Flightfax
Number 66 June 2018 Online Newsletter of Army Aircraft Accident Prevention

Training for Contingencies at Terrain Flight Altitude - *Retooling the Force for Large-Scale Ground Combat Operations*

Army Aviation must change its training approach to a terrain flight mindset to prepare for large scale combat operations (LSCO) against near-peer adversaries that pose complex and lethal multi-domain air and area denial threats.

Changing Operational Landscape

The Army is preparing for the most complex combat environment we may face across the range of military operations on the conflict continuum in the coming years, reflected in the newly revised Field Manual 3-0. All of these potential LSCO conflicts entail first world adversaries with near-peer or better threat capabilities. For Army Aviation, the anti-access, area denial (A2AD) capabilities that these near-peer threats pose – characterized by a multi-domain, contested environment consisting of early warning, cyber, space, electronic warfare, integrated air defense systems, and sophisticated reconnaissance and surveillance capability, tied to lethal and precision long range fires – will drive our rotary wing forces much closer to the ground. We must now train to operate at terrain flight mission profiles that we have predominantly eschewed during the limited contingency operations of the last 16 years. The prospect of LSCO against a peer competitive threat dictates that we retool our training approach. Foremost, we must focus our crew training on contingencies and emergencies that require immediate crew recognition and action because, at terrain flight profiles, there simply isn't the decision time or maneuver space to react like there is at permissive altitudes.

With this retooling, our aircrews must demonstrate in training scenarios the ability to operate proficiently in high-workload situations. Part of this training should be incorporating and rehearsing during the crew mission briefing the crew actions and crew coordination necessary

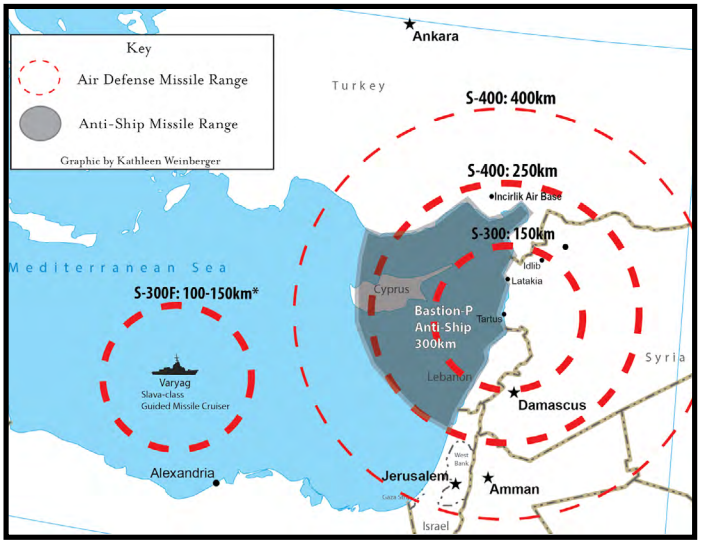

Figure 1. Source: ISW, Russia Advances its Integrated Air Defense System (IADS) in Syria, Chris Harmer and Kathleen Weinberger

during unplanned events (i.e., emergency procedures, contingencies) and during critical points of flight during the mission. Incorporation of contingencies and emergency procedures into training scenarios at the highest workload demands within the mission profile will inform aircrews on where they are proficient and where they require additional emphasis in training.

Old Ways Become New Again

The skill sets and operational environment in which Army Aviation has become proficient in the COIN fight now require the training paradigm to shift back to what some refer to as the Cold War scenario, except in the 21st Century, near-peer adversaries have taken a quantum leap forward in their ability to contest the environment and deny area access. Our desire to operate at altitude with air superiority and little fear of surface-to-air threats won't survive RSOI at port in a contested LSCO fight. Likewise, the techniques we have trained and ingrained through rigorous situational and

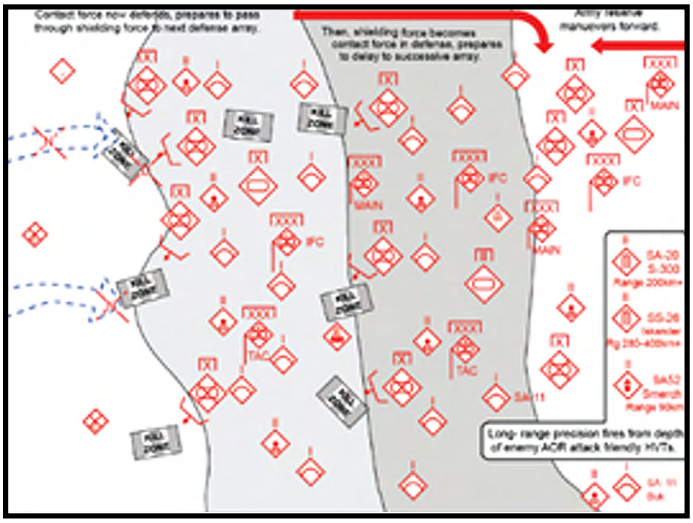

Figure 2. Enemy continuous maneuver defense in depth within enemy main defense zone

emergency procedures training for COIN operations must now transition to the doctrinal tactics and techniques necessary to survive in a high threat environment. And as seen over the last several months in recent mishaps that occurred while training in decisive action, near-peer scenarios, we must focus procedural response to emergencies and contingencies at terrain flight mission profiles.

The flight environment during operations at terrain flight altitudes is very unforgiving; there is little margin for error. Reaction time and maneuver space is severely limited when operating near the surface at slow airspeeds and at the high gross weights typically associated with combat operations. When tough environmental conditions, particularly degraded visual environments, are added to an already higher-risk profile, relatively benign emergencies can overwhelm an aircrew if they have not thought through and rehearsed those scenarios.

The following is a good example of a mishap that reinforces the need to increase our intensity, focus, and repetition of emergency procedures training. While transitioning into a battle position in the desert at night in difficult terrain at terrain flight altitude, the crew of an attack aircraft failed to respond correctly to a night vision sensor (NVS) failure. The pilot on the controls who experienced the NVS failure did not respond according to the procedure, and he transferred the controls to the co-pilot without announcing the emergency. The co-pilot gunner, whose attention was inside the cockpit during this critical portion of maneuver at the time of the transfer, was unaware of the emergency situation. The result was an aircraft impacting the ground and two fatalities.

Maximize Situational Training

We may enter LSCO at a position of disadvantage and geographical location not of our choosing, but we can train for known A2AD and IADS threats in the contested environments and possible geographic locations and environmental conditions in which we expect to fight. Tough, realistic training tailored to these conditions and mission profiles, with progressive and iterative repetitions executed to standard, is the formula for success. Commanders and instructor pilots must focus on rigorous situational training, maximizing simulator use to gain valuable repetitions rehearsing emergency procedures and response to contingencies, and they must incorporate these actions into crew and mission briefings and rehearsals.

