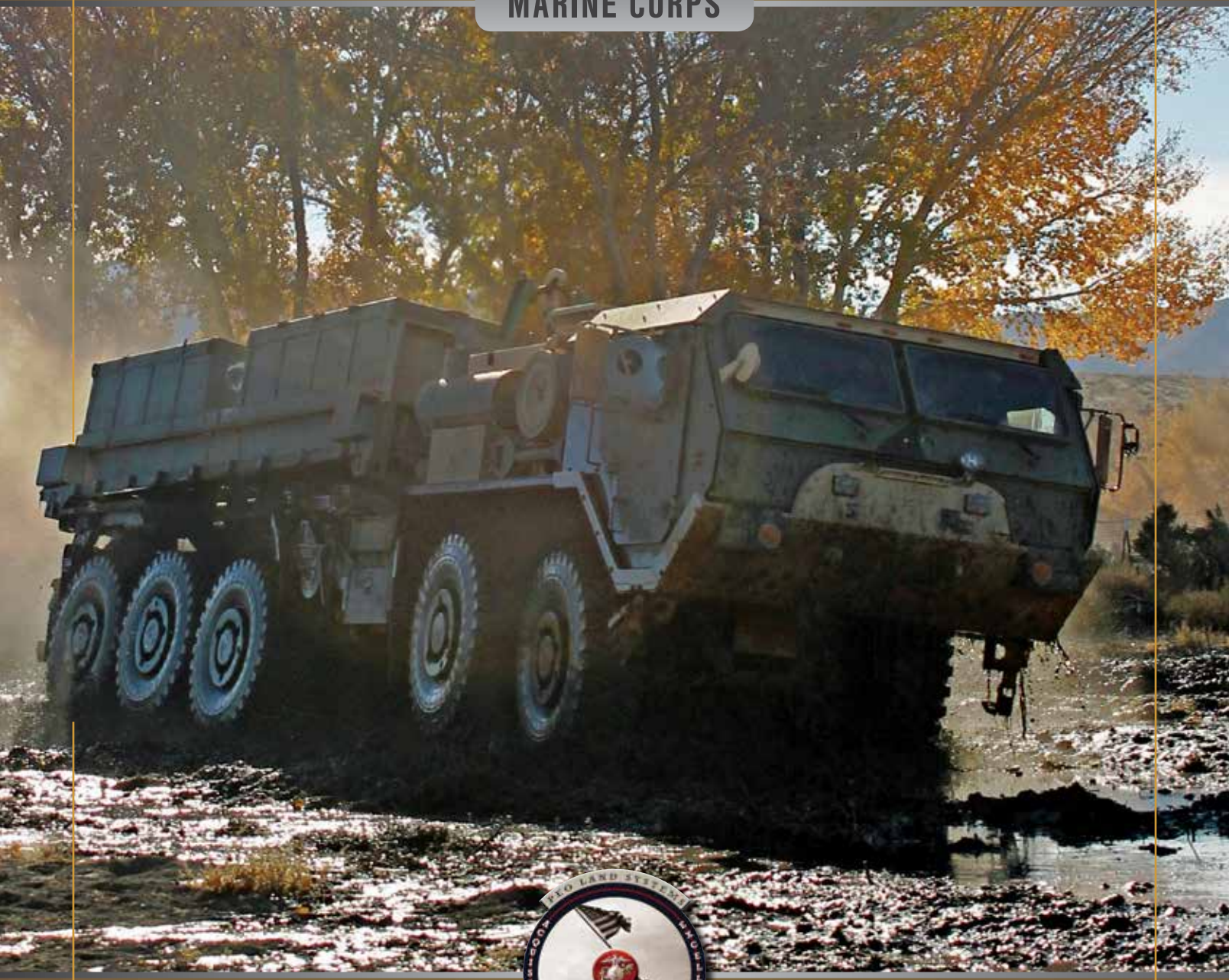
PROGRAM EXECUTIVE OFFICER
LAND SYSTEMS

MARINE CORPS



IT'S ALL ABOUT THE WARFIGHTER!

