Flightfax
Number 61 January 2018 Online Newsletter of Army Aircraft Accident Prevention

The Aviation Safety Officer

For more than 40 years, aviation safety officers have proven an indispensable asset for commanders across the Army, both in peacetime and at war, at home and deployed. There is little doubt they have played a tremendous role in sustaining the Army's aviation fleet and preserving the lives of our aviators, all while managing competing priorities and ever-increasing OPTEMPO. However, there continue to be some disconnects in how ASOs are utilized in individual formations. We must capitalize on the talents of these critical safety professionals and ensure the right person is in the job, particularly with regard to tactical and technical proficiency.

The safety guidebook for aviation commanders, Department of the Army Pamphlet 385-90, Army Aviation Accident Prevention Program, outlines in detail tasks expected of an ASO. It's a great resource for young leaders assuming their first or second aviation commands, but experience will eventually show there is much more to an ASO's job than safety inspections and monitoring programs. What the regulation doesn't state is that ASOs are an integral part of the operational mission set and must be active in tactical operations at high risk points to effectively assist in risk mitigation. As such, commanders in tactical environments must prioritize where the safety team is needed to produce the greatest mitigation results (e.g., zero illumination missions, forward area refueling and re-arming points, pickup zones, motor pool).

Focus on Tactical Ops

An ASO who is a night vision goggle (NVG) flight lead, mission planner, expert in forward area arming and refuel point (FAARP) operations, etc., provides the commander and unit with a trained aviation safety professional situated at the location that allows him or her

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unhindered access in ensuring their crews' safety and successful, mishap-free mission completion.

Focusing our ASOs on tactical aviation operations allows them to position themselves at locations and times they can best identify and mitigate risk, therefore improving the quality and quantity of observations and advice they pass to their commanders.

We must take a hard look at our training programs, from the schoolhouse to rotational missions and everywhere in between. Only tough, realistic training can provide ASOs with the tacit and explicit knowledge necessary to maximize operational safety during combat operations. We have to shift our focus beyond the regulatory requirements for Army Aviation to transition to an active tactical safety program, and ASOs are key enablers to expedite this change.

Just as commanders focus units on mission essential task list (METL) tasks, ASOs must be in the right places at the right times to ensure operational safety. And just as commanders select key individuals for their command, they also have the prerogative to select their safety team. A young officer just out of the safety course has book sense but might be very inexperienced in tactical operations, so commanders must determine who can best facilitate mission completion with maximum risk reduction. That individual might be a seasoned aviator with tactical experience to pull from as well as years of experience in risk mitigation.

Combat Multiplier

Proactive and effective safety officers continually circulate their units to minimize risk, and commanders can help by ensuring their ASOs are integrated into the unit's tactical mission sets. This doesn't negate his or her duties beyond the tactical operation; instead, it prioritizes the importance of integrating the ASO into the tactical plan, staging at the higher risk areas and directly assisting in preventing aircraft mishaps while airborne or on the ground. A technically and tactically proficient – and involved! – ASO is a combat multiplier.

The U.S. Army will fight anywhere, under any conditions. True risk mitigation smartly applied to the conditions at hand, will prevent the loss of resources and enhance Army Aviation's readiness. Our ASOs are key to maintaining that readiness and reducing loss within our formations. ■

Readiness through Safety!

DAVID J. FRANCIS
Brigadier General, USA
Commanding

The return of Army short-range air defense in a changing environment

The continuing Russo-Ukrainian conflict has seen a transformation of the Russian military and the need for short range air defense with our maneuver forces. Included in the overall Russian transformation, per the Russian New Generation Warfare Handbook, is the blending of unmanned aircraft systems (UASs), electronic warfare jamming equipment, and long-range rocket artillery.

The synchronization of effects of these elements has produced devastating consequences to Ukrainian forces. In addition, it was noted that the integration of self-propelled air defense systems and man-portable air defense systems in maneuver forces "shot the Ukrainian air force out of the sky." Short-range air defense artillery units were historically embedded in Army divisions, providing them with an organic capability to protect their critical assets against fixed-wing and rotary-wing aircraft. However, in the early 2000s, these ADA units were divested from the Army to meet force demands deemed more critical at that time. Decision-makers accepted the risk that threat aircraft might have on maneuver forces and other critical assets because we believed the Air Force could maintain air superiority. Thus, the short-range ADA force post-2005 was reduced to two battalions of active component Avenger and counter-rocket, artillery and mortar batteries and seven National Guard Avenger battalions; none of which are organic divisional elements. Defense against air threats in maneuver forces is currently limited to that provided by organic weapons and maneuver personnel.

The last few years has seen an influx of threat capabilities in air and missile platforms globally with corresponding threats to the maneuver forces. The development, fielding, and use of UASs has also increased exponentially. UASs, as noted in lessons learned, have become increasingly common and important to operations by both sides in the Russo-Ukrainian conflict. Low, slow and small UASs, in particular, present considerable threats to

maneuver forces and are difficult to detect and defend against by maneuver units.

These UASs are consistently enhanced with surveillance, targeting and attack capabilities. Surveillance-capable UASs are commercially available throughout the world and can be modified with explosive devices to create lethal attack platforms.

