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PREPARING AND PROTECTING THE FORCE

LEADERSHIP PERSPECTIVE

Lt. Gen. John B. Cooper
Deputy Chief of Staff Logistics
Engineering and Force Protection
HQ USAF

Air Mobility Command Full Spectrum Readiness ■ Air Force Logistics Complexes
DLA Streamlining Nuclear Missile Maintenance ■ USTRANSCOM Strengthening Sealift Strategy

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U.S. AIR FORCE READINESS

The Air Force Sustainment Center's logistics complexes—Ogden, Oklahoma City, and Warner Robins—serve as the engine of readiness for the U.S. Air Force.
By Air Force Sustainment Center Public Affairs

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Fulfilling Logistics Enterprise Mission
Lt. Gen. John B. Cooper
Deputy Chief of Staff for Logistics, Engineering and Force Protection
Headquarters U.S. Air Force

AIR FORCE SUSTAINMENT CENTER
Logistics and Sustainment Support to the Joint Forces
Lt. Gen. Lee K. Levy II
Air Force Sustainment Center
Air Force Materiel Command

Cover: A U.S. Air Force F-15C Eagle assigned to the 18th Wing at Kadena Air Base, Japan, receives air-to-air refueling through a KC-10 Extender from the 6th Air Refueling Squadron, Travis Air Force Base, CA. (U.S. Air Force photo by Tech. Sgt. James Hodgman)

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INDUSTRY PARTNER

IMPROVING AIRCRAFT PERFORMANCE AND REDUCING LIFE-CYCLE COSTS

With its C-5M engine's record-setting history and other industry achievements, GE Aviation has delivered effective capabilities for Warfighters through its sustaining, upgrading, and re-engining efforts.
Interview with Karl Sheldon

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INSIGHTS

Saluting the Air Force, the August issue of Armor & Mobility brings you a varied lineup of interviews and features. Our Leadership Perspective interview with Lt. Gen. John B. Cooper, Deputy Chief of Staff for Logistics, Engineering and Force Protection at Headquarters U.S. Air Force, sheds light on how Air Force Logistics and Sustainment is preparing against cyber threats through its efforts to make "Every Airman a Sensor." This human capital strategy involves providing Airmen with the skills to address and mitigate cyber threats to maintenance, distribution, and technology.

In addition, we present our Air Force Sustainment Center feature, in which Lt. Gen. Lee K. Levy II gives us an informative glimpse into how the AFSC is leading the way in providing logistics and sustainment support to the joint forces, including the innovative "Art of the Possible" approach to achieving the efficient execution of processes, capitalizing on partnerships to build synergy, and agile manufacturing technologies such as 3-D printing. Complementing Lt. Gen. Levy's insights is an informative article from the Air Force Sustainment Center Public Affairs Office that provides an in-depth overview on this important enterprise consisting of three air logistics complexes.

Highlighting the significant role readiness plays in military thought and planning, Brig. Gen. John D. Lamontagne, Deputy Director of Operations, Strategic Deterrence and Nuclear Integration for Headquarters Air Mobility Command (AMC), and Brig. Gen. Steven J. Bleymaier, Director of Logistics, Engineering and Force Protection, Headquarters AMC, give us a detailed update on the command's current efforts in modernization, Full Spectrum Readiness, and more. Gen. Darren W. McDew, Commander, U.S. Transportation Command, calls our attention to the importance of readiness in the sea domain, reminding us that the transportation of supplies to our forces is not immune to disruption by adversaries and issuing a clarion call to refocus attention on our sealift strategy.

With all the talk about readiness, it was only fitting that we included a success story of efforts to improve nuclear readiness. Defense Logistics Agency personnel launched a clever initiative to improve their programmed depot maintenance for the ICBM launch facilities and control centers at the 309th Missile Maintenance Group, Ogden Air Logistics Complex, Hill Air Force Base, Utah. The initiative resulted in notable improvements, including increased speed and efficiency.

Finally, the Air Force will have a new addition: the Rapid Sustainment Office. Secretary of the Air Force Heather Wilson announced on July 25 the establishment of the new office, which will support the National Defense Strategy and whose focus areas will include predictive maintenance and agile manufacturing technologies.

As always, we welcome your comments and suggestions. Thank you for your continued readership.

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LOGISTICS COMPLEXES DRIVE READINESS FOR AIR FORCE

Functioning interdependently as a symbiotic enterprise, the Air Force Sustainment Center's three ALCs comprise a vital logistics and sustainment network that plays a major role in supporting readiness.

By Air Force Sustainment Center Public Affairs

In the early morning hours, an RQ-4 Global Hawk landed at Robins, Air Force Base Ga. Aircraft routinely fly to Robins, but this was the first one to land without a pilot onboard. To prepare for its arrival, a building-based launch and recovery element was established. (USAF photo by Tommie Horton)

The Air Force Sustainment Center's logistics enterprise—comprised of the Ogden Air Logistics Complex (OO-ALC) at Hill Air Force Base, Utah; the Oklahoma City ALC at Tinker AFB, Oklahoma; and the Warner Robins ALC at Robins AFB, Georgia—serves as the engine of readiness for the U.S. Air Force.

Organic depot maintenance accomplished at the ALCs is a ballet of sophisticated theory-of-constraints and guided processes, with the complexes themselves operating in a symbiotic, interdependent manner, forming a logistics and sustainment network that underpins Air Force readiness. This is the logistics kill chain needed for a modern military to deter our adversaries and reassure our allies.

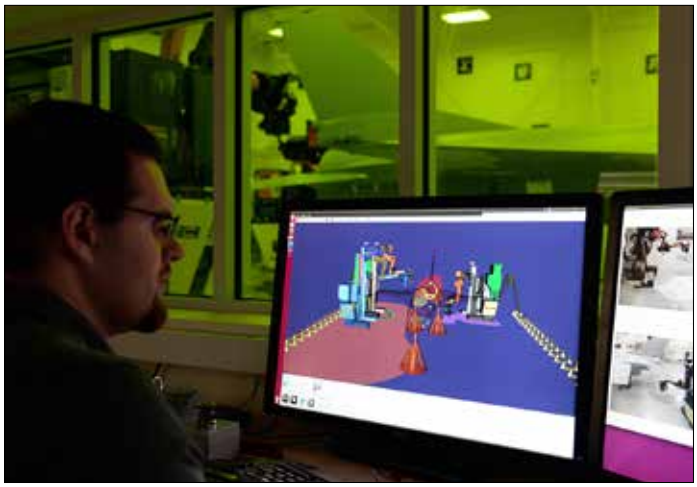
Ogden Air Logistics Complex

The Ogden ALC provides war-winning expeditionary capabilities to the Warfighter through world-class logistics, support, maintenance, distribution, and engineering management for actively flying mature and proven weapon systems.

The OO-ALC provides logistics, support, maintenance, and distribution for the nation's premier fighter aircraft: the F-35 Lightning II, F-22 Raptor, F-16 Fighting Falcon and A-10 Thunderbolt. In addition, it maintains the C-130 Hercules, T-38 Talon and other weapon systems, as well as the Minuteman III ICBM. The complex is one of the leading providers of software, pneudraulics, secondary power systems, composites and ICBM rocket motors for the Department of Defense. The complex is also the Air Force's Landing Gear Center for Industrial and Technical Expertise, handling all Air Force landing gear and a majority of other DoD landing gear. Personnel in remote locations perform aircraft, missile and electronics maintenance, regeneration, and storage.

The complex employs more than 8,100 military, civilian, and contract personnel at Hill AFB in 155 different job series. It also extends to 10 remote locations in the United States and Japan. The scope of responsibility includes cost, schedule and quality of depot and maintenance repair, overhaul and modification of Air Force aircraft, the Minuteman ICBM system, and a variety of commodities, software, aircraft storage and regeneration.

The 309th Aerospace Maintenance and Regeneration Group,



Cory Yambor, a contractor supporting the Ogden Air Logistics Complex Engineer Directorate, watches over the controls of the robotic laser depainting equipment at Hill Air Force Base, Utah. The system increases the speed of stripping old paint off F-16s and completes the task without using harmful chemicals. (USAF photo by Alex R. Lloyd)

F-16s undergo various stages of depot-level maintenance at Hill Air Force Base, Utah. Over the next few years, F-16 maintenance is scheduled to increase at Hill and continue for several more decades. (USAF photo by Alex R. Lloyd)

located at Davis-Monthan AFB, Arizona, supports the Department of Defense, NASA and other government agencies by providing selected aerospace depot maintenance and modifications, aircraft regeneration, storage and preservation, and aircraft parts reclamation and disposal.

The 309th Aircraft Maintenance Group performs depot repair, modification and maintenance support on the F-35, F-16, F-22, C-130, T-38 and A-10. This support includes teams deployed worldwide to perform aircraft battle damage repair, crash damage repair and field-level depot maintenance. A geographically separated unit maintains T-38 aircraft at Randolph AFB, Texas.

The 309th Commodities Maintenance Group is the Technical Repair Center for landing gear, wheels, brakes, secondary power systems, hydraulics and pneudraulics, and composites. The group maintains, repairs, manufactures and modifies armament, power systems, gas turbine engines, auxiliary power units, secondary power units, and fuel accessories and controls. In addition, the group does structural sheet metal, aircraft canopies, flight controls, and heavy machining work.

The 309th Electronics Maintenance Group repairs, overhauls and modifies electronics, avionics, radar, laser guidance systems, instrumentation, photonics, electrical systems and components, and ground power, oil and air-cooled generators, and munitions loaders/trailers. It supports programmed depot maintenance and modification of aircraft weapon systems, provides worldwide resupply support for component parts, and manages the Support Center Pacific, Kadena Air Base, Japan.

The 309th Maintenance Support Group is the facilities manager for projects in the Complex maintenance infrastructure program and manages military construction program projects. Group laboratories analyze and test chemicals, materials, wastes, and weapons systems components to help customers sustain and improve their processes. The group is the technical source of repair for the Air Force metrology and calibration program on assigned systems and components.

