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Flightfax®

Online Report of Army Aircraft Mishaps

The Walk Around Inspection

What's the last thing you do before you climb into your aircraft? The tail boom check comes to mind for many aircrew personnel – novel thought but not my target.

"Engine start was attempted with one blade tie-down rope still attached to the blade. The blade rope caused visible damage to the tail rotor paddles, the tail rotor gear box cover, minor sheet metal damage to the tail pylon and minor damage to the red blade. Class C damage reported."

This reads like the 'selected aircraft mishap briefs' found on the back page of Flightfax. Why? Because that is exactly what it is – a description of a recently reported mishap. This is actually one example of several types of similar mishaps that get reported each year that fall into the "things I should have noticed" category. Actually, that's not an official category, but unsecured cowlings, covers, panels, tie-downs, etc. can and do pose hazards to aircraft operations.

The Class C list for this FY includes: left engine cowling opened in flight, engine exhaust cover flew into rotor system damaging blade, right hydraulic door opened in flight causing damage to four main rotor blades, No. 2 engine inlet plug installed during start causing overtemp and engine replacement, and the left-side hydraulic deck cover opened at a hover and contacted all four main rotor blades.

A look back at the last five years shows 29 Class C and 55 Class D/E reported mishaps. I stress the word reported because the unreported or no-damage numbers would push the count even higher. The cost associated with these incidents is nearly $3,000,000. The more common events include the AH-64 engine cowling opening in flight; the UH-60 APU compartment door left unsecured as well as the occasional nose compartment door opening and slamming into the windshield, the inlet covers not being removed or secured prior to engine start, the ever traditional drive shaft cover that's closed but not fastened as well as other unsecured panels, shrouds, doors, and covers still occur. No aircraft is immune. Although the mishaps listed the last few years have been Class C or less, Class A and B mishaps have occurred in the past, to include fatalities. Human error is often the cause factor but not every incident can be attributed to it. Material failure of fasteners and latches can and do occur. But the great majority can be placed squarely on the human element and are very preventable.

So, how do you reduce the numbers? The initial thought is that every pre-flight checklist refers to the "covers, locking devices, tie-downs, and grounding cables – removed and secured." The simple solution is to follow the checklist. That works well for most occasions, but the variances that can occur during the preflight process can cause mistakes. The urgency to launch can lead to splitting the duties to reduce time. Last second maintenance being accomplished as the crew readies to start can lead to missed checks and unsecured panels. Stand-by aircraft that are preflighted but not run-up often remain tied-down until needed. When a mission does surface, there is increased exposure to errors being committed as the crew plans and preps for a quick

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launch. The are numerous things that can disrupt the routine leading to missed checks.

Aviation is a system of checks, double checks, and more redundant checks to confirm the airworthiness of the aircraft. The final walk around is one of these. Depending on the airframe, it can be referred to in slightly different ways, both in the operator's manual and the ATM. "The PC will ensure a walk around inspection is completed prior to flight" or "the PC will perform a walk around inspection prior to aircraft start" are two examples.

As with many things - *how* the walk around is accomplished is left up to the PC. There is no set standard on *what* you look for on your personal inspection. From reviewing the mishap reports the obvious items include visually or physically checking the security of the cowlings, removal of blade and aircraft tie-downs, no covers or jettison pins remaining, and loose equipment/seat belts secured. Timing is everything so the least amount of time between conducting the inspection and climbing into your seat leaves the minimal amount of time for an outside influence to come in and change what you last observed on your aircraft. And it should be done prior to each start. Crews have been caught short by having outside agencies work on their aircraft while between missions, sometimes without their knowledge. The nose compartment was secure for the first flight but when they came back from lunch it was not secured properly when the radios were re-keyed. Pop goes a windshield on takeoff.

My walk around was always conducted as the last thing I did before climbing into the aircraft. It wasn't something I would delegate to another crew member. Typically, it was a time to mentally conduct one last overview of the mission, check your aircraft, and secure your body armor and survival vest. In addition to the items listed previously, I would also check the general condition in and around the parking spot. Checking for loose debris and hazards (i.e. dust) associated with departing the parking area as well as the anticipated effects of the rotor wash on nearby objects were more thoroughly accomplished from outside the cockpit. If I was not involved in the preflight I would expand my inspection to include physically checking the top and engine inlets. Those are my techniques. You have your own. I've observed PCs numerically count latches and panels as their technique to know that they checked them all.