While UASs are more common on the battlefield, attack helicopters continue to constitute the greatest single threat to maneuver forces. Some potential threat nations are growing their manned aerial fleets in both quantity and quality. Improved fire control and weapons capabilities enable them to fire from longer standoff ranges. More capable fixed-wing aircraft and cruise missiles are also being proliferated worldwide. New aircraft versions feature such enhancements as on-board jammers and lower radar cross sections. More capable cruise missiles are being developed and fielded in larger quantities. These cruise missiles feature longer ranges, lower altitude flight paths and increased accuracy. Each of these aerial platforms, by itself, presents a formidable threat to the maneuver force. Future threat tactics will likely see a synchronized mix of platforms in complex and massed attacks, particularly against the less mobile fixed and semi-fixed assets of maneuver forces.

The divestment of divisional ADA, continuing asymmetric threats, and the re-emergence of peer and near-peer adversaries have left our maneuver forces and key assets vulnerable to enemy air surveillance, targeting and attack from aerial platforms. Additionally, enemy indirect Fires threaten our ability to protect and sustain the force, leading to potentially higher friendly attrition, loss of initiative and reduced freedom of action. Consequently, we'll struggle to get to the "close fight" with the current Fires portfolio. To reduce the risk of the low-flying air threats, the Army is reinvigorating short-range air defense (SHORAD) by expanding the number of ADA short range systems and growing ADA formations within the divisions. In the meantime, the Army is also exploring an option to temporarily introduce combat arms Stinger teams that are organic to the maneuver force.

SHORAD's Role

SHORAD is defined as dedicated air defense artillery and

non-dedicated air defense capabilities which enable movement and maneuver by destroying, neutralizing or deterring low altitude air threats to defend critical fixed and semi-fixed assets and maneuvering forces. Within this context and for the purpose of clarification, "non-dedicated" denotes organic active and passive measures collectively known as "combined arms for air defense. " Fixed and semi-fixed assets denote permanent facilities and structures (e.g., air bases) and transient facilities and structures (e.g., assembly areas), respectively. Also, note "maneuvering" vice "maneuver" force; SHORAD capabilities are being designed to protect the maneuver force on the move, not just when it or its assets are stationary.

SHORAD Vision

The SHORAD vision embraces three complementary, concerted Army efforts that address defense of the maneuver force, fixed and semi-fixed assets, and combined arms for air defense. These efforts encompass what we can do now, and where we want to be in the future. Our goal over the next few years is to develop and field capabilities across all three efforts that will mitigate the current vulnerability to our maneuver formations.

The first effort, defense of the maneuver force, is entitled M-SHORAD – Maneuver SHORAD. Today's divisional formations have no organic SHORAD capability and only a limited ability to detect aircraft in the air (two Sentinel radars in the division artillery). Without such capabilities, maneuver formations are exposed to potentially continuous surveillance by threat UASs and subsequent devastating attacks by fixed-wing and rotary-wing aircraft and artillery.

The objective M-SHORAD capability focuses on mobility and survivability compatible with the supported force. Ongoing SHORAD initiatives to lower operational risks and protect maneuver forces include training maneuver Soldiers as combat arms Stinger teams, improving the Stinger missile capability, and identifying potential interim materiel solutions to protect the maneuver force until an objective M-SHORAD capability can be fielded.

- Initial training of 62 combat arms Stinger teams was started with European Command in July 2017. Training will continue with three follow-on courses for Forces Command units at Fort Sill, Okla., beginning in October 2017. Training and Doctrine Command will assess the initial teams in various training environments through 2018 to make a recommendation to the Army leadership on continuing this effort for some 600 additional teams (one per maneuver company).

- The Army acquisition community conducted an M-SHORAD demonstration with industry partners in September 2017 to evaluate interim M-SHORAD platforms that can mitigate current threats to maneuver forces until we are able to develop the objective M-SHORAD capability (one battalion per division).

- A proximity fuse enhancement for the Stinger missile is being developed. The proximity fuse will facilitate the effective engagements of the low, slow and small UASs and increase capabilities against fixed-wing and rotary-wing threats.

● The objective M-SHORAD concept of operations has been developed and the initial capabilities document (ICD), which defines the new capability requirements to associated capability gaps, was approved by the Army requirements oversight council (AROC) in June 2017.

In addition, conceptual underpinnings for the next generation of man-portable air defense are being drafted. This capability is essential when conducting future operations in urban and mega-city environments.

The second effort addresses the Army's fixed and semi-fixed assets. Current ADA systems, Avenger with Stinger missiles and the Phalanx gun system in counter-rocket, artillery and mortar units, will be replaced by the Indirect Fire Protection Capability (IFPC). The IFPC will provide enhanced firepower protection to critical, more stationary fixed and semi-fixed assets. Block 1 of the program is nearing a Milestone B decision and will soon transition to the engineering and manufacturing development phase of the acquisition process. Block 1 will provide the capability to defeat advanced UAS and cruise missiles threats, as well as fixed-wing and rotary-wing aircraft. It is projected to be initially fielded in early 2020. Block 2 is envisioned to add an enhanced protection capability (either an advanced missile or directed energy) against rockets, artillery and mortar projectiles in flight. In addition, the Sentinel radar is being upgraded with advanced antenna technology to increase its range and detection capability. This new variant, Sentinel A4, will also provide advanced electronic protection that is essential to survival on the modern battlefield.

