sling-load operations training, the sling reportedly failed and the load fell to the ground. Debris from the load impact with ground struck the under-carriage of the aircraft. (Class C)
- During operations, the pilot inadvertently released a sling-load during flight. (Class C)

Degraded Visual Environment

- Aircraft crashed during infiltration while negotiating brown-out conditions. The aircraft was destroyed in place. (Class A)
- During a night vision goggle (NVG) brownout landing, aircraft contacted a T-barrier. (Class B)
- While landing in heavy dust the electro-optical sensor (EOS) was damaged when it struck a rock. (Class C)

Loss of Components/Open Cowlings

- Co-pilot's door separated from the aircraft during a post-phase maintenance test flight. Upper and lower latches were still attached on the airframe and the safety wire was unbroken. The aircraft sustained minor superficial damage. (Class C)
- After the crew departed the FARP and returned to aircraft parking, the crew chief noticed that the no # 2 aft pylon platform was unlatched and on the engine cowling which caused damage. (Class C)
- During an instrument flight rule (IFR) flight, the left side escape hatch panel blew out. (Class C)
- The No. 1 engine cowling separated from the aircraft at the mounting points, followed by the opening and separation of the work platform at the cabin hinge mount which made contact with the Yellow rotor blade. (Class C)
- During the final approach, the left-side cockpit door separated from the aircraft. (Class C)
- The co-pilot door reportedly separated from the aircraft while in flight and was blown into the aft rotor system. The aircraft landed without further incident and post-flight inspection confirmed damage to all main rotor blades (MRB). (Class C)
- Reported separation/loss of aircraft ramp extension during flight. (Class C)
- Reported separation of co-pilot door during aerial refuel training. The door was not recovered. (Class C)
- The left-door gunner's window separated upon departure/climb-out of the aircraft. The crew was able to maintain visual contact of the window to its impact with trees and identify the grid location for recovery. (Class C)
- While conducting slope landing operations the right aft landing gear separated from the aircraft due to the right aft landing gear swivel assembly shearing from a stress/fatigue crack at the critical shoulder fillet. (Class C)

Object Strikes

- During pinnacle landing training, the aft rotor system made contact with the ground causing aircraft damage and crew injuries. (Class A)
- The crew was ground taxiing at an airport when the aft rotor blades made contact with the corner of a hangar, resulting in damage to all three aft rotor blades, two hangars, and two aircraft inside the hangar. (Class A)
- Two aircraft under NVG were taxiing for refueling at the FARP when Chalk 2's rotor blades struck Chalk 1 in the rear. (Class A)
- During aircraft hover operations on a ramp, the aircraft hovered too close to obstacles on the ramp which resulted in the aircraft's main rotor blades contacting an unlit light pole. Three MRBs were damaged. (Class C)
- At 500 feet above ground level (AGL), the aircraft experienced a bird strike. Post-flight inspection revealed glass damage to the forward-looking infrared (FLIR) system. (Class C)

- Aircraft struck a flock of birds causing damage to both windscreens. (Class C)
- During aerodynamic braking, subsequent to a roll-on landing the aircraft's main rotor system made contact with the drive shaft cover, intermediate gearbox cover, drive shaft flexible coupling, and troop commander antenna. (Class C)
- Blades made contact with the fuselage (forward tunnel covers) due to reported failure of an aft main rotor-blade damper during engine shutdown. (Class C)
- Aircraft sustained damage to the undercarriage when it made contact with the ground during pinnacle landing training. (Class C)
- The crew was attempting a NVG confined space landing in an approved landing zone (LZ), when the aircraft descended into trees with the aft blades, damaging all three aft rotor blades. Aircraft landed safely with no injury to the crew. (Class C)

Miscellaneous

- During a maintenance test flight (MTF), fire was observed from the front pylon area of the aircraft during landing. A hole was found in a hydraulic line which caused misting hydraulic fluid to catch fire from nearby wire bundle which had chaffed. (Class A)
- Rotor wash from taxiing aircraft allowed an un-chocked and out of gear Aviation Light Utility Mobile Maintenance Cart (ALUMMC) to roll downhill until it contacted the forward left blade of a parked aircraft. (Class C)
- During MTF take-off, crew reportedly experienced aircraft attitude anomalies, during which the aft wheels made repeated contact with the runway. The crew conducted emergency shutdown procedures. The flight engineer sustained injury to one knee during the sequence. MTF was pursuant to replacement of an integrated lower actuator. (Class C)
- Aircraft was hot loading a 463L pallet with engines at flight idle. The flight engineer (FE) failed to signal the forklift operator to stop in a timely manner and the forklift contacted the aircraft upper rear pylon. (Class C)
- During post-flight shutdown procedures, a fire ignited in the heater compartment. The crew placed both engine control levers (ECLs) in the STOP position prior to egress and disengaged the auxiliary power unit (APU) shutoff valve. The fire was caused by sparks from a chaffed electrical wire igniting atomized hydraulic fluid spraying from a chaffed hydraulic line in the heater compartment. (Class C)
- Rotor wash from a landing aircraft resulted in damage to an adjacent aircraft as its crew was conducting shutdown procedures. Damage was reported to the airframe and flight controls due to main rotor blade contact with the No. 1 tunnel cover. (Class C)
- The combining transmission cooling fan shaft assembly seized in flight and caused hot transmission oil to be re-cycled through both No. 1 and No. 2 engine transmissions and the combining transmission, resulting in an over temperature condition of all three transmissions. (Class C)
- During post-flight inspection, the crew discovered lubricant leaking from the swash plate area. Upon further inspection, FOD was discovered (slip bushing) jammed in the non-rotating swash plate area. (Class C)

Don't Forget the Class D Lessons!

