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Maintenance Pre-Ops Training for Un-Tracked Aviators

The success of the Army can be measured by many elements, one of the most important is solid and effective training. Soldiers are initiated into this organization from the first day they raise their hand. As they progress along their specific career paths, their success can be attributed to regimented training received at their units, and externally through professional military education (PME). Aviators have additional graduate level training which they can pursue throughout their careers; Instructor Pilot (IP), Maintenance Test Pilot (MTP), Aviation Safety Officer (ASO), and Aviation Mission Survivability Officer (AMSO). This article takes a look at how we should institute training for non-MTP aviators who conduct maintenance operational checks (MOC) and are pilots (PI) during maintenance test flights (MTF), to prevent inexperience leading to incidents.

Issues

Over the last five years, there have been two Class A, one Class B, and 28 Class C mishaps which involved MOCs and MTFs. Maintenance operational check mishaps typically involve non-MTP pilots and the mishaps during MTFs involve non-MTP PIs as crew members. Let's take a look at a few mishap examples that resulted in catastrophe involving MOCs and MTFs.

UH-60 MOC

This mishap occurred while a PI was assigned the task of conducting a MOC for a No. 2 engine fuel filter leak check. The aviator was assisted by two enlisted maintainers. While the MOC was a typical ground run of one engine against the gust lock, it resulted in two fatalities. The team was not wearing their protective flight equipment (helmet and gloves) and had no communication capability except yelling over the engine noise.

You can already imagine and visualize where this situation is headed. While the engine was at idle against the gust lock, the non-rated crewmember on the engine platform told the PI to "bump it up." The PI pushed the power control lever (PCL) past the idle detent, resulting in the rotor blades engaging and breaking the gust lock stop. Since the blades were tied down with the aircraft still moored, one of the blades broke and as the rotor RPM increased the extreme flapping of the unbalanced rotor system caused the deaths of the PI and the non-rated crewmember on the engine platform. The maintainer who was standing near the aircraft, jumped inside the cabin area and was subsequently thrown from the aircraft and injured.

Remember that simple MOC, for an untrained, unknowing aviator, resulted in the deaths of the pilot and a non-rated crewmember.

OH-58 MTF

This mishap occurred while a PI was assigned co-pilot duties during an OH-58 test flight checking autorotational RPM. While the MTF for checking the autorotational RPM after blade or rotor work is common, it is still a critical MTF task. In this case,

the MTP conducting the check failed to manage the cockpit actions to standard and the PI failed to assist the MTP in taking the appropriate corrective actions when they both realized they needed to conduct a power recovery.

During the check, the airspeed slowed to 52 knots and the MTP failed to increase the throttle to 100 percent resulting in the aircraft being unable to execute a power recovery. The PI failed to offer assistance by informing the MTP that the airspeed was going below the required range for the check and that the throttle was not at 100 percent during the descent. The aircraft impacted the ground with two fatalities. In this case, the PI was a low hour aviator with 294 hours total time and the MTP had 7 hours of MTP time with 1,108 hours total time.

CH-47 MOC

This mishap occurred while two MTPs were conducting a MOC for a fuel control replacement. While these two MTPs had experience, this example shows how important it is to make sure maintenance work is checked by an MTP and QC prior to conducting MOCs. When the MTPs reviewed the paperwork they weren't 100 percent certain that the work in the logbook had actually been completed. The team relied on group think (e.g., discussed with several other MTPs whether to do the check) in deciding if they should MOC the engine.

While executing the MOC on the engine, the engine surged and caused the rear of the aircraft to lift off the ground. The MTP took action applying aft cyclic which resulted in the aircraft becoming airborne. The lead MTP immediately lowered the thrust lever while the other MTP moved the engine control levers to stop and the aircraft settled back to the ground hard.

In this example, two experienced MTPs made mistakes and damaged the aircraft. They didn't make certain the aircraft work had been completed and that the aircraft was ready for MOC.

Discussion

In two of the examples mentioned, there is an un-tracked aviator involved in the mishap related to a MOC or MTF and one example involves experienced MTP errors in not understanding what work was completed. While MTPs attend resident graduate aviation schooling at the MTP course at Ft. Rucker, Alabama and are well trained, they still require a pilot (PI) to be able to conduct MTFs. The MOC typically requires just one PI and can be completed by a non-MTP (unless an MTP is required at a set of controls by regulation or technical manual).

Here lies the problem. Those who have been in Army aviation for a while, understand that aviators typically carrying out the duties of MOCs, not requiring an MTP, are usually young, inexperienced PIs. These same inexperienced aviators usually are the PI on MTFs. On one hand, these MTFs and MOCs are great learning opportunities for new aviators. On the other, if not properly trained for the particular requirements for conducting MOCs and as a PI on an MTF, they can easily become a hazard to themselves and others.

While the old adage "the test flight sandbag" comes to mind for many when they are scheduled for maintenance PI duties, it betrays the actual requirements to ensure each PI can safely execute MOCs and operate as part of the crew on MTFs. No pilot should ever be labeled a "test flight sandbag"; all aviators regardless of mode of flight must be

actively engaged members of the crew instead of just filling a seat.

While some units may have a program in the unit SOP covering standard training for PI's who will be approved to conduct MOCs and to operate as a PI on MTFs, many don't. The ability to understand specific, standard roles and responsibilities is important. Many times young aviators are scheduled to do a MOC and don't understand what or why they are doing it. They are told what they need to do and what not to do by the assisting maintenance team members, typically floor maintenance enlisted Soldiers or crew chiefs. As you can see from one of the examples above involving the engine fuel filter leak test MOC, this certainly isn't the correct way to train our aviators.

In relation to operating as the PI for MTFs, the PI's must understand what is going on in the MTF and possible contingencies due to a system failure. While MTPs are trained to be able to manage the checks and the cockpit during MTFs, that doesn't absolve the PI from reacting appropriately to a failure.

Recommendation

Units should develop training programs to standardize preparing aviators for conducting MOCs and MTF PI duties. Easily integrated into the unit SOP, this has the capability to increase unit mission readiness, and decrease risk to Soldiers and equipment by reducing incidents.

Requiring training in the classroom followed by simulator scenario training should provide each PI with the appropriate tools to become competent to conduct MOCs and to operate as a part of an MTF crew. This training would "tool" or prepare the PI to be as big a part of preventing a mishap whether on the ground or in the air as it does in providing the appropriate instruction. The use of the checklist should be reinforced and a checklist for MOCs should be generated to standardize the process.

A standards, maintenance, quality control (QC), and aviation safety officer (ASO) should assist the commander with developing the training. This training doesn't need to be to the level of training PIs to be MTPs, but it should focus on common MOC systems that don't require an MTP. Additional training is required for MTF tasks requiring control manipulation by both pilots while conducting checks (e.g., engine turbine analysis check, autorotational RPM check, tail rotor transfer check).