Program Executive Officer Land Systems

PEO LS

Science &Technology Focus Areas

MTVR

AAV

CAC2S

HMMWV

MRAP

G/ATOR

LW 155

ITV

GBAD

LVSR

JLTV

PEO LS S&T FOCUS AREAS

Power & Energy
- Fuel Efficiency
- Intelligent Power & Thermal Management

Survivability & Mobility
- Autonomy
- Corrosion
- Crew Visibility
- Fuel Containment & Fire Suppression
- Safety
- Weight Reduction

Modeling & Simulation

Open Plug & Play Communications Architecture

PEO LAND SYSTEMS

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U.S. MARINE CORPS PHOTO BY LANCE CPL. DEVIN G. JANTZI

INSIGHT WITH THE PEO

Maintaining disciplined, focused attention on acquisition programs enables PEO Land Systems to solve problems despite the uncertainty of the times

By David M. Branham, Congressional & Public Affairs, PEO Land Systems Marine Corps

"PEOs devote full-time attention to managing their assigned programs" – SECNAV INSTRUCTION 5400.15C

■ In a year that's been largely dominated by an uncertain budget environment brought on by automatic budget cuts known as sequestration, compounded by a 6-day government furlough during the summer, followed by a second four-and-a-half-day furlough in conjunction with an October government shutdown, begs the question: "Can it get any worse?"

Despite having to manage acquisition programs in this challenging environment with unstable budgets and unpredictable impacts like furloughs, PEO Land Systems seems to have found a winning formula for delivering required capabilities to meet the warfighter's needs as evidenced in having achieved the following milestones:

- 66 Joint Light Tactical Vehicle (JLTV) vehicles entered a 14-month government test effort in late summer 2013 which capped off a highly successful engineering, manufacturing and development (EMD) effort with the joint program garnering the Packard Award in the process (see PM LTV);
- Common Aviation Command and Control System (CAC2S) Phase I achieved full operational capability (FOC) in the fall of 2013 with final fielding at Dam Neck, Va. (see PM AC2SN);
- P-19 R (Replacement) Fire Truck entered into the EMD phase with Oshkosh Defense on contract to develop 164 vehicles, the first fire trucks procured by the Marine Corps in 30-years (see PM Medium/Heavy Tactical Vehicles);
- Flat Rack Refueling Capability (FRC) entered into full rate production (FRP) in late summer 2013 (see PM Medium/Heavy Tactical Vehicles);
- A Milestone C decision to send the Ground/Air Task Oriented Radar (G/ATOR) Program into low-rate-initial production (LRIP) is on track for January 2014 (see PM G/ATOR/GBAD).

Not a bad list of accomplishments for an organization that didn't even exist seven years ago. Now heading into its seventh year of operation, PEO LS is poised with mature competency-aligned resources across the engineering, logistics, contracting and finance domains to ensure assigned programs are well-supported for successful outcomes.

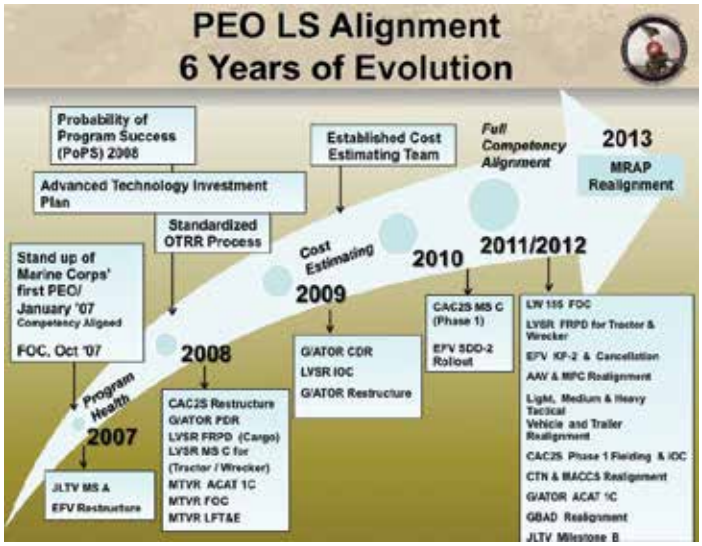
"Our major programs are in good shape right now, based on the president's budget request for FY 14," said Senior Executive Officer (SES) Bill Taylor, Marine Corps Program Executive Officer for Land Systems, recently in a speech before nearly 200 industry representatives at the Modern Day Marine Exposition held annually at Quantico Marine Corps Base, Quantico, Va.