Situational training in the most demanding modes of flight and environmental conditions with repetitive emergency procedures and crew coordination rehearsals will provide the commander with the trained and ready aircrews necessary to deploy, fight, survive, and win against the peer or near-peer threat.■

Readiness Through Safety!

COL Christopher W. Waters
Deputy Commanding Officer
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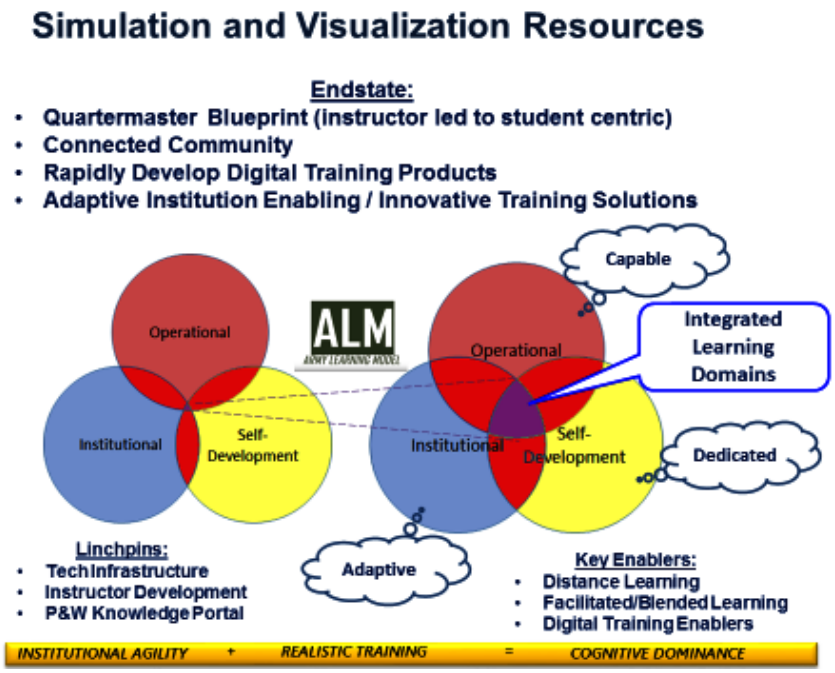
Sustaining the Aviation Force Quartermaster Petroleum Operations and Digital Training Enablers

The Army's ability shape the operational environment, prevail during large-scale combat operations, consolidate gains through tactical success and continue the fight depends upon its ability to refuel and rearm vehicles, aircraft, tanks and other equipment on the move, enabling the units to maintain combat momentum. The Army Quartermaster branch enables combined arms maneuver through provisioning of refueling and rearming support while reducing the operational risk through digital training sustainment. Support to aviation operations requires high standards and continuous training in forward arming refueling operations (FARP).

A FARP is a temporary operation strategically setup, organized, equipped and deployed by an aviation commander to provide fuel and ammunition necessary for the employment of aviation maneuver units in combat. It expands the aviation commander's operational range by staging forward, closer-to-the-ground maneuver units being supported, greatly increasing the range and station time for Army aviation assets. A FARP permits rotary-wing aircraft to refuel rapidly and rearm simultaneously. A FARP primarily has four points with a minimum of 100 feet between each refueling nozzle. When employing the advanced aviation forward area refueling system (AAFARS), each refueling point has the capability of refueling multiple aircraft at 55 gallons per minute at each point or 90 gallons per minute independently. The heavy expanded mobility tactical truck (HEMTT) tanker aviation refueling station (HTARS) primarily has four points dispersed 100 feet apart with the capability of refueling at 62 gallons per minute at each point. Refueling capabilities for both systems change depending on the number of points employed.

The location of a FARP is selected to minimize response time, decrease turnaround time and reduce risk to maneuver ground and air units by providing sustainment support forward. Minimizing flight time to and from the FARP and reducing the refueling and rearming time within the FARP achieves this objective. Fueling and arming assault helicopter and heavy-lift aircraft can be accomplished in about 20 to 30 minutes, while processing an attack aircraft may take up to 45 to 50 minutes. In both instances, refueling takes 10 to 15 minutes, while ordnance uploading is mission dependent. The overarching factor in estimating FARP processing time revolves around what ordnance is required; secondary factors are environmental, aircraft armament and support personnel proficiency.

To sustain the 92F Petroleum Supply Specialist military occupational specialty (MOS) technical proficiency and increase repetition, the Quartermaster School is developing digital training enablers that can replicate setup and operations of critical Quartermaster systems. The first of the two digital training enablers (DTE)



focused on enhancing maneuver unit lethality and operational reach. Today's warfighters have access to virtual HTARS and refuel-on-the-move (ROM) DTEs to sustain technical proficiency. Both of these can be set up and operate in a virtual environment, providing the needed repetition and muscle memory to sustain proficiency.

The development of the FARP DTE relied on a joint effort with the Combined Arms Support Command (CASCOM) integration development team, Quartermaster School, Ordnance School and Aviation School. The focal point was to provide the warfighter tools to improve training proficiency, prepare for supporting large-scale combat operations and sustain the ability to refuel and arm aircraft during continuous combat operations. Due to the 92F flexibility, many times they won't operate the aviation refueling systems enough to maintain their training sustainment needs. The Quartermaster School goal was to develop DTE to help sustain a trained and ready liquid logistician's force. The use of digital training enablers provides low-cost but effective training options that reside in a virtual environment, an ideal solution for home station training.

A major component to the Army Learning Model (ALM) strategy is reducing the gap that exists between the institutional, operational and self-development training domains while providing Soldiers reach-back capabilities for sustainment training. As an example, the petroleum supply specialist 92F is a broad MOS. Soldiers can be assigned to organizations that do not require the knowledge of tasks associated with support of aviation units. This may happen for several assignments. They may go years without using their knowledge of aviation refueling while being assigned to units responsible for pipeline or ground refueling operations.

Soldiers receive training on environmental stewardship, firefighting, ship-to-shore operations, ground, aviation, hoseline, pipeline, fuel additizing and the accountability of fuel. The DTEs provide refresher training to sustain technical proficiency across the MOS and reduce the operational risk during live training and combat operations. Providing access to these DTEs to maintain knowledge and aptitude throughout their careers guards against atrophy of skills not routinely used and is a force multiplier. To increase the integrated learning domains, we have leveraged the ALM to ensure what we are teaching in the institutional Army is being reinforced in the operational Army for sustainment training.