One more thought. Most of the written guidance on walk-arounds refer to the PC conducting or ensuring the inspection is completed. Remember earlier in the article it stated that there have been fatalities associated with these type events? About fifteen years ago an aircraft was conducting an engine MOC for a fuel filter replacement. The engine was being run against the gust-lock. The aircraft chains and blade tie-downs were still in place. The gust-lock broke. Secured main rotor blades began to turn. The imbalance and vibrations caused by broken blades rotating resulted in two fatalities – the crew chief monitoring the MOC from the engine work platform and the PI in the pilot's seat. The aircraft was destroyed. Two lessons – if the aircraft is going to be started, complete the checks as if it is going to be flown and if you are the individual who is in charge of starting the aircraft whether for MOCs, engine flushes, or whatever reason – you are responsible for completing the checks.

When you are reviewing the contents of this article at your next safety meeting - and I know you will - ask the question "What is the last thing you do before you climb into your aircraft?" The walk around inspection should be somewhere in the mix.

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The Art of Interpretation

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We live in an age of documented change, or should I say, changing documents. Never before have I seen so many Army publication changes than in the past few years. The changes may be for safety, legal and/or procedural purposes intended to guide us in our everyday missions. With each newly changed document, we as an aviation community are charged with interpreting these changes.

In the distant past, interpreting publications was fairly easy – we relied on the "old guys'' to show us. Now that I'm the "old guy," I find myself looking at the written words and questioning the meaning of it all. So, how do we interpret all these changes? The obvious method would be to read it word for word – the literal meaning of the written word. I had an "old" IP once tell me "words mean things." But, unfortunately, due to the rapid fielding of many documents, wording and sustenance can be contrary to what think we know. Even though the words have individual meanings, I sometimes have difficulty putting them together into a meaningful whole. Of course, this was not the intention of the author(s). I know, because I have helped write numerous changes, only to see the draft document go through the staffing process and be published with errors and/or misunderstandings. In this case, we must know the intent of the document to better interpret it – but "words mean things." This catch-22 leads me to believe interpreting publications is a true art form, so we must be satisfied to only be *jacks of all and masters of none* when interpreting publications.

Let's first look at the realistic art of deciphering the publication by diagramming the sentences. See, 8th grade English may save your life. We must start by breaking down the sentence into its major parts: nouns, verbs, adverbs and adjectives. Then we look at its syntax, how the words and punctuation work together to give the sentence meaning – "sentences mean things." This form of interpretation will give us the literal meaning of the sentence, the connotation. Now that we know the meaning, we are able to put it into practice, right? Well hold on, what do we do about the document that leaves us asking "what was the purpose for putting *that* in there?" or "where is the common sense in *that*"? Ms. Smith, my 8th grade English teacher, said to understand a sentence, I need to know how to diagram it. Oh-no! Here is the catch 22 all over again. She was partially right: whether I diagram it or not, I must be able to put all the words and punctuation (right or wrong) into a meaningful whole. If I said "the nut is broken," did you picture a nut as in the food or a nut as in hardware that goes with a bolt? In order for you to know which one I'm talking about, I must give you more information to go on; this provides denotation – the meaning in the context. I do this by adding more and more sentences to create paragraphs that have meaning – "paragraphs mean things."

Using the connotation and the provided denotation, we can now begin to interpret these publications to achieve the intent for which they were written. Determining the intent is an art form in itself also. Luckily for us, many Army publications start with a purpose or intent paragraph. This provides the foundation and guidance for us to better understand the document.