M-SHORAD and the IFPC are complementary systems that provide a tiered defense of critical assets. The IFPC's strength lies in its capacity (magazine depth) for an engagement in defense of fixed and semi-fixed assets. Fixed and semi-fixed assets are at greater risk due to massed Fires and their more stationary (less mobile) natures. M-SHORAD trades capacity for mobility to maintain pace with supported maneuver forces who are less vulnerable to massed Fires and complex attacks due to their mobility.

The Army recognizes the need for more SHORAD formations. While complementary, M-SHORAD and the IFPC are not interchangeable without a significant loss in warfighting capability in each. These future ADA units must be designed with a mix of M-SHORAD and IFPC so they have the ability to protect the maneuver force and critical Army fixed and semi-fixed assets. This mix of capabilities will enable the use of air defense principles mass, mix, mobility and integration.

The third effort focuses on the combined arms contributions to air defense. This consists of actions taken by a unit's organic weapons and passive actions to reduce the potential effects of an aerial attack. These actions are secondary missions and are generally considered to be complementary to the protection provided by dedicated ADA formations. However, in many situations combined arms for air defense are the only air defense capabilities available to maneuver formations as ADA resources have always been insufficient to protect all of the force components. Even with anticipated growth, the ADA force will not have the number of units and systems to provide the required defenses throughout the force. Thus, it is incumbent upon units of all the warfighting functions to incorporate defense against aerial threats into their

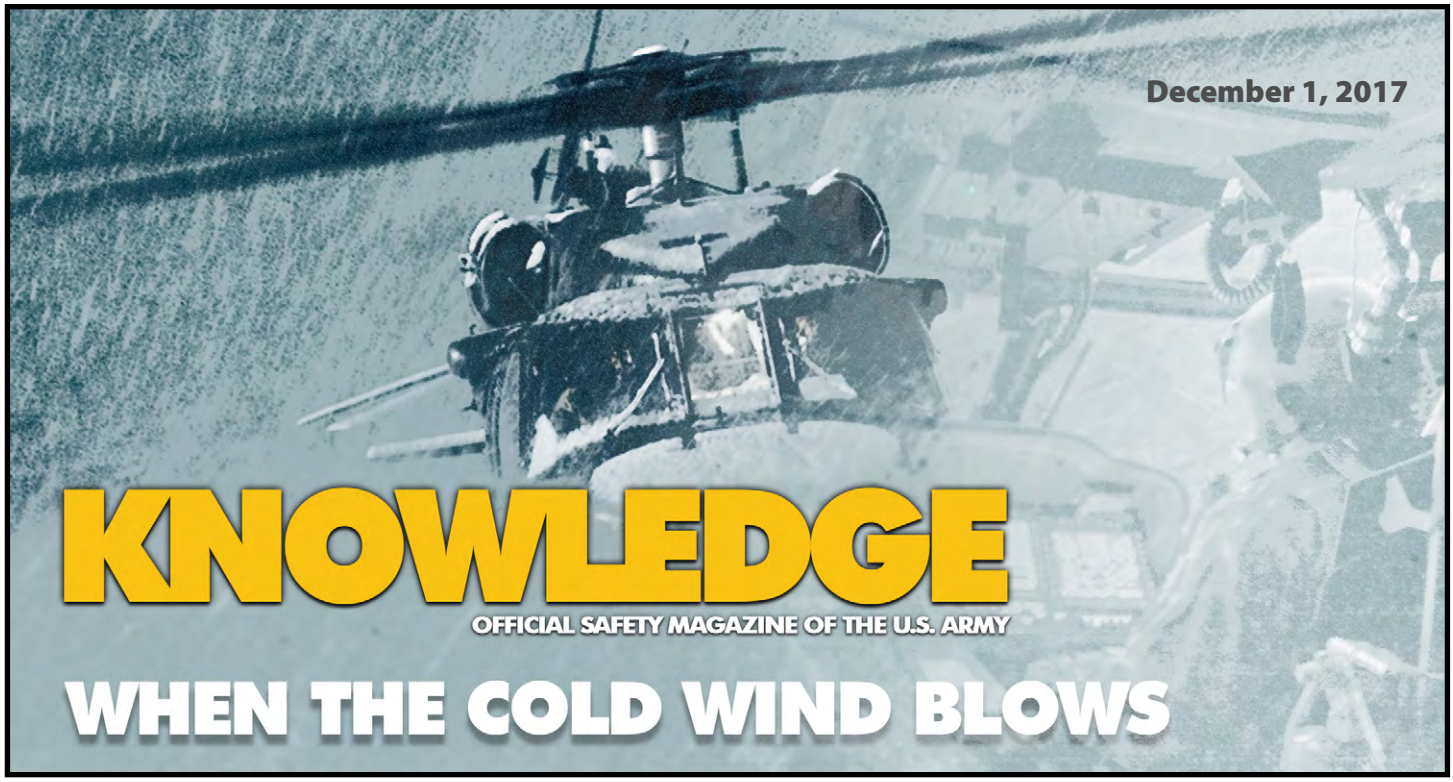
training programs. The Army Techniques Publication (ATP) 3-01.8, "Techniques for Combined Arms for Air Defense," provides some guidance for planning and training on how to defend against aerial threats. In addition to the ATP and training of Soldiers in maneuver companies as combat arms Stinger teams, "other initiatives underway look to repurpose existing equipment in the force and formulate non-kinetic effects to negate or kill the air threats. "The aviation community is outfitting select Apache helicopters with L7A Hellfire missiles capable of air-to-air engagements of enemy helicopters and some tactical UASs. Several existing Army-ground electronic warfare programs have been repurposed to provide air defense defeat capability against small hand-launched UASs. The Cyber Center of Excellence is aggressively pursuing their Multi-Functional Electronic Warfare requirements documents. The Fires community has tested and deployed a repurposed variant of the Q-50, the lightweight counter-fire target acquisition radar in the brigade combat teams' Fires battalions, capable of detecting and tracking small UASs. Development of an air surveillance capability for the Q-53 counter-fire target acquisition radar is currently ongoing.