Army aviation relies on rapid refueling and arming to support the cross-domain maneuver effort and decisive actions. The Quartermaster branch supports this operational mission by supplying fully trained 92F personnel and the required sustainment training enablers necessary to execute rapid refueling and arming in training and during combat operations. The Army Quartermaster branch enabling capabilities provide support to Army aviation on time, on target and decrease operational risk to ground and air maneuver forces by providing forward refueling and arming, allowing extended reach, time on station and support to the ground maneuver commander. ■

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Summer Weather:
Are You Ready for the 2018 Season?

Introduction

For many adults, summer is the time we look forward to taking family vacations. For kids, the season provides a much-needed break from school work for their brains. For teenagers, it's a time to bask in the sun at the beach. For aviators, though, summer is a time when many flight hazards exist. Understanding and preparing for these hazards are the keys to staying safe.

As we transition into summer, gone are the days of cold fronts and nor'easters. Most of summer's weather is tied to thunderstorms. Whether you're talking about the sea breeze, air mass thunderstorms, severe weather or a tropical system, all thunderstorms have certain inherent dangers: severe turbulence, severe icing, low-level wind shear (LLWS), heavy rain, hail and lightning. It even says so right there in Block 22 of the DD 175-1! All thunderstorms have the potential to turn severe with little or no notice. And finally, any thunderstorm can produce a microburst. There are a few other summertime hazards besides thunderstorms, and we will get to those later.

22. THUNDERSTORMS

CHART					
	NONE		AREA		LINE
	ISOLATED 1 - 2%				
	FEW 3 - 15%				
	SCATTERED 16 - 45%				
	NUMEROUS - MORE THAN 45%				
HAIL, SEVERE TURBULENCE & ICING, HEAVY PRECIPITATION, LIGHTNING & WIND SHEAR EXPECTED IN AND NEAR THUNDERSTORMS.					
LOCATION					

Thunderstorm Development

It is important to understand the basic dynamics of a thunderstorm. To put it simply:

Moisture + Instability + Lift = Thunderstorm

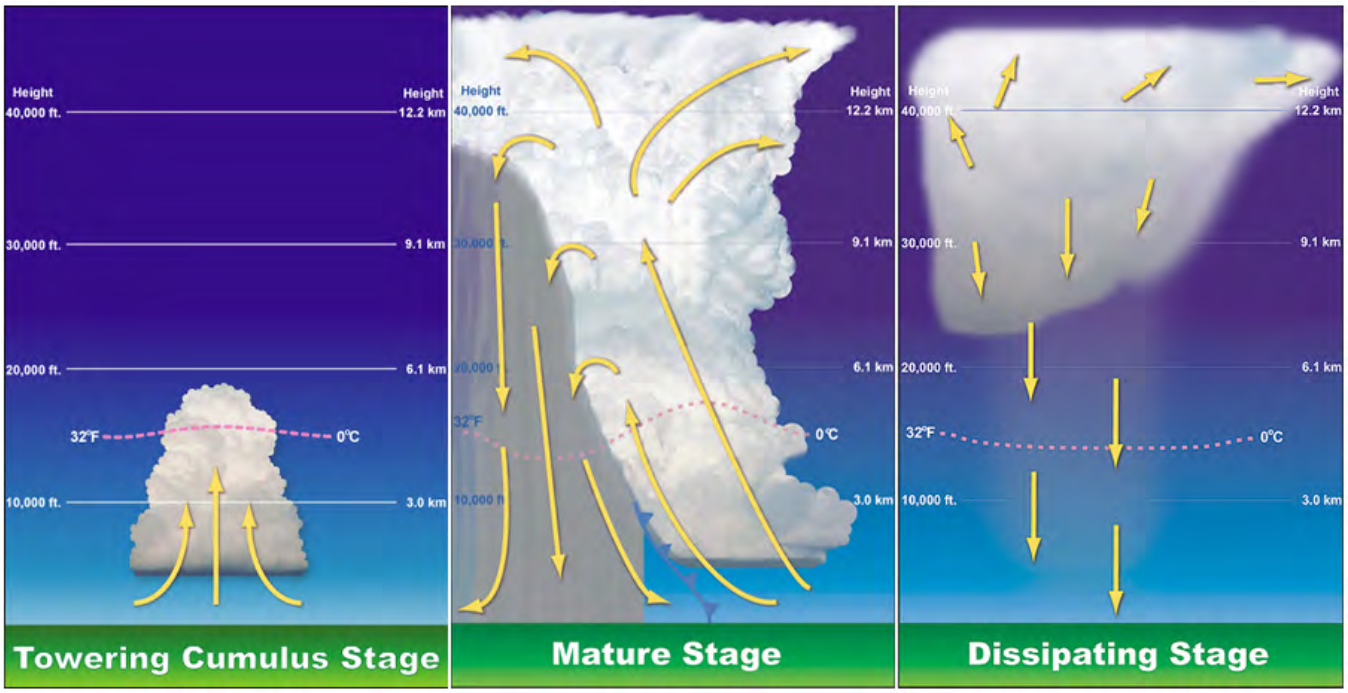
When these three ingredients come together, it is the perfect recipe for a thunderstorm. As a harmless cumulus cloud grows into a dangerous thunderstorm, it goes through three stages:

Developing Stage: During this stage, the cumulus cloud (CU) grows vertically, and an updraft develops. Little, if any, precipitation falls, but there is some occasional lightning. Expect some light turbulence in and around these convective clouds.

Mature Stage: In the mature stage, the updraft continues to feed the storm, and a downdraft is formed. Precipitation falls, sometimes heavy, often reducing flight visibility to < ½ SM. Frequent lightning, hail, damaging winds and tornadoes are possible.

Dissipating Stage: As the downdraft reaches the surface, it cuts off the updraft and the storm dissipates. Although the precipitation tapers off, lightning is still present and isolated instrument flight rules (IFR) ceilings are possible. It is during the dissipating stage that you have to watch out for microbursts.

Life Cycle of a Thunderstorm



Types of Thunderstorms

There are three types of thunderstorms: single-cell, multicellular and supercell. Let's take a closer look at each type.

A single-cell storm (also known as a pulse storm or air mass thunderstorm) is generally short-lived, lasting only 30-60 minutes, and usually does not produce severe weather. It contains a single updraft. Strong winds and marginally severe hail are possible, but tornadoes are rare.

Multicellular storms are clusters of single-cell storms. New storms tend to form on the rear edge of the cluster; mature cells are in the center; and dissipating storms are along the front edge of the cluster. New cells can continue to develop every 5-15 minutes. Flash flooding, large hail and strong winds are the main hazards, but short-lived tornadoes are also possible.

A supercell contains a single, rotating updraft and is usually isolated from the main thunderstorm outbreak — a renegade, if you will. Large hail, severe winds and tornadoes are possible. The lifespan of a supercell can be several hours.