The 309th Missile Maintenance Group provides depot-level maintenance and support to America's land-based Intercontinental Ballistic Missile force and to the Air Launched Cruise Missile force. Four geographically separated units provide on-site depot-level maintenance, repair and modifications of 450 Minuteman III launch facilities and 45 missile alert facilities spread across five states. The group plans and directs repair of ICBM operational ground equipment, transportation and handling equipment, reentry systems, and unique support equipment. It controls movement, provides storage for Minuteman III weapon system boosters, and performs static firing and depot-level maintenance for the Minuteman III weapon system. Accountable assets are tracked for the New Strategic Arms Reduction Treaty by the group. The group also conducts strategic and tactical rocket motor propellant dissection and analysis, tests missile integrated systems, repairs shelters and radomes, and performs Radar Cross Section characterization testing of aircraft and flight hardware.

The 309th Software Maintenance Group is leading the way as a world-class software development organization. The group's engineers and technicians provide critical system updates for military bombers, fighter jets, missile systems, satellite systems and others. The group provides "cradle-to-grave" systems support, encompassing software engineering, hardware engineering, program management, data management, and consulting solutions of the highest quality and capability to the Warfighter, while meeting the commitment to safety, quality, schedule, and cost.

Oklahoma City Air Logistics Complex

The Oklahoma City ALC (OC-ALC) is one of the largest units in Air Force Materiel Command. It employs more than 9,800 military and civilian personnel with 98 different job skills. The complex utilizes 63 buildings and 8.2 million square feet of industrial floor space in support of its mission.

The OC-ALC performs programmed depot maintenance and modifications on KC-135 Stratotanker, B-1B Lancer, B-52 Stratofortress, E-3 Sentry and Navy E-6 Mercury aircraft; maintenance, repair and overhaul for F100, F101, F108, F110, F117, F118, F119, F135, TF33 engines; and a wide variety of commodities for the Air Force, Navy, Marine Corps, and foreign military sales.

The complex is responsible for the development and sustainment of a diverse portfolio of mission-critical software for the Air Force and other customers, as well as worldwide aircraft battle damage repair capability for multiple weapon systems.

At the Oklahoma City Air Logistics Complex, sheet metal mechanics with the 76th Aircraft Maintenance Group work on the KC-135 Programmed Depot Maintenance line. (Air Force photo by Kelly White)

Jamin Alato, an aircraft mechanic with the Oklahoma City Air Logistics Complex's 565th Aircraft Maintenance Squadron, replaces nut plates on "Ghost Rider" B-52's vertical stabilizer. (Air Force photo by Kelly White)

The OC-ALC is comprised of five groups that team together to provide world-class maintenance, repair, and overhaul support to the Warfighter.

The 76th Aircraft Maintenance Group is the Air Force's premier unit for programmed depot maintenance on B-1, B-52, KC-135, E-3, E-6, and special mission fleets. The 76th AMXG performs all facets of depot maintenance, including full overhaul maintenance, FAA certified aircraft repairs, engineering services, aircraft modifications, depaint and paint services, flight testing, and expeditionary depot repair teams. The group is currently preparing for the Air Force's next generation tanker, the KC-46 Pegasus.

The 76th Commodities Maintenance Group (CMXG) directs, manages, and operates organic depot-level maintenance facilities in the repair and overhaul of Air Force, Navy, and FMS aircraft and engine parts to serviceable condition. The group's portfolio includes the A-10, B-1, B-2, B-52, C-5, C-17, C-130, C-135, C-141, E-3, F-4, F-5, F-15, F-16, F-22, MQ-1, MQ-9, and T-38 weapons systems. The 76th CMXG also serves as the Air Force Technology Repair Center for air and fuel accessories, constant speed drives, and oxygen-related components.

The 76th Maintenance Support Group is responsible for maintaining one of DoD's largest industrial complexes on a 24/7 basis. It keeps the buildings, hangars, machines, and equipment running so the depot can meet the Warfighters' requirements. Structures range from World War II-era buildings and hangars to state-of-the-art software and engine maintenance facilities and equipment. The group services include physical plant management, metrology, physical science laboratories, tools management, environmental oversight, and long-range facility planning.

The 76th Propulsion Maintenance Group is DoD's foremost engine repair and overhaul center. It sustains most of the bomber, tanker, fighter, and special mission aircraft engines in the Air Force, as well as some Navy and Foreign Military Sales engines. The group performs repairs on engines and major engine assemblies for the F100, F101, F107, F108, F110, F117, F118, F119, F137, and TF33.

The 76th Software Maintenance Group delivers a wide spectrum of software and systems engineering solutions in a dynamic cyber environment. As part of the Air Force Sustainment Center Software Enterprise, the group provides the DoD with capabilities in operational flight programs, mission planning systems, space systems, ground-based radar, weapons support, mission support, jet engine test, training and simulation systems, and diagnostics and repair.

Warner Robins Air Logistics Complex

The Warner Robins Air Logistics Complex (WR-ALC) at Robins Air Force Base, Ga., is a critical piece of the Air Force Sustainment Center's logistics enterprise.

Robins, like its partner bases in Utah and Oklahoma, utilizes the Art of the Possible, or AoP, methodology to achieve its missions. AoP is about recognizing opportunities, understanding and eliminating true limiting constraints, improving processes, and maximizing available resources.

Through about 7,000 employees, the WR-ALC provides depot maintenance, engineering support, and software development to major weapon systems such as F-15, C-5, C-130, C-17 and Special Operations Forces aircraft. The Complex achieves command objectives providing a capability/capacity to support peacetime maintenance requirements, wartime emergency demands, aircraft battle damage repair, and a ready source of critical items for maintenance.

The 402nd Aircraft Maintenance Group provides programmed depot maintenance and unscheduled repair activities on F-15, C-130, C-5 and C-17 aircraft and is responsible for the repair, modification, reclamation and rework of over 200 aircraft worldwide. The group prepares and deploys combat Aircraft Battle Damage Repair, crash recovery, and supply and transportation teams worldwide.

The 402nd Maintenance Support Group provides logistics support for depot maintenance repair facilities and provides plant facilities, equipment engineering, calibration, and installation support to the wing's infrastructure. The unit is organized into two squadrons: the Industrial Services Squadron, which manages capital investment-related programs, and the Maintenance Materiel Support Squadron, which is responsible for determining, establishing, maintaining, forecasting, and transporting inventory of consumable and exchangeable materiel required for depot maintenance.

The 402nd Commodities Maintenance Group provides depot maintenance support to major weapons systems, primarily F-15, C-5, C-130 and SOF aircraft, through major structural repair, manufacturing, modification, and component and special process

Caleb Andersen, hydraulics mechanic, checks the C-5 main landing gear for rigging at Robins Air Force Base, Ga. (USAF photo by Tech. Sgt. Kelly Goonan)

repair. The group applies industrial engineering and production control programs and procedures.

The 402nd Electronics Maintenance Group provides combat-ready avionics parts and services to warfighting forces. Their production encompasses 75 percent of the Air Force organic workload, comprised of 275 key systems incorporating 6,100 discrete items. The group transformed capability into effects through outstanding depot-level test, maintenance, manufacturing, repair, and engineering capabilities for all Department of Defense services and Foreign Military Sales.

The 402nd Software Maintenance Group serves as the single organic source of Mission Critical Computer Resources and Automatic Test Equipment software for all assigned prime systems and equipment. The 402nd serves all echelons of maintenance requiring computer programming skills and assembly-level computer programming languages. The group designs, develops, and provides new, altered, updated, or modified software and updates/corrects existing avionics items/system software. It also provides on-site engineering assistance to identify and correct software deficiencies and provides criteria and documentation for automated equipment. The group conducts feasibility studies for the application of automation to the depot maintenance process and serves as the Automatic Test Systems focal point for the wing.

Robins AFB recently announced the establishment of an Air Force Advanced Technology and Training Center, currently under construction in Warner Robins, Ga. The facility will provide scientists, engineers, technicians, and educators in Middle Georgia a state-of-the-art facility to help revolutionize future manufacturing technologies. The facility is expected to be completed by late 2018.

The ATTC will be a place to train on and test new technologies without interrupting actual aircraft maintenance production.

The facility will provide quick reaction and qualification capabilities for new technologies and processes in a non-production environment; training capabilities for advanced technology equipment and processes; and cross-discipline collaboration space to share ideas and interact real-time in a fast-paced and dynamic environment. By leveraging these capabilities, the center will allow the staff to work collaboratively to foster innovative thinking, increase education and training, and push the state of the art in manufacturing.

The center will seek to capitalize on the government and academic talent of people in the Middle Georgia region and encourages new opportunities for local high schools, community colleges, and universities.

This air logistics complex trifecta, fueled by innovation and modernization, ensures the AFSC is able to deliver combat power for America now and into the future. Airmen in combat cannot succeed without the air, space, and cyberspace capabilities produced by the AFSC organizations at these installations.

CAPITALIZING ON TECHNOLOGY TO FOCUS ON READINESS

Lt. Gen. John B. Cooper is Deputy Chief of Staff for Logistics, Engineering and Force Protection, Headquarters U.S. Air Force, Washington, D.C. Lt. Gen. Cooper is responsible to the Chief of Staff for leadership, management, and integration of Air Force logistics readiness; aircraft, munitions, and missile maintenance; civil engineering; and security forces, as well as setting policy and preparing budget estimates that reflect enhancements to productivity, combat readiness, and quality of life for Air Force people.

Lt. Gen. Cooper entered the Air Force in 1983 and received his commission through the ROTC program at The Citadel in Charleston, South Carolina. He is a career logistician who has commanded two maintenance squadrons, one maintenance group, and one maintenance wing. He has also held a variety of staff leadership positions and has been the Director of Logistics for three separate major commands and for Headquarters U.S. Air Force. Prior to this assignment, the general was the Director of Logistics, Headquarters Air Combat Command.