The ADA community, in concert with other TRADOC centers of excellence and the Army staff, is focused on quickly returning short-range air defense to enable freedom of movement and maneuver along the three efforts outlined in this paper. The future SHORAD force must be designed with the appropriate mix of M-SHORAD, IFPC and man-portable capabilities. Our adversaries will use complex integrated attacks; we will counter with a layered approach.

This is the first of a series of articles on SHORAD. Subsequent articles will address dedicated ADA and combat arms Stinger team forces and capabilities, aerial intelligence preparation of the battlefield and planning for air-ground integration, SHORAD mission command, and air and missile defense operations in maneuver formations. ■

"First to Fire!"

Brig. Gen. Randall McIntire
U.S. Army Air Defense Artillery School Commandant



Winter Weather

So there I was … Assigned to the 51 FW at Osan AB, South Korea in the winter of 2007. I had already experienced one winter in Korea as I was previously assigned to the 607 WS, DET 1 at Camp Red Cloud. But this was my first time actually performing observations during a winter full-time.

We were expecting snow one day from a low moving in from China across the Yellow (West) Sea. It was already snowing across some of the stations along the western shore and it was only a matter of an hour or two before the snow would start falling at Osan.

I had just taken an observation and was submitting it through our weather system when the phone rang. It was a phone patch from a C-12. Apparently, the pilot was aware the conditions were degrading quickly across the area. So, they had begun looking for a place they could land since they weren't going to make their first choice. My flight commander had picked up the phone and was relaying the current and expected conditions.

Luckily we had a portable phone, so the commander and I headed outside to brief the conditions "live" to the pilot. The pilot was still 15 minutes from landing, so I kept an eye out on prevailing conditions with an increased vigilance for changes to the western sky. Over the next few minutes, we were losing visibility to the west, dropping from 3 miles to 2 miles. I could see the gray colored wall of snow off in the distance. Thankfully, the east was still clear, so prevailing conditions were 5 miles.

We continued to see falling visibility over the remaining time for the plane to make its descent. Pretty soon I could hear the drone of the turboprop, in the clouds. At that point, we saw the flakes begin to fly and visibility was prevailing at 3/4 mile with the western sector visibility less than 1/2 mile. As our commander called out 3/4 mile, I could see the plane dip below the clouds and make the landing. I couldn't see the aircraft make the end of the runway to turn for the taxiway, but at least we could still hear the engines.

Winter weather is never easy, and in this case we had a successful recovery. But there are a lot of hazards inherent in winter. Let's go through some of them briefly.