Forecasting Thunderstorms

As Air Force meteorologists, we have many tools at our disposal to detect and predict thunderstorms. As you probably guessed, we use the operational weather squadron's hazard charts. These forecast turbulence, icing and thunderstorms in three-hour increments out to 120 hours. We also look at surface and upper-air analysis as well as the Skew-T Log P diagram. The Skew-T gives us a vertical profile of the atmosphere at a particular location so we can identify the availability of moisture, instability and lift (remember those three ingredients?).

Every day is different, and every thunderstorm is different. I've seen days when I'd have bet the mortgage on getting severe thunderstorms and gotten absolutely nothing. And I've seen days when I had to amend the mission execution forecast (MEF) before it was even valid because thunderstorms fired up hours earlier than expected. That's what makes thunderstorm season so interesting and exciting!

Satellite Imagery

Satellite imagery is a great tool for identifying clouds, areas of turbulence and thunderstorms. I'm particularly fond of visible imagery, but it is only available during the daytime hours. With a 1 km resolution image, you can watch the CU build, the thunderstorm bubble up, the anvil top blow off and the outflow

boundaries form. It's quite a sight! At night, we use infrared (IR) imagery. There are various enhancements that help identify thunderstorms.

Radar

Of all the tools at our disposal, radar is the single most important in monitoring the development and progression of thunderstorms. Using radar imagery, we can track the location and movement of precipitation; identify thunderstorms versus showers; pinpoint any areas of hail or rotation; and interpret whether the storms are building or weakening.

So how does the radar work? Basic radar theory is that the radar shoots a beam at the lowest elevation angle. The returns are bounced back to the radar, where the data is processed into the imagery that we all know and love. Once the radar has completed a 360 degree sweep of the lowest elevation angle, it moves on to the next highest elevation angle and so on and so forth. Within minutes, we have a full picture of all slices of the atmosphere. Each individual slice is plotted as a base reflectivity product, and the composite of all slices is plotted on a composite reflectivity product.

Radar imagery can be deceiving. Don't fall into the trap of seeing red and thinking it means a thunderstorm. That is not necessarily the case. While red on the radar could mean a thunderstorm, but it could also mean large raindrops or a great number of raindrops. The interpretation of red also depends on which product you are viewing. Most forecasters I know use the composite reflectivity as a briefing tool because it gives a nice overview. However, this product is a compilation of all layers in the column, so the presence of red might make you think the situation is worse than it actually is. A scan of the lowest two to three layers of base reflectivity is a better way to check out a storm. Or better yet, ask your local weather experts at the Air Force Weather team!

Some other things to watch out for:
Beware of the bow! When you see a line of thunderstorms begin to bow outward, that's an area you want to avoid. A bow echo is usually indicative of damaging straight-line winds.

Outflow boundaries are no picnic either. An outflow boundary is essentially a small-scale cold front. Across an outflow boundary, you'll notice a wind shift, gusty winds and cooler, drier air. It is along these boundaries that new thunderstorms are likely to form. When outflow boundaries converge, you could see warning-level winds and new thunderstorm development.

I mentioned earlier every thunderstorm has the potential to produce a microburst. Unfortunately, predicting microbursts is a challenge. We can't tell you which cell will produce a microburst and when that microburst will occur. The science and technology just isn't there yet, at least not on the military side. We can examine radar data for signs a storm might collapse by looking at the echo tops trends and vertically integrated liquid (VIL) trends; but by the time we receive the data, it's already several minutes old. Unfortunately, we usually only find out about a microburst after the fact — when one of our weather sensors reports a gust of 65 knots. That's not a good feeling!

Air mass thunderstorms are prevalent during the summer months. In and of themselves, they are usually manageable and easy to pick around. However, certain interactions can quickly wreak havoc on aviation. We constantly monitor the radar for outflow boundaries, merging cells, sea breeze and other interactions that tend to ramp up convective activity. Any of these interactions increases the risk of warning-level winds.

Other Hazards

We've been talking a lot about thunderstorms, but they are not the only game in town during the summer months! Let's not ignore other summer aviation hazards: turbulence, LLWS and fog. Hurricane season also spans the summer months.

Turbulence: ***The two main types of turbulence are thermal and mechanical.***

Thermal turbulence occurs when the surface heats up and warm air rises. Thermal turbulence is usually light and confined to the lowest levels of the atmosphere. As you probably guessed, the peak times for thermals to occur is from late morning until late afternoon, since that is when heating is at its max.

Mechanical turbulence is caused by horizontal and/or vertical wind shear and can be the result of pressure gradient, orographic effects or frontal zones. Mechanical turbulence is generally found in a thin layer with a width of 10-40 miles and a length much greater than that. Watch out for rotor, lenticular and cap clouds. These clouds are associated with mountain wave turbulence and should always be avoided.

In general, the effects of turbulence for rotary-wing aircraft are amplified with increased airspeed;

Turbulence Intensity by Aircraft Category

Turbulence intensities for different categories of aircraft			
Cat. I	Cat. II	Cat. III	Cat. IV
N	N	N	N
(L)	N	N	N
L	(L)	N	N
L - (M)	L	(L)	N
M	L - (M)	L	(L)
M - (S)	M	L - (M)	L
S	M - (S)	M	L - (M)
S - (X)	S	M - (S)	M
X	S - (X)	S	M - (S)
X	X	S - (X)	S
X	X	X	S - (X)
X	X	X	X
Key: N = None, ( ) = Occasional (less than 1/3 of the time), L = Light, M = Moderate, S = Severe, X = Extreme			

Source: AFH 11-203V2

decreased weight of aircraft; decreased lift velocity; and increased arc of the rotor blade. The turbulence intensity depends on aircraft type. The table below shows the turbulence intensities relationship across the four categories of aircraft: Category I, II, III and IV.

LLWS: Drastic changes in speed and/or direction in lowest levels of the atmosphere. Outside of thunderstorms, LLWS most often occurs near/along frontal zones and in mountainous areas.

Fog: It is common after heavy rain to have periods of dense ground or tree fog. This happens frequently during the summer months. The good news is this is usually localized and short-lived. Radiation fog is very common also during the summer months. More good news: Radiation fog burns off when the inversion breaks, usually by mid-morning. Terrain can also impact fog formation. Upslope winds will cause fog to form; it will persist until the winds change direction. Upslope fog can last for days.

Hurricanes: Hurricane season runs from 1 June through 30 November. Hurricanes form over the warm ocean waters and can even impact areas well inland. A good example of how much area they can effect is last summer. As Tropical Storm Cindy was bearing down on the Louisiana coast, I had an aircrew preparing to fly from Fort Rucker to Texas. Even knowing the storm was entering Louisiana, they would not cancel the mission until I provided the DD 175-1. Needless to say, my forecast was for severe everything! The crew was not happy the mission didn't go, but they survived to fly the aircraft to Texas when the weather cleared.

