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Army Aviation Fixed-Wing Maintenance:
Are You Sure You Should Be Doing That?

As pilots, we discuss the idea of the most conservative approach in many different scenarios. Whether it be fuel requirements, weather, duty day or emergency procedures, the most conservative approach is discussed. The term "most conservative approach" even makes an appearance in the UC-35 Aircrew Training Manuel (ATM) under the task Conduct Pre-Mission Performance Planning. We talk about it so much one would think it would become second nature in everything we do as aviators; but what about when it comes to fixed-wing maintenance? Do we always take the most conservative approach?

When something is wrong with the aircraft, does it always get written up or just passed on to the first maintenance person that meets us at the aircraft? Does foreign object debris (FOD) found in the airplane always get reported, and are there some things in the aircraft that you can just live without to get the mission accomplished? These are all discrepancies many of us are guilty of. What about when we are away from home station — in a foreign country, for instance — and the aircraft breaks? Do you know what the right answer is in that situation?

Realistic Examples

In December 2014, I was on short final to Goose Bay, Canada. At approximately 500 feet above ground level (AGL), the pilot I was flying with and I heard a loud bang from outside of the C-12U we were flying. My pilot-in-command (PC) thought it came from the nose of the aircraft, so when we landed, he kept the nose off as long as possible. As soon as the nose touched, it was apparent; we had blown our nose wheel tire in flight. We brought the aircraft to a stop, shut down on the runway and waited for the tug to arrive. While waiting, I commented to my PC, "I wonder how long it is going to take the contract maintenance organization to get someone up here to change this tire." He said, "Don't worry about it. I'll find an A&P here on the field to

change the tire and we will be on our way the day after tomorrow. We'll just put it on the aircard."

In 2015, two pilots flying a C-12U in the South Pacific had an electrical problem. They had a passenger to pick up at their next stop and wanted to continue the mission. After troubleshooting on the phone with maintenance personnel at home station, it was determined they had blown a current limiter. The pilots took it upon themselves to change the current limiter and continued the mission.

In the summer of 2016, I was preparing for a trans-Atlantic mission from the United States to Germany and back. During the planning process, the brigade aviation maintenance officer (BAMO) identified the potential risk of tire damage on the trip. The recommendation passed down was for each crew participating to receive a class from the fixed-wing maintenance contractor on changing a tire on a C-12. Then each crew would fly with tires, tools and jacks. The logic behind this recommendation was, in this unit, some pilots worked as aircraft mechanics in their civilian jobs. I did not approve of this course of action and the maintenance contractor at our site refused to conduct the training. I found out later the same pilot that recommended the training had rolled a tire off the rim in Iceland and changed it himself.

Aircraft Maintenance Culture

The rules of aviation maintenance are pretty cut and dried in the rotary-wing community. There is an army of trained aircraft maintainers available to work on the aircraft, and if a maintenance procedure is considered user- or pilot-level maintenance, it is in that airframe's operator's manual. Instructor pilots in flight school used to tell us the Army did not issue pilots tools for a reason. Only qualified maintainers are allowed to operate those tools and perform maintenance on the aircraft to maintain the safety of flight for the crew and passengers. So how did all of this get forgotten when the transition was made to fixed-wing? Why is there a maintenance culture difference with fixed-wing operations?

When it comes to Army fixed-wing aviation maintenance safety, there are multiple layers of safety in place to keep pilots and passengers safe. The Federal Aviation Administration (FAA) regulates the training, certification and operating requirements of civilian aircraft mechanics. The fixed-wing program manager is responsible for overseeing all things fixed-wing, including maintenance contracts. The maintenance contractors are required to work within the safety procedures outlined by the FAA, what is stipulated in the contract, and meet Army safety standards. The unit-level contracting officer representative (COR) is there to be the go-between for the pilots and contract maintenance. They are responsible for ensuring the contract is being followed and the airplanes remain safe to fly. In accordance with ATP 3-04.7, Army Aviation Maintenance, Army personnel are required to have the military occupational specialty (MOS) classification or additional skill identifier authorizing them to perform repairs on the aircraft before they are permitted to conduct maintenance.

One of the reasons pilots tend to get fixed-wing maintenance wrong is because the contract is proprietary and regular line pilots do not know what is in it. Many times, the performance work statement is not discussed, and the contract changes hands depending on how many years the contract was awarded. Under the contract when all my examples happened, the contract company was solely responsible for all maintenance on the aircraft. If an airplane broke and could not be safely flown to home station, it was the contract company's responsibility to get the parts and mechanic to the aircraft. If it was timelier and cost-effective, the contract company had the option of subcontracting the work if the airplane was broken at an airfield with a maintenance facility. All the different scenarios which may occur are typically worked out between the unit COR, the fixed-wing program manager and the contract company.

Managing Change

The fixed-wing landscape in the Army is changing. The new fixed-wing for life program is producing a younger and less experienced aviator fixed-wing force. It is incumbent upon all aviation leaders to discuss maintenance and make sure these junior aviators know the right answer when they break on the road. It should be impressed upon them and all aviators that when pilots take maintenance into their own hands, they not only violate Army regulation, but they also remove layers of built-in safety designed to protect them, their passengers and the aircraft. If you break somewhere, do the right thing. Be patient, call back to the rear and let the systems that are already in place to recover a downed aircraft work for you.

The fixed-wing maintenance system is designed to provide a safe and operable aircraft fleet and is there to respond when you need them, whether at home station or overseas. Use it! ■

CW3 Frank M. Webb
Aviation Safety Officer
UC-35 JET DET

Basic Daily Maintenance Safety

During my 35-year career, I served in many maintenance positions. It has been my experience that most maintenance personnel are persistent in ensuring all maintenance tasks are completed in a timely manner. We all learn our maintenance habits from people who have been "doing this for the last 100 years." We grow to respect these individuals, emulating their actions and processes even when we know they may not be strictly by the book. But it works and saves time.

Now let's talk about the thing that has not been mentioned to this point: safety. We all develop strict safety habits based on a situation or an accident that burns those results into our minds. We all understand the inherent dangers of using power tools such as power saws, metal shears and the like. Therefore, the prescribed safety precautions are in place and followed — most of the time. We will return to this shortly. We fall short in the daily areas of safety in everyday tasks that are not even thought about by supervisors unless we have that burning experience.

How many times have you gotten in a hurry to complete a task that was only going to take "two minutes to get the aircraft back up and good?" For example, to replace a safety wire and get the aircraft back to fully mission capable (FMC), you grab your wire cutters, some safety wire and away you go. The technical inspector (TI) who found the loose wire you are replacing is standing by. You are in a rush. You cut the wire (snip, snip), inspect the attachment points, re-safety the item and twist. The job is complete. The TI inspects the work and determines all is good. What did not happen during this process? What steps were missed that would have added no more time to the process? What action did the TI condone and burn into your mind that it's OK to forego? Where is your safety equipment?

Now let's look at the same task from another viewpoint. You grab your wire cutters, some safety wire and away you go. The TI is waiting because, after all, we are in a hurry. You cut the wire but it wasn't a clean cut so you have to cut it again to avoid damaging the attachment point. As you cut the wire you feel a burning pain in your eye. How did that happen? I had my hand covering the wire so what happened? Or you hear the TI as a small piece of wire enters her eye. The same question enters your mind. This is only the start of the problem. You could have avoided this if only, when grabbing your cutters, you also picked up your safety goggles and ensured the TI had hers. The true pain here is it only takes 10-15 seconds to pick up the right tools to complete the job and avoid an injury and personnel downtime.