These checks have higher potential to result in a system failure requiring immediate action. PIs must understand what and why they are checking a system and possible actions they may need to conduct in an emergency situation. Train active performance by the PI when conducting MTFs so they understand they are important in assisting the MTP and working as a crew.

Don't forget to spell out how the procedures and processes trained in the program require involvement from the QC shop. It is the QC shop and their responsibility in MOCs to ensure they inform the aviator of the work done and entries in the logbook. It's like a maintenance back-brief so that the pilot doing the MOC knows exactly what work was completed, where they should put even more emphasis during preflight, and to understand the MOC required by the IETM.

Conclusion

Army aviation requires standardized operations. We understand this at the higher echelons but seem to miss it at the unit and battalion level. It is time that we make sure we integrate MOC and MTF training for our PIs who will be either executing the MOC task or flying as a crew member during an MTF. There is no longer a need to treat these tasks as only requiring an unknowing and unsuspecting "sandbag". Our aircraft and systems are far too complex to not prepare and train our aviators to complete MOCs or to fly as a PI for an MTF. ■

Aviation Division
Directorate of Assessments and Prevention
US Army Combat Readiness Center

Aviation Ground Support Equipment

With over 20 years in Army aviation both as a maintainer and aviator I believe one thing is certain, maintenance is the backbone that allows the Army's aircraft to support combined arms maneuvers. Without a robust and well-supported maintenance program, we would never be able to take the fight to our enemies. Aviation ground support equipment (AGSE) is a key part of a robust aviation maintenance program.

AGSE custodians are required to use the equipment manuals to schedule the inspection intervals by using the preventive maintenance checks and services (PMCS) guidance. The PMCS inspection of the equipment ensures it is ready for operation at all times. Inspections should be incorporated into the maintenance schedule just as they are for aircraft. These inspections provide discovery of defects, allow corrective action, and/or parts requisition before the fault(s) result in serious damage or failure of the equipment during use.

Often discrepancies are left unreported leaving unserviceable equipment on the flight line, yet unavailable for use. Not only does it pose a threat to the aircraft, but also the maintainers using the equipment who can become injured due to faulty equipment. You can walk the hangar floor, flight line and find unserviceable equipment everywhere. Whether it is a B-1 work stand with inoperative brake mechanisms or an aircraft tug with an inoperative parking brake or seatbelt, every piece of AGSE requires maintaining. The equipment requires scheduled maintenance and when noted, unscheduled maintenance just like aircraft and military vehicles.

Effective Management for Maintaining AGSE

Simple tactics, techniques, and procedures (TTP) can help units effectively manage AGSE. A few quick ones are: defects discovered during operation will be noted for future correction; stop operation immediately if a deficiency is noted which would damage the equipment; and take corrective action by repairing or ordering repair parts. All deficiencies and shortcomings will be recorded together with the corrective action taken on the appropriate form. Any discrepancy will be immediately reported to the AGSE custodian for repair.

TM 1-1730-215-13&P 0010 00

FIELD MAINTENANCE

MAINTENANCE PLATFORM ADJUSTABLE, AIRCRAFT
(TYPE B-4A) PART NO. 54J6345 NSN 1730-00-294-8883

PREVENTIVE MAINTENANCE CHECKS AND SERVICES INTRODUCTION

GENERAL

This section lists and authorizes PMCS required for the Maintenance Platform Adjustable, Aircraft.

EXPLANATION OF COLUMNS

ITEM NO. Column

NOTE

Numbers shown in item number column shall be used as the source of numbers for the TM number column on DA Form 2404, Equipment Inspection and Maintenance Worksheet.

The number used to identify sequence of checks and services in logical order of performance regardless of the interval. This column shall be used as a source of item numbers for the TM Number Column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, when recording results of PMCS.

INTERVAL Column

Indicates the time interval upon which the checks and services must be performed. Intervals are divided as follows:

B Before
D During
A After
W Weekly
M Monthly
C Combat Operability Check

ITEM TO BE INSPECTED Column

Indicates items and components to be inspected.

PROCEDURES Column

Indicates the procedure by which the check or service is to be performed. Tolerances, adjustment limits and instrument readings are included as applicable. When replacement or repair of a component is required, the procedures column will direct personnel to the appropriate task.

END OF

The production control (PC) officer and NCO should have AGSE included in the daily PC meeting while ensuring a valid AGSE maintenance/inspection program is maintained. If the equipment is not serviceable but still used, it can lead to a higher risk to Soldiers, the mission and the unit. When equipment is faulty and doesn't operate properly, shortcuts begin to surface which puts Soldiers on the ground at risk and puts the aircrews operating the aircraft at risk. A solidly managed AGSE maintenance program is a must!

Observations

Below are a few of the everyday items used by maintainers which I have seen a habitual failure to PMCS and maintain in a serviceable condition (scheduled and unscheduled maintenance).

Aviation Light Utility Mobile Maintenance Cart (ALUMMC)
Self-propelled Crane Aircraft Maintenance and Positioning (SCAMTP)
Standard Aircraft Towing System (SATS)
Tractor, Wheeled Air
Shop Equipment Contract Maintenance (SECM)
Auxiliary Ground Power Unit (AGPU)
Generic Aircraft Nitrogen Generators (GANG)
Aviation Scales
Aircraft Jacks and Jack Stands

Aviation Stands and Trailers

Every piece of AGSE is critical to performing aviation maintenance to standard. Substandard AGSE maintenance hurts the mission, the unit and easily can lead to injury or death of service members.