To be sure, in the acquisition business, no achievement happens without a great deal of attention and effort behind it.

"Since the PEO's inception, we put into place robust, formalized, disciplined, standardized operating processes and procedures that have been proven throughout the rest of DoD," said Taylor.

One of the top strategic goals PEO Land Systems laid out at its first management off-site six years ago that still is intact today, is in establishing timely program reviews in a transparent environment where representatives of all various organizational stakeholders attend to receive insight into the acquisition

William E. "Bill" Taylor, Program Executive Officer Land Systems Marine Corps, speaks with defense media (Meg Eckstein, *Defense Daily* Congressional reporter at left and Lee Hudson, associate editor, *Inside the Navy* on the right) following remarks he made at the Sept. 26, 2013, "report to Industry" during Modern Day Marine at Quantico Marine Corps Base, Va.



programs they champion and provide clarification to program managers as they seek the solutions to the warfighter's requirements.

Referred to as "PMRs," the reviews include a detailed examination of the program using the Probability of Program Success or 'PoPS' methodology which PEO Land Systems matured and the Department of Navy adopted as the mandated standard across all of its acquisition programs. Each of PEO Land Systems' programs is subject to a Program Management Review (PMR) every quarter.

Another effort PEO Land Systems initiated is one that identifies and prioritizes the top technical issues within PEO LS with the goal of informing, influencing, and aligning science and technology (S&T) investments to resolve program technical issues and support transition of critical capabilities to the warfighter is the Advanced Technology Investment Plan or "ATIP."

"The ATIP demonstrates our continued focus on concept-aligned, capability-based technology transitions into programs of record and is designed to foster collaboration, align science and technology (S&T) investments and support effective technology insertion within PEO LS programs," said Taylor.

The ATIP can be accessed via the Office of Secretary Defense's Defense Innovation Marketplace (www.defenseinnovationmarketplace.mil/ATIP.html) which is a resource for information about Department of Defense (DoD) investment priorities and capability needs. Additionally, industry uses this site to submit proprietary independent research & development (IR&D) summary reports that are separately stored, accessed and used solely for compliance with the Defense Federal Acquisition Supplement.

PEO Land Systems' stewardship of resources also includes its management of the Transportation Demonstration Support Area (TDSA) which is geographically just south of Quantico Marine Corps Base and accessible via US Route 1.

TDSA has a Severe Off-Road Track (SORT) which is a permanent demonstration and evaluation course developed and constructed for the United States Marine Corps. It's the only track of its kind within the national capital region with obstacles that are primarily focused and designed to facilitate light tactical vehicles and intermediate tactical vehicle platforms up to medium tactical vehicles platforms. The two miles of severe unimproved perimeter track and trails feature numerous challenges designed to approximate the rugged terrain a vehicle or system may encounter in a military environment, paramilitary environment, or a border patrol assignment for homeland defense missions.

The SORT features severe hills with steep inclines and declines to evaluate a vehicle's capabilities, suspension design, braking ability, overall vehicle power and agility for all platforms and their installed systems. The SORT obstacles provide an alternation bump tie obstacle to assess suspension weaknesses, articulation, travel and resiliency. The staggered rock climb, perimeter track curves, hills, soft sand, pea gravel pit, and Rubicon boulder run, with large-diameter rocks, puts a vehicle through its paces to observe off-road capability and vehicle control. The variety and severity of the installed obstacles within the SORT provides the DoD and industry an opportunity to get a quick, informal assessment of real-world, off-road performance and address relevant transportability, interface compatibly solutions and address urgent needs.

TDSA was used extensively this past summer for the Joint Light

Tactical Vehicle (JLTV) engineering, manufacturing and development (EMD) vehicle demonstrations.