As an aviation maintenance technician, one of the first manuals I was introduced to was TM 1-1500-204-23-1 Aviation Unit Maintenance (AVUM) and Aviation Intermediate Maintenance (AVIM) Manual for General Aircraft Maintenance. In days gone by this was better known as the maintenance bible. This manual, along with the 385 safety series, can help individuals ensure they have the correct tools and equipment required to perform all tasks in a safe manner.

The most common task where mechanics take safety shortcuts are: cutting safety wire; grinding; drilling; air drying/cleaning; and the use of paints and solvents. Even when the individual remembers their personal safety gear, they often forget to ensure those personnel in their immediate work area are also protected.

An example of how this failure to use safety equipment can have a profound impact on how you look at the use of safety personal protective equipment (PPE) follows.

As a young E-3 just assigned to my first unit, I wanted to do a good job and learn everything there was about being a good mechanic. As time went by I was allowed to do tasks on my own because I had shown the capability to follow instructions in the manuals and properly perform the task I was assigned.

On this occasion I was given a simple task: replace a threaded insert on the underside of the aircraft. Two minutes tops. I got a replacement insert, 1/4 inch oversize threaded insert, 1/4 inch replacement flush mount screw, extension cord, drill, 3/8 inch drill bit, vacuum and away I went. As I replaced the stripped insert, something I could not explain happened. I was not directly under the hole. I had my hand positioned where I could catch the shavings to avoid leaving FOD on the floor. I felt a sharp burn in my right eye. The first thing I did was rub my eye to attempt to get out whatever was in there. The more I rubbed, the worse it got. To avoid getting into trouble and thinking it would get better without having to seek medical attention, I paused my work and retrieved a pair of safety goggles and continued the task at hand. Several more shavings fell out but my goggles kept them out of my eyes. After just a few minutes the new insert was in and the screw secured. The only issue was the burning in my eye had moved to the side.

The following day at the PT formation I could not see out of my right eye. My squad leader sent me to the troop medical clinic to get it checked out. The shaving had moved to the back of my eye and was now embedded there. The only thing the doctor could do was remove my eye to extract the metal shaving. The possible outcomes were, depending on the damage, I could lose all or part of my sight in that eye. Think about that for just a second. While waiting, I called my squad leader to let him know I would not be back for three days and that they were going to take my eye out to retrieve the shaving. I could hear the section leader's reaction: "What the heck did you do and why didn't you have on eye protection when drilling under an aircraft?"

Remember when I said earlier that the true pain here is it would only take 10-15 seconds to pick up the right tools to complete the job and avoid an injury and personnel down time? This is where safety and PPE come into play. If I would have picked up my goggles as part of the equipment necessary to complete the task, I would not have gotten a metal shaving in my eye. I would have avoided an injury and had the right tools for the job. Total downtime as per the accident report totaled three days missed work and 14 days partial lost time due to a patch over my eye.

In 1977, the estimated cost, which included medical and lost time was more than $10,000. That did not include the pain my leadership endured due to my failure to use the right tools and equipment to do the job correctly.

The next time you or a Soldier under your leadership are performing a task without using their safety PPE, think about what will happen if something goes wrong and you or they get injured. There are no shortcuts to safety in aviation maintenance operations, even on those simple tasks. We are all safety officers and NCOs. Make a difference and enforce safety standards in your hangar.■

Patrick Lott
CW5, USA Retired

Proper Weight and Balance Procedures

A survey of five combat aviation brigades over the past four years demonstrated a systemic training deficiency in Army aircraft weight and balance records. The survey indicated numerous procedural and administrative errors in the documentation of aircraft weight and balance records. When weighing an Army aircraft, technicians must adhere to both Technical Manual (TM) 55-1500-342-23, dated 1 August 2015, and the aircraft-specific interactive electronic technical manual (IETM). All too often, units perform the weighing in accordance with the IETM, but fail to observe specific technical requirements in accordance with TM 55-1500-342-23. This was evident in the records review of a four-year period. Consistently, the records revealed technical procedures outlined in TM 55-1500-342-23 were omitted or overlooked when computing weight and balance data.

The TM states once the scale readings are recorded on the Form B (DD Form 365-2) Aircraft Weighing Record, paragraph 5.5 requires the technician to compute the difference between the calculated weight and arm (last entry on Chart C (DD Form 365-3)) and the actual Basic Aircraft Weight and Arm to be posted to Chart C (see Form B). Post the weighing to Chart C, if the weighing results are within the tolerances in Table 5-1 of TM 55-1500-342-23.

*(*note the UH-60 IETM currently requires two weighings averaged together before using Table 5-1)*

Table 5-1 specifies that aircraft less than 75,000 pounds must be +/- 0.4% of the basic weight and +/- 0.2 of an inch of arm.

Aircraft Basic Weight	Weight Tolerance (pounds)	Arm Tolerance	
		%MAC	Arm
≤ 75000 pounds	± Basic Weight x 0.4%	± 0.2%	± 0.2 inches
> 75000 pounds	± Basic Weight x 0.5%	± 0.5%	± 0.5 inches

Table 5-1

The Automated Weight and Balance System (AWBS) will compute this information and provide validation in the form of red or green highlighted fields in the Form B summary block. Figure 1 depicts that the weighing exceeds both the basic weight and arm tolerances of Table 5-1.


Summary

	Weight	Long. Arm	Long. Mom.	Lat. Arm	Lat. Mom.
Non-Level Weigh - Arm Correction to L...		-3.15		0.00	
Total Average (as corrected)	12,891.0	210.40	2,712,300.45	0.00	0.00
Total Column I	1.0	1,121.00	1,121.00	0.00	0.00
Total Column II	0.0	0.00	0.00	0.00	0.00
Actual Basic A/C Weight and Arm	12,890.0	210.33	**2,711,179.45**	**0.00**	**0.00**
Calculated (last entry on Chart C)	12,978.7	209.47	2,718,609.46	0.00	0.00
Actual vs Calculated Weight and Arm	-88.7	0.86	-7,430.01	0.00	0.00
Compare weigh 1 vs. 2	-80.0	0.35	-12,013.00	0.00	0.00

Figure 1

If the weighing is within the criteria stated in Table 5-1, the fields will be highlighted green, as shown in Figure 2.