Lessons learned from minor mishaps can prevent more serious events in the future so take a look at these Class D mishaps:

- Following NVG four-wheel landing on rocky, up-sloping terrain, a post-landing inspection revealed damage underneath the cabin door area of the fuselage. (Class D)
- Aircraft was ground taxiing when the right aft-landing gear entered a pitted section of the taxiway, filled with rocks and gravel, resulting in separation of the landing gear and damage to the strut. (Class D)
- CH-47 crew chief injured during Bambi Bucket hook up qualification. (Class D)
- Co-pilots door separated from aircraft during flight. (Class D)
- After completing a left bank of 15-20 degrees the escape hatch in the upper half of the main cabin door separated from the door and fell

into the water. The cabin door was closed at the time of the separation. (Class D)

- A crew member suffered injury during an unexpected landing resulting from lack of proper crew coordination. (Class D)
- While conducting pinnacle landing training the pilot on the controls allowed the aircraft to drift aftward causing the rear cargo ramp to contact the ground. The aft cargo ramp was damaged. (Class D)
- During straight and level flight, right side pilot door departed the aircraft over a wooded area. (Class D)
- While pushing a pallet of meals ready to eat (MRE) off of the aircraft, the pallet caught on the ramp extension non-slip area and tipped over injuring a crew member. (Class D)

Summary

Three (60 percent) of the Class A mishaps occurred under night (N)/NVG conditions and for all H-47 Class A-C mishaps it was 59 percent. Fifteen (37 percent) occurred while deployed. In comparison to the five-year period FY10-FY14, the H-47 Class A mishap rate dropped from 3.04 to 1.37 mishaps per 100,000 hours. The FY10-FY14 five-year period contained 17 Class A H-47 mishaps compared to five this period and a total of 92 Class A-C mishaps compared to the total of 41 this period. More detailed information on accident prevention may be obtained by your safety officer through the Risk Management Information System (RMIS) on the safety.army.mil website. Registration is required and requires common access card (CAC) to access. ■

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

H-47 CLASS A – D MISHAPS FY15 – FY19

FY	Class A	Class B	Class C	Class D	Class A Flt rate	Fatal	Damage
2015	0	0	11	5	0	0	$1,973,415
2016	1	0	5	14	1.35	0	$2,889,143
2017	0	1	7	6	0	0	$1,749,582
2018	2	0	8	7	2.80	0	$9,527,829
2019	2	1	3	5	2.73	0	$37,006,829
Total	5	2	34	37	1.37	0	$53,146,798

By The Book

We are all guilty of cutting a corner from time-to-time and think nothing of it. When we don't come to a complete stop before turning at a red light or we don't conduct a toolbox inventory following maintenance activities we are cutting corners. We may not even realize when we deviate from standardized procedures detailed in our books that we are increasing our risk to a hazardous level. The assumption of risk is a critical responsibility whether you're the maintainer, maintenance supervisor, technical inspector or maintenance pilot. Someone is assuming the risk for actions or inactions, the consequences of which can be catastrophic. We will look at some consequences of tasks or checklists which aren't completed "by the book."

Non-Standard Deviation

During a recent accident investigation, a present but not contributing (PBNC) finding related to phase maintenance was identified. The team did not correctly document the maintenance procedures they had conducted in accordance with (IAW) the maintenance manuals. During the records review the investigation board's technical inspector (TI) identified that the maintainers used an unapproved but common practice in the CH-47F community when completing forward adapter lubrication.

The task called for removal of the forward transmission aft fairing in order to lubricate the forward adapter connecting the driveshaft and forward transmission. The phase team members did not remove the fairing completely as required by the book. The common practice or technique used required only removing the hardware necessary to allow the fairing to be lifted enough to slide the driveshaft from underneath. This is a textbook example of not conducting maintenance by the book and following the technical manuals, resulting in individuals cutting corners for the sake of saving a few minutes of time. A properly trained and supervised TI would find this paperwork unacceptable, note improper task performance and would not have signed off on the work conducted. When deviations are made from known standards, we create a new standard that sets a precedent for others to follow. This normalization of deviation starts the chain of events that lay the groundwork for an accident. James Reason's "Swiss Cheese Model of Accident Causation" (Figure 1. above) shows the successive layers of defenses that are broken resulting in accidents. As you can see from the example above, the holes in the defensive layers begin to line up when we don't adhere to published standards.