The first hurricane season outlook for 2018 is in and Colorado State University is predicting a slightly above average forecast with 14 named storms, seven hurricanes and three major hurricanes (Category 3 or greater). An average season would have 12 named storms, six hurricanes and three major hurricanes. Furthermore, these hurricane gurus are forecasting a 63 percent chance of a landfall along the U.S. coastline (the average is 52 percent) and a 38 percent chance of a landfall along the Gulf Coast (average is 30 percent). Will these numbers pan out? Only time will tell.

A Final Word

Many aviation hazards exist during the summer months. We are all impacted by weather in our daily lives, but probably no one more so than aviators. Mother Nature can quickly turn a routine mission into a life-threatening situation. Understanding these hazards, ensuring you have the most current weather brief, and how to mitigate them is critical to keeping your aircrew safe. Weather happens… Are YOU prepared? ■

Cindy Howell
Meteorological Technician
18 ASOG, USAF
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Mishap Review - CH-47 Ground Taxi Mishap

History of Flight

A CH-47 was on a redeployment ferry mission from a port to a regional airport for staging to redeploy to its home station. The aircrew was conducting a limited maintenance test flight during the ferry mission. Once the aircraft had landed at the regional airport, the crew was given taxi instructions to transient parking. The pilot in command (PC) taxied the aircraft to the transient area where there were no ground guides. As the aircraft taxied between a parked CH-47 and a hangar, the PC stated he would be making a 180 degree turn near the hangar. The crew chief stationed at the cabin door addressed concern about the proximity to the hangar to the crew. The PC continued the turn and the crew members stated the aircraft was clear to make the 180 degree turn. While conducting the turn, the aircraft's aft three rotors struck the hangar. Three aft rotor blades, the corner of the hangar and two aircraft inside were damaged.

Crewmember Experience

The PC had 1,647 hours in series and 1,806 hours total time. The PI had 49 hours in series and 133 total time.

Commentary

Aircraft operations are just as hazardous when taxiing as when in flight. The crew's ability to successfully negotiate aircraft ground operations in confined/congested areas requires accurate aircrew visual surveillance and appropriate crew communication. While aircraft are being ferried, post- and pre-deployment, commanders, aviation safety officers (ASO) and leaders must be involved in the planning. The operations cell should ensure the locations in which aircraft will be refueling and/or overnighting have been surveyed and a pre-accident plan has been integrated for the flight ground staging area. When Army aircraft are operating at non-military sites, it becomes even more important for unit ASOs to actually conduct onsite safety surveys of the transient parking and refuel locations and provide a detailed pre-accident plan and what operational issues must be addressed for safe operations.

The aircrews involved in post-deployment ferry operations back to home station must make sure they don't become complacent. For aircrews, they must maintain vigilance in performing their crew duties and aviation decision-making. When something doesn't look right it probably isn't, so crewmembers should communicate this and the PC should halt operations of the aircraft until they can assess the danger and either mitigate it or choose an alternate course of action. After high OPTEMPO deployments, leaders must make sure they place the appropriate controls in place to reduce the risk of a mishap. Some things leaders can do to assist in reducing complacency errors is minimizing multiple flights by the same crews, ensuring Army personnel (properly trained) are on ground at the staging airfield parking area/refuel area to ground guide aircraft, ensuring the ASO has completed an onsite safety survey of the planned staging airfields and pre-accident plans have been developed for each location. ■

Class A - C Mishap Tables

	Manned Aircraft Class A – C Mishap Table									as of 25 May 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	7	0
	November	1	0	4	0		0	1	3	0
	December	1	0	4	2		1	0	7	0
2nd Qtr	January	1	0	3	0		1	1	3	2
	February	0	1	4	0		0	0	1	0
	March	0	1	6	0		0	1	10	0
3rd Qtr	April	1	0	6	1		1	2	3	2
	May	1	0	7	0		1	0	4	0
	June	0	2	5	0					
4th Qtr	July	0	1	8	0					
	August	3	3	4	6					
	September	1	1	7	1					
	Total for Year	9	9	65	10	Year to Date	5	7	38	4
	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: 1.03	

	UAS Class A – C Mishap Table								as of 25 May 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	3	0	2	5
MQ-5	5	0	1	6	Hunter	0	0	0	0
RQ-7	0	18	39	57	Shadow	0	5	14	19
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	20	45	80	UAS	3	5	16	24
Aerostat	6	0	1	7	Aerostat	3	1	0	4
Total for Year	21	20	46	87	Year to Date	6	6	16	28

Flightfax Forum Op-ed, Opinions, Ideas, and Information

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

Transferring the Controls A Training Case Study

"Why did you give me the controls?" will become the primary consideration in this article. In the past several months, Army aviation has experienced several mishaps which resulted in fatalities. These fatalities should never have occurred.

For example, let's look at a UH-60M mishap which occurred while conducting multi-aircraft formation training. The mission was supposed to be a quick and easy night vision goggle (NVG) currency and multi-aircraft operations sign-off out and back several times for multiple pilots in training. It was a zero illumination night, and the threat of spatial disorientation was high due to operations over water in a degraded visual environment (DVE). Not long into the mission, one UH-60 and all crewmembers were victims to a failure to train to standard.

You seasoned aviators, and probably many who are younger, may have witnessed this same training drill. Execute the training and get the crews progressed so they can be ready to make the mission happen on the next training or real-world deployment. The instructors have done this a hundred times, the briefers have briefed this mission a hundred times, and it has become somewhat of the quasi standard to get it done.

As good, solid instructor pilots with a wealth of information at our fingertips, we can pull all the applicable references right off the Internet. So we probably have filed the correct references, briefings and unit standard operating procedures (SOP) and have them readily available to make sure we train to standard. So you now wonder how this mishap could have happened with all the standards-based training information, media and professional military educated personnel and leaders involved down to the unit level. The answer is a failure to train to standard.

Train to Standard

In the mishap, a pilot on the controls became spatially disoriented while over water in a DVE during a turn following the lead aircraft. The pilot not of the controls was in a head-down position when the pilot on the controls states, "You have the controls." The other pilot takes the controls and acknowledges it but is also disoriented. So what should have happened? As instructed in the UH-60 Series Aircrew Training Module (ATM), here is what should have happened based on Army standards in crew coordination and aviation flight standardization (key points have been bolded/underlined):

Aircrew Coordination Principles-
(1) Announce and acknowledge decisions and actions. To ensure effective and well-coordinated actions in the aircraft, all crewmembers must be kept informed and made aware of decisions, expected movements of crew and aircraft, and the unexpected individual actions of others. Each crewmember will announce any actions that may affect the actions of other crewmembers. In turn, communications in the aircraft must include supportive feedback that clearly indicates that crewmembers acknowledge and correctly understand announcements, decisions, or directives of other crewmembers.