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But this alone does not provide the full intent and its effect on our mission, so we must look at who wrote it and why. Each publication is constructed and maintained by a proponent. The proponent is staffed by Subject Matter Experts (SMEs); one of their many tasks is to write and update its publications. Believe me, this is a very time consuming job with an abundance of criticism. These SMEs use references and source documents to write their part of a change in a team effort to get their collective intent across. As we learn more about this proponent and its purpose, we are afforded a better understanding of their intent. The intent of the document is its heart and soul. It's worth more than the sum of its parts. We must be able to read between the lines and see the different shades of gray to fully understand the intent hidden in all the words, sentences and paragraphs. Therefore the question we must ask ourselves is "how does the publication's intent affect the commander's intent?" Remember, all the Army's publications are designed to guide, assist and regulate the commander in achieving the unit's mission—"publications mean things".

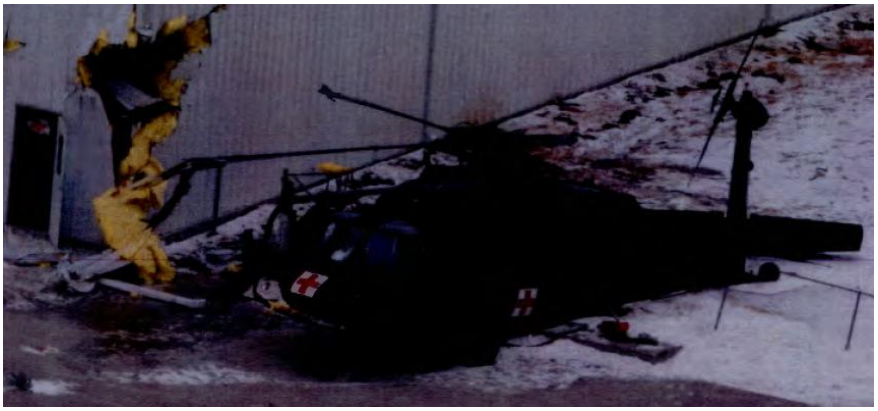
Interpreting publications is like looking at a painting. We must look past the colors, the brush strokes, the imperfections, and the abstract content to truly see the painter's intent. If we are able to do this when interpreting a publication, we will be able to see past the fog, confusion and errors to determine the writer's intent. If we truly see the publication for why it was written and not how it was written, we will surely meet the commander's intent and be successful in our missions. "There can be no sound interpretation without good faith and common sense." (Remarks on The Army Regulations and Executive Regulations in General by G. Leiber, JAG, 1898, p. 86)

Manned Aircraft Class A – C Mishap Table as of 28 Aug 13

	Month	FY 12					FY 13			
		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	6	1		1	0	7	0
	November	0	1	13	0		0	1	3	0
	December	2	2	6	4		2	1	0	0
2nd Qtr	January	2	0	12	0		0	0	5	0
	February	2	1	6	0		0	0	2	0
	March	1	3	11	0		3	1	5	7
3rd Qtr	April	2	1	6	4		1	1	6	2
	May	1	0	4	0		0	0	4	0
	June	1	0	2	0		1	0	3	0
4th Qtr	July	3	3	10	1		0	2	4	0
	August	2	4	8	0				4	
	September	1	0	4	2					
	Total for Year	19	17	88	12	Year to Date	8	6	43	9

Mishap Review: UH-60 Ground Taxi

While ground taxiing to a refuel point at a civilian airfield, the UH-60A contacted an aircraft hangar resulting in significant aircraft damage and no injuries to the crew.



History of flight

The mission was a day single ship cross country return flight to home station following two days of internal training on the eastern side of the state. The original 0930L VFR departure was backed up to the afternoon due to weather. The crew planned an IFR flight to an intermediate airfield for refuel followed by a VFR leg to their home station. The mission was low risk. The weather was broken skies with visibility of 10 miles. Winds were 090 degrees at 08 knots; temperature -01C and PA of +2300 feet.

The aircraft departed on an IFR flight plan at 1515L en route to the refuel stop. Approximately one hour after take-off and 10 miles from their destination, the crew canceled IFR and proceeded VFR to the airfield. With the PI on the flight controls, the aircraft landed and ground taxied toward the fuel pump. Concurrently, the IP began the shutdown procedures, telling the PI they needed to be close to the refuel pump. There was no ground guide or marking for taxi and parking. Approaching the point, the CP in the left crew chief station called a blade clearance warning of five feet, followed by turn right - stop. Near simultaneously, the main rotor blade tips struck the hangar door and a heavy steel beam on the hangar corner. The aircraft rotated approximately 270 degrees to the left coming to rest with extensive damage to the aircraft, hangar, and other parked aircraft. An emergency shutdown was completed. There were no injuries to the crew.