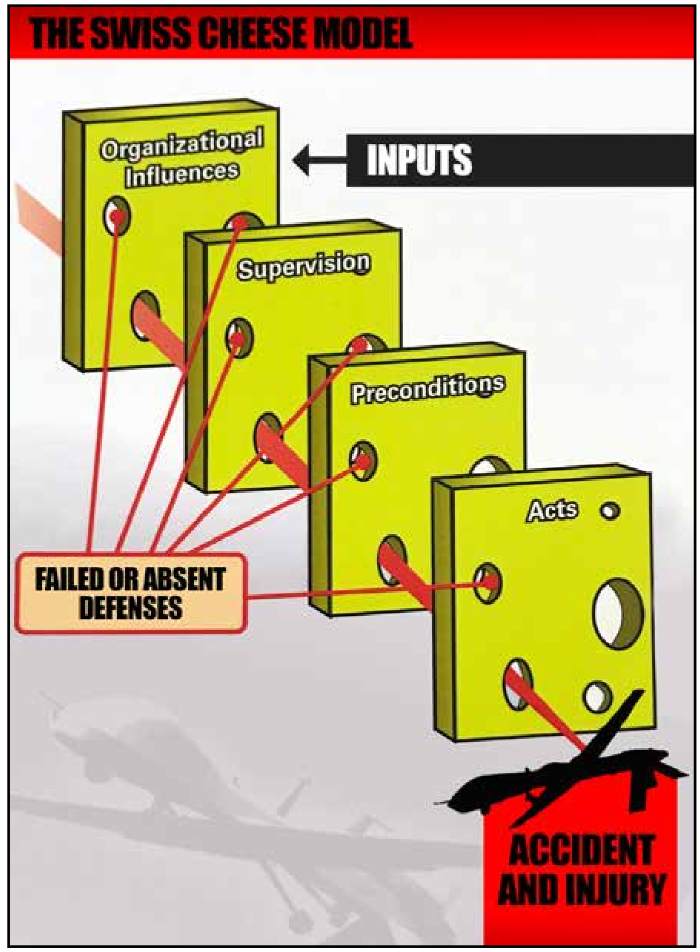


Figure 1. Swiss Cheese Model of Accident Causation

Foreign Object Damage

Let's look at another example of not following the book resulting in deviations being normalized. Safety data shows many examples of foreign object debris/ foreign object damage (FOD) i.e. tools, safety wire, hardware… having been left behind after maintenance was conducted on Army aircraft. We all know FOD checks are required, completed and stamped off by TI's, but the data shows we continue to suffer from FOD mishaps. Are we actually doing the FOD check to standard or has it become another normalized deviation?

Figure 2. CH-47F with pitot tube covers marked "Remove Before Flight"

In recent years, there have been a few instances where engine inlet FOD screen inlet covers remained installed when they should have been removed before aircraft operation and resulted in engine damage. Something as simple as an inlet cover with a highly visible "REMOVE BEFORE FLIGHT" tag not being removed shows us that individuals are not following the checklist in their rush to complete a task. Foolishly we deviate our operations from the book, maybe because we feel we know everything procedurally or it's what we were taught to do. The fact the Army required installation of a "REMOVE BEFORE FLIGHT" tag on covers and special tools is a built in risk mitigation tool used to prevent individuals from making these major mistakes, yet it happens a few times a year.

Final Thoughts on By the Book

The ability to overcome near misses and mishaps resulting from improper completion of a task due to normalized deviation of maintenance procedures requires that leaders take a fresh look at our training mechanisms, where we may fall short and reinforcing corrective training. Along with this look at training, a re-evaluation of priorities and maintenance task supporting the aviation company mission essential task list (METL) should be addressed.

Aviation safety officers (ASO) play a key role in assisting the commander as their safety eyes on unit operations. ASOs should be where critical points in the company or troop operations are expected. Aviation maintenance remains one of those critical points which have a high possibility for procedural deviation due to the amount of moving parts associated with conducting scheduled and unscheduled maintenance. Healthy aviation units with low incidence of maintenance mishaps have active ASOs who aren't immune to the maintenance hangar and actively give the unit maintenance officer and commander direct feedback on maintenance operation safety.

With new Soldiers and young leaders in our units, it is important to use primacy and teach them right the first time. Using the book and completing the task to standard, whether on a phase team, individually conducting a 100-hour inspection, or preflighting, leaders train your Soldiers to standard the first time. Expect by the book maintenance every time! ■

CW4 Robert Moran
Aviation Accident Investigator
Aviation Division
Directorate of Assessments and Prevention
U.S. Army Combat Readiness Center

Unmanned Aerial Systems and Ice, They Don't Mix

Icing in aviation is and has been an issue. So it is important to understand how ice or the condition of your aerial system prior to entry into possible ice formation weather is of utmost concern. While many Army aircraft have de-ice and anti-ice capability certain ones don't. Of particular interest for unmanned aerial systems (UAS) is the RQ-7 Shadow and MQ-1 Gray Eagle.

Condensation Impacts

Condensation on and inside cowlings of the RQ-7 are problematic. The operators manual, commonly referred to as the "dash 10" (-10), details specific procedures on how to deal with aerial system condensation during the pre-flight checks while the -10 checklist (CL) directs verifying that flight surfaces are dry.

While some refer to the -10 CL primarily, maintainers and operators must have a thorough knowledge of the detailed procedures in the -10 to fully understand the why, when, and how of completing the step or task. Over the recent months there have been several mishaps which ice formation contributed to the accident. Icing potential should be addressed as part of your pre-mission planning, taking weather and temperatures aloft into account while enforcing the proper pre-flight operations in accordance with (IAW) the checklist.