Summary

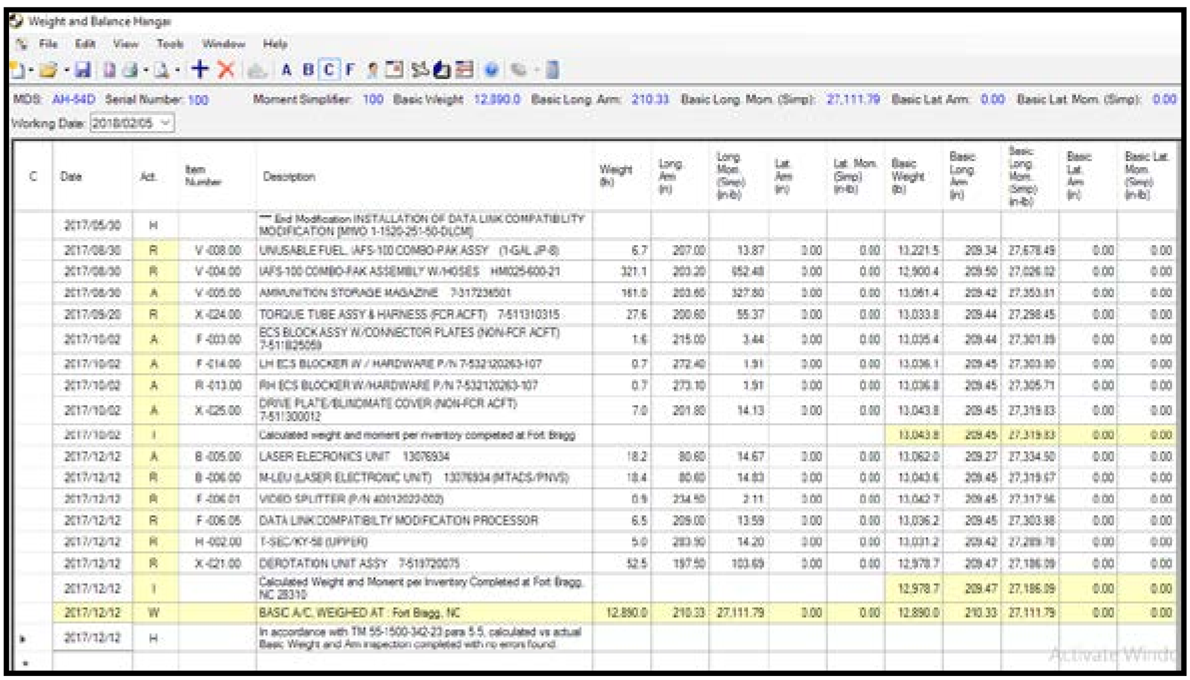
	Weight	Long. Arm	Long. Mom.	Lat. Arm	Lat. Mom.
Non-Level Weigh - Arm Correction to L...		-3.35		0.00	
Total Average (as corrected)	13,170.0	208.27	2,742,865.50	0.00	0.00
Total Column I	1.0	1,118.30	1,118.30	0.00	0.00
Total Column II	0.0	0.00	0.00	0.00	0.00
Actual Basic A/C Weight and Arm	**13,169.0**	**208.20**	**2,741,747.20**	**0.00**	**0.00**
Calculated (last entry on Chart C)	13,137.8	208.37	2,737,520.81	0.00	0.00
Actual vs Calculated Weight and Arm	31.2	-0.17	4,226.39	0.00	0.00
Compare weigh 1 vs. 2	0.0	0.00	0.00	0.00	0.00

Figure 2

The technician must follow a series of steps in paragraphs 5.5.1 through 5.5.14 to determine if errors are present when an aircraft fails to meet one or both of the requirements in Table 5-1. If errors are found, and can be corrected mathematically (e.g., incorrect measurement data), the technician will adjust the Form B and/or Chart C and verify the aircraft is now within Table 5-1 requirements.

If no errors are found to explain the excessive difference between the calculated (Chart C) versus the actual basic weight and arm (Form B), repeat two independent weighings. The two independent weighings are acceptable if they are within 0.25% basic weight and 0.1 inches in arm. The individual weighings do not have to be consecutive. Once two independent weighings have been obtained, average them. This average will be used to complete Form B, and post the weighing results to Chart C.

The AWBS will compute this information and provide validation in the form of red or green highlighted fields on the Form B summary block to the right of the "Compare weigh 1 vs. 2" block. This can be seen in Figures 1 and 2. After posting the weighing results to Chart C, enter the following statement on the Chart C as a header: "In accordance with TM 55-1500-342-23 Para 5.5, calculated vs actual Basic Weight and Arm inspection completed with no errors found." This is shown on the last line in Figure 3.



Weight and Balance Hangar

File Edit View Tools Window Help

MDS: AH-64D Serial Number: 100 Moment Simplifier: 100 Basic Weight: 12,890.0 Basic Long. Arm: 210.33 Basic Long. Mom. (Simp): 27,111.79 Basic Lat Arm: 0.00 Basic Lat Mom. (Simp): 0.00

Working Date: 2018/02/05

C	Date	Act.	Item Number	Description	Weight (lb)	Long. Arm (in)	Long Mom. (Simp) (in-lb)	Lat. Arm (in)	Lat. Mom. (Simp) (in-lb)	Basic Weight (lb)	Basic Long Arm (in)	Basic Long Mom. (Simp) (in-lb)	Basic Lat. Arm (in)	Basic Lat Mom. (Simp) (in-lb)
	2017/05/30	H		*** End Modification INSTALLATION OF DATA LINK COMPATIBILITY MODIFICATION [MWO 1-1520-251-50-DLCM]										
	2017/08/30	R	V -008.00	UNUSABLE FUEL IAFS-100 COMBO-PAK ASSY (1-GAL JP-8)	6.7	207.00	13.87	0.00	0.00	13,221.5	209.34	27,678.49	0.00	0.00
	2017/08/30	R	V -004.00	IAFS-100 COMBO-PAK ASSEMBLY W/HOSES HM025-600-21	321.1	203.20	652.48	0.00	0.00	12,900.4	209.50	27,026.02	0.00	0.00
	2017/08/30	A	V -005.00	AMMUNITION STORAGE MAGAZINE 7-317236501	161.0	203.60	327.80	0.00	0.00	13,061.4	209.42	27,353.81	0.00	0.00
	2017/09/20	R	X -024.00	TORQUE TUBE ASSY & HARNESS (FCR ACFT) 7-511310315	27.6	200.60	55.37	0.00	0.00	13,033.8	209.44	27,298.45	0.00	0.00
	2017/10/02	A	F -003.00	ECS BLOCK ASSY W/CONNECTOR PLATES (NON-FCR ACFT) 7-511825059	1.6	215.00	3.44	0.00	0.00	13,035.4	209.44	27,301.89	0.00	0.00
	2017/10/02	A	F -014.00	LH ECS BLOCKER W / HARDWARE P/N 7-532120263-107	0.7	272.40	1.91	0.00	0.00	13,036.1	209.45	27,303.80	0.00	0.00
	2017/10/02	A	R -013.00	RH ECS BLOCKER W/HARDWARE P/N 7-532120263-107	0.7	273.10	1.91	0.00	0.00	13,036.8	209.45	27,305.71	0.00	0.00
	2017/10/02	A	X -025.00	DRIVE PLATE/BLINDMATE COVER (NON-FCR ACFT) 7-511300012	7.0	201.80	14.13	0.00	0.00	13,043.8	209.45	27,319.83	0.00	0.00
	2017/10/02	I		Calculated weight and moment per inventory completed at Fort Bragg						13,043.8	209.45	27,319.83	0.00	0.00
	2017/12/12	A	B -005.00	LASER ELECRONICS UNIT 13076934	18.2	80.60	14.67	0.00	0.00	13,062.0	209.27	27,334.50	0.00	0.00
	2017/12/12	R	B -006.00	M-LEU (LASER ELECTRONIC UNIT) 13076934 (MTADS/PNVS)	18.4	80.60	14.83	0.00	0.00	13,043.6	209.45	27,319.67	0.00	0.00
	2017/12/12	R	F -006.01	VIDEO SPLITTER (P/N 40012022-002)	0.9	234.50	2.11	0.00	0.00	13,042.7	209.45	27,317.56	0.00	0.00
	2017/12/12	R	F -006.05	DATA LINK COMPATIBILTY MODIFICATION PROCESSOR	6.5	209.00	13.59	0.00	0.00	13,036.2	209.45	27,303.98	0.00	0.00
	2017/12/12	R	H -002.00	T-SEC/KY-58 (UPPER)	5.0	283.90	14.20	0.00	0.00	13,031.2	209.42	27,289.78	0.00	0.00
	2017/12/12	R	X -021.00	DEROTATION UNIT ASSY 7-519720075	52.5	197.50	103.69	0.00	0.00	12,978.7	209.47	27,186.09	0.00	0.00
	2017/12/12	I		Calculated Weight and Moment per Inventory Completed at Fort Bragg, NC 28310						12,978.7	209.47	27,186.09	0.00	0.00
	2017/12/12	W		BASIC A/C WEIGHED AT : Fort Bragg, NC	12,890.0	210.33	27,111.79	0.00	0.00	12,890.0	210.33	27,111.79	0.00	0.00
▸	2017/12/12	H		In accordance with TM 55-1500-342-23 para 5.5, calculated vs actual Basic Weight and Arm inspection completed with no errors found										

Figure 3

To prevent procedural and administrative errors in the documentation of aircraft weight and balance records, it is recommended to conduct a thorough records review and weight and balance refresher training. Resources are available on the Joint Technical Data Integration (JTDI) website at https://www.jtdi.mil/. For AWBS training and issues, select the AWBS tab; for weighing procedures and documentation issues, select the Aeromech tab. Both resources contain training products and list points of contacts who you can reach out to for additional information. ■

Charles Brown
AMOC Instructor
Fort Rucker, Alabama

Capitalizing on Situational Awareness Geospatially Enabled Tools: Reflections Following a RAF Rotation

by Captain Matthew A. Hughes

What is a Situational Awareness Geospatially Enabled Tool?