Lt. Gen. Cooper holds a Bachelor of Science degree in Business Administration from The Citadel, a Master of Arts degree in Business Management from Webster University, and a Master of Science degree in Strategic Studies from the Air War College.

Lt. Gen. John B. Cooper

Deputy Chief of Staff for Logistics,
Engineering and Force Protection
Headquarters U.S. Air Force

A&M: Please describe for us the current state of Air Force logistics and sustainment.

Lt. Gen. Cooper: I'd say the state of Air Force logistics and sustainment is as strong as it has ever been. The priority of Air Force logistics is to be ready to sustain a fight. Our vision statement reads, "The world's best at building, sustaining, and protecting our bases," and I think we live up to that vision. The Secretary of the Air Force has tasked us to make sure our logistics and sustainment enterprise is focused on readiness to support the National Defense Strategy. Within the Air Force, a complex network ensures the sustainment of air operations, supply chain management, global mobility, and base operations support. Whether repairing or refueling a jet, loading cargo, defending the base, or building a runway, the 260,000-plus men and women of the Logistics Enterprise are effectively postured to accomplish the mission. Over the past year, we have increased readiness, worked with service and international partners to better position Air Force materiel for current and future fights, and worked to improve and develop our leaders.

A&M: We recognize that a key part of the Air Force's ability to provide mobility to the joint fight is the tanker force. What are your plans to improve the tanker force?

Lt. Gen. Cooper: Well, first, we're excited to bring the KC-46 into our inventory this year to begin a critical recapitalization of our tanker fleet. The current program calls for the purchase of 179 KC-46 aircraft. Once all KC-46s are received, the Air Force will have a tanker fleet of 479 aircraft. All that said, we also remain focused on operating and sustaining our legacy tanker fleet. That is an increasing challenge as we deal with aging aircraft issues. Many of our KC-135 tankers have entered their 56th year of service, and we plan to keep a large number of them for many years to come. To keep them flying we have to continue to come up with innovative ways to sustain them. Some of the initiatives we're working on include reducing the amount of time an aircraft is down for maintenance, upgrading avionics and other mission systems, and increasing our maintenance manpower to battle the inspections that come with an aging fleet. One example: The ongoing avionics upgrade program for the KC-135 will increase system reliability and bring the digital flight director, autopilot, and radio altimeter systems in line with newer aircraft and reduce our maintenance workload considerably. Another example is our efforts to use big data to predict component failure, which will allow us to be much more proactive in the way we maintain our fleets.

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Lt. Gen. John B. Cooper speaks to Airmen of the 1st Special Operations Maintenance Group at Hurlburt Field, Florida. (Official AF photo)

A&M: Can you discuss "predictive and proactive maintenance" a little more? And what other new ideas and concepts are you working to deliver?

Lt. Gen. Cooper: We have several ongoing initiatives to improve maintenance and logistics in the Air Force. One program getting a lot of traction is our "Flightline of the Future" initiative, which links dozens of concepts to revolutionize maintenance and logistics by harnessing and weaving together emerging technologies. Another program receiving a lot of attention is our Predictive Maintenance Program, which falls under the umbrella of Condition Based Maintenance-Plus (CBM+). The end goal of these initiatives is to predict failure, then act to reduce or eliminate unscheduled maintenance actions on our aircraft to keep them flying.

We're finding that improvements in technology can now allow us to use the massive amounts of data we've always had to predict failures. We're seizing this technological advance and using it to our benefit. One good example currently underway is our effort on the E-3 airborne warning and control system using CBM+. Our initial analysis on the E-3 predicts a potential of a 28 percent reduction in unscheduled maintenance time. We are obviously excited about that, and we realize that this is the maximum potential, with a 28 percent savings being the "Outer Boundary." But even if we realize a 5 percent or 10 percent reduction in unscheduled maintenance, we're still money ahead!

A&M: Speaking of new ideas and concepts, is there anything industry is currently doing that you are interested in replicating?

Lt. Gen. Cooper: There are major commercial airline fleets out there that have been able to leverage condition-based maintenance to fundamentally affect sustainment in a positive way. We strive to leverage these industry lessons learned and best practices to influence data to optimize mission generation.

Over the past year, one major airline had 300-plus days of uninterrupted maintenance on their fleet because of condition-based maintenance and predictive maintenance. We want that type of performance, the kind where we can predict when a part is going to fail, and then replace it beforehand during maintenance windows that are already scheduled.

A&M: Are you looking at other commercial options for modernization?

Lt. Gen. Cooper: Yes! I coined a few "Log Truths" as the AF/A4, and one of them is: "You don't have to own it to use it." I firmly believe in this. We are trying to leverage commercial off-the-shelf solutions rather than custom-built technologies and systems. We also want to use the best-of-breed industry products, solutions, and processes.

The bottom line: We are always looking to team with industry in the technology space. Today we are working with industry on building a comprehensive cloud-based environment, on building apps, and on providing commercial software as a service. We see the use of commercial technologies as a growing sector in our effort to modernize the way we sustain our Air Force.

A&M: What are you doing to prepare Airmen for attacks against cyber networks and war without log technology and networks?

Lt. Gen. Cooper: We take the Cyber threat very seriously and are focusing on improving our people through learning and enhancing their capabilities through training and exercises.

For people, we are revamping our logistics human capital strategy to focus on developing skillsets to make "Every Airman a Sensor" with the ability to identify, assess, and mitigate threats against logistics supply chains and maintenance and distribution processes, as well as the technology they ride on. To be clear, we don't want to make logistics Airmen who necessarily fix a cyber problem, but we want them to recognize a cyber problem and have the capability to mitigate it so as to continue the mission. To accelerate our "Every Airman a Sensor" project, we are working with Air Education and Training Command and our industry partner, EdgeDweller, to leverage blended learning tools and techniques to accelerate competency and certification for our Airmen.

Our logistics human capital strategy also focuses on building joint logisticians. Logistics Airmen must better understand joint ops. It's no longer enough for an Airman to be only good at Airmanship. We must have a working knowledge of ground maneuver and maritime operations if we are to truly integrate air, space, and cyber operations in a seamless joint campaign. We are starting this part of the journey by reinvigorating a cyber "ability to survive and operate" training plan.

A&M: Any final thoughts?

Lt. Gen. Cooper: I would just like to say that I could not be prouder of the men and women who build, sustain, and defend our bases. Although we talked a lot about IT and data today, in the end it is our Airmen who will get the job done, like they always have. They are our asymmetric advantage. It is an exciting time to be an Airman as we leverage technology to help us innovate faster, solve problems faster, and figure out how to win America's wars faster. I am proud to be a part of the effort!

LEADING THE WAY IN SUSTAINMENT AND LOGISTICS

Lt. Gen. Lee K. Levy II, recent Commander, Air Force Sustainment Center, Air Force Materiel Command, headquartered at Tinker Air Force Base, Oklahoma. As the AFSC Commander, he leads nearly 43,000 Total Force Airmen to deliver combat effects for the immediate and long-term requirements of component and combatant commanders in every area of responsibility.

Serving as the Logistics Numbered Air Force, AFSC is the supporting command for the readiness of Logistics and Sustainment activities around the world. The Center comprises three Air Logistics Complexes, three Air Base Wings, two Supply Chain Wings, and 23 CONUS and OCONUS geographically separated operating locations. The AFSC has $16 billion in execution authority and $26 billion in assets providing logistics operations, supply chain management, supply chain operations, depot maintenance and modifications, as well as sustainment for the nuclear enterprise, joint and interagency operations and foreign military sales partners. General Levy was born in New Orleans, Louisiana. He entered the Air Force in 1985 as a Louisiana State University graduate.

General Levy has held numerous operational, command, and staff positions leading logistics, civil engineering, operational contracting and nuclear operations. Prior to his current position, he was Vice Director for Logistics, the Joint Staff, Washington, DC.

Lt. Gen. Lee K. Levy II

Air Force Sustainment Center
Air Force Materiel Command

A&M: The Air Force Sustainment Center stood up in 2012. Can you tell us a little bit about it?

Lt. Gen. Levy: Nearly 43,000 personnel—military, civilian and contractor—make up the Air Force Sustainment Center. Our team is composed of three air logistics complexes (ALC), two supply chain wings, and three air base wings spread across the globe. We provide logistics and sustainment support to our joint forces via a global interconnected ecosystem. The ALCs (Ogden ALC at Hill Air Force Base, Utah; Oklahoma City ALC at Tinker AFB, Oklahoma; and Warner Robins ALC at Robins AFB, Georgia) and the two supply chain wings (448th Supply Chain Management Wing at Tinker and 635th Supply Chain Operations Wing at Scott AFB, Illinois) lead the way in providing sustainment and logistics readiness to deliver combat power for America.

We support joint and coalition forces at the beginning, middle, and end of every operation, and we secure our homeland by enabling continuous surveillance and air defense, supporting multiple combatant commanders and the interagency simultaneously. Critically, AFSC provides logistics and sustainment support for two of the three legs of our nation's strategic nuclear triad. Our capability to deter, respond to, and eliminate threats relies upon our nation's ability to proactively and continuously develop advanced air, space and cyber capabilities, while simultaneously honing the readiness and lethality of the logistics and sustainment enterprise to meet evolving requirements, increasing demand signals, and ever developing asymmetrical threats.

A&M: The way the Air Force operates has changed over the years. It seems the Air Force has embraced innovation in terms of accomplishing its various missions. What processes have changed?

Lt. Gen. Levy: The Air Force Sustainment Center has adopted a methodology called Art of the Possible. AoP uses a method to achieve its missions by aiming at the right results the right way. AoP is about recognizing opportunities, understanding and eliminating true limiting constraints, improving processes, and maximizing available resources. AoP describes the goal of the AFSC as creating a culture that is focused on the efficient execution of its processes. AoP methodology does this by first creating a goal—vetted through the enterprise—for the pace of execution. This "Road to..." goal provides a common destination and site picture for the enterprise to measure how well the process is executing.