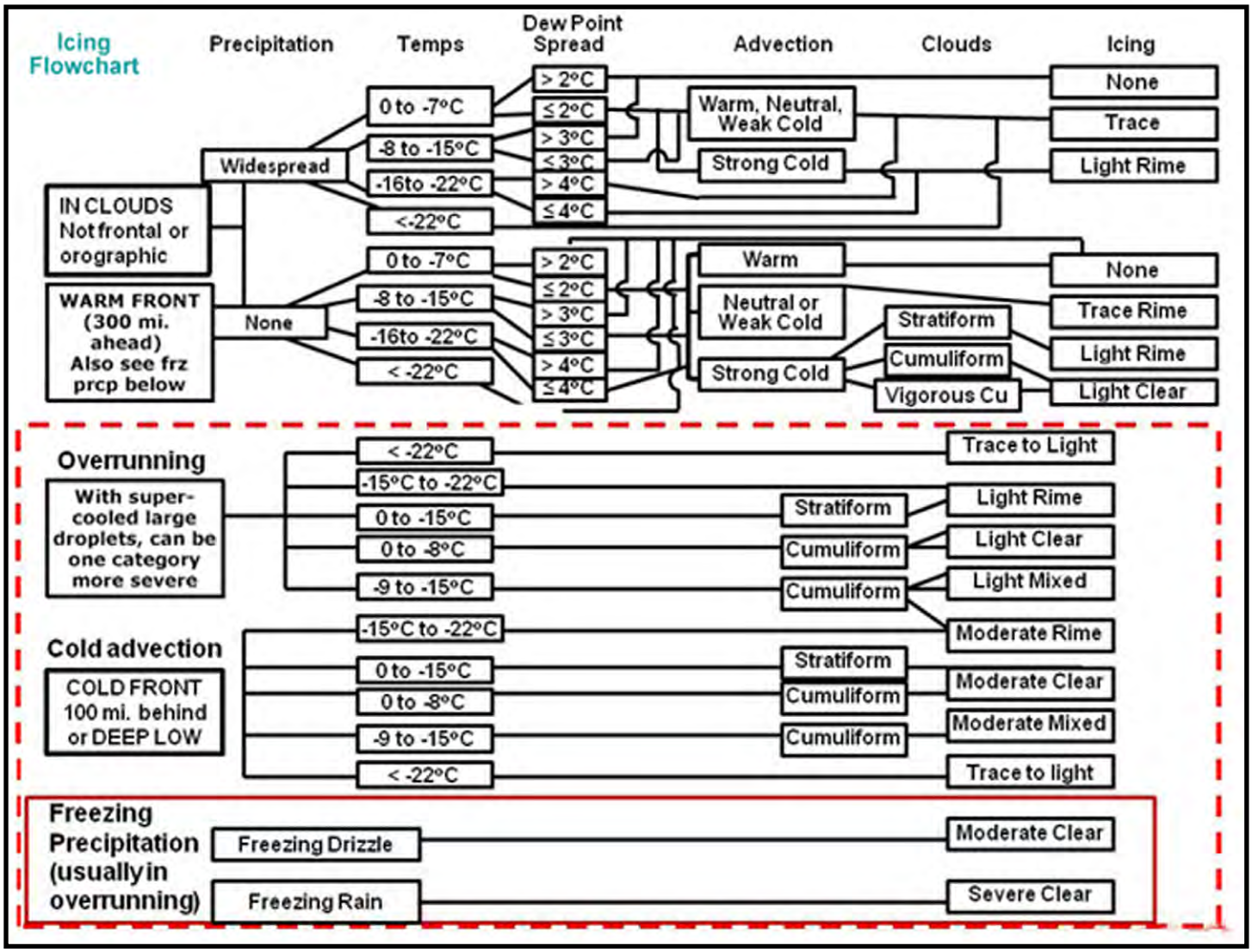
Icing

Ask pilots which weather condition is most challenging for flying, and many will say icing. Ice accumulation increases aircraft weight and degrades its aerodynamics. Icing impacts, depend on aircraft size, wing orientation and the availability of onboard deicing equipment.

Icing occurs in the presence of super cooled liquid water - in clouds and/or precipitation in regions of sub-freezing temperatures often associated with low pressure systems. These layers appear on atmospheric soundings as moist layers with temperatures in the 0°C to -22°C range. While the -22°C is often used as the lower temperature limit for super cooled cloud water, it can be observed at lower temperatures, especially in mountain wave and convective clouds.

The most reliable reports of icing usually come from pilot reports, although, ideally we want to keep aircraft out of icing conditions as much as possible. Other observational data sources that can detect or indicate icing conditions are radiosondes (weather balloons), weather radar and satellite.

This flowchart gives weather forecasters an excellent guide on forecast conditions and what icing type to forecast.



Army Regulation 95-1, Flight Regulations, states that aircraft will not be flown into severe icing conditions and any flight into moderate will only be done if the aircraft is equipped with adequate operational deicing or anti-icing equipment.

Clear Air Turbulence

Clear air turbulence (CAT) is the turbulent movement of air masses absent of any visual clues, like clouds, in the upper troposphere (23,000-39,000 feet). CAT is most frequently encountered near jet streams. Jet streams are stronger in the winter and thus CAT intensity and frequency increase.

Clear-air turbulence is usually impossible to detect with the naked eye and very difficult to detect with a conventional radar, making it difficult for aircraft pilots to detect and avoid it.

Even with the weather indices and tools currently available, forecasting CAT remains a subjective process. This is due, in part, to how turbulence is verified. Pilot reports are the only observations that truly indicate its presence, and they're not always available to confirm or deny it. This can make it difficult to relate atmospheric patterns, forecasted parameters, and precise index values to the actual presence of turbulence.

Over time, experienced aviation forecasters learn to forecast significant CAT through pattern recognition. Understanding the patterns found in satellite imagery, upper-air observations, and model output then makes it possible to forecast the locations and altitudes of CAT.

Mountain Wave Turbulence

Just as jet streams are stronger in winter, so too are the surface lows and winds at the surface. When combined over mountains, the air moves from a mostly horizontal pattern to adding more of a vertical one.

This dramatically increases the turbulence and it can form

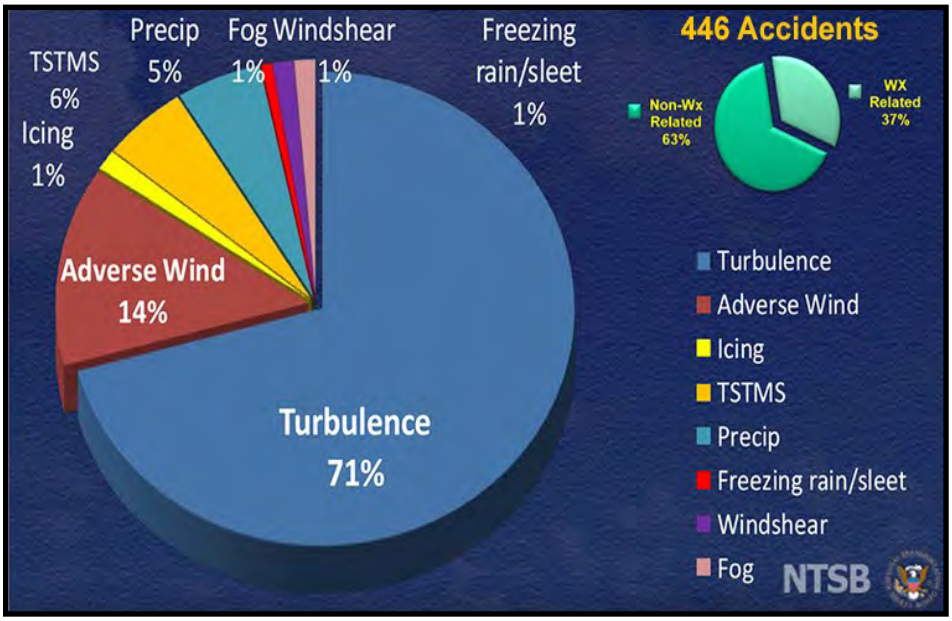
into waves, where you may not experience turbulence at one moment and then drastically lose altitude the next.