Situational Awareness Geospatially Enabled (SAGE) is an extension tool for use on ArcGIS designed by the U.S. Army Corps of Engineers' Geospatial Research Laboratory to simplify and expedite generating geospatial layers and analysis products. Users download foundation data from the Army Geospatial Center's Common Map Background portal online, which become inputs for SAGE.[1] These include elevation data (i.e., Shuttle Radar Topography Mission, Digital Terrain Elevation Data and digital surface or terrain models) and land cover layers (i.e., GeoCover or VISNAV datasets). Through a series of 17 steps, Soldiers can use SAGE to transform this foundation data into a comprehensive mission folder for a region.[2] The complete folder includes a series of layers for cross-country mobility, mobility corridors, slope degree and more, facilitating intelligence preparation of the battlefield (IPB) and geospatial analysis associated with friendly and enemy courses of action.

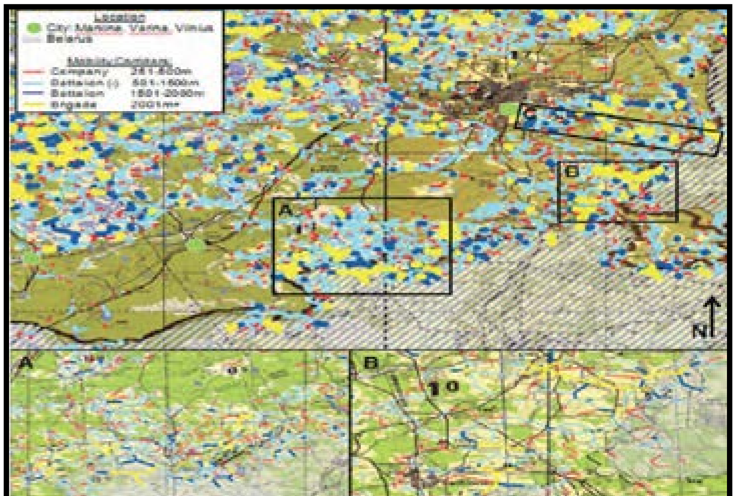
SAGE received Project Manager Distributed Common Ground System Army (DCGS-A) authorization for use on DCGS-A systems on March 18, 2014.[3] The program is unclassified/for official use only, so a unit may install SAGE on a stand-alone system with ArcGIS, as it does not have a certificate of networthiness for use on NIPRNET systems. Units may request SAGE training in the form of a standard 40-hour block or remotely through other means using developed training modules or new material tailored to mission needs.

Familiarization and Preparation for Deployment

A geospatial engineer in a sister brigade first introduced me to SAGE when he hosted a 40-hour training block at Fort Hood, Texas. I sent our all-source analyst with a DCGS-A workstation to this training. Following the course, the analyst described the toolsets and new capabilities to our intelligence cell and we began to incorporate SAGE into analysis projects. We applied SAGE during a field training exercise at Fort Hood in August 2015. Throughout the exercise, members of my team benefitted from additional one-on-one training with SAGE developers and trainers. We created several analysis products that enhanced mission planning during the exercise, demonstrating the program's versatility to battalion and company leaders.

(Clockwise) In November 2016, CW2 Deuel flew the UH-60 flight simulator at Illesheim, Germany along a route he templated for HTA, Germany using SAGE. He modeled air ambush teams' radial line-of-sight and generated a linear viewshed along his flight path to determine visual detection probability along the route.

In the remaining weeks leading up to deployment, we further gained familiarization as our intelligence cell created SAGE mission folders for 11 countries, requiring over 200 hours of computing. We mastered the process of finding foundation data and transforming it into a mission folder with detailed geospatial data, readily available for additional analysis or incorporation into a brief. We constantly used these folders throughout the deployment to generate detailed analysis products, often with very little prior notice, throughout the area comprising Operation Atlantic Resolve.



In December 2015, analysts used SAGE to identify and analyze avenues of approach in border regions of southeast Lithuania for a Lithuanian aerial leader's recon of the border.

Advent of SAGE in Europe

We invited our organic pilots and analysts from the 173rd Infantry Brigade Combat Team, 12th Combat Aviation Brigade, and 60th Geospatial Planning Cell Detachment to a 40-hour SAGE training block we hosted in Germany in November 2015. This training marked the advent of SAGE in Europe, spearheading its implementation from company to theater levels in training and contingency operations. For the 40-hour block, we used a mission folder for Hohenfels Training Area (HTA), Germany, containing light detection and ranging (LIDAR) data in a series of practical exercises in preparation for two pending rotations at Hohenfels.

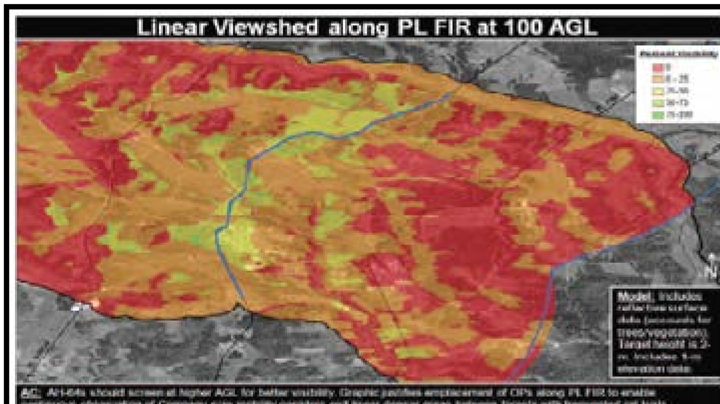
"In one exercise, I provided the enemy situation for a friendly air assault mission in Raversdorf village. Pilots then plotted enemy air ambush teams and used SAGE to assess the suitability of flight paths using linear viewshed features, exposing any areas where enemy elements could see and engage helicopters along templated flight paths."

The pilots then flew their chosen flight paths in a simulator with NATO vehicles or an overlay modeling time required for a quick-response force (QRF) to reach any area on the map.

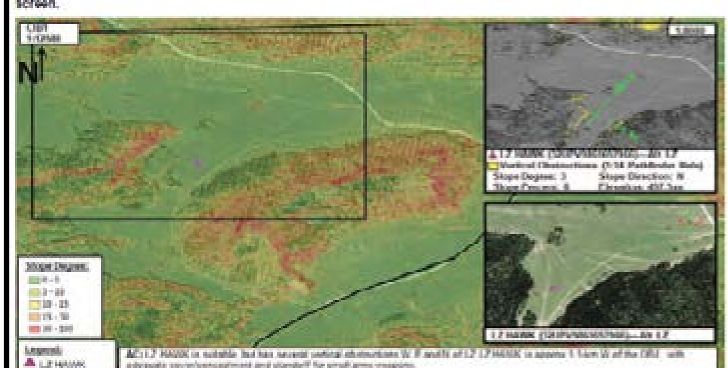
In December 2015, we also conducted rapid IPB in support of a mission flying Lithuanian military leaders in a UH-60 Black Hawk near the southeastern border to assess the feasibility of adversarial border crossings. We used SAGE to model mobility corridors along the border, compare surrounding land cover, assess cross-country mobility for armor and wheeled assets, and construct a linear viewshed for the UH-60 flight path to model if they would be able to see these potential border crossings or if they would need to program enemy weapons systems at the chosen grids to gauge the usefulness and accuracy of SAGE for mission analysis.