Crewmember experience

The IP, sitting in the left seat, had more than 2,000 hours total flight time, with 1,900 in the UH-60 (1,300 as a IP/PC) and 600 hours NVG time. The PI, flying in the right seat, had 128 hours total time, 45 hours in the UH-60 and 19 hours NVG time. The IP qualified CP in the left crew chief seat had 1,500 hours with 280 NVG. The flight medic, sitting in the right crew chief seat, had over 500 hours with 150 NVG.

Commentary

The accident board determined the crew failed to maintain a path clear of obstacles allowing the main rotor blades to contact the hangar door. The pilot on the controls failed to estimate distance, closure, and control input; the IP failed to properly direct his attention outside the aircraft during a critical situation; and the co-pilot was not timely and assertive in his obstacle clearance advisories during a critical phase of flight.

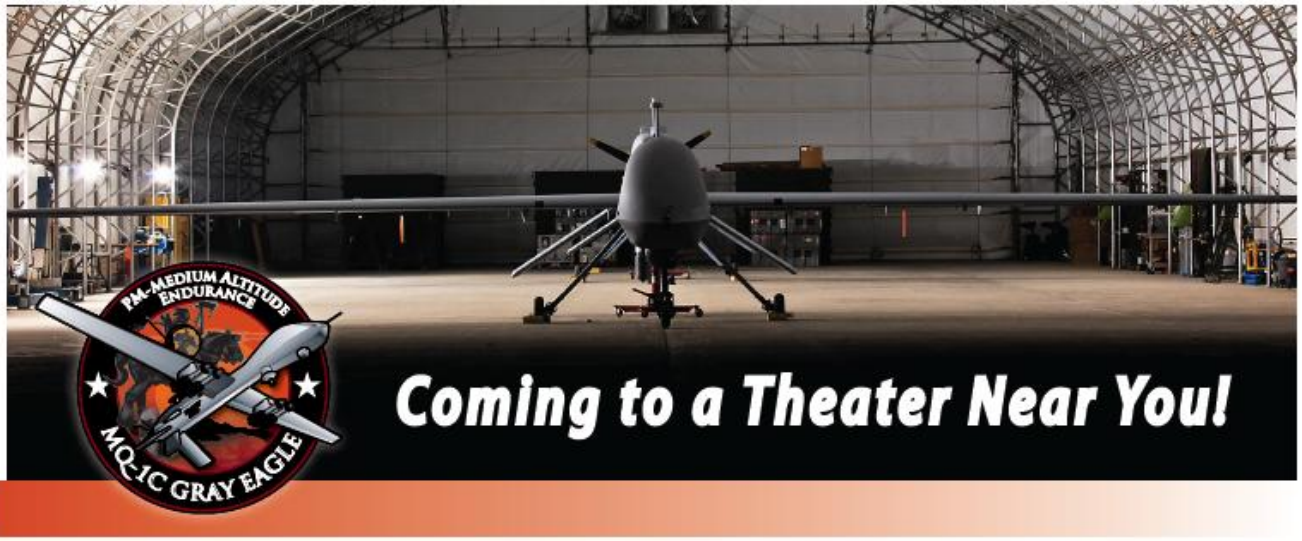
Know your unmanned aircraft

The MQ-1C Gray Eagle Unmanned Aircraft System (UAS) will provide combatant commanders a much improved real-time responsive capability to conduct long-dwell, wide area reconnaissance, surveillance, target acquisition (RSTA), communications relay, and attack missions (4 HELLFIRE II® missiles). Gray Eagle addresses an ever-increasing demand for greater range, altitude, endurance and payload flexibility.

The acquisition strategy has capitalized upon competitive forces, bringing cutting-edge improvements at the best cost and value that support the major thrusts of the Department of Defense UAS Roadmap, a host of other studies, and the imperatives of Army modernization and Army Aviation Transformation. This includes a heavy fuel engine, Tactical Common Data Link technology and network connectivity that reduces information cycle time and enhances overall battlespace awareness through liberal dissemination, teaming with manned platforms, and steps toward integration of UAS into national and international airspace.