Turbulence Statistics

To better illustrate the risk of turbulence, the following graph of aviation incidents from 2000-2011 shows the propensity of accidents to be caused by turbulence.

Again, the Flight Regulation provides guidance on flying into turbulence. Aircraft will not be flown into extreme turbulence or forecasted severe (exceptions are made for mission necessity for severe).

Weather Related Cause/Factors of U.S. Airline Accidents 2000 - 2011



Freezing Precipitation

Finally, we'll end with freezing precipitation which includes freezing rain and freezing drizzle. These conditions are extremely hazardous, not only in the air but on the ground as well. They can cause damage to engines by coating the fan blades or by collecting on the cowlings and breaking off and getting ingested.

Freezing rain occurs when the layer of freezing air is so thin that the raindrops do not have enough time to freeze before reaching the ground. Instead, the water freezes on contact with the surface, creating a coating of ice on whatever the raindrops contact.

Freezing drizzle is formed in low-level stratus type clouds when vertical motion is weak. It consists of relatively small drops, light in nature. It generally occurs when drizzle forms in an air mass at below-freezing temperatures but warmer than 14 °F. At such a temperature, the water droplets stay super cooled as there are few ice nuclei to change them to ice crystals. In winter arctic conditions it can happen at even lower surface temperatures as the air is even cleaner. ■

Tech. Sgt. Chris Bridgham
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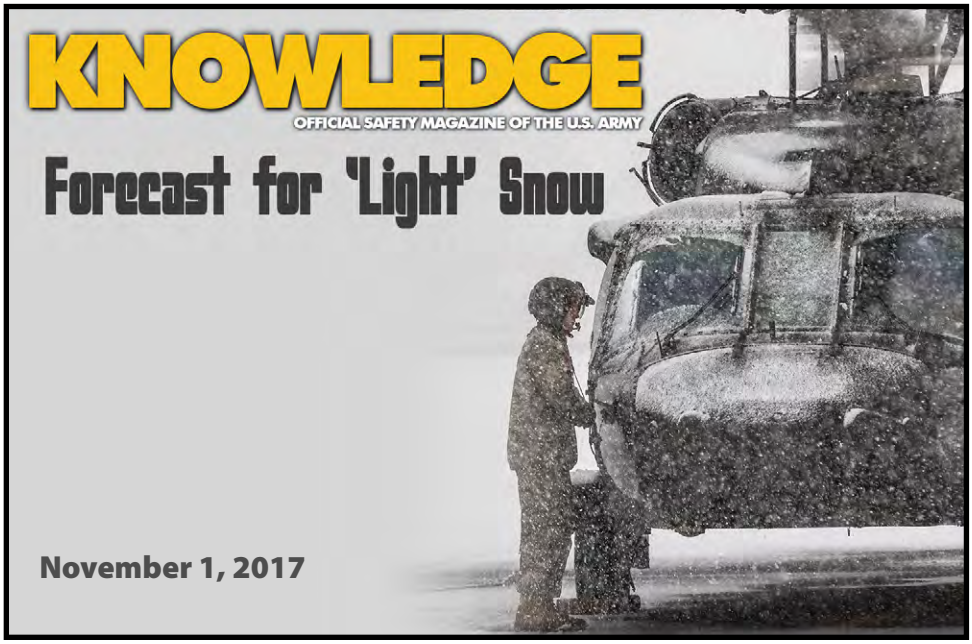

Mishap Review: UH-60 Inadvertent IMC

While conducting night vision goggle (NVG), multi-ship operations at 500 feet above ground level (AGL), the lead UH-60L in a flight of two encountered instrument meteorological conditions (IMC). During the execution of inadvertent IMC procedures, the aircraft descended rapidly and struck the ground. The aircraft was destroyed and five of the seven personnel on board were injured.

History of Flight

The crew of the accident aircraft was conducting a multi-aircraft continuation training mission with another UH-60L. Planned for a daytime departure, the training mission was from an airfield on the installation to a civilian airport. They would return under NVGs. However, due to an unscheduled maintenance delay, the first leg of the flight started as a daytime departure with an in-flight transition to NVGs, after sunset.

The aircraft departed, stopped at the civilian airport, departing at 2318 under NVGs. On the return leg of the flight, the crews of both aircraft noted deteriorating weather conditions with rain, low clouds and fog increasing in low-lying areas. The crews then discussed an inadvertent IMC plan for both aircraft to recover to their home installation under instrument flight rules (IFR), if necessary. A few minutes after discussing the IMC plan, the rain became more intense. The accident aircraft reported being in the soup and initiated the discussed recovery plan.