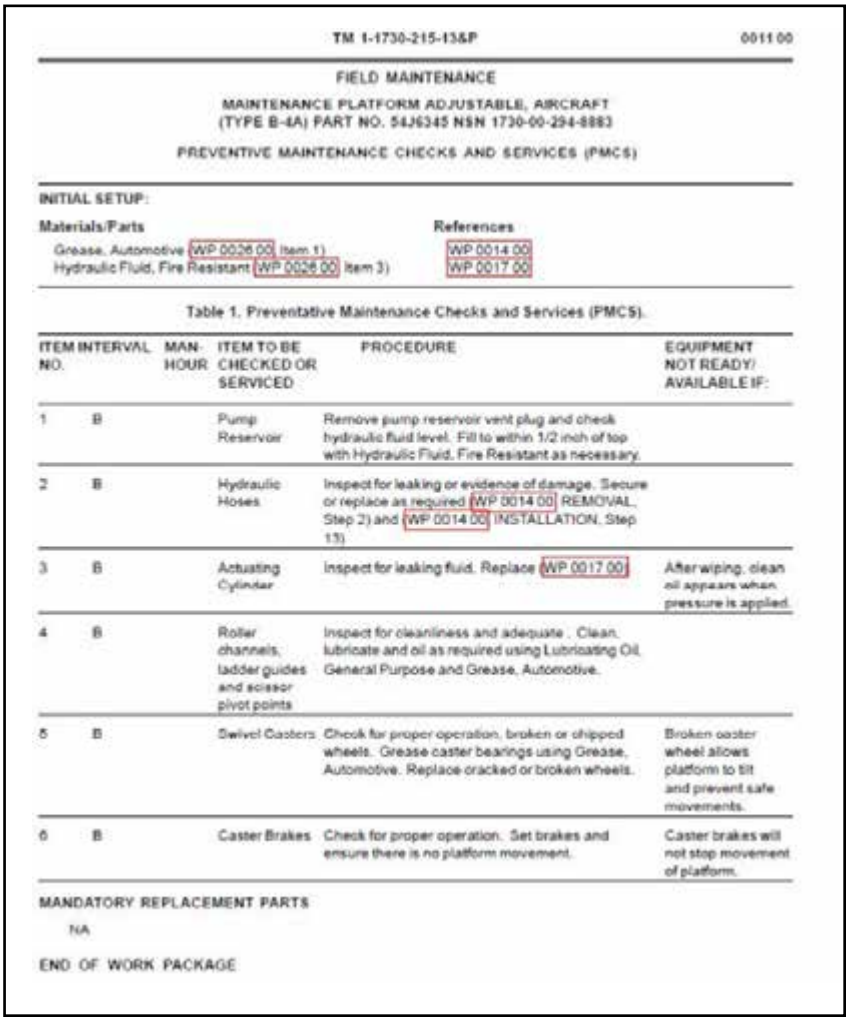
Who Cares?

Everyone in an aviation unit should care. The reason the unit exists is to support combat operations with aviation assets. Without serviceable AGSE the unit becomes limited in its ability to provide the maximum fully mission-capable aircraft to perform its wartime mission. Commanders and first sergeants should set the example by making sure the unit maintenance program includes AGSE and that maintenance officers and noncommissioned officers (NCO) train their personnel in the proper procedures for the performance of PMCS on the equipment.

A well-honed AGSE maintenance program and the supporting training program can do wonders for reducing aircraft downtime due to non-mission capable maintenance (NMCM), injuries to Soldiers from using faulty AGSE, and mishaps due to shortcuts being used because of faulty equipment.

Check out these AGSE websites for tickets, assistance, and national stock number/tech manual needs:
https://agse.peoavn.army.mil/AGSEHelpDesk/AGSE

https://www.jtdi.mil/group/agse/home (The home page shows under construction, yet tabs are being populated with data and manuals so information is available) ■



TM 1-1730-215-13&P 0011 00

FIELD MAINTENANCE

MAINTENANCE PLATFORM ADJUSTABLE, AIRCRAFT
(TYPE B-4A) PART NO. 5J6345 NSN 1730-00-294-8883

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

INITIAL SETUP:

Materials/Parts
Grease, Automotive (WP 0026 00, Item 1)
Hydraulic Fluid, Fire Resistant (WP 0026 00, Item 3)

References
WP 0014 00
WP 0017 00

Table 1. Preventative Maintenance Checks and Services (PMCS).

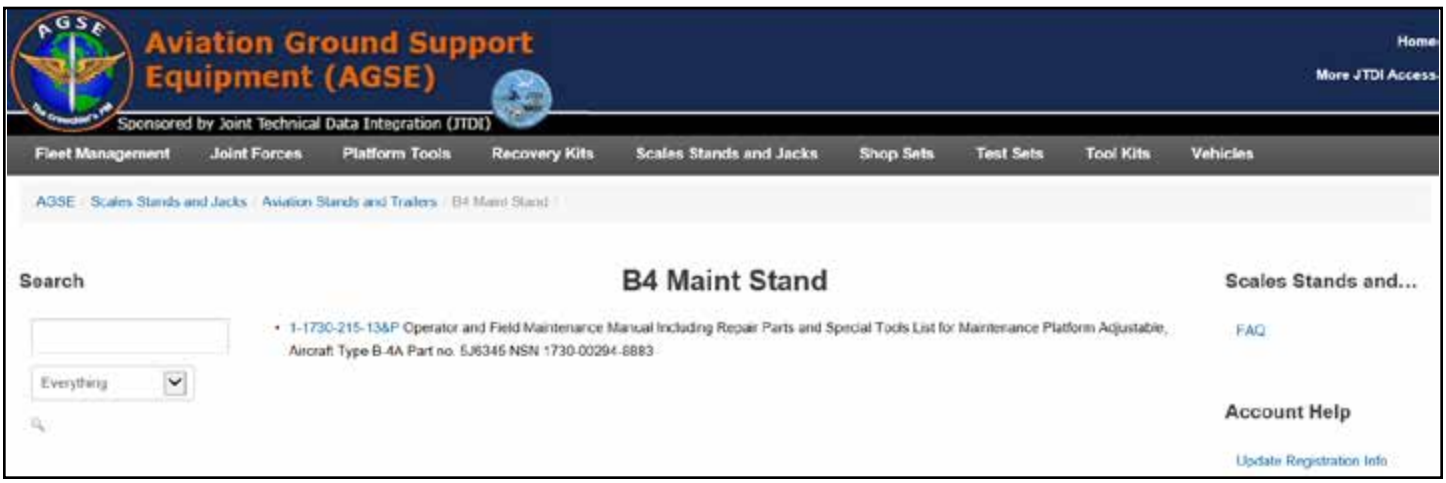
ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	B		Pump Reservoir	Remove pump reservoir vent plug and check hydraulic fluid level. Fill to within 1/2 inch of top with Hydraulic Fluid, Fire Resistant as necessary.	
2	B		Hydraulic Hoses	Inspect for leaking or evidence of damage. Secure or replace as required (WP 0014 00, REMOVAL, Step 2) and (WP 0014 00, INSTALLATION, Step 13).	
3	B		Actuating Cylinder	Inspect for leaking fluid. Replace (WP 0017 00)	After wiping, clean oil appears when pressure is applied.
4	B		Roller channels, ladder guides and scissor pivot points	Inspect for cleanliness and adequate . Clean, lubricate and oil as required using Lubricating Oil, General Purpose and Grease, Automotive.	
5	B		Swivel Casters	Check for proper operation, broken or chipped wheels. Grease caster bearings using Grease, Automotive. Replace cracked or broken wheels.	Broken caster wheel allows platform to tilt and prevent safe movements.
6	B		Caster Brakes	Check for proper operation. Set brakes and ensure there is no platform movement.	Caster brakes will not stop movement of platform.