SAGE Expedites and Enhances Intelligence Preparation of the Battlefield

Following this 40-hour block, our intelligence cell completed IPB for HTA in December 2015. This was a lengthy process, requiring extensive research and detailed analysis, but SAGE greatly expedited Steps 1 and 2 of IPB by generating a digital modified combined obstacle overlay. We exported and briefed images of different layers generated using SAGE, such as land cover, hydrology and mobility corridors. We then created sample products relevant to aviation operations using SAGE tools. We made a slope degree layer for the entire training area and a mounted brushfire modeling in different colors of the time required for a downed aircraft recovery team (DART) to reach a helicopter at any point on the map. This greatly reduces time required for analysis in the event of a downed aircraft. Similar tools can generate a cross-country mobility model for 12 types of NATO vehicles or



S-2 cell utilized SAGE to reflect visible areas for AH 64s screening at 100 AGL during a training rotation at HTA, Germany in January 2016. Analysts used graphic to argue in favor of OP insertions along PL FIR due to poor coverage of AH 64 screen.



S-2 cell used SAGE to assess the suitability of LZ HAWK during a multinational air assault in April 2016 at HTA, Germany an overlay modeling time required for a quick reaction force (QRF) to reach any area on the map.

In December 2015, we also conducted rapid IPB in support of a mission flying Lithuanian military leaders in a UH-60 Blackhawk, near the southeastern border to assess feasibility of adversarial border crossings. We used SAGE to model mobility corridors along the border, compare surrounding land cover, assess cross-country mobility for armor and wheeled assets, and construct a linear viewshed for the UH-60 flight path to model if they would be able to see these potential border crossings or if they would need to adjust their altitude or route.

Revolutionizing Analysis and Autonomy at the Battalion Level

In April 2015, several months prior to our deployment to Germany, we conducted a rotation at the National Training Center at Fort Irwin, California. We canceled one air assault mission due to risk management, as we could not get the dynamic and continuous geospatial support needed to provide slope analysis on changing landing zones. If we had SAGE tools during that training rotation, we would have had all the slope analysis tools readily available to make that mission a success. During our rotational deployment to Europe, SAGE gave our battalion S-2 cell unprecedented autonomy, granting flexibility and efficiency by enabling us to generate geospatial products we would have previously requested from higher echelons or specialized intelligence cells.

During a January 2016 training rotation, our unit supported the Italian Garibaldi Brigade at the Joint Multinational Readiness Center (JMRC), HTA, and Germany. SAGE played a pivotal role in the success of the unit's mission. The topographic cell of our higher headquarters had shut down one month prior as part of downsizing, and the Italian unit was unable to provide the same geospatial support we would expect from a U.S. brigade S-2 cell. We had a similar experience using SAGE during another training rotation at JMRC in April 2016.

At Hohenfels, we utilized SAGE to create a variety of products, including:

- Enemy Integrated Air Defense System coverage areas for helicopters flying at varied above ground levels (AGLs).
- Helicopter landing zone (HLZ) analysis (including slope degree, slope aspect and vertical obstructions using the 1:14 pathfinder rule).
- Visibility for AH-64 Apache screen line at varying AGLs.
- Mounted brushfires for DART and QRF showing travel time to areas on map.
- Mobility corridors overlay for echelons platoon (-) to brigade.
- Cross-country mobility overlays for 12 types of NATO vehicles and dismounted troops (contributed to analysis for friendly evasion and escape or enemy infiltrate/exfiltrate).
- Likely enemy observer post and air ambush team locations, based on visibility.

Interoperability with Google Earth, Quick Terrain Modeler and other programs also enabled us to build three-dimensional vantage points to gauge suitability of attack-by-fire positions for AH-64s and observer posts (OPs) for scouts prior to missions using radial line-of-sight tools with reflective surface data.

In June 2016, our battalion traveled to Poland to support Operation Anakonda, a multinational training operation throughout the country. Using SAGE, we assessed the suitability of flight paths for an air assault mission consisting of 32 helicopters. Toolsets assisted in determining optimal vantage points for enemy scouts, flight path sections most vulnerable to enemy weapons systems, potential masking terrain and HLZ suitability.

The Way Forward

An emphasis on LIDAR data collection in Europe can greatly enhance the utility of SAGE among intelligence cells. NATO recently announced plans to "deploy four multinational battalions to Estonia, Latvia, Lithuania and Poland" in a deterrence role."[4] This will include U.S. troops and likely increase the number of training exercises in Poland and the Baltic states. Unfortunately, geospatial databases such as the Army Geospatial Center Portal and Geospatial Repository and Data Management System contain only 30-meter data for these areas, as opposed to the LIDAR available for Hohenfels. Units should submit requests for LIDAR data collection of training areas and border regions in Poland and the Baltic states to enhance the efficacy and precision of analysis using SAGE.

The U.S. Army Intelligence Center of Excellence can play a significant role in spreading awareness of SAGE tools by incorporating demonstrations and training on SAGE into the curriculum for enlisted, warrant officer and officer ranks. According to the

Diffusion of Innovations Theory, introduced by French sociologist Gabriel Tarde in 1903 and further developed by E.M. Rogers in 1995, certain conditions can "increase or decrease the likelihood a new idea will be adopted by members of a given culture."[5] Following this model, the diffusion of SAGE in the Army is currently in the "early adopter" phase (see Figure 1). Relatively few units are applying SAGE in training or real-world missions, mostly due to a lack of awareness. Exposure to SAGE during institutional training periods can contribute to awareness and implementation.

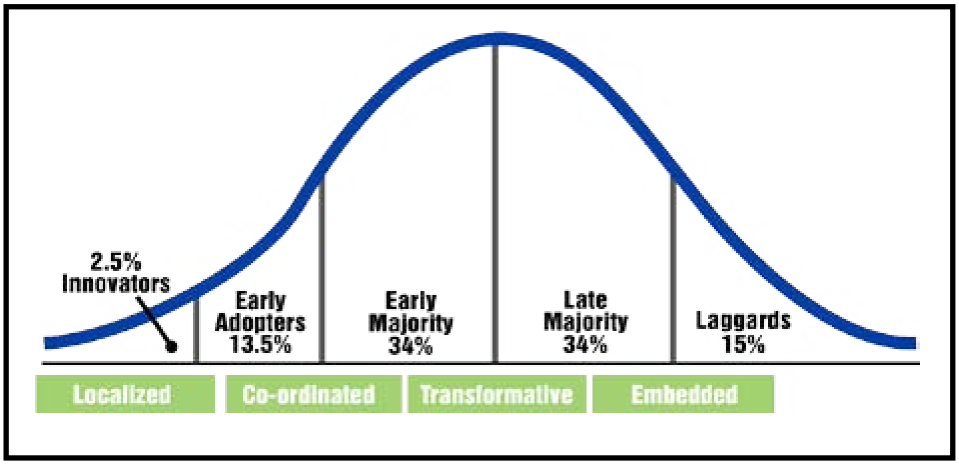


Figure 1. The Diffusion of Innovations Theory Model illustrates that over time, a population will adopt an innovation in distinct phases on a variety of conditions.[7]

Additionally, SAGE does not come pre-installed onto DCGS-A workstations when fielded or during updates as some applications. Those wishing to use SAGE acquire a file from a current user or from a SAGE trainer and personally install it on a workstation. Since most battalion S-2s have a DCGS-A workstation in their modified table of organization and equipment, DCGS-A mentors should periodically acquire SAGE updates and install SAGE when they update units' DCGS-A workstations. Intelligence analysts with SAGE experience should host training for sister units to demonstrate SAGE applications and distribute digital files. This can be especially effective in preparing for a rotation at a combat training center with other units, facilitating information sharing and collaboration on IPB. Such efforts can bring about institutional change in battalion and brigade S-2 cells across the Army and propel the diffusion of SAGE beyond the "early adopters" phase for maximum benefit.[6]

Endnotes

1. U.S. Army Geospatial Center CMB Online, accessed 4 June 2016. At https:// agcwfs. agc.army.mil/CMBOnline/default.aspx.