While executing the recovery plan, the accident aircraft leveled along the roll axis and initiated a climb straight ahead with the cyclic to allow the airspeed to decelerate to climb airspeed. The airspeed slowed to 50 KIAS, and the pilot brought the steep pitch and 50-knot airspeed to the attention of the pilot-in-command (PC). The (PI) lowered the nose briefly and then raised it back again to approximately 20 degrees up before the airspeed had a chance to build. The accident aircraft then entered a 20-degree, nose-high decelerating attitude. The PI then issued a second challenge by calling out that the airspeed was 0 KIAS and they were descending. The PC did not take corrective action. The aircraft rapidly descended at 2,000-foot-per-minute, a near-vertical descent. The PI said, "I have the controls," grabbed the flight controls, and pulled up fully on the collective as the aircraft descended into the trees.

Crewmember Experience

The PC had 969 total hours with 597 in the UH-60. The PI had 356 total hours and 170 hours in the UH-60.

Commentary

When crews plan missions, it is important to make sure that they have the most current information. As aircrews conduct briefings and flight planning for training missions, they should brief how changes to the plan will be handled and further addressed in terms of mission aborts or modifications. Maintenance and weather changes occur consistently in the aviation realm and it is important to brief how to handle those changes. Following regulations and briefed parameters help make sure crews are able to conduct operations safely. The briefing process is such that it positively impacts safety and the ability to execute missions in a manner which allows crew and aircraft to live to fight again. ■

Class A - C Mishap Tables

	Manned Aircraft Class A – C Mishap Table									as of 2 Jan 18
	Month	FY 17					FY 18			
		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities
1st Qtr	October	0	0	7	0		1	2	6	0
	November	1	0	4	0		0	1	2	0
	December	1	0	2	2		0	1	5	0
2nd Qtr	January	1	0	2	0					
	February	0	1	3	0					
	March	0	1	5	0					
3rd Qtr	April	1	0	6	1					
	May	1	0	7	0					
	June	0	3	4	0					
4th Qtr	July	0	1	7	0					
	August	3	3	4	6					
	September	1	1	6	1					
	Total for Year	9	10	57	10	Year to Date	1	4	13	0
	Class A Flight Accident rate per 100,000 Flight Hours									
	5 Yr Avg: 1.14		3 Yr Avg: 1.09			FY 17: 0.99			Current FY: 0.52	

UAS Class A – C Mishap Table									as of 2 Jan 18
	FY 17					FY 18			
	Class A Mishaps	Class B Mishaps	Class C Mishaps	Total		Class A Mishaps	Class B Mishaps	Class C Mishaps	Total
MQ-1	10	2	4	16	W/GE	2	0	0	2
MQ-5	5	0	1	6	Hunter	0	0	0	0
RQ-7	0	15	37	52	Shadow	0	0	3	3
RQ-11	0	0	1	1	Raven	0	0	0	0
RQ-20	0	0	0	0	Puma	0	0	0	0
SUAV	0	0	0	0	SUAV	0	0	0	0
UAS	15	17	43	75	UAS	2	0	3	5
Aerostat	6	0	1	7	Aerostat	0	0	0	0
Total for Year	21	17	44	82	Year to Date	2	0	3	5

Blast From The Past: Put it down; Leave it down

*Articles from the archives of past **Flightfax** issues* **VOL 7, NO. 31, 23 May 1979**

While on approach to a runway about a mile and ahalf away, a CH-47 pilot saw the transmission chip detector light flicker. Rather than continue the approach, he immediately made a precautionary landing. As the helicopter touched down, the transmission exploded and the aircraft caught fire, causing major damage.

But let's consider the brighter side of this picture. At the time of the emergency, six persons were on board the aircraft. If the pilot had ignored the warning light and continued his approach, all six persons could have been killed.

Any aviator who flies long enough sooner or later is going to have the opportunity to demonstrate, when the chips are down, whether or not his training and flying hours have been well spent. As you know, a helicopter is a mass of push-pull rods, chains, gearboxes, linkages, servos, and other items which generally work smoothly, but occasionally hang up and once in a while go snap, crackle, and pop. When this happens, an aviator must have the good sense to put the aircraft down at once and leave it down.

But this is not always the case. Accidents occur when pilots don't make precautionary landings when they should. Why don't they? Let's look at a few of the reasons some have given.

"It's probably just fuzz on the plug. We can make it."

"The Old Man doesn't like to fill out all the paperwork that's required if we put the aircraft down out here."

"Oh, don't get upset. I can handle it. That light comes on all the time; ignore it".

"I just brushed that tree. There's no real damage."

Excuses such as these can have catastrophic results ...

A UH-1 pilot entered autorotation when the engine rpm dropped to 5200. The rpm then increased and the pilot made a power approach to the ground. Once on the ground, he decided that since the engine was still running, he could make it one more mile to an airfield. Complete engine failure occurred en route and the aircraft crashed.

In another case, an OH-6 was not developing full power, so the pilot landed to see what was wrong. He then made a hover check and decided the engine was performing normally. Instead of having maintenance inspect the helicopter, he tried to continue his flight. The engine failed at 100 feet during takeoff, the helicopter crashed, and all on board were killed.

The pilot of this CH-47 made a precautionary landing at first flicker of the chip detector light and got it down just in time. The transmission exploded on touchdown.

Another OH-6 pilot radioed that he was having trouble controlling excessive engine rpm. The problem continued for 10 minutes when the pilot said, "I think I just lost everything." Witnesses said the engine and rotor revved up and then was followed by relative silence. The main rotor severed the tail boom and the aircraft fell from about 1,500 feet. The aircraft was destroyed and the pilot killed because he failed to land after numerous indications of a malfunction.