MANDATORY REPLACEMENT PARTS

NA

END OF WORK PACKAGE

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



Aviation Training Strategy Evolution

Aviation simulation training has become a standardized initial aviator flight operations training method and continuation training reinforcement strategy not only for civil aviation but for the Department of Defense (DoD) military flight operations as well. Simulations evolved from the first "blue boxes"* to the current state of the art, full motion and realistic visual simulators. While the Army has fully embraced the training value of the current simulators, has our training strategy evolved and been refined to a higher degree just as the state of the art simulators?

While Army aviation mishap rates continue to decrease, the mishaps that are occurring are primarily found to be human error related. In some instances, human factor errors seem to be consistent among concurrent mishaps (emergency procedure execution errors). Is there possibly a better way to train in our simulators that would have a positive effect on the reduction of human factor errors in Army aviation?

Hard Realistic Training

We use hard realistic training to develop the best-trained aviation personnel in the world. Maybe we need to also continue to evolve the training to meet the hard realities of combat operation flight. The standards which we use are put into words, formatted, and codified in our aircrew training modules (ATM). We utilize other documented training, operational technique and skill development products, such as training support packages and unit standard operation procedures (SOP) to further give our aviation personnel that realistic training.

While documented training procedures and standards are necessary, at times, we can become steadfastly attached to them. We are so well trained and have procedurally been ingrained to follow: the book, the standards, and maintain a much regimented task-oriented flight mission profile we tend to fall into the straight and level syndrome. This syndrome for most aviators is generated from the time they begin training in flight school and onward through their careers in Army aviation. Who can forget their instructor pilot (IP) chastising them for banking too hard in the simulator or the aircraft

or for not making that 90-degree pedal turn while taxiing to the active runway? Maybe your' s was you didn't execute that emergency procedure quick enough in the simulator, the one that even if you took a few seconds to think through before retarding or moving a power control lever the aircraft was still safely flying.

The "straight and level syndrome," as referred to by Rogers in his Federal Aviation Administration (FAA) report on simulator-based upset-recovery training, refers to pilots accustomed "to small control inputs required for straight-and-level flight or flight at small bank angles and pitch attitudes." In the case of Army aviators who are called upon to operate in combat conditions, we do most of our training in permissive environments. During this training, whether continuation training or during flight support missions, we typically don't have to go outside the straight and level flight profiles. But when something does occur which requires flight outside that profile due to some condition or hazard which is a fundamental surprise, are we training our crews to successfully respond to those?

Paradigm Shift in Training Mentality

To maximize our training and preparedness for combat operations, a paradigm shift needs to occur which produces aviators who are realistically trained to manage situations encompassing fundamental surprise. This surprise can occur in any flight regime whether ground taxi or in level flight or while heavily tasked during a battle handover in contact.

The key point for preparing our aviators to respond to a situation of fundamental surprise is to train for it. While in simulators, this affords the perfect opportunity to prepare our aviation warriors to handle any surprises which require a break out from the straight and level syndrome. As an example of training, let's take brownout landings. When was the last time you can remember your IP in the simulator putting the aircraft into an unusual attitude while departing in a full brownout condition, then having you recover from the fundamental surprise of being 15 feet off the ground, 20 degrees nose low and in a bank? You probably don't, but maybe you do recall something similar from unusual attitude recovery while doing instrument training or check rides at altitude.

During emergency procedure training, in the simulator, is a prime time to input scenarios which create stress on the crew. This stress can make the crew break out of the typical scenario they are accustomed to and being able to fall back on formulaic responses (e.g., responses which have become procedural without thought.) Remember that IP rushing you to retard the power control lever for a single engine fire, it becomes almost instantaneous the speed at which you began to grab and pull. To offset those rote responses which can result in a mishap, we need to change the behavior to emergency procedures which requires thought and action. Our aviators are smart enough to know and memorize those emergency procedure immediate actions necessary for a failure which will be catastrophic without immediate response (i.e., you suffer a dual engine failure requiring autorotation). However, we need to teach them to think and react in a manner which prevents the mishap, handles the procedure, and allows them to modify the combat mission as necessary.

Are We Willing to Make the Change?

This evolution involves a change in mindset and not equipment. We have the personnel and simulators available to implement the evolution from how we currently train to one which prepares our aviators to handle those situations which can and do occur. These situations of fundamental surprise during high task situations often result in the mishap which we so rigorously trained to try to prevent. All it requires is an adjustment to how we train in the simulator for emergency procedures and how we design our training scenarios. Creating these scenarios is as simple as unit standards working with their unit aviation safety officer to review mishap reports and utilize the factors involved to develop training that puts aviators in these same type situations.

Change is hard for systems as large and formulaic as Army aviation training programs. But if we have a desire to continue to give our current and future aviators the world-class training they deserve, which our country demands, we need to make sure our training evolves.

Conclusion

Times change and our training methods should evolve when we determine there are additional benefits to adjusting how we train. Reviews of mishaps and utilizing lessons learned tell us so many things about our training. It is only prudent to take a look at how we train and how we can adjust to better prepare our aviators to manage those fundamental surprises when they occur, break away from a purely formulaic (procedural) response without thought, and sometimes you have to operate the aircraft beyond those small bank and pitch angles to survive. ■

**The term Link Trainer, also known as the "Blue box" and "Pilot Trainer" is commonly used to refer to a series of flight simulators produced between the early 1930s and early 1950s by the Link Aviation Devices, Inc.*

References

Rodgers, R., Boquet, A., Howell, C., DeJohn, C. (2009). An Experiment to Evaluate Transfer of Low-Cost Simulator-Based Upset-Recovery Training. Federal Aviation Administration Technical Report No. DOT/FAA/AM-09/5. March 2009.

Aviation Division
Directorate of Assessments and Prevention
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Mishap Review

Mishap Review - UH-60L Severe Weather

While hover taxiing to parking in a UH-60L, the instructor pilot (IP) encountered an unforecast wet microburst. As a result, the aircraft entered a left descending yaw from which the crew was unable to recover. The aircraft was destroyed and the crew sustained minor injuries.

History

The mishap crew was conducting qualification training for initial entry students. The crew completed their normal program of instruction (POI) with briefing the training mission, mission rehearsal, and the student's daily brief. Then, the crew conducted the appropriate mission briefing process inclusive of being approved for conducting training in rain conditions. The crew proceeded to the aircraft and conducted the pre-flight inspection. During this time a weather watch for lightening within 15 nautical miles (NM) of the base airfield was active.

The crew conducted the first portion of the training mission without event. The pilots (PI) onboard switched locations with the second-period student aviator becoming PI during the accident phase. During the return flight to the base field for hover and slope work, another weather warning was issued for moderate thunderstorms with maximum winds of 38 knots. Shortly afterward, the mission execution forecast was amended to reflect the weather warning.