2. Michael Rainey, "SAGE Quick Start Guide–Creating and Visualizing Foundation Products," 23 July 2015, 6.

3. Charles A. Wells, Memorandum for Record, 18 March 2014, Program Executive Office: Intelligence, Electronic Warfare and Sensors, Authorization for Use of SAGE tools on DCGS-A workstations, Department of the Army.

4. Ryan Browne, "NATO Chief: 4 Battalions to Eastern Europe amid Tensions with Russia," CNN Politics, 13 June 2016, accessed 24 June 2016. At http:// edition.cnn.com/2016/06/13/politics/nato-battalions-poland-baltics-russia/.

5. Diffusion of Innovations Theory, University of Twente, accessed May 28, 2016. At https://www.utwente.nl/cw/theorieenoverzicht/Theory%20 clusters/Communication%20and%20Information%20Technology/Diffusion_ of_Innovations_Theory/.

6. Ibid.

7. Clive Young, "Enabling Innovation and Change–Part 1," University College London, 24 June 2012, accessed 24 June 2016. At https://blogs.ucl.ac.uk/the- digital-department/2012/06/24/enabling-innovation-and-change-part-1/.

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Credits:
Military Intelligence Professional Bulletin Oct-Dec 2016
PB 34-16-4

Mishap Review - UH-60 Maintenance Operational Failure

While on a maintenance test flight, a unsafetied retention bolt for the main rotor pitch change rod vibrated free from oscillatory loading and was thrown from the aircraft. The unrestrained upper pitch change rod resulted in complete loss of control over the main rotor system and, ultimately, an inflight breakup of the aircraft. The aircraft impacted in an open field. All three personnel on board were fatally injured. A post-crash fire destroyed the major portions of the aircraft.

History of Flight

While executing completion of a maintenance information message to install phenolic washers to PC rod end bearings and dampers, work was started but not completed and write-ups were signed off. During the maintenance procedure, three dampers and one PC link were found to be unserviceable. The crew chief did not remove them; a decision was made to leave the PC and damper bolts loose and unsafetied. Due to haste, the aircraft maintenance test flight was rescheduled for four days earlier than planned. Due to the reschedule, several other maintenance personnel were assigned to finish several other maintenance actions on the aircraft. Once the aircraft maintenance actions were thought to be completed, the technical inspector arrived and conducted his inspections, during which he failed to thoroughly inspect the logbook and verify what work had been completed and required signoff. Due to this lapse, he signed off that the PC rod had been re-torqued and safetied. Following the work, the aviation maintenance officer and pilot (PI) failed to complete the pre-flight inspection in accordance with the technical manual, resulting in failure to find the PC rod retaining nut was not torqued or safetied. The aircrew departed the airfield en route to the maintenance test flight area. At approximately 3/10 of an hour into the flight the PC rod came loose and the aircraft broke up in flight.

Crewmember Experience

The maintenance test pilot (MP) had 469 hours in series and 469 hours total time. The PI had seven hours in series post flight school.

Commentary

Army aviation maintenance is a demanding and high task-saturation environment. It is inherently unforgiving of even minor errors. As maintainers operate in this high OPTEMPO environment, it is critical supervisors and unit leaders maintain the standards. When we see failures occur, such as in this mishap, we had three levels of failure: the executor, the quality control system and, finally, the aircrew. To catch the errors, leaders must be visible on the maintenance floor — not only just milling about to be visible, but actively visible and engaging the maintainers on what task they are completing, verifying the technical manual is on hand and open to the procedure being completed, querying the technical inspectors on the status of the aircraft and verifying aircrews are conducting proper preflight inspections.

As you can see from what leaders should be doing to maximize safe maintenance operations, this visibility requires each level of supervision and leadership to be visible: the floor sergeant, the technical inspector, the aviation maintenance officer, the production control officer, the platoon leader, the first sergeant and the commander. Implementing leader visibility is an active process and the one sure method to catch errors before they become a mishap. Supervision by multiple levels breaks the accident chain. Enforce high standards. Get eyes on the operation so you have situational awareness of how well the maintainers perform, who excels and who requires more supervision or training. Deploy an aviation maintenance training program with your commander's guidance and manage it. A standardized program will assist in preventing errors and mishaps. ■

Class A - C Mishap Tables

	Manned Aircraft Class A – C Mishap Table									as of 26 Mar 18
	Month	FY 17					FY 18			
		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities
1st Qtr	October	0	0	7	0		1	2	6	0
	November	1	0	4	0		0	1	3	0
	December	1	0	4	2		1	0	7	0
2nd Qtr	January	1	0	3	0		1	1	2	2
	February	0	1	4	0		0	0	1	0
	March	0	1	5	0		0	0	5	0
3rd Qtr	April	1	0	6	1					
	May	1	0	7	0					
	June	0	3	4	0					
4th Qtr	July	0	1	7	0					
	August	3	3	4	6					
	September	1	1	6	1					
	Total for Year	9	10	61	10	Year to Date	3	4	24	2
	Class A Flight Accident rate per 100,000 Flight Hours									
	5 Yr Avg: 1.14		3 Yr Avg: 1.09			FY 17: 0.99			Current FY: 0.85	

UAS Class A – C Mishap Table									as of 26 Mar 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	1	4
MQ-5	5	0	1	6	Hunter	0	0	0	0
RQ-7	0	16	38	54	Shadow	0	4	10	14
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	18	44	77	UAS	3	4	11	18
Aerostat	6	0	1	7	Aerostat	2	1	0	3
Total for Year	21	18	45	84	Year to Date	5	5	11	21

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

Trouble with Maintenance **VOL. 7, NO. 21 14 MAR 1979**

Maintenance errors pose a serious threat to flight safety. A recent sharp upward trend in the number of maintenance-induced mishaps and the nature of the errors leading to these mishaps suggest all is not well. A look at some of the mishap experience readily shows why.

During the period 1 January 1974 through 31 August 1978, OH-58 aircraft were involved in 146 maintenance-related mishaps. These mishaps resulted in the destruction of one aircraft, four major accidents, one incident, 21 forced landings and 119 precautionary landings. A single cause factor — improper torque—was instrumental in causing 33 of these mishaps, four of which were major accidents.

Other maintenance-related mishap cause factors, in descending order of occurrence, were:

- Improper wiring procedures that resulted in frayed and broken wires and electrical short circuits.
- Improper fuel control adjustments.
- Loose cannon plugs jamming flight controls.
- Improper inspection procedures.
- Improper installation and routing of fluid and pneumatic lines, causing chafing.
- Improper voltage regulator adjustments, causing thermal runaway.
- Improper adjustment of linear actuators.
- Insufficient lubrication.
- Contaminated fluids.
- Maintenance-induced FOD to engines and other components.
- Improper engine cleaning procedures.
- Incorrectly installed bearings.
- Improperly locally manufactured fluid lines.
- Incorrectly manufactured training skid shoes.