(2) Ensure that statements and directives are clear, timely, relevant, complete and verified. These are qualities that must describe the kind of communication that is effective. Considering the fleeting moments of time in a busy aviation environment, only one opportunity may exist ***to convey critical and supporting information before tragedy strikes.***

This can be further defined in actions which should have occurred by a quick look at the UH-60 Series ATM under Task 3010 Perform Multi-Aircraft Operations:

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.

a. Participate in a formation flight briefing in accordance with unit SOP

b. Maneuver into the flight formation.

c. Change position in the flight formation when required.

d. Maintain proper horizontal and vertical separation for the type of formation flight being conducted.

e. **Announce if visual contact is lost with other aircraft.**

f. Perform techniques of movement, if required.

Under crew actions:

Note. The most important consideration when a crewmember has lost visual contact with the formation is to announce loss of visual contact to the other members of the crew and the rest of the flight and reorient. Except for enemy contact, all mission requirements are subordinate to this action.

More standards-based directed training information can be found in the Maritime Operations Training Support Package (TSP), located on the DOTD Flight Training Branch webpage on Army Knowledge Online (AKO) at https://www.us.army.mil/suite/page/691190.

This is a very intense training mission with high workload demand and should be thoroughly planned and briefed.

TC 3-04.11, paragraph 6-49, states, **"If an approved TSP exists for training it will be utilized."**

And let's look at TC 3-04.11: 6-49.

Environmental Training

In their SOP, aviation units will explain the effects of the environment on the unit's flight operations. **Commanders will** establish a comprehensive academic and flight training program that develops and sustains ACM proficiency in that environment and will ensure training was completed satisfactorily before the ACM performs flight operations in the unique environment as described in FM 3.04-203. **If an approved training support package (TSP) exists for the training, it will be utilized.**

All these references, guides, training manuals and directives are there so we train aviators to standard, and through this we ensure that they take the correct actions while in mission to preclude a mishap from occurring. In this tragic event that occurred, a simple transfer of controls which wasn't conducted to standard resulted in a fatal mishap. An example of a standardized transfer of controls follows:

Pilot on the controls: "You have the controls. I feel disoriented"

Pilot not on the controls: "I have the controls. Leveling the wings, climb power, engaging Z-Axis Plunge (H-60M model)."

Other crewmembers: "Roger, right-rear increasing scan. I don't have lead aircraft in sight"

Other crewmembers: "Roger, left-rear increasing scan. Backing up as required"

Pilot on controls: "I have transitioned to instruments. Wings level, heading XXX, airspeed XXX, altitude XXX. Flight director has engaged"

For H-60M model aircraft, you note that there are multiple warnings and a note in the ATM about operating in DVEs and utilization of the flight director. In fact, it states it will be coupled and the primary means of flight operations. *See Figure 1 below.*

Warning

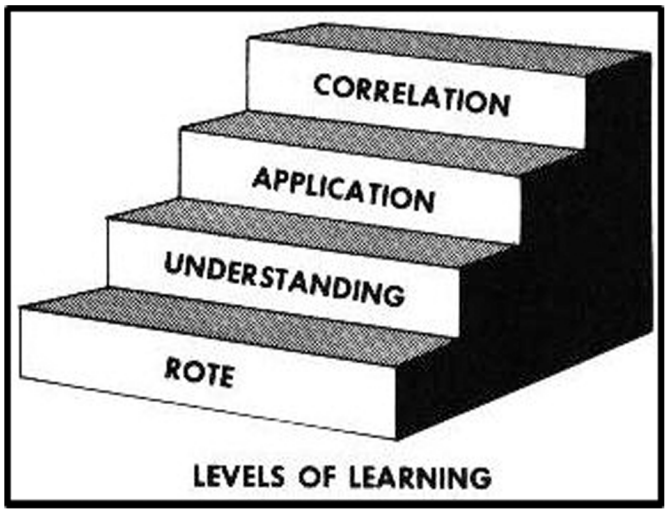
A degraded visual environment (DVE) is circumstance where weather, obscurants or obstacles hinder the ability of the crew to determine where they are in relation to the surrounding terrian. Utilization of the coupled flight director prior to encountering DVE will aid and assist in the prevention of spatial disorientation, reduce crew workload, fatigue and prevent accidents. When operating and/or training in DVE in a UH60M, utilization of the coupled flight director will be the primary means of flight operations.

Figure 1. Warning for DVE and use of the coupled flight director

All the information and training support you require as aviators to train to standard and complete the mission safely while preventing a mishap, in this case SD related to DVE is the most likely cause, are available. As the resident experts in aviation, instructor pilots must go beyond the rote memory programming of the students. An example of this is you can probably ask any hour level aviator what is DVE and they can spit out the memorized verbiage. More importantly, instructors training the aviators to the correlation level will prepare them for when they encounter a problem which interferes with their ability to pilot the aircraft (DVE, SD, sick feeling or a problem with their instruments or equipment) they can identify and announce it when transferring the controls.

"When aviators announce the reason of the control transfer this alerts the other crewmembers to the situation, if a developing catastrophic sequence is occurring, and what actions they must take to maintain control of the aircraft."

The UH-60M aircraft have the flight director system, with the Z-Axis Plunge button and the Go-Around button. In the case study, a simple push of either of these buttons would most likely have prevented this mishap. The only possible reason either pilot didn't



push the button is because they weren't trained to push the button. Repetition is required to build the automatic reflexes required to ingrain immediate action steps into aviators. Instructors use this method to build the automatic reflexes in aviators necessary to execute immediate action emergency procedures. So this same system should be utilized to ingrain use of the Z-Axis Plunge and Go-Around modes in training scenarios where aviators are put into situations where they require it (DVE, SD).

Commanders Take the Controls

The aviation training program is the commander's program. To positively influence the training program, commanders set the example and provide guidance on their priorities for the unit. All commanders prioritize the safety of crews and safe operation of aircraft in conducting their assigned missions. As the primary trainer, they must ensure the programs support their priorities and are meeting the standards. If the unit standardization program isn't preparing the aviators for actions when encountering issues which require a transfer of controls and the use of aircraft systems which make the difference between life and death of aviation crewmembers and/or passengers, then the program is not meeting the standard.

The commander's first line of defense against training deficiencies should be his unit aviation safety officer (ASO) in concert with his standardization instructor pilot (SP). If the training is not being conducted to standard, the ASO and SP should be the first to identify it by being engaged in surveilling the training program. At this point, the team can inform the commander of the identified training program deficiency and the plan to mitigate it. This action should happen rapidly, as aviation is inherently unforgiving to lack of discipline.