"In order to be effective in this new environment, we must maintain our forward influence, strategic mobility, power projection, and rapid response capabilities that Marines are known for today." – Gen. James Amos, Commandant of the Marine Corps before the House Armed Service Committee, Sept. 18, 2013

Although the future remains uncertain, PEO Land Systems is pursuing several technology development efforts in 2014 in which to provide additional improvements for the warfighter:

- Procurement of approximately 460 Seat Survivability Upgrade (SSU) Kits and 780 Egress Modification Kits involving front door upgrade, rear door with rear step upgrade, and exhaust for the mine resistant, ambush protected (MRAP) family of Marine Cougar vehicles.
- AAV Survivability Upgrade to improve force protection to the Assault Amphibious Vehicle (AAV) Personnel Carrier Variant platform.
- HMMWV SMI (Sustainment Modification Initiative-SMI) to improve the performance, safety and reliability of the ECV HMMWVs.

As 2014 takes shape, PEO Land Systems' stewardship of resources will be even more critical in balancing modernization and sustainment of assigned programs.

The reality of doing so is reflected in the statements before Congress this year of Gen. James F. "Jim" Amos, the 35th Commandant of the Marine Corps on the impacts of the uncertain budget environment:

"We're going to do more with less," said Amos.

PEO Land Systems will assist in helping build the most ready Marine Corps the nation can afford by remaining true to its moorings in devoting full-time attention to Marine Corps Weapon Systems acquisition, while partnering with Marine Corps Systems Command, in order to develop, deliver, and provide life-cycle planning for its assigned programs. ■

MRAP Is Added to the PEO LS Portfolio

■ On July 29, 2013, the Hon. Sean Stackley, Assistant Secretary of the Navy for Research, Development and Acquisition (ASN[RDA]), approved the alignment of the Marine Corps mine resistant, ambush protected (MRAP) vehicle program under PEO LS to optimize system capabilities across the entire tactical fleet, better align workload, consolidate expertise, and streamline the associated managerial and support structures.

On Oct. 1, 2013, the Joint Program Office (JPO) stood down and each service and special operations command became responsible for executing their new responsibilities for managing the enduring MRAP fleet.

With an approved enduring requirement of 1,231 vehicles, which includes route clearance, explosive ordnance, and mobility capabilities, the Marine Corps MRAP Program Office will be responsible for continued combat support operations, retrograde, and reset of vehicles and equipment.

Looking ahead, the program office will be responsible for divesting excess USMC vehicles and parts while redistributing assets for operational units, home-station training, and storage.

In addition, the program office will be working with the industrial base to procure approximately 460 Seat Survivability Upgrade (SSU) Kits and 780 Egress Modification Kits involving front door upgrade, rear door with rear step upgrade, and exhaust for the MRAP family of Marine Cougar vehicles.

The PM USMC MRAP Program Office is located in Stafford, Va. Lt. Col. Brian Seiffert is the Acting PM for USMC MRAP. Mr. Tom Miller, currently serving on the Joint Staff, has been selected as PM for USMC MRAP, with an arrival date in Spring 2014. ■

On July 29, 2013, ASN(RDA) approved the realignment of the MRAP program (which includes, top to bottom, the Cougar, M-ATV, and Buffalo variants) from Marine Corps Systems Command to PEO LS.

An MTVR powers through mud on one of the Nevada Automotive Test Center's (NATC) 3,000 miles of test courses.

EXPEDITIONARY MOBILITY

By Scott R. Gourley

Across its portfolio spectrum, one key characteristic of United States Marine Corps land systems involves its expeditionary mobility. From light personnel carriers to heavy logistics transport vehicles, the emphasis on expeditionary mobility is a defining performance trait for Marine Corps platforms.

"The Marine Corps has a fairly unique perspective when they look at vehicle mobility," offered Ben Garza, Marine Corps coordinator for Joint Center Ground Vehicles. "Based on its mission profiles, the Marine Corps looks at having the operational capability to support our expeditionary mission with all of our vehicle platforms."

Outside the Marine Corps, few individuals have more personal knowledge and experience with the underlying mobility mandates than Henry Hodges, Jr., president of the Nevada Automotive Test Center (NATC).