While conducting hover and slope training at the base field, the mishap aircraft had to land to wait out heavy rain conditions. Once the heavy rain passed, the aircraft was hovering to parking when the weather conditions were conducive to a microburst. At that time, a severe downdraft forced the aircraft into a descending left yaw which could not be overcome with full pedal input. The aircraft struck the ground causing Class A damage and the crew sustained minor injuries.

Crew

The IP had 337 hours in MTDS and 6,900 hours total time. The PI had 1 hour in MTDS and 101 hours total time.

Commentary

The aircraft had been briefed to operate in rain conditions. While executing the training mission the weather conditions began to worsen. During transitioning to parking, a microburst occurred and its wind forces affected the aircraft so severely full pedal input and IP actions could not overcome the situation.

While seasoned aviators have more than likely found themselves in similar situations, where the weather conditions changed while in mission profile, the ability to make sound decisions based on current conditions cannot be overstated. In the mishap, the crew was briefed for operations in rain conditions, yet that doesn't give carte blanche for crews to continue the mission when the conditions have drastically changed from "just rain." While IPs work hard to get the training mission conducted and progress students (whether in flight school or during readiness level (RL) progression at the unit), they should not go beyond the mission briefing scope. In this case, the weather changed from rain conditions to severe thunderstorms with the possibility of microburst formation. It is a good measure to teach your aviators of dynamic re-briefing, as part of your safety training program. As IPs and pilot-in-commands (PC) at Training and Doctrine Command (TRADOC) organizations and within the field units, you have the opportunity to train your pilots to use dynamic re-briefing when conditions of the flight, flight-environment, or mission change from the brief. In the case of this mishap, a dynamic re-brief with updated weather conditions would have provided the commander with the opportunity to weigh the risk and better assist the IP in making the decision to modify, abort, or continue the mission. It is no different for any PI, PC or unit IP. When conditions change from what is briefed, use dynamic re-briefing to determine the way ahead and place the decision making at the appropriate level. ■

Class A - C Mishap Tables

	Manned Aircraft Class A – C Mishap Table									as of 19 Apr 20
	Month	FY 19					FY 20			
		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities
1st Qtr	October	1	1	4	0		2	1	5	0
	November	0	0	3	0		1	1	1	2
	December	1	1	2	0		1	1	2	3
2nd Qtr	January	1	1	0	0		0	0	4	0
	February	2	0	0	0		1	0	5	0
	March	0	1	5	0		1	1	4	0
3rd Qtr	April	0	1	3	0		0	1	0	0
	May	2	2	6	1					
	June	0	0	5	0					
4th Qtr	July	2	1	2	0					
	August	1	0	3	1					
	September	2	1	8	1					
	Total for Year	12	9	41	3	Year to Date	6	5	21	5
	Class A Flight Mishap rate per 100,000 Flight Hours									
	5 Yr Avg: 1.08		3 Yr Avg: 1.09		FY 19: 1.15		Current FY: 1.29			

	UAS Class A – C Mishap Table								as of 19 Apr 20
	FY 19					FY 20			
	Class A Mishaps	Class B Mishaps	Class C Mishaps	Total		Class A Mishaps	Class B Mishaps	Class C Mishaps	Total
MQ-1	9	2	3	14	W/GE	2	0	2	4
MQ-5	1	0	0	1	Hunter	0	0	0	0
RQ-7	1	12	38	51	Shadow	0	7	10	17
RQ-11	0	0	0	0	Raven	0	0	0	0
RQ-20	0	0	1	1	Puma	0	0	1	1
SUAV	0	0	0	0	SUAV	0	0	0	0
UAS	11	14	42	67	UAS	2	7	13	22
Aerostat	1	1	1	3	Aerostat	2	0	0	2
Total for Year	12	15	43	70	Year to Date	4	7	13	24
UAS Flight Mishap rate per 100,000 Flight Hours									
MQ-1C Class A	5 Yr Avg: 9.56		3 Yr Avg: 9.87		FY 19: 8.77		Current FY: 3.95		
RQ-7B Class A-C	5 Yr Avg: 58.29		3 Yr Avg: 69.64		FY 19: 109.84		Current FY: 97.25		

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

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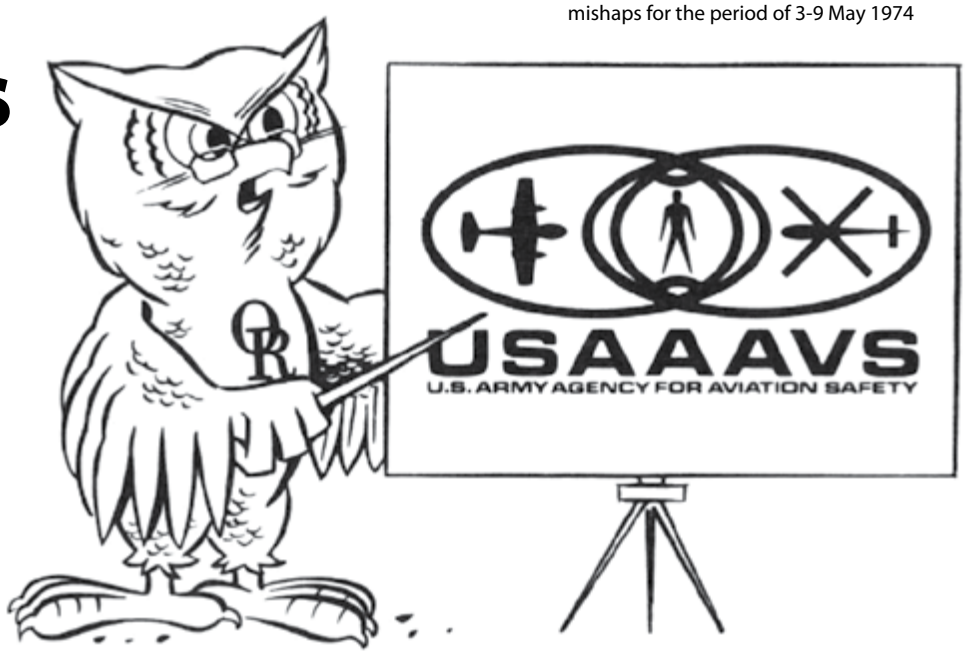
mishaps for the period of 3-9 May 1974

Orval Tells it like it is



FOR ALMOST TWO YEARS, Orval Right has been sharing his extensive aviation knowledge and experience for the benefit of the Worldwide Army Aviation Accident Prevention Program. This program is headed by an accident prevention group known as the United States (U.S.) Army Agency for Aviation Safety (USAAAVS)- pronounced "U-Saves."

His official title is Chief Advisor on Matters of Aviation, and he is known for his expertise in all areas of aviation, his diplomacy, tact, and wisdom … all those good things.