AFSC processes are seen as machines that can be set up to have specific, predictable results once they are understood. There is a science behind the creation of the machine that leads to both the predictable output and the changing of a lexicon to speak in terms of the process machine. Once the process machine is set up according to this science, it

is monitored for performance. The AFSC process machines are based on the principles of standard work with visual displays that help the process doers understand the status of the assets in their process and how the doers affect the process. Careful process monitoring allows the weakest process links to be identified and process improvement techniques applied that result in more efficient processes and execution.

A&M: How is the AFSC using technology to improve readiness?

Lt. Gen. Levy: Agile manufacturing technologies, such as additive manufacturing, support the Air Force Future Operating Concept by providing the Air Force an edge against our adversaries through a smaller deployed footprint, more agile/efficient maintenance and modification, and faster supply chain sourcing. Agile manufacturing technology is especially well-suited to sustaining low-quantity part production because it is not hampered by high startup costs associated with traditional manufacturing methods.

By growing a cyber secure library of qualified parts that can be printed across an Air Force network of certified printers, we enable a more agile and efficient logistics supply chain that can quickly deliver the right part on demand. This will have a direct appreciable impact on a weapons system's mission capable rates.

While additive manufacturing presents itself as a viable solution to rising costs associated with Diminishing Manufacturing Sources, the process requires a rapid reverse engineering capability and a workforce that understands how to leverage it in order to provide a responsive, resilient parts supply chain. It also requires access to intellectual property that the department currently does not possess. These challenges remain a barrier.

A&M: Additive manufacturing seems to be a part of the Air Force vernacular now. Any examples of where this alternative manufacturing process is realizing some success?

Lt. Gen. Levy: The additive manufacturing or 3-D printing capability throughout the Air Force Sustainment Center allows us to create weapon system components using a manufacturing process through which three-dimensional solid objects are created. It enables the creation of physical 3-D models of objects using a series of additive or layered development framework, where layers are laid down in succession to create a complete 3-D object. 3-D printing is an alternative to the traditional product manufacturing process, where objects were designed by cutting and forcibly shaping raw material and constructing an object through the use of molds and dies.

The art of 3-D printing is essentially the process of creating a three-dimensional product from a digital file. The work being performed is considered metrology: measuring things, capturing data and comparing it to drawings to ensure there is dimensional accuracy. The additive manufacturing teams can scan the original part, print out a test model with the 3-D printer, and then make sure the part meets the exact measurements and specifications before it is created from metal. When measuring and inspecting these parts, the 3-D printing experts have a tool that is precise down to three microns. To put that into perspective, a strand of hair is roughly 75 microns.

The Reverse Engineering and Critical Tooling (REACT) cell at the Oklahoma City Air Logistics Complex has been solving parts supportability challenges using additive manufacturing since 2013 with great success. REACT improved local manufacturing support in fiscal 2017 by supporting 70 different components and reducing flow time to the customer by 350 days, and with a cost avoidance of more than $367,000.

Personnel at Robins AFB modeled an F-15 Eagle seal plate from engineer-drafted blueprints using computer-aided software to create a model that was uploaded to a 3-D prototyping machine. Machining this part out of aluminum would have cost in the neighborhood of $10,000 to $15,000, but Robins workers were able to print the plastic prototype for $20.

New advanced technology facilities, a next-generation battle systems mission, and additive manufacturing capabilities prove that innovation and modernization are alive, well and growing in the AFSC.

A&M: It appears the Air Force has developed unique partnerships and has started working more with external stakeholders from academia, scientific organizations, and others. Can you give me some examples of success stories related to these collaborative efforts?

Lt. Gen. Levy: The Air Force Sustainment Center has taken significant steps towards an innovation focus across our workforce, capitalizing on partnerships to explore opportunities and build synergy across the enterprise. The introduction of additive manufacturing technologies into the sustainment infrastructure is promising to address operational constraints related to design and production lead times, and supply chain support. Access to the capabilities required to accomplish additive manufacturing has been made possible through teaming programs such as the Utah Science Technology and Research (USTAR) facility located in the Falcon Hill Aerospace Park near Hill Air Force Base.

USTAR is an entity of the State of Utah chartered to serve as a high-tech incubator and prototype lab to accelerate innovation and foster business development in the tech sector. Clientele, including academia and small businesses, purchase memberships and have access to maker-space that offers additive manufacturing equipment, CNC milling machines, metal working equipment, and cutting-edge software. Hill Air Force Base engineering purchased a membership to support maintenance activities with the ability to access the resources for any project or mission partner across the enterprise.

So far this year, the 309th Maintenance Support Group has additively manufactured and/or developed technical data packages for 90 different components, cutting production flow time by 640 hours and yielding more than $198,000 in savings. The rapid speed enabled by these partnerships and this technology is incredibly effective in the hands of our workforce. Saving flow days and decreasing the time an aircraft is in the depot creates a more agile sustainment kill chain, resulting in a more lethal Warfighter.

A&M: With changes to the logistics environment, what is the AFSC doing to keep up with today's warfighting methods?

Lt. Gen. Levy: Today's evolving warfighting concepts require a fundamental change to the logistics environment. Within this transformation, a most critical element is a logistics command and control capacity that truly ensures the effective employment of resources. Ten years ago, the focus of logistics command and control was directed at task organizing and logistics mission assignments. Command and control was not automated and was functionally centric and non-integrated. Information was derived from after-the-fact reporting focused on transactional activity and latent white board displays of assets and resources. The predominant characteristic of logistics was achieved by maintaining large stockpiles to meet every possible requirement.

The new environment demands a logistics command and control capability that emphasizes situational awareness and decision support to meet commanders' emphasis on speed and agility. Operational speed and agility means logistics forces will need to cover greater distances, while lacking secure lines of communication.

A&M: What does the future of the AFSC look like?

Lt. Gen. Levy: The Air Force Sustainment Center is the nation's readiness and war sustaining insurance policy. Throughout the life cycle of a weapon system, our relationship with industry is integral to the success of our Warfighters.

We must continue to invest in the organic industrial base if we expect its performance in the future to meet the needs of an increasingly sophisticated and lethal battlespace in the 21st century.

One of the most daunting challenges remains in the area of cybersecurity, specifically the roles of artificial intelligence and data security. The budding artificial intelligence capabilities on the commercial market promise faster, predictive and more accurate decisions for our supply chain and engineers who troubleshoot aging weapon systems and our industrial plant. Adapting and implementing artificial intelligence systems to our legacy data systems hold great promise but will require significant investment.

The Center remains essential in sustaining our nation's nuclear enterprise, from the depot-level maintainer in the nation's missile fields to managing the nuclear supply chain.

Editor's note: The Air Force has announced that Maj. Gen. Gene Kirkland will succeed Lt. Gen. Lee K. Levy II as the Air Force Sustainment Center commander. The date of the change of command was unknown at press time.

Maj. Gen. Donald E. "Gene" Kirkland is the Director of Logistics, Deputy Chief of Staff for Logistics, Engineering and Force Protection, Headquarters U.S. Air Force, Washington, D.C. He is responsible for organizing, training and equipping more than 180,000 technicians and managers maintaining the aerospace weapons system inventory. He provides strategic guidance for materiel and equipment management, fuels, vehicle management and operations, distribution, personal property and passenger traffic management. The directorate develops logistics readiness, maintenance and munitions policy, ensuring the readiness of the single largest element of manpower supporting Air Force combat forces globally.

TIRELESSLY PURSUING FULL SPECTRUM READINESS

Whether it is providing humanitarian assistance, meeting threats, or performing air-to-air refueling, readiness is at the forefront of the mission of Air Mobility Command. Brig. Gen. John D. Lamontagne and Brig. Gen. Steven J. Bleymaier provide an update on the current efforts, including modernization, innovation, and talent retention.

Staff Sgt. Michael Plummer, 2nd Maintenance Squadron communication and navigation mission systems shift supervisor, shows Airman 1st Class Christopher Shelby, 2nd Maintenance Squadron COMNAV (communication and navigation) journeyman, a corroded interphone wire inside a B-52H Stratofortress on Barksdale Air Force Base. Aircrews use the interphones to communicate with each other in the aircraft. (U.S. Air Force photo/Senior Airman Micaiah Anthony)(RELEASED)

Brig. Gen. John D. Lamontagne *is the Commander, 618th Air Operations Center (Tanker Airlift Control Center), Scott Air Force Base, Illinois. The 618th AOC (TACC) is responsible for operational planning, scheduling, directing and assessing a fleet of approximately 1,100 aircraft in support of combat delivery and strategic airlift, air refueling, and aeromedical operations around the world.*

Prior to assuming his current position, Brig. Gen. Lamontagne was the Deputy Director of Operations, Strategic Deterrence and Nuclear Integration for Headquarters Air Mobility Command, Scott Air Force Base, Illinois. In addition, he held command positions at the squadron, group, and wing levels. He was also assigned to the Strategy Office within the Office of the Under Secretary of Defense for Policy.

Brig. Gen. Lamontagne received his commission from the U.S. Air Force Academy in 1992.

Brig. Gen. Steven J. Bleymaier *is Director of Logistics, Engineering and Force Protection, Headquarters Air Mobility Command, Scott Air Force Base, Illinois. He is responsible to the Commander, Air Mobility Command for leadership, management and integration of total-force logistics, engineering and force protection activities across the global mobility air forces enterprise. His directorate also provides direct support to 18th Air Force, AMC's sole warfighting numbered air force, and the U.S. Air Force Expeditionary Center, the Air Force's Center of Excellence for enroute, contingency response and partnership capacity building mission sets.*

Brig. Gen. Bleymaier entered the Air Force in 1991 with a Bachelor of Science and commission from the U.S. Air Force Academy. He has a diversified background in fighter and heavy aircraft and munitions maintenance, acquisitions logistics, legislative liaison and politico-military plans. Prior to his current position, he served as the Commander, Ogden Air Logistics Complex, Hill AFB, Utah.