At first glance, it might seem that the situation is not really serious. After all, 146 maintenance-related mishaps over a period of four years and seven months amount to only a little more than two and two-thirds mishaps per month. Compared to the overall aircraft monthly mishap experience, this would appear to be of minor concern. But such is not the case. These mishaps are highly significant.

First, these 146 mishaps involved but a single model aircraft — the OH-58. While mishap statistics are currently being compiled for other Army aircraft, preliminary information strongly indicates the findings will be similar to those of the OH-58.

Second, examination of the maintenance errors that precipitated these mishaps reveals violations of basic procedures when maintenance was performed. With few exceptions, causes can be classified in one or more of the following categories: failure to properly install lines or components; failure to properly torque fittings or hardware; and failure to refer to and follow TM procedures. Bluntly, all these errors involve basic maintenance fundamentals and, for the most part, are inexcusable.

Finally, a close examination of these mishaps reveals the seriousness of their nature. Only a combination of pilot alertness, skill, and favorable environmental factors prevented additional major accidents — perhaps catastrophic ones.

But while a computer printout can provide us with such information as numbers, types of failures and locations of mishaps, it cannot point out the real causes of our problems. At best, it can only indicate a breakdown in our system of checks and balances — a breakdown that involves maintenance procedures, quality control and supervisory personnel.

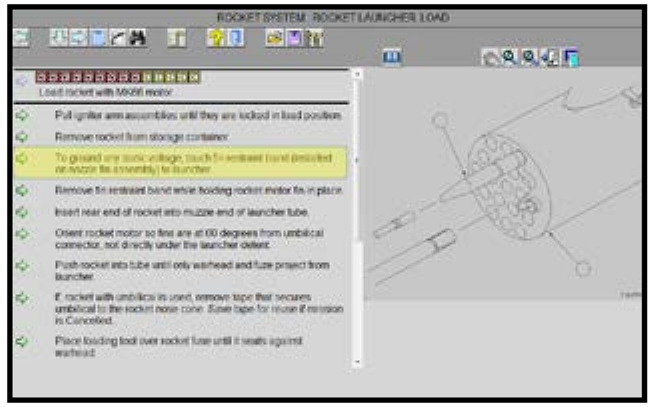
Consequently, if we are to identify problem areas for corrective action, we are going to have to look at ourselves. Solutions may involve logistical support, the training element or personnel action outside our own unit. Do we have a sufficient number of mechanics for the maintenance we must perform? Are experienced personnel being replaced with inexperienced ones? Do we have such a heavy workload that our mechanics are continuously rushed to maintain the required aircraft availability rate? Are they constantly working under the stress of fatigue? Do we have an adequate number of current TMs available for use by maintenance personnel? Do we have a sufficient number of quality control personnel? Are they school trained? Do we have a meaningful OJT program? What about our supervisors? Are they spread out too thin to be effective? These are but a few of the questions we might ask ourselves.

Once we have identified the underlying problems, we can begin to formulate and implement cures. If solutions cannot be found within our unit, then we may have to seek outside assistance. (Use the Army Suggestion Program and DA Form 2028s for publication changes.) For example, some of our problems may have their origin in our basic maintenance training program. Is the initial training we provide our mechanics thorough and adequate or is it too rushed to be effective? It is noteworthy that many of the maintenance errors which caused mishaps occurred during the performance of work that did not require an inspector's signature to clear the related write-up.

In any event, the place to begin is in our own unit — with ourselves. And the time to start is now. Let's take a good look at our maintenance program, identify and correct deficiencies and prevent errors that can lead to mishaps.■

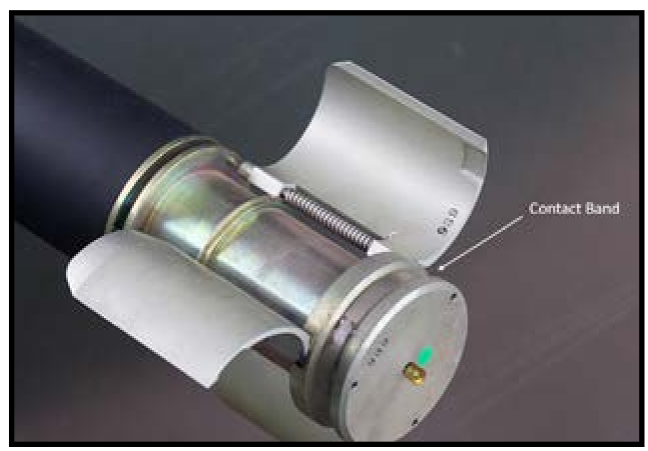
Flightfax Hot Topics

Are You Loading and Unloading Your Rockets Correctly?



In accordance with (IAW) Interactive Electronic Technical Manual (IETM) EM 0126, TM 1-1520-LONGBOW/APACHE, dated 30 June 2016, Task "Rocket System: Rocket Launcher Load," the Hydra 70 rockets should be grounded to the launcher before you remove the rocket fin restraint band, not after.

The purpose for the rocket fin restraint band is twofold. One is the obvious; it retains the fins during storage and handling operations to prevent damage. The second purpose is to protect the contact band from static electricity. By grounding the fin restraint band first, you are dissipating any stored static electricity before exposing the contact band during arming operations.



The IETM specifically states before beginning the task, "WARNING: Rockets are susceptible to ignition by electromagnetic discharge. Do not touch the contact band of the MK66 to the launcher during Loading/Unloading operation. There is a high probability of rocket motor ignition if the contact band of the MK66 is touched to the launcher. If injury occurred, seek medical aid."

During downloading operations, it is required that the rocket fin restraint band be reinstalled IAW the IETM. If the rocket fin restraint band has become weak and unusable, you can order either new replacement rocket fin restraint bands, NSN: 1340-01-271-3440, or tape, pressure sensitive, aluminum, 3-inch wide, NSN: 7510-00-816-8077. ■

ACPO Updates

Airspace Control portfolio review GOSC: The next Airspace Control portfolio review has been moved to 17 April 2018 at 1400 hours.

JAGIC ATP revision: Tentatively, the digital Living Doctrine compliment will be based on the 2014 JAGIC ATP.■

Flightfax Forum

Safety Overmatch in Cross-Domain Maneuver, the Sixth Domain

Cross-domain effects are the employment of mutually supporting lethal and nonlethal capabilities of multiple domains to create conditions designed to generate overmatch, present multiple dilemmas to the enemy and enable joint force freedom of movement and action. To execute operations, the Army and joint forces operate across five domains (land, maritime, air, space and cyberspace). To successfully accomplish this mission requires detailed planning, coordination and application of complex risk management.

As our armed forces execute combined arms maneuver against peer and near-peer threats in a very complex and dense space, the application of intense and coordinated management of the associated risks becomes a sixth domain for diminishing risks to multiple branches and services. As the Army transitions its training and employment techniques from counterinsurgency to large-scale combat operations with high-tech land and air combat systems and integrated air defenses, we must also apply risk mitigation as a coordinated effect. The ability to openly maneuver on the ground, fly and receive supporting fires when required during stability operations will be increasingly limited during combined arms maneuver against a peer threat.

Risk mitigation to the Army and joint team will require intricate pre-planning and coordinated efforts which will challenge our Army leaders and Soldiers to get it right the first time. To get it right the first time in the sixth domain means that the level of communication and integration inherent to cross-domain effects will have to be continuously trained and evaluated. As our operations will involve, at the minimum, Army, Air Force, Navy and Marine forces executing simultaneous and integrated operations, we must train together as we will fight. Common to the combined and joint training, we can identify the challenges we face in reducing fratricide, risk to ground maneuver forces and aviation. These risks become amplified when we execute operations in high-density confined areas of operations with ground, air and sea forces taking action concurrently — not to mention with host-nation agencies and, potentially, coalition and NATO partners.