Founded in 1957, the independent proving ground in western Nevada includes a 6,200-acre main ranch site and 1,200-square-mile operational area with more than 3,000 miles of measured test courses.

"What we try to do is measure and quantify the environment that supports the expeditionary role of the Marine Corps," Hodges said. "And over the years – both on the commercial side and in support of the military – we have continued to measure, expand, and understand dirt. You have got to understand the soil and you have got to understand the conditions where these vehicles will operate. We put numbers to it and then give that data back to the Marine Corps, which uses the data as they see fit. But it is all focused on evaluating vehicles to the range of conditions in which they will be operating.

"And over the years that has allowed us to bring our knowledge – of the dirt and the terrain and the conditions and the roughness – and put those conditions in engineering terms that can be used by the Marine Corps," he added.

Hodges offered a historical image of "Twister," an extremely high mobility platform developed by Lockheed Missiles and Space that has been identified by many as the most mobile vehicle ever built by the Army.

"The Twister was a high mobility twin engine – front-powered/rear-powered – vehicle with roll, pitch, and yaw articulation," he explained. "And the reason that is significant relative to the Marine Corps is that their Logistics Vehicle System [LVS] purchased back in the 1980s represented the first application of a vehicle that had a center joint that allowed roll, pitch, and yaw, together with the associated mobility. Twister was really the precursor to that LVS platform."

Over the past several decades, NATC representatives have traveled the globe and returned with specific information on conditions and terrain elements subsequently incorporated into the test venue.

"Whether it's rice paddies, sand, or mountainous terrain, we want to be able to quantify how vehicles will perform in that broad range of conditions," he said. "And we stay globally current because we also work for corporations and organizations involved in large international infrastructure projects. Obviously they will want to pick vehicles that will do their best for those big projects. And that entire process helps the Marine Corps as well, because we are able to explore some of those most severe conditions, which also helps the Marine Corps in their expeditionary role."

"As an expeditionary force, the Marine Corps has to be very cognizant of those environmental extremes," Garza echoed. "I'm not saying that our vehicles are deployed without support, but the expectation for all of our vehicles is that they will perform very well with great reliability and reduced life-cycle costs across those environmental extremes."

Along with assured mobility, the engineering information is also used in modeling, simulation, and performance testing to help validate safety and survivability elements of the platform.

Garza and Hodges shifted from the testing and engineering foundation to explain how the NATC processes have been applied to the development of today's Marine Corps land systems as well as how it is being applied to future initiatives.

"In 'the old days,' people might say that they want to be able to operate cross-country in rough terrain," Hodges related. "Well, what does that mean? Are they talking about cross-country in Afghanistan? Iraq? Korea? All of those situations are different. So, in order to have a vehicle capable of worldwide expeditionary operations, you want to be able to quantify the information and bring it back to the Marine Corps so that they can do the necessary system evaluations to pave the way for an integrated vehicle design."

Three elements of soft-soil mobility analysis are depicted in this cube graphic.

"In order to really study worldwide operations accurately, you've got to pick some specific places," he continued. "So, early on, and in concert with guidance received from the Marine Corps, we selected five operational areas as 'representative' of a very broad range of conditions."

Those five representative operational areas and related conditions include: Costa Rica (wet/hot, coastal plains to mountains, and limited infrastructure); Philippines (wet/hot, monsoons, jungles and mud, and limited infrastructure); Southwest Asia (dry/very hot, desert/sand, open spaces, varied infrastructure); Norway (very cold/snow, mountains with channelized access, and moderate infrastructure); and Korea (dry to wet, hot to cold, urban areas and mountains, and limited to moderate infrastructure).

"This is not because the Marine Corps is going to land in Costa Rica," Hodges added. "But, in terms of South America, in an unclassified sort of way, it provides things like very interesting terrain, soil types, and heavy vegetation with grades. So, for each of these representative operational areas, specific missions were identified."

Garza noted that the specific mission sets included things like noncombatant evacuation, humanitarian operations, raids and seizures, and full-on, force-on-force combat.