A&M: Can you discuss some of Air Mobility Command's (AMC) efforts to improve Total Force Full Spectrum Readiness?

Brig. Gen. Lamontagne: Full Spectrum Readiness requires improving equipment and tactics used to meet the complex threats being developed and proliferated among potential adversaries. To ensure we remain a ready force today and in the future, AMC prioritizes readiness, modernization, innovation, and talent retention.

To build upon our ability to respond, the command launched Exercise Mobility Guardian in 2017, which brought together more than 3,000 personnel from 30 countries. The goal was simple: provide the most realistic, real-world training our command has ever seen.

Airmen from the 621st Contingency Response Wing, Travis Air Force Base, Calif., perform a High Altitude Low Opening jump during Exercise Mobility Guardian while flying over Washington. The exercise was intended to test the abilities of the Mobility Air Forces to execute rapid global mobility missions in dynamic, contested environments. (U.S. Air Force photo/Senior Airman Clayton Cupit)

The training prepared us for extensive disaster relief operations. During the 2017 hurricane season, Airmen across the total force flew more than 1,500 sorties and delivered 28 million pounds of supplies to victims of Hurricanes Harvey, Irma and Maria, in addition to three missions providing relief to Mexico after devastating earthquakes.

At the same time, U.S. and coalition forces worked overtime to help defeat ISIS. U.S. tanker crews flew approximately 90 percent of the coalition's nearly 46,000 tanker missions conducted since operations began in 2014.

Over the past six months, AMC also worked to prioritize training for high-end threats. To do this, the command began to reduce capacity in some areas to allow our crews to use those aircraft to train for more challenging operational problems.

The command demonstrated more success with the strategic airlift fleet because of our ability to offset some operational requirements by leveraging our commercial airline partners who are flying a larger portion of our strategic airlift requirements. We continue to find ways to reduce the operational tempo for our KC-135, KC-10 and C-130 crews to help us prioritize their high-end training.

A&M: As the Air Force readies for phase-in of new KC-46 assets, how is AMC working to prepare receiving facilities for the arrival of the KC-46?

Brig. Gen. Lamontagne: The KC-135 has been the backbone of the tanker fleet for six decades and will continue to remain a vital part of AMC's air refueling mission for years to come. In 2018, however, AMC will welcome the KC-46A, the refueling aircraft that will provide joint and coalition partners with a new generation of enhanced refueling capabilities for our nation. The $44 billion contract will deliver 179 airplanes to the U.S. Air Force through 2028.

The KC-46 is a multirole weapon system that will be capable of refueling U.S., allied, and coalition aircraft and will be able to detect, avoid, defeat, and survive threats. It can be configured to transport 18 cargo pallets, 114 passengers, or 50 aeromedical evacuation patients.

The first KC-46 is expected to be delivered to McConnell Air Force Base (AFB), Kansas, in October 2018. McConnell AFB is setting the standard for integrating the KC-46 enterprise into the Air Force as the first main operating base. The wing has completed 16 projects totaling $267 million through fiscal year 2017 to prepare for the delivery of the KC-46A. This includes three new hangars totaling more than 297,000 square feet and valued at more than $150 million. Additionally, construction on the 37,000-square-foot KC-46 Regional Maintenance Training Facility was completed in March 2018 at McConnell AFB. The base also received the first KC-46 flight simulator in March 2018.

A KC-46A Pegasus takes flight. Altus Air Force Base, Okla., will be the training base for aircrew of the KC-46. (Courtesy photo by Boeing)

Since World War II, the 22nd Air Refueling Wing has had a global impact on our nation's freedom, and that tradition will continue for years to come. Not only are they laying the groundwork for the next generation of air refueling, but they are also creating the next generation of Airmen.

Later this summer, AMC also expects to select the pilots who will fill the first two squadrons at McConnell. It is a great opportunity to merge the best tactics, techniques, and procedures from several different weapons systems.

A&M: As the cost of fueling the Air Force's tanker and cargo aircraft fleets has grown, can you tell us about some ways AMC is leading efforts to minimize cost both operationally and through research and development?

Brig. Gen. Lamontagne: It's important to understand that the Mobility Air Force is a $46 billion enterprise, with a fleet of more than 1,000 aircraft and 125,000-strong Total Force Airmen.

To remain the world's preeminent mobility force requires rapid and meaningful innovation and investments allowing us to retain the strategic mobility advantage now and in the future.

One innovation that yielded savings and operational enhancements is the introduction of the electronic flight bag. EFBs are portable electronic devices that consolidate dozens of pounds of paper products into a single tablet. This EFB initiative, which began in 2010 for the purposes of improving the effectiveness and efficiency of AMC aircrews, also had the benefit of reducing weight in the aircraft and therefore reducing fuel consumption and costs on each sortie.

For every pound of weight removed from the aircraft, you save a certain amount of fuel on a given sortie. For instance, if you remove 120 pounds of paper from every single sortie, we calculated the command would save about $780,000 per year in fuel costs and nearly $3.7 million in printing and distribution within the Mobility Air Forces.

Cost savings were not the only added value with using the EFBs. Increased safety and knowledge enhancement are also added benefits for aircrews and aircrew support. EFBs enhance the crews' access to technical orders. The tablets also contain electronic flight information publications such as navigational charts in addition to other digital publications, such as Air Force instructions and technical orders.

We must continue to modernize and enhance the Mobility Enterprise to meet new and emerging requirements.

A&M: With air-to-air refueling being the lifeline for U.S. combat operations around the globe, what are some focus areas the Air Force is prioritizing for efficiency in aerial refueling ops?

Brig. Gen. Lamontagne: Air Mobility Command is heavily invested in the upcoming delivery of the KC-46 Pegasus Tanker. This aircraft will provide the Warfighter increased fuel efficiency, maintenance reliability rates, and off-load capabilities. To ensure these efficiencies are brought to the fight, Air Force operators, maintainers, and test personnel are working hard to help the system reach its Initial Operational Capability in the shortest time. At the same time, we are also working to ensure we have the appropriate amount of KC-135 and KC-10 aircraft and personnel positioned properly to more effectively fuel the fight overseas. AMC continues to work to gain air refueling efficiencies by focusing on practical combat tactics and operational training and employing assets effectively to meet our national security objectives in a variety of operational environments around the world.

A&M: With the Air Force's tanker and cargo fleet aging and enhancements to the KC-135, C-130 and C-17 airframe modifications coming online, please discuss areas such as propulsion and avionics upgrades that are helping extend fleet operational life cycles.

Brig. Gen. Bleymaier: Our propulsion systems across all fleets are performing well, with no immediate operational life-cycle limitation identified. However, the sustainment enterprise is always looking for economic opportunities to improve performance and gain fuel efficiency. An example of a reliability improvement modification can be seen on the KC-135's F108 engine. These engines are currently receiving a CFM Propulsion Upgrade Program (C-PUP) overhaul during their depot maintenance cycle. During the F108 C-PUP, upgrades are made in the compressor and turbine section to improve fuel efficiency and extend engine time on the wing and out of the depot.

Conversely, most avionics modifications are made to either address new operational requirements, like automatic dependent surveillance-broadcast out, or obsolescence issues, like multifunction displays. These avionics modifications keep our fleets operationally viable in an environment that is changing at an accelerated rate. The speed of change is so great that our program office avionics teams are working hundreds of projects to ensure the next obsolescence threat is identified early enough for the acquisition process to procure a replacement before we reach the point of zero supportability.

Of course, the increased velocity of avionics changes means more time down for major modifications, which again is good for mission readiness but not so good for aircraft availability. Therefore, the sustainment enterprise spends a great deal of time developing precise master schedules to stack, or integrate, modification and heavy maintenance activities during the same aircraft nonavailability period. While not always possible, these deliberate scheduling processes have a positive impact on aircraft availability.

KC-135 Block 45 is the first stop in updating and modernizing that airplane to improve reliability and maintainability with reduced operating costs. The Block 45 commercial off-the-shelf Air Force acquisition program will extend the KC-135 as a viable weapon system beyond fiscal year 2040.

This modification upgrades or replaces 63 items such as analog instruments, which are considered high-maintenance or obsolete altogether, and completely remodels the inside of the flight deck with new liquid crystal displays, radio altimeter, autopilot, digital flight director, and other computer module updates. This modification takes your 1950s-era tanker and makes it a 21st-century asset that is as modern as any flight deck we have in the Air Force.

In most Mobility Air Force (MAF) fleets, aircraft structure is the life-limiting component. In fact, one of the biggest threats to long-term serviceability is corrosion. As our aircraft age, depot technicians are finding more and more corrosion in every heavy maintenance inspection cycle. Our sustainment partners in Air Force Materiel Command work tirelessly to prescribe the right inspection interval and repair techniques to mitigate the corrosion threat, but it continues to grow.

For most MAF fleets, that means extra time in programmed depot maintenance so the unplanned work, also known as "over and above" work, can be accomplished to remove the corrosion, replace structurally damaged parts, and apply corrosion-prevention products. The good news is that these efforts are protecting the long-term serviceability of our aircraft.

A&M: In terms of preventive maintenance and proactive diagnostics for determining future failure, what is being done to help fleet operability remain high?

Brig. Gen. Bleymaier: Here in AMC, the command's mission demands are insatiable. Our operations run 24 hours a day, 365 days a year, with aircraft taking off every 2.8 minutes somewhere around the globe. This amount of activity requires the command to continuously look for innovative solutions that bring increased capability and ultimately increased lethality and readiness.

We are focused on transforming our maintenance enterprise to one that is more predictive and based on prognostics as opposed to diagnostics. This will allow us to drastically reduce the amount of unscheduled maintenance we perform on a daily basis. Big data and predictive technologies will allow us to perform all of our maintenance in a scheduled environment, improving aircraft availability tremendously and bringing direct impact to the Warfighter.