Safety overmatch will provide the Army and its joint partners the ability to effectively conduct simultaneous operations by maximizing limited resources with minimal loss due to fratricide, coordination errors and loss of situational awareness. To create and maintain the overmatch requires leaders to understand the complex environment they will face against a peer threat and how important it is that their Soldiers train to understand the constant coordination, pre-planning and communication necessary for synchronous operations to occur. Just as important is their understanding of what they may not have available to support them. Training for these operations with and without support from ground maneuver, Army aviation, joint aviation and sea and field artillery can teach valuable lessons learned by allowing leaders and Soldiers to identify the challenges and learn methods to overcome them.

These challenges will follow with a better air-ground integrated force and an ability of leaders and Soldiers at the brigade level down to the squad level, whether on the ground or in the air, to think on their feet when they meet an operational dilemma, overcome it and continue the direct action. Becoming fixed in place resulting from a lack of communications or network bandwidth restrictions whether in the brigade tactical operations center, conducting a hasty attack by fire or maneuvering on an objective produces higher risk for the force and the operation's success. Unit leaders must overcome these potential high-risk challenges, which will occur in combat just as they occur in training, through intense training on coordination and planning. This will reduce the risk to personnel, equipment and the mission.

As our Army transitions, we produce safety overmatch through training rigorously for decisive actions against a peer or near-peer threat. Within that training we institute a new level of coordinating efforts. As the combined arms team plans maneuvers against an enemy, they must take into account the stringent coordinating efforts required for domains to be mutually supporting and deconflict air and ground maneuver space so each supporting effort can execute its mission. It is only through intense and coordinated preparation for high-intensity battle that we can overmatch the higher-risk operations. Safety, the sixth domain, allows commanders the ability to conserve their combat strength and employ it for maximum effect in decisive operations. ■

Jeff Warren
Major, USA Retired

Near-Miss Reporting Tools

Near-miss reporting tools that are available to the field can help reduce the risk to the force at the lowest common denominator, the Soldier level, while providing the command with insights necessary to develop mechanisms and strategies it can implement to manage the reported near-misses. One application the field can utilize (currently manually and in the future electronically) is the safety awareness program-aviation (SAP-A) application. SAP-A provides the field an easy method to collect the near-miss information while allowing the Soldier to remain anonymous if they desire.

Figure 1 shows an example form units can use to provide their Soldiers with an interim manual near-miss reporting mechanism. This or a unit produced product could be utilized to inform the safety officer directly or anonymously in a drop box.

The electronic application, SAP-A, was integrated with the field testing of Aviation Data Exploitation Capability (ADEC) 1.2. Follow-on fielding for SAP-A is slated for FY18 later portion of the year. This program is a proactive, anonymous and self-reporting system modeled after systems currently in place at many airlines under the auspices of the Federal Aviation Administration. ■

SAP-A

SAFETY AWARENESS PROGRAM - AVIATION

•DATE/TIME (L):________________________

•Is this a time sensitive hazard? YES / NO

•POC (not required if you wish to remain anonymous):____

•Description of Event/ Comments/ Lessons Learned/ What Could Be Improved:

____

____

____

____

____

____

____

Phase of Operation	Steady State	Planning/ Briefing	Pre-Flight	Ground Ops	Departure	Enroute	Mission	Arrival	Post-Flight

FOB/HLZ Name: GRID:

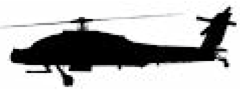
(Circle most appropriate block to the right of the category the report falls under)

Airfield/HLZ	Facilities	Hazards	Lights/Signs/ Paint	Navigational Aids	Pads/Parking	Runway	Taxiway
Airspace	Altitude Deviation	Birds	Near Mid Air	Operating Area	Route Deviation	UAS Conflict	ROZ
Communication	Air to Air	Air to Ground	Controlling Agency	Crew Coordination	Equipment Problem	Pilot/Crew Mix	Tactical Comms
Compliance	Aircraft Limitations	Controlling Agency	Indiscipline	Procedures	ROE	SOP	Reading Card File
Maintenance	Aircraft Not Ready	Failure to use checklist or TM	Degraded Operations	Fueling Issues/ FARP Ops	Personnel/ Equip/Parts	Repeat Discrepancy	System Failure
Mission Snafus	Briefing	Planning Tools	Debriefing	Execution	Planning	Scheduling	Support Operations
Physiology	Crew Mix	Distraction	Spacial Disorientation	Fatigue/ Fighter Management	Illness	Illusion	Noise/Temp Extreme
PZ/LZ/Runway Events	Abnormal Landing	Aborted T/O	Animal/Vehicle Activity	Tire Damage	Condition	Incursion	Setup/ Procedures
Unsafe Practices	Aircraft	Controlling Agency	FOD	Ground Equipment	Personnel	Weapons/ Gunnery	Loading/ Unloading
Weather/Environment	Forecast Accuracy	Icing	IIMC	Sever WX	Visibility/Ceiling	Weather Brief	Winds/Dust/ Snow
Tactical Operations	Engagement Technique	WPNS Malfunction	Fratricide	Lasers	Timing	GFC/ JTAC	TOC

Figure 1

Mishap Briefs

Attack Helicopters

AH-64 

D Model– Crew reportedly experienced a Torque Split and high TGT indication exceedance on #1 Engine while on approach. Crew landed aircraft and upon shutdown identified an Engine #1 NG Overspeed >102.2. (Class C)

D Model– Aircraft main rotor blades are suspected to have made contact with a tree branch during NOE training. Damage was identified the following day by an aircraft maintainer. (Class C)

Utility Helicopters

UH-60 

L Model– Crew received a #1 engine oil pressure indication during taxi for take-off. Post shut-down inspection revealed that the #1 engine oil cap was unsecured/unseated. Soldiers were in an additional flight training period (AFTP) status. (Class C)

L Model– Aircraft experienced a #2 engine over-temp condition (999°C) during a post-flight normal engine shutdown. (Class C)

M Model– Crew was conducting dust landing iterations when debris was identified on the unimproved LZ. Crew Chief exited the landed aircraft and was in the process of collecting metal items when they were reportedly blown into the main rotor system, resulting in blade damage. (Class C)

Unmanned Aircraft Systems

MQ-1 

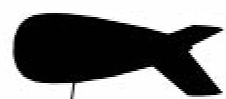
C Model– Crew received a "Gearbox Pressure Low" warning following takeoff and initiated an immediate RTB. A FADEC Degrade7 Warning was received while en route to base and System crashed while making turn to final for approach. System was recovered with Class A damage. (Class A)

RQ-7 

B Model– During a mission flight at a forward deployed location, AV had a caution for DGPS/BARO altitude mismatch 58003 ft. Immediately the aircraft started acting erratic and lost link, GPS, altimeter, altitude and video reporting. During the checklist procedures video was regained. The aircrew attempted to fly towards the mission site using dead reckoning. During the attempt the AV impacted the ground while reporting 30000 AGL. (Class B)

B Model– AV began reporting multiple GPS related failures. The AV was placed into TALS loiter but the AV began to climb un-commanded. The decision to deploy the FTS was made and the AV was recovered by the Unit. (Class C)

Aerostat



ALTUS Model– Aerostat experienced breakaway while aloft, reportedly in 14 knot wind conditions. The aerostat was tracked with an ISR asset for approx. 3 hours until elevation rapidly increased and vision was lost. The system is considered a total loss. (Class B)

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