"What's really important in that is that it allowed definition and measurement of everything from snow to jungle in engineering terms," Hodges said. "Prior to this, we tended to 'fight the Fulda Gap,' worrying about the plains of Europe and how to operate in that environment. And that emphasis had established a certain set of criteria, in things like 60 to 70 percent on-road and 30 to 40 percent off-road. And a lot of vehicles were developed to those profiles.

"In the early 1990s, the Marine Corps recognized that their expeditionary roles would further limit their access to improved infrastructures. In many cases they would not have infrastructure to exploit for mobility. And, quite honestly, that 1990s shift in emphasis on mobility and infrastructure has put the Marine Corps in a good position in places like Afghanistan," he added.

That mobility recognition in the early- to mid-1990s also supported a need to quantify those values on a worldwide basis. Moreover, it coincided with Marine Corps efforts to transition from their aging 5-ton logistics platforms to a newer model vehicle design.

The service's search for a "better 5-ton" included a look at expected operational terrains, recognition of the realities of a third-world roadway infrastructure, the need to navigate beach or littoral operational entry points, and the ability to perform in urban terrain environments. When combined with mobility and reliability issues from Desert Storm, the resulting Marine Corps Medium Tactical Vehicle Replacement (MTVR) requirements literally flipped the historical operational profile to reflect 30 percent on-road and 70 percent off-road operations.

"They needed that mobility and capability," Hodges said. "And this is the time frame when certain definitions were identified and established."

From an engineering perspective, the specific definitions encompassed figures for root mean square (RMS). At a "top level" view, it meant that the cross-country terrain RMS of 0.6 to 2 inches RMS for the historical Eurocentric mission profile was now reflected for MTVR as 1.5 to 4.8 inches.

"This was kind of a turning point," Hodges observed. "It meant that as an expeditionary force the Marine Corps looked at the terrain roughness and the severity of conditions associated with that requirement [and] they realized that their operational terrain would be considerably rougher than previously specified."

Applying those operational terrain differences to specific platform requirements eventually led to the acquisition and fielding of MTVR by the Marine Corps and the Family of Medium Tactical Vehicles (FMTV) by the Army.

"Similarly, there is a significant difference between the Palletized Loading System [PLS] for the Army and the Logistics Vehicle System-Replacement [LVS-R] for the Marine Corps," Hodges noted.

He added that most recently, the Army and Marine Corps worked closely to reach operational consensus on the JLTV.

PEO LS IMAGE

Comparative analysis of soft-soil mobility between the AAVP7, the MPC-TD, and the M1A1 Abrams tank, conducted at Sand Mountain State Park, Nev.

"The Marine Corps had previously established levels of roughness and, in discussions with the Army and recognition of how JLTV would be used in the future, joint service agreement was reached," Hodges said. "As a result, the JLTV now has terrain conditions, roughnesses, and severity that match what the Marine Corps identified and defined starting back in the mid-1990s with the MTVR."

From a developmental standpoint, the identification and definition of terrain leads to determination regarding overall system performance and capability. Specifically, once mission terrain profiles and environmental extremes are specified, requirements planners can identify how fast they want to cross that terrain; how much they need to carry; the reliability required; and system survivability mandates.

"When you integrate all those elements it effectively defines how much wheel travel you need to have, how big the tires have to be, how much traction you need, how big the motor has to be, and other on-board capabilities that might be required," Hodges asserted. "So by having the terrain measurement and then being able to sit down and work up your operational mode summary, you can define all those elements of an integrated design. And not only do you understand what the vehicle needs to be successful, but as the missions change going forward, you understand what you need to do to update or optimize that vehicle."

In terms of hardware, the Marine Corps mobility requirements process has also been fed by lessons learned through two decades of NATC Advanced Concept Technology Demonstration (ACTD) platforms for the MTVR, LVS-R, Combat Tactical Vehicle Technology Demonstrator (CTVTD), and Marine Personnel Carrier Technology Demonstrator (MPCTD). Each of the ACTDs built off previous efforts and incorporated additional capabilities onto the platforms.