A 3,600 pound gross take off weight, Fowler flaps which improve take-off and landing performance, Automatic Take-off and Landing (ATLS) and the flexibility to operate with or without Satellite Communications (SATCOM) data links are just some of the characteristics that make this system a combat multiplier.

Wing Span	Length	Power	Weight	Payload Capacity	Payloads	Altitude	Endurance	Maximum Air Speed
56 ft (17m)	28 ft (8.5m)	Thielert 160 HP (JP8)	3,600 lb	575 lb int 500 lb ext	EO/IR, SAR/ GMTI, and Communications Relay	25,000 ft	27 hours	150 Kts



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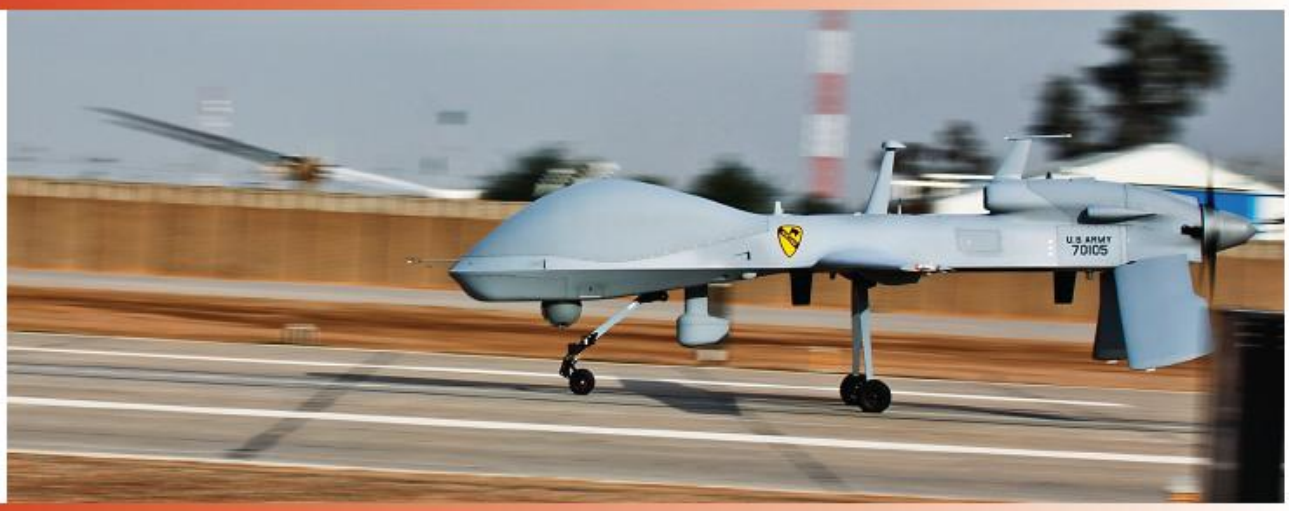

System Features

- Redundant Flight Controls and Avionics
- Dual Redundant ATLS
- System Operational Availability Over 80%
- Displacement/Emplacement in Less than Two (2) Hours
- Near All Weather Capability
- Common Ground Control Station

Mission Features

- Integrated in the Combat Aviation Brigade within each Division
- Immediately Responsive
- Persistent Surveillance
- Target Acquisition, Designation, Attack, and Battle Damage Assessment
- Reinforce Brigade Combat Team Capabilities
- Heavy Fuel Engine (JP8)
- Manned-Unmanned Teaming

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Why did they take these risks? Feb 2000 Flightfax

A recent accident illustrates how risk-taking behavior can lead to a tragic chain of events. The result was destroyed equipment, crew injuries, and death.

Poor judgment does not reserve itself to any category of aviator. Low-time and high-time pilots alike can make poor decisions. When a poor decision is made, it can be fatal, not only for the offender, but for the crew and passengers as well. The following account, which traces the mission and planning of an ill-fated flight, demonstrates the consequences, which arose from risk taking and violation of Army flight regulations.