Pilot continued flight after repeated indications of trouble.

Ten minutes after takeoff, another helicopter pilot reported his engine chip detector light was on and that he was returning to home base. The last radio transmission heard was that the turbine outlet temperature was "out of sight," that the aircraft was vibrating severely, and that the pilot intended to land at the closest helipad. A witness stated that he saw flames coming from the rear of the helicopter and then the engine quit. The aircraft hit a 50-foot tree and sank in about 8 feet of water. All three occupants were killed.

It's hard to say why these aviators continued to fly rather than land, but no reason given could justify their decisions to continue flight and jeopardize lives and aircraft.

Maintenance officers aren't immune to accidents and are no more qualified than any other aviator to fly a substandard aircraft even when there may be only a suspected malfunction.

In one case, an aviator decided that his aircraft was unflyable due to an increase in egt when power was applied. Black smoke was seen pouring from the tailpipe, oil vents, and particle separator. The unit maintenance officer made a 15-minute runup with the same signs of a malfunction, but then decided to fly the aircraft to the maintenance area. As he made a downwind, near maximum performance takeoff, the engine failed. The aircraft rolled and slid 280 feet down a railroad track.

A decision to tow or sling load the helicopter to the maintenance area would have prevented this accident.

Regardless of any excuse, whether it be pride, mission accomplishment, or coercion by supervisory or maintenance personnel, it's safer to put that aircraft down and leave it down at the first sign of trouble. ■

Huey pilot put it down after engine rpm dropped, then decided he could make it one more mile.

How many of you are aware of what maintenance action is required if an engine is started or operated with the inlet plug(s) installed?

In accordance with (IAW) EM 0271, TM 1-2840-248-23&P, dated 15 June 2017 Work Package (WP) 029400, the proper maintenance is Replace Engine (AVUM) or Replace Cold Section Module (AVIM)! The work package goes on to describe several different variations of blockage; swirl frame, inlet guide vanes, one vane, multiple vanes, adjacent vanes, etc. All require an inspection, many an engine or cold section replacement.

The reason for this extreme measure is a phenomena known as High Cycle Fatigue (HCF), in this case aerodynamic excitation caused by engine flow path pressure perturbations. This can begin at engine speeds of 14,000 RPM (approximately 30% N_G) and is initially undetectable by inspection. HCF is when an airfoil is subjected to repeat bending which can cause essentially unpredictable failures due to fatigue-crack propagation under ultrahigh frequency loading.

If you don't remove the cold section module, you run the risk of blade separation and foreign object damage (FOD) to the entire engine. So the next time your pilots miss the BIG RED inlet covers on preflight, help them out, remove the covers and save your unit a lot of money and a possible in-flight failure. ■

Fatigue is a major challenge for many engine components, including fan blades:

* **Caused by load cycling**
* **Occurs at cycling loads well below the ultimate strength**
* **HCF caused by vibration / flutter**
* **Low Cycle Fatigue (LCF) caused by engine cycling**

Compressor blade tested in a vibratory fatigue test rig

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Detection and Engagement
Chief Warrant Officer 4 Michael Behrendt, Directorate AMSO

The Army is shifting focus to operation in a decisive action environment which will require increased demands on training our force. One thing that is evident is we must look at how we conduct route planning. Specifically, we must leverage the tools within Falcon View (FV) to assist us when it comes to planning in an Anti Access Area Denial (A2AD) or the Contested, Denied, or Operationally Limited (CDO) operational environment. The key to planning is leveraging the AMS triad: AMSO, S2, and EWO within your brigades to work as a cohesive team. Due to the observed mismatch in capabilities, we cannot assume we can destroy every enemy asset while in support of the ground force commander. Therefore, these observed capabilities will drive us to first avoid areas with templated threat, then minimize exposure as much as possible to these threats. The last event would be to defend against the threat. This is the last resort when it comes to mission planning and there may be times when the mission dictates that all other options have been expended and we must directly defend ourselves.

The results of the recent Quick Reaction Test (QRT) focused on operations in an RF environment will be on the street soon in the form of a training support package. These products will assist us in training these types of TTPs to increase our tactical capabilities in an RF environment. ■

Mishap Briefs

Utility Helicopters

UH-72

A Model- Aircraft leveled out at 1000' AGL and encountered a flock of birds, resulting in multiple bird strikes. Post flight revealed damage to one blade. (Class C)

Unmanned Aircraft Systems

RQ-7

B Model- Aircraft experienced engine failure approximately 22 minutes after launch. FTS was deployed and the aircraft was recovered. (Class C)

If an engine has FOD, it can become nothing more than a useless collection of nuts, bolts, gears and nicked compressor blades.

PREVENT FOREIGN OBJECT DEBRIS (FOD)

- Conduct regular FOD walks.
- Perform FOD sweeps with ground equipment.
- Make sure the FOD cans are readily available.
- Maintain clean and orderly work areas to ensure a safe and FOD-free environment.
- Be aware of what is on the ground around you at all times when the aircraft rotors are turning.
- Remember to make your FOD program visible and keep the emphasis on training, involvement and teamwork.

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

Review archived issues of Flightfax:

https://safety.army.mil/ON-DUTY/Aviation/Flightfax/Archives.aspx

Flightfax Online Newsletter of Army Aircraft Accident Prevention

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 accident 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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