A simple procedure such as wiping condensation off the wings and from inside of the cowling while seemingly unimportant, rapidly can turn into a UAS losing the capability to maintain flight once the aircraft encounters freezing temperatures at altitude. Power margins are typically slim for the RQ-7, as operators know, and it doesn't take much ice formation and its weight to turn a routine mission into an emergency procedure.

My Gray Eagle has De-Ice Capability

Gray Eagle UAS are not immune to the icing problem. While the aerial system does have de-ice, this doesn't take away from the fact that the proper maintenance and pre-flight of the system must occur to ensure the vehicle won't fall prey to a mishap due to ice formation.

Minor issues to de-ice system components such as broken cable connectors and improper maintenance turn into major issues once airborne and encountering icing conditions. Failure of the de-ice system can have catastrophic consequences on the Gray Eagle's performance when icing conditions are experienced. Once again, following the -10 and -10 CL when operating your UAS and maintaining its systems pays huge dividends in being fully mission capable (FMC) and able to support operations.

Follow the Procedures

The maintenance and operation procedures detailed in the aerial system -10 and -10 CL are there to give you the information necessary with which if followed, will give your UAS and the mission the best chance of success. Simple procedures such as just wiping moisture off the wings of an RQ-7 are in certain cases mission critical. That small amount of moisture that wasn't a problem in 90 degree weather, becomes the cause of loss of ability to maintain flight in cold weather and when temperatures at altitude are in the freezing level.

The same holds true for the MQ-1, if the systems aren't maintained and operational, that small bit of condensation on the UAS that didn't cause any issues when you left it on the wings before takeoff in the summer weather, quickly leads to an emergency procedure when in cold temperatures. Just as critical those cable connectors to the de-ice system components that have been bent since the summer never caused an issue, but once operating in cold weather cause the de-ice system to fail. Again, with the change in seasons, a fault not corrected leads to an emergency procedure.

Do the Right Thing

Do the right thing when you're taking care of maintaining your UAS. Conducting the pre-mission planning necessary and a good brief to your crew can assist in all the team understanding how important it is to execute their tasks by the book and to standard. Make sure your maintainers understand that seemingly inconsequential tasks they are to conduct are anything but inconsequential. More is riding on the UAS maintaining flight and successfully executing the mission than they may understand so show them the importance of correctly carrying out their tasks.

For the operators, make sure you're thoroughly planning your missions and know the weather and forecast. Make sure you incorporate the right factors and risk levels into your risk-common operating picture (R-COP) and risk assessment worksheets (RAW). If icing is a forecasting factor, make sure your UAS is capable and approved to operate in the conditions and get that icing factored into your risk mitigation controls. Make sure your team is briefed on the risks and how to reduce them by following the book instructions and understanding factors such as the impacts of condensation on the wings. ■

Aviation Division
Directorate of Assessments and Prevention
U.S. Army Combat Readiness Center

Mishap Review

CH-47F Controlled Flight into Terrain (CFIT)

While conducting a night vision goggle (NVG) approach to a two-wheel, pinnacle landing, the pilot allowed the aircraft to drift from his intended landing area to a location that did not contain adequate clearance for the aft rotor. The aft rotor system contacted the terrain as the aft wheels touched down, causing the aircraft to lose main rotor components. The aircraft impacted the steep slope, rolled down the mountain and a post-crash fire occurred. The result was one fatality and three injured crew members.

History

The mishap crew, as part of a task force, was conducting training operations for individual and collective training at a high altitude mountain environment training (HAMET) site to prepare for combat operations in Afghanistan with an end state of all aircrew trained and the task force prepared to execute combat operations. The mishap flight was briefed as a moderate risk due to the 15 percent illumination in a Continental United States (CONUS) mountainous area, pinnacle/ridge-line operations, and possible brown out landings. The mission for the flight period was combat crew training (CCT) and local area orientation (LAO) for the accident pilot (PI) and non-rated crew members (NRCM).

The mishap crew departed the staging area at 1844 for their flight. The instructor pilot (IP) had the crew fly the route structure for orientation then transitioned to a training area and landed. The crew discussed the aft two-wheel landing they would execute on the next landing during the training while preparing for takeoff and adjusting their NVG as the sun had set. After hover check of updraft conditions at the training pinnacle point of landing the crew took off and transitioned from unaided to aided flight once they made the turn to final for the pinnacle aft two-wheel landing.

During the approach, the PI on controls came to a hover about 100 feet short of the intended landing point. While being directed by crew members forward and down, the crew called for hover over landing point which had the nose of the aircraft over the edge of the pinnacle. The PI started descending and drifted

forward. Once the aft wheels made contact with the ground, the aft rotors made contact with terrain. The IP took the controls and tried to fly forward but the aircraft rotor system came apart and the aircraft fell to ground and rolled downslope an unknown number of times. A fire immediately followed. Three crew members were injured and one crew member was a fatality.

Crew

The IP had 928 hours in MTDS and 1,008 hours total time. The pilot (PI) had 652 hours in MTDS and 739 hours total time.