As commanders, you must take the controls on your aviation training program. This will ensure the right training is conducted by engaging your standardization section after surveilling ongoing training within the unit. High standards of training with emphasis on those tasks which are seen as weak, deficient or undertrained (i.e., identifying and announcing when impacted by DVE/SD, announcing why you are transferring controls, crew-coordinating actions, Z-Axis Plunge, Go-Around system use) should be prioritized. Effective training management by the commander and quality assurance surveillance by the SP and ASO can prevent the next mishap. ■

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

Hot Topics

New 2018 STACOMs:

18-01: Clarification and Amendment of AR 95-1 (MAR2018) Requirements
This STACOM is a clarification and amendment of AR 95-1(22MAR2018) requirements. Through staffing of final revisions it was determined that some requirements cannot be met until updates to Aircrew Training Modules (ATMs), The commander's Aviation Training and Standardization Program (TC3-04.11), Centralized Aviation Flight Records System (CAFRS) and electronic log books have been made. These policies will be implemented pending program revisions and completion of a Rapid Action Revision to AR 95-1.

POC: DAC Bill Tomkins at 334-255-3440 or william.r.tompkins8.civ@mail.mil

LOCATION: https://www.ako1.us.army.mil/suite/files/4486324

18-02: Unmanned Aircraft System (UAS) Observers
This STACOM re-establishes the definition and requirements for UAS Observer (Previously referred to as Ground Observers in AR 95-23).

POC: DAC Bill Tomkins at 334-255-3440 or william.r.tompkins8.civ@mail.mil

LOCATION: https://www.ako1.us.army.mil/suite/files/4486324

18-03: Update to the Commander's Aviation Training and Standardization Program
This STACOM serves as a Warning Order on Aviation Enterprise efforts that will better prepare individual aviators and units to execute large scale combat operations (LSCO) in contested environments. While you will see changes in knowledge levels we focus on, it is important to emphasize that this is not a license to know less about our profession, but rather a responsibility to know more, - optimizing what we know so that we may focus on safe and tactical application of our systems on the battlefield.

POC: DAC Ron Niles at 334-255-3440 or ronald.e.niles.civ@mail.mil

LOCATION: https://www.ako1.us.army.mil/suite/files/4486324

Joint Air Ground Integration Center (JAGIC) Update

• JAGIC ATP Revision. ACPO is complete with the first author's draft of ATP 3-91.1. The draft, staffing memo, and sent out for worldwide staffing on 27 March with a suspense of 25 Jun 18. ACPO estimates completion of the ATP Revision will be 4th Qtr. 18.

• JAGIC Training Circular. ACPO is complete with the first author's draft of TC 3-91.1, Training the JAGIC. Released for worldwide staffing with a suspense of 2 Jul 18 and plans to submit to ATSC and published by 4th Qtr. FY18.

• Div FDU. ACPO has provided the organizational design for the Airspace Control Element in the division, Organization of the JAGIC using PLS containers and airspace and JAGIC. The Design and O&O are at FORSCOM for staffing.

• CALL's JAGIC MTT Insights provides additional JAGIC-related insights, lessons, and best practices from mobile training team visits, Warfighter exercises, and other training events led by a group of the Army Joint Support Team with the USAF Air Combat Command and Fires Centers of Excellence subject matter experts to inform and empower division commanders and their staffs to learn and adapt from others.

• Airspace Management Operational Planning Team (AMOPT). ACPO attended the first meeting from 16-18 May 2018 at Fort Bragg, NC. Attendees were representatives from TCM Ranges, IMCOM, FORSCOM, DAMO TRS, USAACE (TCM AB and DOTD), and MCCOE. The purpose of the AMOPT was to define the status of installation airspace management capabilities/processes, individual installation airspace management mission scope, gap identification, and COA development. The overarching objective was to improve airspace management capabilities and efficiencies in order to manage ever increasing complexities associated with safe management of installation airspace.

For questions, comments or concerns contact ACPO via the Airspace Control page on milBook (https://www.milsuite.mil/book/community/spaces/airspace-control). Be sure to follow the page and stay informed on products, discussions and updates to all things concerning airspace control and airspace management.

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

ARMY AIRCRAFT MISHAP PREVENTION DATA

FLIGHT FAX

ORVAL RIGHT
Chief Advisor on
Matters of Aviation

A USAAAVS PUBLICATION

VOL 3, NO. 12, 15 January 1975

APPROVED FUELS

SOURCE	PRIMARY OR STANDARD FUEL	ALTERNATE FUEL	
U.S. MILITARY FUEL	JP-4 (MIL-T-5624)	JP-5 (MIL-T-5624)	
NATO CODE NO.	F-40 (WIDE-CUT TYPE)	F-44 (HIGH FLASH TYPE)	
COMMERCIAL FUEL (ASTM-D-1655)	JET B	JET A	JET A-1/NATO F-34
AMERICAN OIL CO.	AMERICAN JP-4	AMERICAN TYPE A	
ATLANTIC RICHFIELD	ARCOJET B	ARCOJET A	ARCOJET A-1
RICHFIELD DIV.		RICHFIELD A	RICHFIELD A-1
B.P. TRADING	B.P.A.T.G.		B.P.A.T.K.
CALTEX PETROLEUM CORP.	CALTEX JET B		CALTEX JET A-1
CITIES SERVICE CO.		CITGO A	
CONTINENTAL OIL CO.	CONOCO JP-4	CONOCO JET-50	CONOCO JET-60
GULF OIL	GULF JET B	GULF JET A	GULF JET A-1
EXXON CO. USA	EXXON TURBO FUEL B	EXXON A	EXXON A-1
MOBIL OIL	MOBIL JET B	MOBIL JET A	MOBIL JET A-1
PHILLIPS PETROLEUM	PHILJET JP-4	PHILJET A-50	
SHELL OIL	AEROSHELL JP-4	AEROSHELL 640	AEROSHELL 650
SINCLAIR		SUPERJET A	SUPERJET A-1
STANDARD OIL CO.		JET A KEROSINE	JET A-1 KEROSINE
CHEVRON	CHEVRON B	CHEVRON A-50	CHEVRON A-1
TEXACO	TEXACO AVJET B	AVJET A	AVJET A-1
UNION OIL	UNION JP-4	76 TURBINE FUEL	
FOREIGN FUEL	NATO F-40	NATO F-44	
BELGIUM	BA-PF-2B		
CANADA	3GP-22F	3-6P-24e	
DENMARK	JP-4 MIL-T-5624		
FRANCE	AIR 3407A		
GERMANY (WEST)	VTL-9130-006	UTL-9130-007/UTL 9130-010	
GREECE	JP-4 MIL-T-5624		
ITALY	AA-M-C-1421	AMC-143	
NETHERLANDS	JP-4 MIL-T-5624	D. ENG RD 2493	
NORWAY	JP-4 MIL-T-5624		
PORTUGAL	JP-4 MIL-T-5624		
TURKEY	JP-4 MIL-T-5624		
UNITED KINGDOM (BRITAIN)	D. ENG RD 2454	D. ENG RD 2498	

NOTE

Anti-icing and Biocidal Additive for Commercial Turbine Engine Fuel- The fuel system icing inhibitor shall conform to MIL-I-27686. The additive provides anti-icing protection and also functions as a biocide to kill microbial growths in aircraft fuel systems. Icing inhibitor conforming to MIL-I-27686 shall be added to commercial fuel, not containing an icing inhibitor, during refueling operations regardless of ambient temperatures. Refueling operations shall be accomplished in accordance with accepted commercial procedures.