AMC is also looking at unique ways to partner with Lockheed Martin and Impact Technologies to do similar data collection and analysis on the C-5. That effort will focus on some of the jet's key systems, like landing gear and air conditioning to enhance predictive maintenance.

AMC is taking a deliberate fleet management approach to maximize the health and service life across the mobility fleet of aircraft. This process, the Total Force effort to sustain and modernize the fleet, is a holistic approach designed to bring greater success to modernization and sustainment of the mobility fleet of aircraft than any single effort would.

The three lines of effort are to adjust the Rapid Global Mobility (RGM) recapitalization plan, execute a reciprocal transfer of aircraft, and provide common configurations, modifications, and capabilities for the C-17 fleet.

Information on the recapitalization of RGM aircraft is currently found in multiple sources, including reports to Congress, Core Function Support Plans, the Air Force Resource Allocation Plan, and various independent research agency reports. The RGM recapitalization plan is the first attempt to consolidate this information into a single source detailing the desired way forward for the MAF fleet. The recapitalization plan is the foundation of the future of fleet management, allowing the command to extend the service life and decrease associated costs.

The reciprocal transfer of aircraft is a deliberate approach to swap aircraft across components to redistribute the equivalent flying hours across the MAF C-17 fleet. If the MAF can systematically vary the usage of airframes, it will have a significant impact on the life span of the C-17 fleet. This process is already established with the KC-46 and will be a seamless part of employment.

Providing common configurations, modifications, and capabilities works to identify equitable and effective aircraft capabilities across components to enable additional sustainment and modernization plans. By defining unit capability necessities, it allows for a greater potential of reciprocal transfers. Future fleet-wide modifications will occur with a phased standardization approach to enable greater potential for reciprocal transfer of aircraft while maintaining unit mission capability with the goal of ultimately extending the service life of the MAF C-17 fleet.

As aircraft continue to age, the demand placed on our skilled maintainers will only increase. AMC must continue to align with agile commercial practices and work across the total force. As a nation, we can't afford to wait for aircraft parts to fail. We can't afford to put a "patch" on potential challenges awaiting the MAF. The good news is: As technology advances, we have opportunities to leverage best practices to accelerate our journey toward better predictive maintenance applications and a more effective force for the future.

More info: http://www.amc.af.mil

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Air Force Stands Up Rapid Sustainment Office

The U.S. Air Force is setting up a new office to quickly demonstrate speed, cost savings, and efficiency in the sustainment of its weapon systems.

Secretary of the Air Force Heather Wilson announced the establishment of the Air Force Rapid Sustainment Office (RSO) July 25. It dovetails efforts to support the National Defense Strategy and quickly transition innovative and transformational technologies that enhance readiness and lethality.

Focus areas for the RSO include predictive maintenance and agile manufacturing techniques, such as additive manufacturing and cold spray repair technologies. The RSO will also emphasize results in robotics and automation, corrosion detection and repair, nondestructive inspection, and advanced composite repair technologies.

Details on the RSO structure are being worked by Air Force Materiel Command (AFMC) and the Office of the Assistant Secretary of the Air Force for Acquisition, Technology and Logistics.

Heather Wilson
Secretary of the Air Force

The two-year test program will address sustainment of aging fleets in a way that is both efficient and responsible to the U.S. taxpayer. It will focus on rapid sustainment that will significantly drive down costs and deliver faster solutions to the field. If the office demonstrates "positive return on investment" over time, the service will consider a transition to a permanent office.

"We will no longer pay premiums for things we can manufacture on our own," said Wilson.

"We will leverage agile manufacturing and reform legacy sustainment processes to drive down costs and meet warfighter needs rapidly."

Wilson added the Air Force will implement and immediately scale any opportunities to address sustainment challenges at lower costs discovered by the Rapid Sustainment Office.

During a live broadcast interview July 25 with *The Washington Post*, Wilson held up a trim wheel for the KC-135 tanker as an example of the promise these technologies will bring to the Air Force and DoD.

"The company that makes them is no longer in business," she told host, David Ignatius. "We [the Air Force] reverse-engineered this and 3-D printed it. ... This part cost about 50 bucks, 55 bucks including all the engineering and everything else. If I had to go out to industry and have them set up the traditional way to do it and buy one part, this is over 700 bucks. So, we can drive down the cost for a part that is airworthy."

The service already uses 3D-printed parts, including metals, particularly in older legacy aircraft where diminishing sources of supply is a factor, AFMC spokesperson Derek Kaufman said. The C-5, for example, is flying nine different printed parts.

Meanwhile, the Materiel Command's Air Force Research Laboratory is studying various metal powders used in additive manufacturing to qualify materials and processes for potential critical safety of flight applications. And the Ogden Air Logistics Complex at Hill Air Force Base, Utah, is already utilizing robotic lasers to de-paint F-16 aircraft faster and with less waste.

The Air Force hopes the RSO will demonstrate this combination of technologies is win-win for the DoD and the taxpayer and will transform future sustainment and supply chain operations.

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DLA STREAMLINES SUPPORT TO NUCLEAR MISSILE PROGRAMS

Increasing speed and efficiency is a vital component of any successful maintenance program. Defense Logistics Agency personnel collaborated and came up with a way to reach that goal, improving their support to the missile maintenance process.

By Cathy Hopkins, DLA Aviation Public Affairs

The 91st Missile Wing's Missile Maintenance Teams of Minot Air Force Base perform maintenance on the Minuteman III Intercontinental Ballistic Missile. (U.S. Air Force photo by Airman 1st Class Kristoffer Kaubisch)

Streamlining the process of acquiring parts for programmed depot maintenance at intercontinental ballistic missile launch facilities and launch control centers is not a simple task, but that is just what Defense Logistics Agency (DLA) Aviation personnel at Ogden, Utah, recently did.

The DLA Aviation at Ogden teams, led by Chris Guzman, DLA customer support manager, and Travis Nelson, chief of the Storage and Distribution Division, devised a way to combine all necessary parts for maintenance work into a single set so that customers did not have to get their parts piecemeal through commercial distribution or transactions. In doing so, they sped up the process, making it much more efficient and, along the way, being good stewards of a DLA investment.

That investment amounted to more than $125 million between 2015 and 2017. The multi-million-dollar investment was for additional repair parts inventory to improve DLA's support to the DoD Nuclear Enterprise. This includes maintaining the readiness of the U.S. nuclear triad of submarines, bombers, and intercontinental ballistic missiles (ICBM).

Taking On the Challenge

Last year, Guzman said, the 309th Missile Maintenance Group at the Ogden Air Logistics Complex on Hill Air Force Base asked DLA to provide services as if its ICBM launch facilities (the missile silos and the attached buildings) and control centers (where the crew stands watch and, if ordered, launches the missile) were to be inducted into programmed depot maintenance (PDM). DLA Aviation became the agency's lead, supporting the industrial customer in the 309th and fielding the first retail support for ICBM PDM.

Determining what DLA could do "was a monumental task," Nelson said. "It took a lot of knowledge and research to … ensure [DLA] not only supports customer requirements but does so in the most cost-advantageous way," he said. "Our question was: How do we package and deliver all the needed parts in one fell swoop?"

Nelson, who operates DLA's point-of-use shop supporting the ICBM launch facility and launch control center PDM efforts at Ogden, said he posed the question to his employees, who came up

Senior Airman Andrew Parrish, 90th Missile Maintenance Squadron topside technician, performs maintenance on a reentry system in the F. E. Warren Air Force Base missile complex in Wyoming. (U.S. Air Force photo by Airman 1st Class Braydon William)

with the idea of creating a self-contained build set somewhat like a shop service center, with all the parts the mechanics need in one place. The idea resulted in a developmental package of almost 300 parts approved by the Air Force engineering community, supporting 23 maintenance tasks. The concept met the 309th's goal to have parts delivered to the site, by task, enabling depot field teams to do maintenance more efficiently and eliminating supply wait times, Guzman said.

"Delivery is based on a program depot maintenance schedule," Nelson said, "but behind the scenes, we need to work with materiel management and DLA Distribution to ensure materiel is available in the [shop service center] for the build sets before they have to deploy to get to the site on schedule."

The build set consists of both repairable and consumable parts, transported by DLA Distribution on 48-foot flatbed trucks to launch facilities at F.E. Warren Air Force Base, Wyoming; Malmstrom Air Force Base, Montana; and Minot Air Force Base, North Dakota.

Travis said DLA owns materiel in the build set when it's sent out, which is different from normal agency inventory management processes where the customer requisitions a part and pays for it before delivery. Here, the Air Force doesn't own build set parts until it uses them, and the service isn't billed until the build set is inventoried when it returns to Hill Air Force Base. Then the build set is resupplied and returned to inventory for reissue. With the new build sets, DLA can now monitor and purchase based on fill and use rates.

Ironing Out the Kinks

Since last year's initial collaborations with the Air Force engineering community and first steps to lay out stock for the launch facility container build sets, both agencies have continually made refinements.

After about three build sets had been sent to the Air Force bases tasked with performing ICBM PDM, the Air Force decided to change from the developmental packages to a list of needed parts—referred to as a bill of materials (BOM)—in late May 2017.

To this day, DLA and Air Force personnel continue modifying the BOM, revalidating it against its own drawings and technical data part numbers, even while it continues to send the existing containers to the maintainers, who in turn help finesse the required parts and quantities needed as they perform their maintenance tasks.

Nelson said his employees are constantly on the lookout to verify the correct parts are entering the supply chain. In recent months, they've worked with Government Industry Data Exchange Program and DLA Stock Readiness, using multiple databases to identify suspect parts as soon as possible and to ensure those parts don't get into the supply system.

"Our employees really earn their way; we set challenges, and they help generate solutions," Nelson said. "The most important skill set my inventory team has is their ability to think innovatively and their willingness to assume accountability."

Guzman said revalidation allows DLA to procure specific nuclear requirements to meet configuration management mandates. It also may soon result in decreased supportability while DLA procures new stock resulting in a temporary supply of old excess stock, but this was a risk the agency was willing to assume to meet the Air Force's initial needs this past year.