Commentary

This mishap was the culmination of individual failures by crew members. The PI had flown only 20 hours over the previous 90 days and had not flown for the two weeks prior to the mishap. The NRCMs failed to accurately detect and announce the hazards during the landing and the IP was overconfident in his capabilities and was sidetracked during the final landing portion as he was communicating on the radios to other aircraft.

The landing portion of flight is a critical point in any mission. The IP had been conducting these higher-risk missions in preparation to train unit personnel. It is crucial that every crew member pay attention to detail during the landing phase. IPs should conduct a thorough record review for aviators and NRCMs they will be flying with during training. While flying with an experienced PI may allow you to multi-task during the landing phase, flying with PIs who are not as seasoned requires your full attention. Take that second look at the records, understand your crew mix and adjust your individual flight task risk level based on your whole crew. Covering the task and expected actions by the crew in the crew brief and using a rehearsal can assist the crew in executing to standard. ■

Class A - C Mishap Tables

	Manned Aircraft Class A – C Mishap Table									as of 21 Jan 20
	Month	FY 19					FY 20			
		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities
1st Qtr	October	1	1	4	0		2	1	5	0
	November	0	0	3	0		1	1	1	2
	December	1	1	2	0		1	1	2	3
2nd Qtr	January	1	1	0	0		0	0	1	0
	February	2	0	0	0					
	March	0	1	5	0					
3rd Qtr	April	0	1	3	0					
	May	2	2	6	1					
	June	0	0	5	0					
4th Qtr	July	2	1	2	0					
	August	1	0	3	1					
	September	2	1	8	1					
	Total for Year	12	9	41	3	Year to Date	4	3	9	5
	Class A Flight Accident rate per 100,000 Flight Hours									
	5 Yr Avg: 1.10		3 Yr Avg: 1.11		FY 19: 1.23		Current FY: 1.27			

UAS Class A – C Mishap Table									as of 21 Jan 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	9	2	3	14	W/GE	1	0	1	2
MQ-5	1	0	0	1	Hunter	0	0	0	0
RQ-7	1	12	38	51	Shadow	0	3	8	11
RQ-11	0	0	0	0	Raven	0	0	0	0
RQ-20	0	0	1	1	Puma	0	0	1	1
SUAV	0	0	0	0	SUAV	0	0	0	0
UAS	11	14	42	67	UAS	1	3	10	14
Aerostat	1	1	1	3	Aerostat	2	0	0	2
Total for Year	12	15	43	70	Year to Date	3	3	10	16
UAS Flight Accident rate per 100,000 Flight Hours									
MQ-1C Class A	5 Yr Avg: 9.56		3 Yr Avg: 9.87		FY 19: 8.77		Current FY: 3.86		
RQ-7B Class A-C	5 Yr Avg: 58.29		3 Yr Avg: 69.64		FY 19: 109.84		Current FY: 93.25		

Forum

Op-ed, Opinions, Ideas, and Information
(Views expressed are to generate professional discussion and are not U.S. Army or USACRC policy)

What does BASH mean to an Army Aviator?

The term BASH (Bird/Animal Avoidance and Strike Hazard) is foreign to Army aviation. There is no mention of a BASH program in Army Regulation (AR) 95-1, Aviation Flight Regulations nor in the AR or Department of the Army (DA) Pamphlet (PAM) 385 series describing what's required in the event of a bird/animal strike with an aircraft. If you have a bird or animal strike, you will only find the code for a bird strike on the Abbreviated Aviation Accident Report (AAAR) of 49. Why does Army aviation not have a program to educate and inform aviators? Why is the Army not on par with other branches of the military? What mitigation tools are at the disposal of aviators to help avoid strikes and report incidents? What can Army aviation do to implement or adopt a program that would provide aviators with a useful tool? Let's look at a few available options.

Bird strikes reported during 2015-2019 period

Row Labels	2015	2016	2017	2018	2019	Grand Tota
⊟C	3		2	6	1	12
AH-64D				2	1	3
CH-47F			1			1
DHC-7	1					1
MC-12W				1		1
MH-47G	1					1
RC-12P	1					1
UH-60A			1			1
UH-60M				2		2
UH-72A				1		1
⊟D	3	4	1	5	2	15
AH-64D	2	2		2		6
AH-64E		1				1
C-12F					1	1
C-12U		1		1		2
DHC-7				1		1
KA-300					1	1
MC-12W	1			1		2
UC-35A			1			1
⊟E	2	7	2	2	2	15
C-12D1	1					1
C-12U		1	2	1		4
CH-47F		1				1
DHC-7	1				1	2
MH-47G		1				1
UC-35					1	1
UC-35B				1		1
UH-60L		2				2
UH-72A		2				2
Grand Total	8	11	5	13	5	42

A review of the United States Army Combat Readiness Center (USACRC) database (see table) shows there were 42 bird strikes reported from 2015-2019 ranging from Class C-E accidents. Remember this only reflects the data that was reported. How many strikes were not captured? Every report helps tell the story and can help the field come up with avoidance methods and ways to combat bird strikes.

The United States Air Force has an entire webpage https://www.safety.af.mil/Divisions/Aviation-Safety-Division/BASH/ dedicated to sharing their BASH program. Publications, forms, statistics, tools, and links are all at your fingertips to keep aviators well informed. Army aviation does not have as much of an issue as the Air Force with ingesting bird or other wildlife into our engines since most of our aircraft have foreign object debris (FOD) screens, but both services often have birds striking our aircraft.

