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Future Hunters Term 1 Mod 5

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Re-Imagining Aviation Maintenance

Background:

As an Army aviator who has been working in the maintenance world for the past several years I have been witness to the challenges and trials of maintaining and ever more complex fleet of aircraft. As Army aviation marches into the future, we will need to re-imagine how conduct maintenance to create cost effective solutions that yield the greatest readiness in an operating environment that will continue to become more contested and complex.

Scenario:

The year is 2032 somewhere in the South China Sea and the first FVL battalion is getting its first taste of combat. I gave up my commission years ago and became a warrant officer so I can work on maintenance full time. I am the maintenance lead for our aviation task force and have with me a small mx team charged with supporting a mixed fleet of Future Vertical Lift and legacy platforms. Our task force has been forward staged on the USS Wasp, a Marine LHA and things are tight. Between the Marines, Soldiers and all their equipment the ship is bursting at the seams. Quarters are cramped and space is at a premium. We had to leave much of our sustainment support at home station, and I have a skeleton crew of experienced maintainers supported by a very small package of repair parts. As I stand on the fan tail, I reflect that 10 years ago the size of the maintenance team would have been two or three times bigger and consisted of a dozen containers of class IX repair parts. My team has 10 Soldiers, a containerized 3D printer and two containers of raw stock materiel.

Our force of Soldiers and aircraft are part of a larger task force charged with securing the Straits of Malacca, a congested narrow waterway that is the gateway to the region. We have been a sea for 45 days and been flying daily reconnaissance missions and have recently air assaulted two companies of airborne infantry into strategic terrain in the Strait to allow a larger naval force to pass unmolested through the AO.

While on mission the lead aircraft experiences a "land as soon as practicable" fault. The fault is discovered by on-board monitoring/diagnostic system which identifies that this does not cancel the mission but will need to get resolved prior to the next flight. The diagnostic system sends a data package back to the ship alerting mx personnel of the issue. As the senior MX lead, I receive the message and my team puts their heads together to determine what action is required. Since FVL has just been fielded we have limited experience on the airframe and unfortunately this fault is not something I'm familiar with. I consult the next generation of Interactive Electronic Manuals (IETMs) which can link back to larger data base at Redstone Arsenal to harness and AI enabled maintenance data base. Since we would be off the grid, I updated our logbooks prior to sailing so while my data is 45 days old its still recent and the program recommends a part replacement. The part that needs to be replaced is a low-density item and I don't have it in my supply of ready-made parts. Since the Army bought the technical data for the entire airframe, I have the technical specifications on the IETM, and I order to be printed by the system we have on board.

When the aircraft returns from mission my senior technical inspector (TI) and I plug into the aircraft and start a dialogue with the aircraft to confirm what we have been working on. The on-board diagnostic system which has been monitoring the situation recommends that the maintenance action could be differed up to five flight hours. The Air Force weather element is

forecasting adverse weather for the next 12 hours, so we make the decision to replace the component.

My maintenance team is composed of platform agnostic maintainers meaning they can work on the full range of Army aviation platforms. As the component finish printing, we assemble our tools and pull of the procedure for review. Instead of working off a laptop as we did 10 years ago or paper manuals as our fathers did, we don augmented reality glass to review the procedure. These glasses are our primary interface with the technical manuals. They allow us to review maintenance tutorials from a library of videos published by TRADOC. Additionally, they sync with the aircraft to provides visual cueing of panels, fasteners, and hardware that need be removed. It walks my team step by step through the procedure calling out torque values and tips as we make our way through the procedure. Once the repair is complete, I power the aircraft up and review the on-board diagnostics to see that in fact the fault has been resolved. The glasses have recording function which allows the TI the ability to review the procedure provide the final quality control check.

As we finish the maintenance action the flight crew is coming back on duty ready for the next mission.

Signals:

- Future of the Work Force
    - Generation Z or I-Gen, those born 1995-2012, will constituted a large share of the military's work force as we move into the future. This work force are digital natives who are more comfortable with technology than they are working with their hands. The military will be competing for talent with industry in a way that has never happened before. If the military is to compete for top talent, we must re-

think how we recruit and train the future work force. We may be facing a situation where we must do more with fewer people.

- FVL Development
    - Future vertical lift is a decades long program that has received greater attention as the Army transitions to the MDO force of 2035. FVL will replace aircrafts that were designed over 40 years ago and with it we have a window of opportunity to re-think how we do maintenance.
- Future Operating Environment
    - The future operating environment will be defined by contest. The military will be contested through the moment we leave home station garrisons till we get to the engagement area. Fixed forward operating bases with secure lines of communication and logistics will be dream of the past. To compete in this OE the Army aviation must become logistically leaner and do more with less.
- MSG-3
    - Currently the Army standard for aircraft readiness is 75% Fully Mission Capable which translates to an aircraft being available 22 days a month. We must do better with that if we are to effectively utilize future assets that cost more and are in greater demand.
- Cost being a key driver
    - Operations and Maintenance constitute roughly 70% of a program's life cycle costs. If we can attack this problem and decrease the O/M costs, we can cycle those cost saving back into greater capability as training and equipment readiness.

How we get there:

I have three focus areas that I believe the Enterprise can work at to achieve the maintenance revolution we need. Each of these focus areas address an aspect of aviation maintenance that has the potential to increase readiness while decreasing costs.

- Change WHO does the work
    - Airframe agnostic maintainers who are qualified to work across the Army's diverse fleet of aircraft. Initial training is focused on the basics of being a mechanic which when coupled with a structured development process at the unit level creates maintainers with a wide range of experience. This process is already being leveraged by the FAA to certify their Aviation Maintenance technicians and avionics technicians.
    - The Army currently has over a dozen aviation maintenance related Mission Operational Specialties (MOS). This is a hold over from an industrial model that trains Soldiers to do very specific jobs. We must be able to create maintenance generalists.
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- Change HOW the work is done
    - Current IETMs are paper manuals that have been converted into PDF
    - Augmented reality interface that leverages the digital instincts of our future work force
    - AI enabled trouble shooting trees that leverage the enterprise's experience to solve problems at the tactical level. Empower the lowest level of maintenance to solve problems
- Change WHAT we work on.

- Maintenance Steering Group 3 (MSG3)
    - Greater sensing and predicting of what's happening on the aircraft in order to cut down on the number of scheduled inspections reducing the amount of time that people touch the aircraft potentially inducing problems into an operating system
        - "The maintenance we do is often because of the maintenance we do"
- Additive Manufacturing
    - By "baking additive manufacturing into the cake" of FVL we can ensure that future systems are designed with sustainability in mind. The greatest challenge will be moving away from a sustainment model where the military is reliant on the OEM for parts support, we must make it cost effective for manufactures to sell us the tech data.
- Phone Home capability
    - This is currently happening on commercial airliners to keep the fleet in the air. The ability for an aircraft to alert maintenance personnel ahead of time of a pending mx event can dramatically shorten the non-availability time associated with a fault.