A case in point

An instructor pilot with 3,900+ hours was preparing for an instrument refresher training flight just before Thanksgiving holidays. The weather had been poor for the previous three days and very few flights had launched. The pilot had approximately 450 hours and flew infrequently as a staff officer. Two crew chiefs were aboard the flight. The weather the day of the accident was poor in the morning, improved a little during the day, and then deteriorated again that evening. Ceilings were 200 feet overcast around 0900 with two statute miles visibility and a temperature/dew point spread of 13/13 degrees. Around 1300 the weather came up to 1,000-foot ceiling, overcast, 10 statute miles visibility and 17/14 temperature/dew point spread. By 1600 that day, when formal flight planning for the training mission began, conditions were still VFR.

Mission planning

The aircraft assigned did not have a glide-slope receiver and at 1630 the IP directed the crew chief to physically inspect the aircraft to verify whether or not the aircraft had a glide slope. After their review of the aircraft, it was determined that the aircraft was not glide-slope equipped.

At 1710 the IP called the flight service station (FSS) for weather and received a forecast for his destination airfield at 1800 of winds variable at three knots, two statute miles visibility, mist, overcast 600 feet, temperature 15, dew point 14 and a temporary condition from 1800-2400 hrs of 1/2 – statute mile visibility, fog, overcast at 200 feet.

Risk-taking behavior #1

Did not receive weather briefing from a military facility IAW AR 95-1 and local SOP.

He also received METAR (Aviation routine weather report) observations for his two en route destinations for training approaches. The first airport was 55 miles to the east and was reporting winds 000 at 00 knots, ¼-mile visibility, fog, temperature and a dew point of 14 at 1650.

The second airport was 27 miles west of the first airport and 33 miles east of the departure airport. The second airport's METAR report cited winds 000 at 00 knots, 10 statute miles visibility, broken 800 feet and overcast 1100 feet, temperature 15 and dew point 14.

Risk-taking behavior #2

Did not associate hazards of a minimal temperature and dew-point spread, temporary condition, deteriorating forecast conditions, and added hazards associated with night instrument flight.

At 1715 the IP filed his flight plan with FSS. Navigation equipment installed included a VOR and

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ADF. The planned approach at final destination had ceiling and visibility landing minima of 400-1/2. IAW AR 95-1 an alternate was required if ceiling and visibility were less than 800-1 ¼. The flight plan indicated 2 hours and 26 minutes of fuel on board.

Risk-taking behavior #3

No alternate airfield planned or filed in the flight plan, in contravention of AR 95-1.

Mission planning and training continued for the pilot using the general planning and FLIP until approximately 1800 hours, 15 minutes past the filed departure time. The IP turned in his DD 175, DD175-1 and risk assessment to operations. The mission briefer approved the mission, and the crew conducted their preflight inspection of the aircraft at approximately 1805.

Risk-taking behavior #4

The mission briefer failed to ensure forecast weather conditions met the requirements of AR 95-1 and the local SOP. Specifically, a non-military facility provided the weather forecast, and an alternate airfield was required but not designated.

The flight

The flight took off at 1832, using a standard instrument departure in route to the first airport, to conduct an instrument approach and a missed approach for training. At the second airport another training instrument approach and missed approach were to be conducted, followed by an instrument approach at their destination airport for termination of the flight.

The flight to the first airport was relatively uneventful. At 1906 the crew was conducting the VOR approach at the first airport. Radar showed the aircraft was on course and had no apparent difficulties executing the approach. The crew made the missed approach and continued to the second airport.

At the second airport, radar and ATC communications revealed the crew had some difficulty with identifying and intercepting the approach course. The approach clearance was cancelled, the aircraft was vectored to re-intercept the course, and the crew flew an ILS approach to the localizer minimums at 1929. Radar data again shows the aircraft on course throughout the approach. The crew executed the intended missed approach and was given vectors for the return leg to their destination airport.

While en route to their destination, the crew acknowledged having the current ATIS information – 100 feet vertical visibility, ¼-statute mile visibility, fog, temperature 13, and dew point 13. After being vectored onto the approach course, the crew executed an ILS approach to localizer minima, and then executed a missed approach at 1957 because they could not identify the runway environment. Radar data shows that the crew flew the approach course without significant deviation down to minimums. The crew requested vectors for a second ILS approach. At 2013 the tower radar identified the outer marker and the crew acknowledged the transmission as they began their second approach. This was the last transmission from the crew.