During the mission-planning phase, pilots should use every tool available to reduce their risk of coming in contact with birds while conducting

Bird strikes are problems the world over. This photo shows an Israeli Air Force UH-60 Blackhawk after a bird strike. Photo: US Air Combat/Wikimedia Commons

flight missions. Army aviation's philosophy is to see and avoid, while the Air Force has also developed a tool to assist in avoiding this hazard. The Avian Hazard Advisory System (AHAS), located on the web at http://www.usahas.com/, was developed with the best available geospatial bird data to allow individuals the ability to see the forecast for their route of flight, observe the potential of migratory birds along the route, and plan avoidance measures.

What is the Army's reporting requirement you ask? All strikes and damage will be captured on the DA Form 2397-AB which is the AAAR and forwarded to your safety officer. The United States Army Combat Readiness Center (CRC) records the data but does not publish it in a way that aviators can use it. There are other reporting tools out there that can be utilized which provide useable data to the pilot. The Federal Aviation Administration (FAA) uses https://wildlife.faa.gov/strikenew.aspx to provide data to the system. If you need to collect a sample of Snarge (bird strike remains) to send in for identification, information can be found at https://www.faa.gov/airports/airport_safety/wildlife/smithsonian/ or you can read the FAA advisory circular at https://www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.current/documentNumber/150_5200-32 that provides detailed instructions on how to collect and send bird strike remains to the Smithsonian Feather Identification (ID) Lab. Local safety officers should have Snarge kits that consist of latex gloves, Ziploc bags, and coffee filters. To collect a sample, wipe up some of the Snarge with a coffee filter and place it into a Ziploc bag with some of the feathers. Do not place body parts in the bag for testing. This sample can be mailed to the following address:

For material sent via US Postal Service

Feather Identification Lab
Smithsonian Institution
P.O. Box 37012
NHB, E600, MRC 116
Washington DC, 20013-7012

(not recommended for priority cases.)

For material sent via Express Mail Service

Feather Identification Lab
Smithsonian Institution
NHB, E600, MRC 116
10th & Constitution Ave NW
Washington DC, 0560-0116

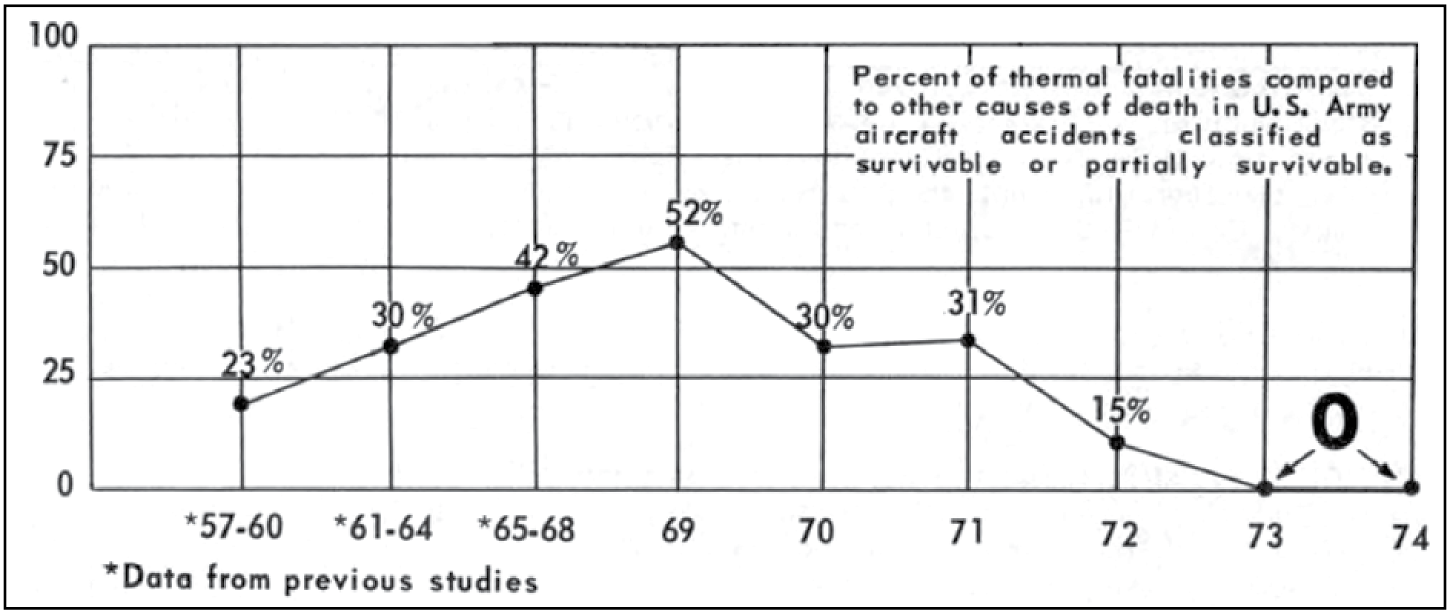
(This can be identified as "safety investigation material.")