Both DLA and the Air Force experienced challenges as the switch to a BOM was made based on inaccurate or insufficient technical data packages, but they worked through the problems. In the first third of 2018, the fill rate for build sets was just over 84 percent.

"In fact, the last three shipments average fill rates of 86.2 percent," Guzman said.

The implementation of launch facility PDM was a collaboration among DLA's suppliers, customers, and three of its major subordinate commands: DLA Aviation, DLA Troop Support, and DLA Land and Maritime.

Always Looking to Improve

Despite their success, the team is always looking for improvements. One is to buy single items to meet build set needs, said Guzman.

"During proof of principle, DLA had to put a box of 100 pieces in the containers for a task requiring one bolt," he explained. "Now the activity can put in one bolt, billed as part of indirect costs of the integrated prime vendor contract for that part instead of the customer having to submit a requisition for 100 parts that may sit around."

A problem with using build sets to perform PDM is the actual time the build set is at the Air Force wing location. Guzman said the maintenance totals 51 flow days. Flow days are measured from when the site is opened and maintenance begins until repairs are completed. DLA sends out the build sets a week before maintenance starts.

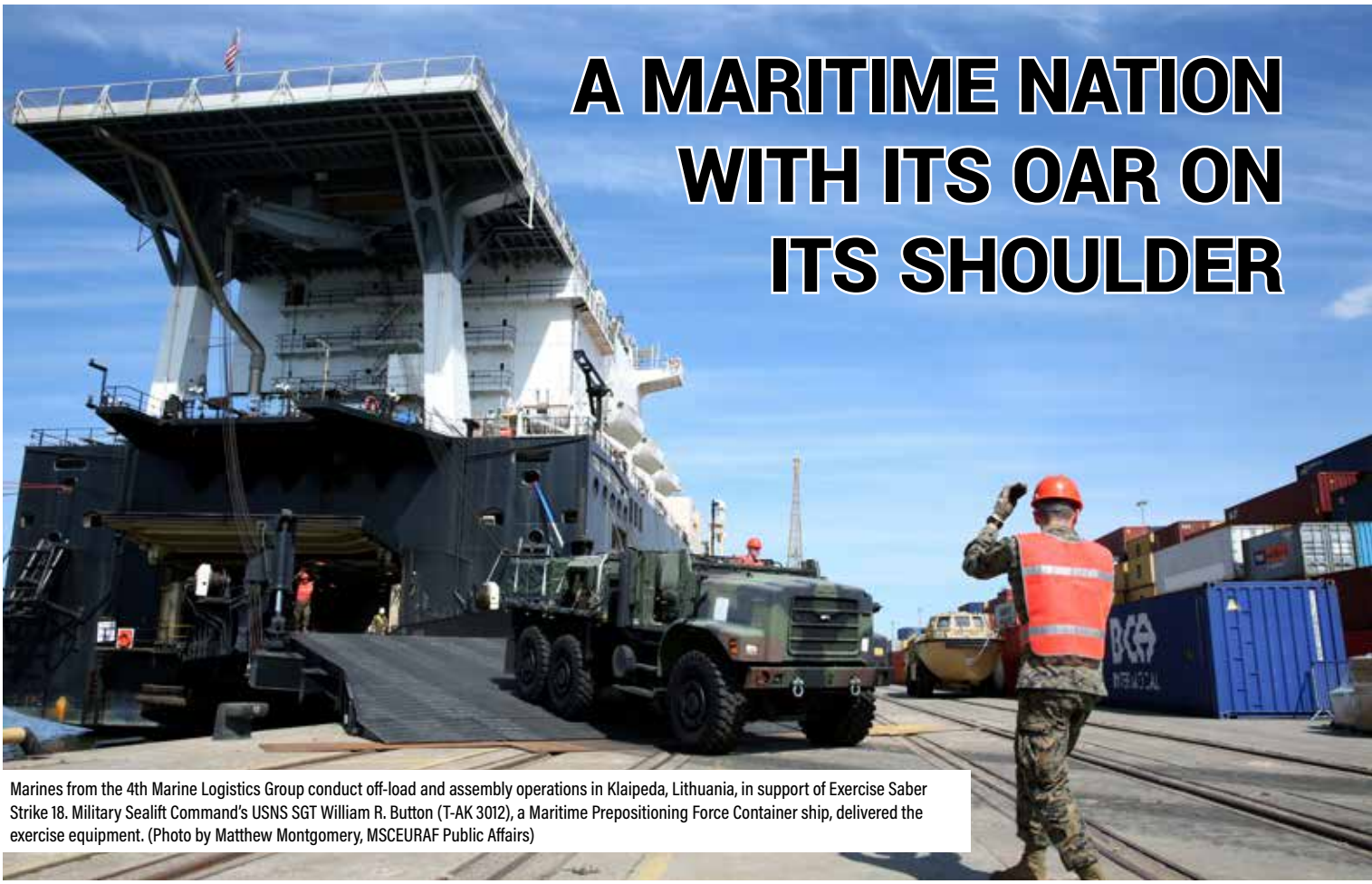
"There are sometimes delays that are weather-related, due to Air Force schedule adjustments or competition for resources, guards, and technicians," Guzman said.

Because delays happen for a variety of reasons, DLA Aviation has 12 launch-facility build sets available and will send three to four sets to a site depending on the site's maintenance schedule needs. Each build set is designed to support one PDM for a launch facility or launch control center.

The initiative has minimized equipment handling, reduced costs for unused items, saved labor hours, raised visibility of parts shortages, guaranteed constant visibility of inventory, and reduced storage requirements. DLA Director Army Lt. Gen. Darrell Williams awarded this cross-functional team his Director's Strategic Goal: Process Excellence Award for its efforts.

More info: dla.mil

A MARITIME NATION WITH ITS OAR ON ITS SHOULDER



Marines from the 4th Marine Logistics Group conduct off-load and assembly operations in Klaipeda, Lithuania, in support of Exercise Saber Strike 18. Military Sealift Command's USNS SGT William R. Button (T-AK 3012), a Maritime Prepositioning Force Container ship, delivered the exercise equipment. (Photo by Matthew Montgomery, MSCEURAF Public Affairs)

The character of war is changing drastically. The reality is that adversaries contest every battle domain, and even the sealift of supplies to military personnel overseas—crucial for projecting American power throughout the world—can be disrupted. To ensure readiness, modernization, and a strategic advantage, it is imperative that U.S. Transportation Command move forward and not rest on the laurels of its past dominance in the sea domain.

By Gen. Darren W. McDew, USAF, Commander, U.S. Transportation Command

At the United States Transportation Command (USTRANSCOM), our job is to transport the U.S. armed forces around the world to wherever our nation needs them to be in peace and war, and then sustain them once they are there, whether those forces are simply on watch or in the fight. Whether it's delivering an immediate force tonight or a decisive force when needed, the men and women of USTRANSCOM stand ready to deliver on behalf of our national objectives—anytime, anywhere.

The United States of America is the world's only superpower. Our country maintains this status because of its global influence and ability to project power into an adversary's near abroad at the time and place of its choosing. A global, warfighting combatant command with functional responsibilities, USTRANSCOM has the role of projecting and sustaining power, a role that is the cornerstone of the Joint Force's efforts to meet national policy objectives.

Moving Forward to Ensure Readiness

USTRANSCOM has been successful for 30 years, but the nation is at an inflection point, and we must evolve to remain viable in the future. Volatile geopolitics, shifting demographics, and emerging technologies are changing the character of war. These considerations are changing societies and the way we fight; they are also changing why and where wars are fought, and who is fighting them. Today, every domain is contested, with conflict unconstrained by geographic combatant command boundaries or principles of sovereignty. Lower barriers of entry are expanding our adversaries' access to disruptive technology, placing our technological superiority at risk. Mobility forces may be required to transport and sustain U.S. and allied forces while under persistent multidomain attack, including deception and data manipulation in cyberspace. We face the most complex and volatile security environment in recent history. Our past successes will not ensure success tomorrow.

The Joint Force has taken domain dominance for granted for 70 years, but we can no longer assume logistics will arrive in theater unchallenged by our adversaries. In an effort to better understand contemporary threats and operate effectively in the current context, USTRANSCOM hosts a series of contested environment wargames and summits. Lessons learned from these events drive changes in how we plan for attrition, cyber, mobilization, authorities, access, and command and control.

For example, we now more fully consider the attrition of organic sealift and airlift fleets in our planning and requirements analysis, as well as the need for global mission command of disparate mobility forces. A growing realization that the homeland is no longer a sanctuary led us to plan for denied access to our own strategic nodes as well as those

abroad. Our analysis revealed that an adversary can derive immense strategic benefit from cyber operations alone. The reality of our time is that adversaries no longer have to stop us with bombs or bullets; all they have to do is slow us down with ones and zeroes. Yet our preparation for these challenges cannot exist solely on paper. We must make some tough fiscal decisions today, prioritizing readiness and modernization to ensure our strategic advantage tomorrow.

In a contemporary environment filled with uncertainty and rising geopolitical tensions, the logistics enterprise must always be ready. Key to this preparedness is USTRANSCOM's effort to set the globe for logistics on behalf of the Secretary of Defense and the Chairman of the Joint Chiefs of Staff, continuously shaping the nation's ability to respond to simultaneous threats within a transregional, multidomain, and multifunctional security environment. With our global perspective and responsibilities, this command is uniquely postured to balance resources worldwide and understand the risks associated with surging and swinging mobility assets between theaters.

Gen. Darren W. McDew, Commander, USTRANSCOM, presents a lecture to Marine Corps War College students at Marine Corps University, Quantico, Va., about leadership and global military transportation. (U.S. Marine Corps photo by Kathy Reesey)

Sealift: the Building Block of Lethality

As we seek to carry out the Secretary of Defense's direction to restore readiness and increase lethality, the resources necessary to transport and sustain the Joint Force must keep pace. I want to focus here on sealift, a capability upon which our ability to build lethal combat power where we need it relies heavily. When the United States goes to war, USTRANSCOM moves 90 percent of its cargo requirements with the strategic sealift fleet, which consists of government-owned ships augmented by the commercial U.S.-flagged fleet.