Radar data shows that the crew flew on course down to localizer minimums. Several hundred feet short of the runway the aircraft track began to veer left of course. The aircraft slowed to 60 knots and descended another 100 feet as it traveled 3/10 of a nautical mile past the runway approach end. At this point, radar identification was lost. From the last known radar position, the

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aircraft turned approximately 180 degrees and traveled the 3/10 nautical miles back towards the approach end of the runway. At 2017, 4 minutes and 20 seconds after crossing the outer marker, the aircraft impacted the ground. The aircraft was in a 30-degree nose-down level attitude.

The consequences

The resultant crash force was 57 G's. The IP and one crew chief were killed on impact. The pilot and other crew chief were ripped out of the aircraft as it disintegrated along the wreckage path. The expulsion of the pilot and crew chief dissipated resultant impact forces so that survival was possible. The pilot and surviving crew chief sustained serious life-threatening injuries. The aircraft was destroyed.

Conclusion

This accident was avoidable. Army flight operations are controlled and regulated for a reason. Major airlines and Part 135 operators use detailed operations manuals and procedures, just as we use SOP's and AR's, to reduce some decision making in the interest of safety and risk management. Major airline and military accident statistics strongly suggest that our operations are safer than general aviation, because the military and major airlines utilize more controls. If the SOP's and regulations are not enforced by supervisors and followed by our pilots, then we lose invaluable checks and balances to keep our operations safe.

UAS Class A – C Mishap Table as of 28 Aug 13

	FY 12 UAS Mishaps					FY 13 UAS Mishaps			
	Class A Mishaps	Class B Mishaps	Class C Mishaps	Total		Class A Mishaps	Class B Mishaps	Class C Mishaps	Total
MQ-1	5	1		6	W/GE	4	1	0	5
MQ-5	1		3	4	Hunter	2	0	3	5
RQ-7		5	20	25	Shadow	0	2	10	12
RQ-11					Raven				
RQ-20			4	4	Puma	0	0	6	6
YMQ-18									
SUAV			1	1	SUAV				
Aerostat	2	5		7	Aerostat	1	2	1	4
Total for Year	8	11	28	47	Year to Date	7	5	20	32

Selected Aircraft Mishap Briefs

Information based on preliminary reports of aircraft mishaps reported in July 2013.

Cargo helicopters

CH-47 

-D series. Engine exhaust cover was still in place during engine run-up for flight. Cover blew into the rotor system and contacted the aft 'green' blade. (Class C)

MH-47 

-G series. PTIT exceedance (1.1K degrees C/12 sec>) during engine-shutdown. Engine replacement required. (Class C)

Utility helicopters

UH-60 

-A series. Post flight inspection revealed damage to the stabilator. Aircraft had been performing autorotations during RL progression training. (Class C)

Observation helicopters

OH-58C 

Aircraft experienced a torque exceedance (106%/1 sec) when crew initiated a vertical climb in dust conditions to avoid terrain. (Class C)

Fixed wing aircraft

UV-20A STOL

Aircraft contacted tree line during take-off sustaining damage. (Class B)

Unmanned Aircraft Systems

MQ-1C 

UA experienced loss of fuel pressure and a FADEC degradation during flight. Crew initiated emergency procedures for return to base. Engine failed with system landing short of the runway. (Class A)

RQ-20A 

Operator lost link with the system and initiated emergency procedures to re-establish. Attempts were unsuccessful and the UA crash-landed. (Class C)

RQ-7B 

System experienced engine failure approximately 45 minutes into flight. Crew was able to control system for descent and deployment of recovery chute. Damaged system was recovered. (Class C)

Aerostats 

-Aerostat reportedly became engulfed in a 'dust devil' as it was being launched. Tether broke in the erratic shifting of the balloon. FTS activated and balloon recovered with damage. (Class B)

- Aerostat was aloft when 'dust devils' were observed and tether was severed by winds. Balloon impacted the ground. (Class A)

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

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