Even if a BASH program is not formally incorporated into Army aviation operations, aviators can still ensure they use the tools that are available and document every strike and damage on the AAAR and forward it to their local aviation safety officer. This as a stand-alone incident doesn't seem important, but when aggregated, the information can be passed along to inform others of bird incidences and accidents in your local flying area which can give incoming flight situational awareness of local hazards. ■

CW4 Robert Moran
Aviation Accident Investigator
Aviation Division
Directorate of Assessments and Prevention
U.S. Army Combat Readiness Center

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

VOL. 2, NO. 40. 17 JULY 1974



We've Come A Long Way

A crash injury study underway at USAAAVS has revealed that for the second consecutive fiscal year, no thermal fatalities were reported in aircraft accidents classified as survivable or partially survivable.

Since the installation of the first crashworthy fuel system in June 1970 and the conscientious wearing of Nomex® flight suits and gloves, leather boots, and helmets thermal fatalities have steadily declined to zero.

To those military and civilian organizations and to all individuals who made this possible, we thank you!

Correspondence Courses

Many fine correspondence courses are available through the U. S. Army Aviation Center, Fort Rucker, Alabama.

This week, attention is directed to the "Flight Operations Coordinator Course," available to enlisted and other personnel of the active Army or a Reserve component and civilian employees of the federal government. Enrollment is for those whose actual or anticipated assignment is in MOS71P20 or whose duties require knowledge of flight operations.

Address correspondence to: Department of Army-Wide Training Support
U. S. Army Aviation Center
P. O. Box J
Fort Rucker, Alabama 36360

(Enrollment application should be submitted on DA Form 145.)

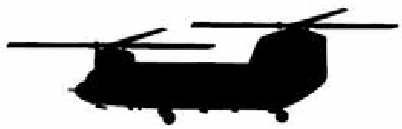
Mishap Briefs #84

ROTARY WING

Utility
H-60
A Model

- Aircraft crashed during a maintenance test flight (MTF) for a hydromechanical unit (HMU) replacement. (Class A)

Cargo
H-47
F Model



- While conducting sling load operations at approximately 2,000 feet above ground level (AGL), the aircraft unintentionally released the sling load. The aircraft did not sustain any damage. The shipping container being slung and contents were damaged. (Class B)

- Down wash caused damage to both a satellite 1.3 Tampa terminal system and a secure internet protocol router/non-secure internet protocol router (SIPR/NIPR) access point (SNAP) terminal (Communication Equipment). Additional damage was reported of cracks in the windshield to one vehicle and a shattered window in a building. Two service members (SM) on the ground received superficial injuries. (Class C)

FIXED WING

C-12
X Model

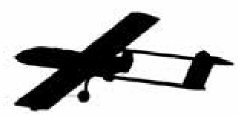
- Aircraft experienced a hard landing while landing on a hard surface runway. After shut down the crew noticed visible damage to all four propellers on the number two engine. No other visible damage was noted. Initial maintenance inspection revealed the number two engine will require higher-level maintenance inspection to determine damage level. Additionally, the right and nose landing gear struts require inspection along with multiple other components and areas of the aircraft due to hard landing. (Class C)

UNMANNED

MQ-1
CER

- Aerial vehicle (AV) ran off the runway during launch operations and crashed into the fence line. (Class A)

RQ-7B



- V2 - During a training flight, the AV experienced erratic flight behavior. As a result, the crew deployed the parachute. The AV crashed 500 meters outside of the military camp on a wooded ridgeline. (Class C)

Flightfax
Online newsletter of Army aircraft mishap prevention information published by the U. S. Army Combat Readiness Center, Fort Rucker, AL 36322-5363. DSN 558-2660. Information is for mishap prevention purposes only. Specifically prohibited for use for punitive purposes or matters of liability, litigation, or competition. ***Flightfax*** is approved for public release; distribution is unlimited.

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MAINTENANCE AND DATA RECORDERS

Maintenance and data recorders have improved aircraft maintenance and operational capabilities while additionally providing post mishap data and voice records for analysis by the United States Army Combat Readiness Center (CRC) at Fort Rucker, AL. It also provides an application to scenario-driven training based on units submitted data and voice recordings which the team in the Digital Collection Analysis and Integration (DCAI) Lab can render animation for aviation lessons learned.

There are several different systems depending on the aircraft mission, design and series (MDS). Staying with the most current MDS, here are some facts about their systems.

The UH-60L/M:

- Has the Integrated Vehicle Health Management System (IVHMS).
- Interfaces with the area microphone/preamplifier and intercom system (ICS).
- Has an underwater acoustic locating device.
- Has a cockpit voice recorder/flight data recorder (CVR/FDR).
- Monitors: Exceedance, data and event recording, rotor track and balance, mechanical diagnostics and bearing monitoring.

The CH-47F:

- Has the Cockpit Voice Recorder and Flight Data Recorder (CVR/FDR).
- It can store up to 2 hours of audio and 64 megabytes of aircraft flight data.
- The CVR/FDR consist of a crash survivable memory unit (CSMU), data acquisition section (DAS), and an underwater acoustic beacon (UAB).
- Designed to withstand 3,400 G impact, 1,100 degree Celsius (C) flame for 60 minutes or 260 degrees C for ten hours and immersion to 20,000 feet depth.
- Has a control panel that allows IBIT, erase capability while weight on wheels and an integrated microphone.