Orval was asked by a fellow aviator the other day, "Just what does USAAAVS do for me?"

ORVAL HAD THIS TO SAY:

Recently, the Department of the Army (DA) staff was reorganized and USAAAVS became an agency of the Office of The Inspector General. Our new boss, LTG H. N. Maples, The Inspector General, and Auditor General, is vitally interested in aviation accident prevention. On a recent visit to USAAAVS, he said, "We are going to tell it like it is" on matters of flight safety.

Let me begin by "telling it like it is" about USAAAVS. As the aviation safety agency, we are generally thought of as safety people, but we like to think of ourselves as accident prevention people. This is because we recognize a great deal of difference between positive prevention measures and safety restrictions.

IT HAS BEEN SUGGESTED that we change our name to the U.S. Army Agency for Aviation Accident Prevention, but the acronym for that is a problem-USAAAAP, pronounced "U-Sap." We'll stay with "U-Saves" until we think of something better.

Regardless of our name, many people do not know what we really do or what services we have to offer. We have been accused of just brooding over stacks of statistics and telling everyone all the things wrong with Army aviation.

SURE, WE ANALYZE past accident experiences, but we're more than just a group of analysts running around in green tennis shoes. The analyses we do are necessary to pinpoint "what's wrong" and to come up with corrective actions to prevent future mishaps from similar causes.

We review every mishap, but this doesn't mean we spend all our time reacting to accidents. This is just one of the means we use to further the cause of accident prevention in all phases of aviation, particularly in regard to the man, his machine, and the operating environment.

WE HAVE MAJOR REPRESENTATION at working meetings for new aircraft systems— Utility Tactical Transport Aircraft System (UTTAS), Heavy Lift Helicopter (HLH), Advanced Attack Helicopter (AAH), Advanced Scout, to design out known accident-producing hazards from new aircraft.

A few of our current major projects include improved warning devices, unit and individual nap of earth (NOE) training, improved forward area refueling and rearming (FARP), the oil analysis program (OAP), and in-flight breakup and rotor blade separation problems. We have 147 other projects of interest to aviation personnel across the board.

BUT THIS IS NOT ALL WE DO. About half of our working time is spent assisting the Soldier and commander in the field. Our assistance visits are planned to reach all company size and, in some cases, smaller units, and their major commands every 18 months. The objective of this program is to help everyone recognize and correct aviation hazards before they cause unnecessary losses in lives and equipment.

Among the areas looked into by our teams are operations, maintenance, unit readiness, training, air traffic control (with the help of United States Army Aeronautical Services Office (USAASO)), standardization, facilities and safety (flight safety, ground safety, shop safety, office safety, even safety in getting to and from work).

We feel we can be of real service to you in these areas, not because we are smarter than everyone else, but because we are constantly in touch with activities in the field, something is bound to rub off.

OUR ASSISTANCE VISITS are designed to help you accomplish your mission-not to restrict your operations-and at the same time conserve aviation resources. We can do this by passing on to you the knowledge we have gained through our worldwide operations.

No funding is required of units requesting USAAAVS assistance, we will and do work on weekends to meet the needs of Reserve and National Guard units.

While we hang our hats at Fort Rucker, we report only to the Inspector General. We are a field operating agency and as such, we can cut through a lot of red tape and save time to get DA staff attention focused on problems we are unable to solve for you in the field.

WE ARE YOUR ACCIDENT PREVENTION field representative on the DA Standardization Board. We also work closely with the National Transportation Safety Board (NTSB); the Aviation Center; Federal Aviation Administration (FAA); Air Force, Navy, and Coast Guard safety centers; and other civil and military agencies as well as industry to give you the most comprehensive information possible concerning your accident prevention program.

It is our policy to make sure your problems are looked into, worked on and solved, hopefully before they become accidents. We have an open-door policy 24 hours a day. In fact, we threw the door away years ago.

WE DON'T HAVE ALL THE ANSWERS, but we do have some of them. Yes, we make mistakes but we try, so try us. Direct communication is authorized by AR 10-29. ■

Forum

Op-ed, Opinions, Ideas, and Information

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

Is Technology Driving Army Aviation Education or Education Driving Technology?

With the integration of the latest technology and its rapid advancements, many see the future of educating Army aviators and maintainers in light of the latest technology, e.g., virtual and augmented reality (AR). While the technological advancements over the last decades have certainly contributed to better systems and interfaces, have we begun to put the cart before the horse as it pertains to how we educate our current and future Army aviation personnel. The reality is that to provide the most beneficial training to our aviators and maintainers, what we require them to learn through our education systems should be driving what technology we use and what we require it to provide.

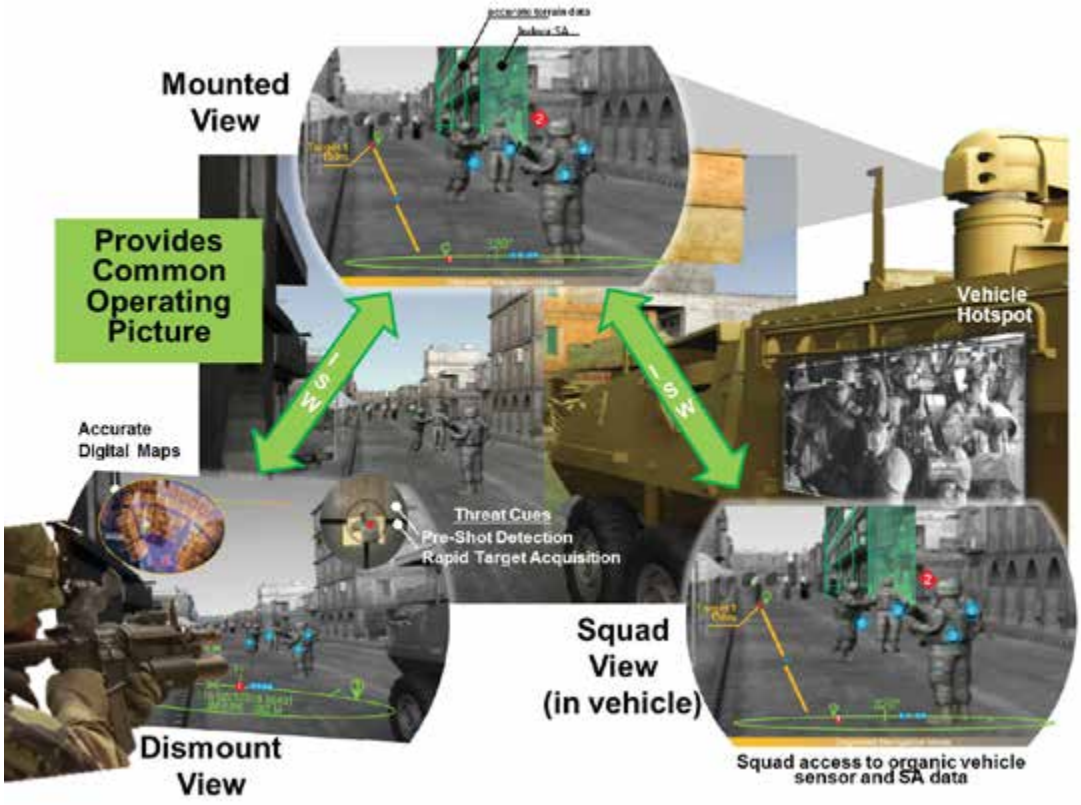
There is a tendency to believe that technology is the fix to any problem and is the method that should be used to develop and train personnel. Selling points are rapid fire on how virtual reality (VR) and simulations with AR can provide the exact training necessary to train our aviation personnel to a high standard while decreasing cost. "What a great capability" the developers say, as they try to get decision makers to quickly commit to a technology based solution.