The ability to deploy a decisive force is foundational to the National Defense Strategy, as the size and lethality of the force are of little consequence if we are unable to project power in the pursuit of national objectives. Therefore, the readiness of the entire strategic sealift portfolio, both organic and commercial, remains the top priority for USTRANSCOM. In this arena, we work closely with the maritime industry and other commercial partners, because we cannot accomplish the mission without them.

Marching Back to the Sea

As we think about where our nation is today in its relationship with its maritime roots, it is instructive to look back to the past—in this case, all the way back to *The Odyssey*, Homer's epic poem now almost 3,000 years old.

In *The Odyssey*, the hero Odysseus is pursued by the sea god Poseidon and descends into hell. He asks the ghost of a blind seer what he can do to pacify the sea god. The seer tells Odysseus that when he returns to the land of the living, he must march inland with an oar on his shoulder. And he must keep walking inland until he comes to a land where men know nothing of the sea—where they don't season their food with salt and have never seen a ship. Odysseus will know he's gone far enough when someone points at the oar on his shoulder and asks what that oddly shaped pole is. Only then will he be safe from the sea god.

This idea has stuck around. For millennia, retiring sailors have spoken of putting their oars on their shoulders. By settling down far from the ocean, retired sailors find it easier to resist the temptation to return.

The United States, as a nation, has put its oar on its shoulder and started marching inland. We remember how hard it is to be at sea. We remember the backbreaking work and the months away from family. We remember the pain and sweat and how hard it is, how expensive—especially how expensive—it is to build American ships and crew them with bold American mariners. In our dread, however, we have forgotten the joy of plowing the restless wave. We have forgotten the majesty of the sea. Even worse, we have forgotten how vital commercial vessels—American commercial vessels—are to our war effort and, more broadly, to our way of life. How do we take our forces to foreign shores without ships, which take years to build? How do we surge our shipbuilding in time of war if our shipyards are shuttered and our mariners are retired, if there's no present generation of shipwrights and sailors to teach the next one? America must remember that it cannot take the war to the walls of Troy without ships. It's time our country finds its way back to the sea.

I'm a career Air Force officer, but I understand that it is simply not possible for our nation to project combat power into an adversary's near abroad without having a robust and capable American maritime force. A single Large, Medium-Speed Roll-on/Roll-off (LMSR) vessel can transport the equivalent of approximately 400 C-17 Globemaster aircraft loads of materiel. That's almost twice the number of C-17s in the entire U.S. Air Force inventory. To take our Army to war, we must have ships, and for us to have confidence in those ships and their crews, they must sail under the American flag.

Our U.S. flagged fleet has declined from 1,288 in 1951 to 81 vessels operating in international trade today. That reduction also means our merchant mariner talent pool has diminished. We must acknowledge the reality of our aging sealift fleet. We cannot delay the process to recapitalize our sealift fleet. Recently, Congress has given the Department of Defense authority to purchase used vessels. Acquiring used ships reduces the time needed to increase our capacity with relative quickness. If we wait to build new ships, we won't even lay the keel until the late 2020s, with sea trials in the early 2030s, so the strategy of buying used, combined with a thoughtful shipbuilding plan for the future, is simply common sense.

Our adversaries know that our sealift fleet is aging. The sealift required to project American power anywhere on the globe is a vital capability that is foundational to our role as a superpower, not merely one of a few great powers. I hope you will join me in advocating for renewed investments in our U.S. flagged fleets, talent pool, and future technologies that will ensure America's global presence always represents the strength of freedom and our country's ideals.

CALENDAR OF EVENTS

AUG 21 - 23
Army Science and Technology Symposium
Washington, DC
Ndia.org

AUG 21 - 22
Modern Warfare Symposium
Ft. Bragg, NC
Globalsofsymposium.org/mws

AUG 22 - 24
Counter UAS
Arlington, VA
Counteruas.iqpc.com

AUG 23 - 26
PA HazMat Tech Conference
Champion, PA
Pahazmat.com

SEP 5 - 7
Interdrone
Las Vegas, NV
Interdrone.com

SEP 10 - 14
VA HazMat Conference
Norfolk, VA
Vahazmat.com

SEP 12 - 13
Military Tactical Communications Summit
Alexandria, VA
Tacticalcommunications.dsigroup.org

SEP 15 - 16
Global ID Summit
New York, NY
Globalidsummit.iqpc.com

SEP 17 - 19
AirSpaceCyber Conference
National Harbor, MD
Afa.org

SEP 17 - 20
COPS WEST
Sacramento, CA
Cpoa.org/event/copswest-training-expo-2018/

SEP 18 - 20
Military Police and Law Enforcement Expo
Fort Leonard Wood, MO
Mpraexpo.com

SEP 20 - 21
US/CAN Border Conference
Detroit, MI
Beyond-border.com

SEP 23 - 27
GSX 2018
Las Vegas, NV
Gsx.org

SEP 25 - 27
Modern Day Marine
Quantico, VA
Marinemilitaryexpos.com

OCT 1 - 2
DNSIS
Norfolk, VA
Defenseleadershipforum.org

OCT 8 - 10
AUSA Annual Meeting
Washington, DC
Ausameetings.org

OCT 9 - 12
LOA Symposium
Oklahoma City, OK
Logisticsymposium.org

OCT 22 - 24
Homeland Security Week
Hyattsville, MD
Homelandsecurityweek.com

NOV 13 - 14
EOD/IED Countermine Symposium
Alexandria, VA
Countermine.dsigroup.org

NOV 14 - 15
ISC East
New York, NY
Isceast.com

DEC 17 - 20
DoD Maintenance Symposium
Tampa, FL
Sae.org/events/dod

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IMPROVING AIRCRAFT PERFORMANCE AND REDUCING LIFE-CYCLE COSTS

With its C-5M engine's record-setting history and other industry achievements, GE Aviation has delivered effective capabilities for Warfighters through its sustaining, upgrading, and re-engining efforts.

Interview with Karl Sheldon

Karl Sheldon is Vice President and General Manager, Evendale Turbofan/Turbojet Department, GE Aviation, responsible for leading strategy and activities for the military combat engine segment as well as its derivatives and commercial applications.

A&M: How is GE helping the USAF improve the effectiveness of their airlift/tanker fleet?

Mr. Sheldon: GE is always working with the Air Force on ways to improve engine performance and deliver for the Warfighter. Through sustainment efforts, upgrades and re-engining programs, we've been able to increase engine performance and meet the evolving needs of the Air Force. GE has also been able to drive down life-cycle costs by making engines more fuel-efficient and more reliable with decreased maintenance costs.

A&M: What experience does GE have with re-engining aircraft?

Mr. Sheldon: GE has successfully re-engined Air Force aircraft three times: the Lockheed C-5 Galaxy, the Lockheed U-2 Dragon Lady, and the Boeing KC-135 Stratotanker. GE's F101 turbofan engine, originally developed in 1974 to power the B-1 Lancer, evolved into the CFM56 commercial engine and became the best-selling narrow-body engine in history. The Air Force then selected GE to re-engine the KC-135 with CFM56 engines in 1984 and leveraged technologies developed commercially in a core upgrade program, further improving performance and fuel efficiency. Additionally, GE's TF39 turbofan engine for the original C-5 in 1968 led to the CF6 commercial engine, the world's best-selling wide-body engine. The new technology developed for the CF6 came back to the military when GE re-engined the C-5 in 2004, creating the C-5M Super Galaxy. GE's proven experience evolving advanced technologies between the commercial and military communities brings the greatest engine performance and cost savings.

A&M: Can you tell us about the benefits that have come from re-engining the C-5?

Mr. Sheldon: The C-5M's incredible performance improvements earned it a nomination for the

2015 Collier Trophy. The nomination package included a quote from General Carlton D. Everhart II, commander of Air Mobility Command: "The C-5M is a game changer for Air Mobility Command. With unprecedented performance and reliability, it is rewriting how we move America's might around the world." The re-engined C-5 set 89 world records (the most by any single aircraft) and has 27 percent greater unrefueled range, 22 percent increased thrust, access to twice as many airfields, 40 percent better mission capable rate, and three times reduced maintenance man-hours. The vastly improved reliability of the C-5M decreased its logistical footprint, requiring less personnel, less spares, less tooling and less depot visits. This re-engining enabled greater tanker availability for other missions and provided the confidence to utilize the platform in flexible ways as the combat environment and needs of the Warfighter continue to change.

A&M: Are there other re-engining programs on the horizon?

Mr. Sheldon: The Air Force has expressed interest in re-engining the Boeing B-52H Stratofortress, a timeless warrior for the Air Force since the 1950s. The Air Force wants to sustain the B-52 past 2050, and GE has two great options: our CF34 and Passport engines.

GE's CF34 engine is the best-selling regional engine in history. Similar to the CFM56 engines for the KC135, we upgraded the CF34 with generations of technology. The latest model, the CF34-10, entered service in 2006 and now has 26 million flight hours of experience and a 99.96 percent dispatch reliability. It's no surprise that CF34 engines power 98 percent of Western-built regional aircraft delivered in the past 10 years.

Our other option is the Passport engine, currently scheduled to enter into service later this year on the Bombardier Global 7500 and Global 8000 business jets. The Passport engine offers the newest technology, proven through a rigorous development and test program.

Both engines offer significantly better fuel burn rates, enabling increased range and time on station. Both of these engines also ensure no scheduled shop visits through 2060. We look forward to working closely with the Air Force and delivering the best results possible.

GE re-engined the C-5 with its F138 propulsion system, creating the C-5M Super Galaxy with multiple improvements, including increased range and decreased maintenance man-hours. (Photo courtesy of One Mile High Photography)

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