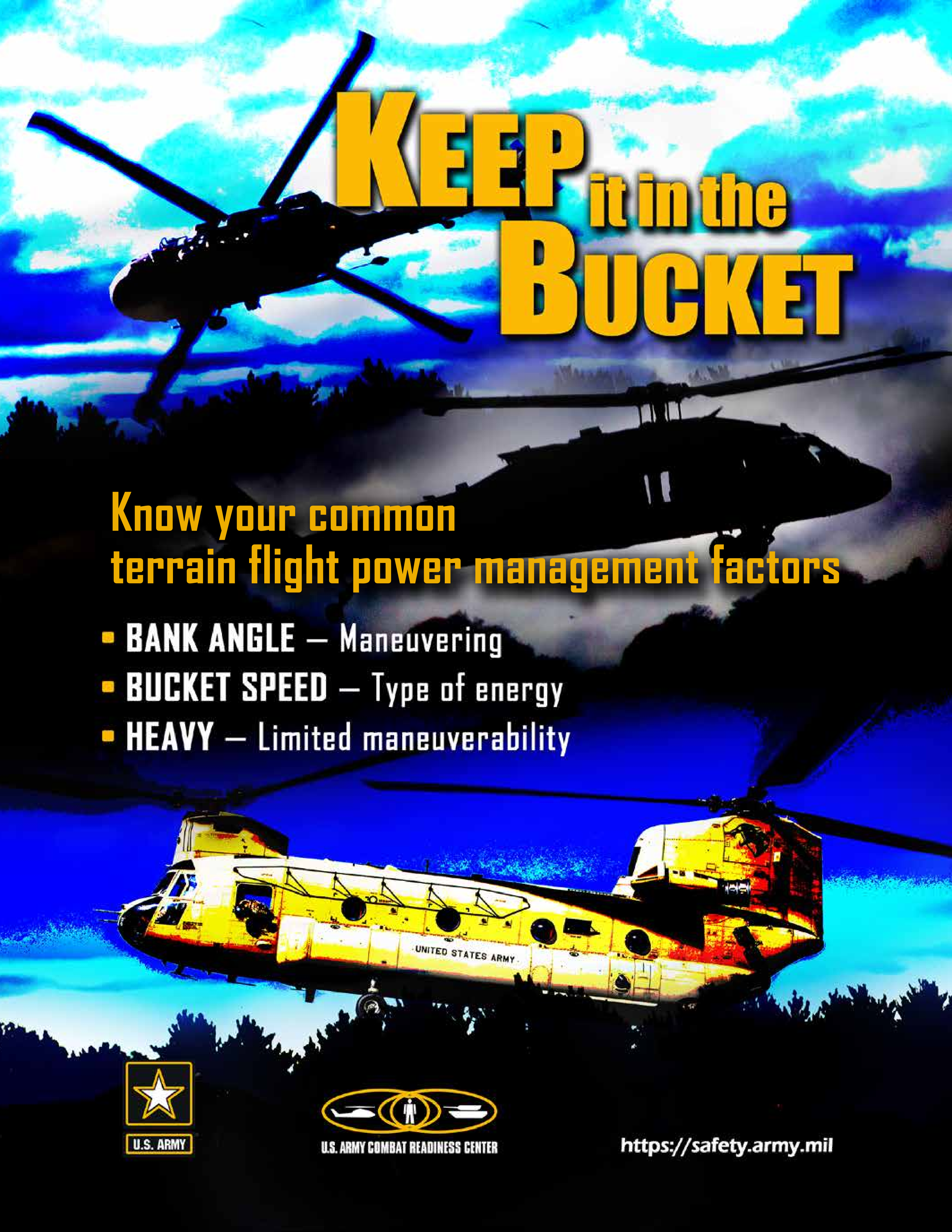
The AH-64E:

- Has a Maintenance Data Recorder (MDR).
- Stores flight data, maintenance faults, aircraft exceedance and warnings, cautions, advisories.
- Operation of the MDR is automatic and requires no crewmember interaction.
- Provides crash survivable data storage for mishap investigation and enhanced aircraft maintenance.
- Captures voice data from the two pilots and cockpit recording.

As the Army continues to enhance the fleet, they have integrated maintenance data recording with voice recording. This provides a better capability to utilize conditioned based maintenance and at the same time provides the fleet with post-mishap investigation data that assist the CRC in analyzing and determining the root cause of an aviation mishap. The ability to recreate the mishap portion with data from systems and voice from the flight crew is a key to developing counter measures, lessons learned and near-miss briefings which assist commanders with informing the field on what happened and discuss or incorporate counter measures into the training to preclude the mishap from happening again.

5 Questions

1. How many megabytes of aircraft flight data does the CVR/FDR hold? (H-47F)
2. Does the IVHMS record voice data? (H-60)
3. Does the MDR require initiation by turning the unit on? (H-64E)
4. Do CVR/FDR and MDR record voice data?
5. Which aircraft system has a UAB?



KEEP it in the BUCKET
Know your common
terrain flight power management factors
▪ BANK ANGLE — Maneuvering
▪ BUCKET SPEED — Type of energy
▪ HEAVY — Limited maneuverability
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