There lies a hazard in technology if we choose technology for education and then change our education to fit that technology. If you were to think about how aviation training developed, it moved from aircraft to simulators. During this transition, we developed education plans and training. Then, when simulators came about, we had the education plan available and applied that to the simulator training (from the Link Trainer to the current state of the art full motion and visual simulators).

If we took a moment and looked in detail at the progression of aviation training, until recent times with the technology explosion, we typically had an education plan or program of instruction (POI) which was initially aircraft flight training and as technology in simulations slowly advanced we incorporated the POI into the simulators.

This effort used education to drive what the technology used would be and integrated that technology into the training program.

While technology has certainly made our aviation and maintainer training advanced and provides possibilities in training that could only be dreamed of 20 years ago, it should not drive how we educate. For those who have used augmented or virtual reality training systems, it has a place in training, but it is not the-be all, end-all to training. While it can enhance training, it cannot replace live, hands-on training. As an example, learning to weld would find it useful to initially train with a VR welder and it may have a cost reduction effect in resources as well as risk reduction for initial entry training. Yet, anyone who has used this system would be able to tell you, it assists in learning what and how to do welding but it does not replace live hands-on training.



Understanding the education process, the various cognitive systems involved, and the physiological senses' impact on training in an aircraft or hands-on for maintainers in contrast to the simulations can inform leaders to the impacts of allowing new technologies to drive the education process. A maintainer who has completed all education virtually, for instance, on the correct way to safety wire a main rotor pitch rod may not be able to complete the task when actually doing it on the aircraft. The Soldier has never actually seen the pliers used, never actually held them or the safety wire. For an aviator, while they used VR to go thru the before engine start sequence for a CH-47 and could successfully complete the task in VR-land, they may not be able to have that success when they are actually required to complete the task in the cockpit. They have no spatial sense of where the controls and switches are in relation to their body. In a sense think of dunker training, without maintaining one hand on a known point, it becomes very spatially disorienting when you actually go underwater and the dunker device capsizes. You lose your spatial sense of where you and other items are in the cockpit, like the door where you will exit.

Don't get me wrong; technology can and does add value to our training. But leaders need to understand the education program and have industry integrate their technology into our education POI and also understand the limitations of technology. The sales pitches are great and offer the world, yet it is just that, a sales pitch. The better option for industry sales pitches on VR, AR, and artificial intelligence (AI) systems for Army aviation training is to demonstrate how Army aviation education programs will drive how their technology will be used to assist in our training. The industry would inform our leaders of the limitations of the technology and what portion of our POI/ training the technology isn't valid to attempt to train. ■

Jeff Warren
Retired Aviator

Mishap Briefs #86

ROTARY WING

Utility

H-60

A Model

- After completion of mission support, the aircrew was performing a post-flight inspection when they observed indications that the underside of all four main rotor blades (MRB) had made contact with vegetation. Mishap time and exact location are unknown. (Class C)

L Model

- After completion of a support mission, the aircrew was performing post-flight inspection when they observed tip cap damage to all four MRB. (Class C)

- The aircrew was conducting a routine approach and landing on an unimproved landing area. The descent and touchdown were normal, and the termination was with minimal dust and forward momentum. After touchdown, the pilot and co-pilot observed more than normal debris to be present in the rotor wash. They brought both engines back to idle to await follow-on mission instructions. After receiving follow-on instructions, they completed the mission and returned to base. After the aircraft was shutdown, one of the blades was observed to have had visible damage as a result of the landing in the unimproved landing area. (Class C)

Attack

H-64

E Model

- Upon arrival and shutdown at the destination facility, the No. 1 nacelle door was observed to be open. The door opened during flight, damaging the door, hinges, and brackets. (Class C)

FIXED WING

MC-12

S Model

- Aircraft was conducting a simulated No. 1 engine failure on approach for landing. As aircraft crossed the approach end of the runway, it was left of course with airspeed below minimum required for safe landing. The instructor pilot (IP) took the controls and attempted a go-around. The aircraft impacted the ground left of the runway in a level attitude. There were no injuries. (Class A)

RO-6

A Model

- Nose landing gear damage during landing. (Class C)