WHAT IF THE PRIMARY FUEL IS NOT AVIALABLE

Engine manufacturers recommend the primal fuel for use in a particular engine for maximum efficiency and longest engine life. But which fuel should you use if the primary fuel is not available? Your safest bet is to follow the recommendations in your dash 10 Operator's Manual. Also, additional information may be found in TB 55-9150-200-25.

Turbine engine fuels with military symbols JP-4 and JP-5 are covered in specification MIL-T-5624. Some of the basic differences in JP-4 and JP-5 are as follows:

• JP-4 turbine fuel consists of approximately 65 percent AVGAS and 35 percent light petroleum distillate (kerosene) with rigidly specified properties.

• JP-5 turbine fuel is a specially refined kerosene having a minimum flash point of 140° F and a freezing point of - 55° F.

• JP-4 has a wider boiling range with an initial boiling point considerably below that of kerosene (JP-5).

• JP-4 has a Reid vapor pressure of 2-3 pounds and flash point below room temperature.

• JP-5 has a Reid vapor pressure of less than 0.5 pounds and a higher flash point.

When JP-4 is designated as the primary fuel for your aircraft and it is not available, JP-5 is not necessarily the next best fuel. You should try to obtain commercial fuel designated as Jet B. Jet B is equivalent to JP-4 in all respects except that Jet B has a freezing point of -60° F. instead of -76° F. The same rule applies to JP-5 and commercial fuels, Jet A and Jet A-1. Both of these are equivalent to JP-5 and both are kerosene type fuels. The freezing point for Jet A is -40° F.; the freezing point for Jet A-1 is -58° F.

The chart (page 1) lists brand name fuels that may be obtained in the USA and at overseas commercial airfields.

The use of kerosene fuel JP-5 or commercial equivalent Jet A or Jet A-1 in specific turbine engines requires that special precautions be observed. Both engine ground starts and air restarts at low temperatures may be more difficult due to negligible vapor pressure.

JP-4 and JP-5 already contain an icing inhibitor but if Jet B, Jet A, or Jet A-1 is used, crewmen should ask if the fuel contains an icing inhibitor. If not, a commercial anti-icing additive called "Prist" should be mixed in the fuel, according to the instructions contained on the aerosol spray can, during refueling operation.

Again, reference should be made to your dash 10 Operator's Manual. The aircrafts' dash 10 Operating Manuals contain the primary, alternate, and emergency fuels and restrictions for their use.

For example, the OH-6A and OH-58 dash 10 manuals state the following fuel operation limitations:

a. The primary (standard) fuel for both aircraft is JP-4 (MIL-T-5624). No restrictions are imposed on engines or aircraft when operating with this fuel.

b. The alternate fuel for both aircraft is JP-5 (MIL-T-5624) with an ambient temperature range of 0° F. to +125° F. and with the following restrictions:

(1) Engine starting difficulties may be encountered at ambient temperatures below +5° C. (+40° F.).

(2) Prior to performing the first practice autorotation or in-flight rapid engine deceleration of the day, insure that requirements of the engine deceleration check (TM 55-2840-231-24) are met.

c. Jet A and Jet A-1 (ASTM-D-1655) are restricted to the same limits as JP-5.

d. The emergency fuel for both aircraft is aviation gasoline (MIL-G-5572) without tricresylphosphate (TCP) with the following restrictions:

(1) Electric fuel pump must be on during all operations.

(2) Use is limited to 6 hours total engine operating time between overhaul. An entry on DA Form 2408-13 is required. ■

LOSS OF RESOURCES
FROM THIS WEEK'S MISHAPS

FATALITIES:	0
INJURIES:	3
AIRCRAFT LOSSES:	2
ESTIMATED COSTS:	$1,184,295

UNITED STATES ARMY AGENCY FOR AVIATION SAFETY
FORT RUCKER, ALABAMA 36360
AUTOVON NUMBERS

Commander	558-3410/3819
Technical Research and Applications	558-6404/6410
Plans, Operations and Education	558-4812/6510
Aircraft Accident Analysis and Investigation	558-3913/4202
Management Information System	558-4200/2920
Publications & Graphics Division	558-6385/4218
After-duty tape recording of incoming calls to be returned following day (hours: 1615 to 0730)	558-6510
Commercial:	255-XXXX

Prepared from information compiled by the Directorate for Aircraft Accident Analysis & Investigation
Colonel Samuel P. Kalagian, Director

Mishap Briefs for Month of May 2018

Attack Helicopters

AH-64

D Model- Crew was ground-taxiing to parking when the main rotor blades made contact with a concrete guard tower. (Class A)

Utility Helicopters

UH-60

M Model- Post-flight/40/120-Hr inspection confirmed main rotor system damage from an obstacle strike during an NVG mountain-landing iteration. Two main rotor blades and 2 tip caps have been cited for replacement. (Class C)

L Model- High TGT on shutdown. (Class C)

UH-72

A Model- Aircraft experienced a main rotor exceedance (118%>) while the crew was performing a main rotor check as part of an MTF. Aircraft was landed w/o further incident. (Class C)

Fixed-Wing

C-208

B Model- Pilot reported ground-resonance effect during landing after his vision was temporarily obscured when his sun visor separated and struck him in the face. Aircraft was landed w/o further incident. Post-flight inspection confirmed propeller blade and front tire damage. (Class C)

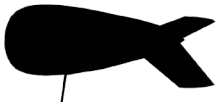
Unmanned Aircraft Systems

RQ-7

B Model- During the mission the AV experienced low engine RPM and was unable to maintain altitude. The parachute was deployed and the AV has been recovered. (Class C)

Aerostat

PTDS



Aerostat experienced a tether failure while aloft, reportedly following a sudden downdraft. Contract crew initiated the FTS and the aerostat and payload were recovered from the downed location, with potential class 'A' damage. (Class A)

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Degraded Visual Environment

There's an aviation killer out there and it's called DVE.

It lurks in conditions conducive to spatial disorientation, low illumination, poor contrast, limited visibility and dusty environments.

It will steal an aircrew's situational awareness.

Maintain Your Guard!

- Plan for it
- Train for it
- Manage the Risk

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