UNMANNED

MQ-1

C-ER Model

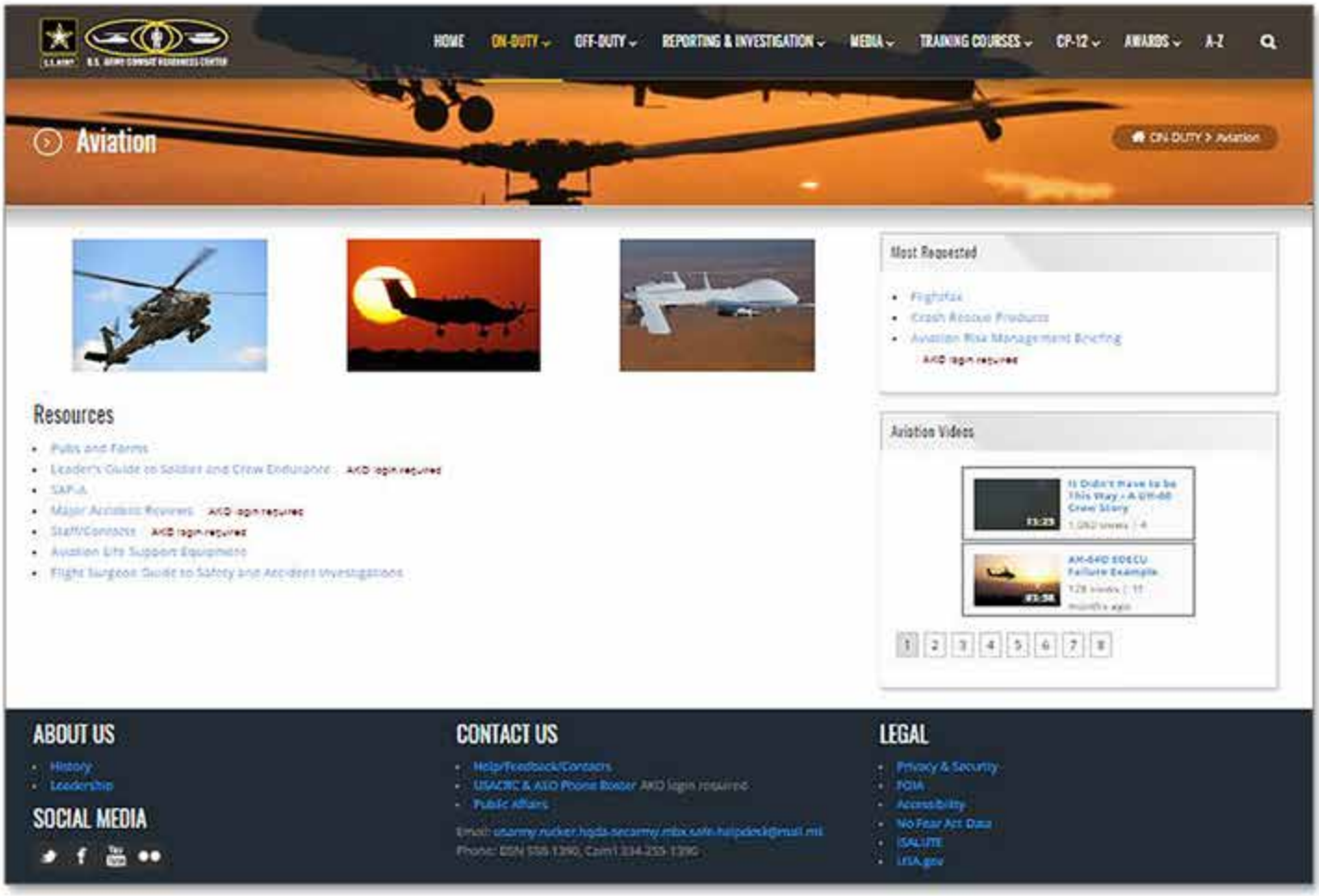
- The aerial vehicle (AV) experienced lost link shortly after transitioning from beyond the line of sight (BLOS) via the satellite ground data terminal (SGDT) to the line of sight (LOS) via the universal ground data terminal (UGDT). All attempts to regain links were unsuccessful. The AV entered its lost link profile while heading towards its lost link contingency mission OCONUS airfield. AV was recovered 90 nautical miles (NM) away from the OCONUS airfield. The AV was reported as a total loss. (Class A)

RQ-7B

V2

- The aircraft operator (AO) was conducting a standard flight evaluation (SFE). The aerial vehicle (AV) was approximately 3 kilometers (km) northeast of the mission site when the engine revolutions per minute (rpm) began to fluctuate. The rpm fluctuated between 3,800 to 8,000 rpm. The minimum threshold was 630 rpm and the highest was 8,000 rpm for two minutes. The AV began to descend from its flight level at 9,000 feet mean sea level (MSL) and impacted the ground approximately 1 minute and 30 seconds later. The aircrew is unsure if the parachute deployed before impact. (Class B)

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



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MOC AND MTF

For Army aviators with a couple of years under their belt, the terms MOC and MTF are well known. We learned what a MOC, maintenance operational check and MTF, maintenance test flight were early in our careers when the commander or platoon leader directed us to "sandbag" with the maintenance test pilot (MTP) for the day. Initially, we didn't know what it meant but we were told that the MTP would let us know what we were supposed to do. And since he usually is very busy trying to get the aircraft back up after maintenance, many times we had to rely on one of the maintainers to let us know what we were supposed to be doing.

For the most part, we probably managed to get the MOC done without breaking any equipment or injuring anyone. When we did the MTF with an MTP, we probably felt much more at ease since we thought the MTP knew everything there is to know about the aircraft and what to do with any malfunction. We could just sit in the other seat and "sandbag" it, don't touch anything or do anything unless told to. While this method probably, if studied, reduced errors by an unknowing pilot, it may also over time contribute to mishaps.

So what exactly are we supposed to be doing as the pilot (PI) who is conducting a MOC or as a rated crewmember during an MTF? To give you a hint, you won't find the word "sandbag" anywhere in any document or mission brief which has to do with MOC or an MTF. The first manual to become familiar with is Technical Manual (TM) 1-1500-328-23, Aeronautical Equipment Maintenance Management Procedures, check out Chapter 3, you can get informed on MOCs, operational checks, functional ground checks, check flights and evacuation procedures. You'll learn there are two types of MTFs: limited and general test flights. The TM gives you the required times either of these must be conducted. Unmanned aerial system (UAS) has requirements just as well so UAS operators need to spin up on their requirements as well. Army Regulation (AR) 95-1, Aviation Flight Regulation, covers manned and unmanned operations (AR 95-23, Unmanned Aircraft System Flight Regulations is now an inactive regulation). The aircraft maintenance manuals and system manuals typically provide the step-by-step checks for MOCs while the aircraft maintenance test flight checklist has the detailed steps to take for aircraft limited and general test flights, which the MTP utilizes during MTFs.

Commanders should ensure they have developed a short training plan for new aviators who are assigned to the unit. This typically is as simple as the unit standardization pilot, aviation safety officer, MTP, and quality control section developing a unit training plan for commander determined key MOC, functional checks, and MTF task which require two pilot action (turbine engine analysis check (TEAC), autorotational RPM check, etc.). This plan should be in the unit standard operating procedures.

5 Questions

1. Where can I find information on when a limited maintenance test flight is required?
2. A current and qualified minimum crew required for flight operations, as specified in the -10, is to be at their stations(s) and manning the flight controls or ground control station whenever a MOC requires the main engine(s) be started. True or False? (TM 1-1500-328-23)
3. Operator and crew member checklists will be used for preflight through before leaving aircraft checks. While airborne, when time does not permit the utilization of the checklist or when its use would cause a safety hazard, required checks may be accomplished from memory. True or False? (AR 95-1)
4. Who is responsible to ensure full compliance with the processes described in TM 1-1500-328-23?
5. MTFs are to be accomplished with assistance as necessary from the most proficient flight crew available. True or False? (TM 1-1500-328-23)


Train it!
✔ ESTABLISH standard operating procedures
✔ TRAIN your aviators on maintenance operation checks
✔ TRAIN your aviators on MTF critical procedures
✔ PREPARE your crews for the unexpected
✔ INCORPORATE simulator scenarios
Sandbags don't belong in the cockpit!
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