"The MTVR was the first ACTD 'out of the box' in the early 1990s," Hodges said. "And it allowed the Marine Corps to bring a number of major technologies to the forefront. Those included things like geared reduction hubs, 1600R20 tires, and big motors. At the time, many people were saying that if you put a big motor in there you would kill yourself in terms of fuel economy. But as it turned out, a compliant suspension, with big tires, with a properly sized motor – in terms of payload delivered – has more than a 30 percent improvement over a solid-axle truck with a 250-horsepower Cummins installed. That's comparing the 5-ton to the MTVR."

He added, "The point is that the Marine Corps has been able to break down some of those vehicle design and performance paradigms to be very successful." As Hodges noted above, the same processes that feed new requirements development also allow planners to optimize the update/reset/recapitalization of existing vehicle platforms. An excellent example can be found in the new Marine Corps HMMWV Sustainment Modification Initiative (HSMI). The initiative is designed to help identify options for extending the viability of remaining HMMWV fleet elements that will not be replaced by JLTV.

"As the HMMWV has gotten so much heavier – in both the Marine Corps and the Army – it gets stuck a lot," Hodges said. "The M1165s and similar HMMWVs will get stuck at their current weights, whereas future vehicles, like JLTV, will not be getting stuck."

In support of HSMI, NATC has developed four different concept vehicle designs, each incorporating different enhancements in the areas of increased wheel travel and damper technology, larger tires with central tire inflation system, and upgraded power train. The designs also reflect a modular approach that would facilitate further cost-effective upgrades of the platforms with future new technologies.

Although focusing on wheeled vehicle performance, Hodges acknowledged that the issues were representative of a similar story regarding Marine Corps tracked vehicles.

"Mobility has always been key for the Marine Corps because of its expeditionary role," he concluded. "And because of that, the Marine Corps has invested in quantifying and making those measurements to ensure that those vehicles can be deployed and will successfully perform worldwide." ■

ROLLING TOWARD BETTER BUYING POWER 2.0

and Portfolio Management with the Joint Center for Ground Vehicles

By Daniel Pierson, Deputy PEO for Land Systems

When it comes to acquisition, it's safe to say affordability is foremost on the minds of defense policymakers and decision makers today. Achieving greater efficiency and productivity in defense spending is the focus of the acquisition community now and far into the future. This will require acquisition stakeholders and decision makers to come together at the enterprise level to maximize shrinking resources as well as leverage knowledge to make more informed decisions to produce better results for the warfighter.

It is in this context that the Joint Center for Ground Vehicles (JCGV) was undertaken just three years ago. The key to making the JCGV work will be how it is governed. We must bring the stakeholders and decision makers together to make more informed decisions at the enterprise level, maximizing available resources and knowledge.

Before explaining the JCGV construct and the benefits it can and will provide, one must first understand the benefits afforded under the Program Executive Officer (PEO) construct.

The PEO construct, in my opinion, has been and will always be at the core of how to best manage large to small acquisition program portfolios. Unfortunately, as I see it, the PEO construct has been underutilized by senior leaders at all levels.

These are organizations that each manage billions of dollars across the Fiscal Year Defense Plan and seldom get pulled in to share their knowledge and experience of what is working and what isn't. Historically, the tendency of senior leadership has been to focus on individual programs after problems have occurred. In doing so, valuable context can be lost when looking only at a single program, thus preventing a candid assessment of the complete problem set. A PEO can provide a much more holistic problem definition and broader solution sets across his or her portfolio when they are outlined in the context of the entire portfolio vs. a single system.

The Better Buying Power 2.0 initiatives (BBP 2.0) of Under Secretary of Defense for Acquisition, Technology, and Logistics (USD[AT&L]) Frank Kendall now are looking at programs in the context of the entire portfolio for which an individual system resides cross-service, with a focus on life-cycle affordability and an eye toward eliminating duplication of efforts. For this reason, I have faith that BBP 2.0 is on the right track.

I was working on the Joint Staff when the department was getting serious about portfolio management. We struggled to figure out how to manage from the Pentagon such large joint portfolios – including the command, control, communications, computers, intelligence, surveillance and reconnaissance (C41SR) portfolio – without standing up huge organizations to do so. We also realized the majority of information and subject matter expertise required to do portfolio management resided within the services where the work is done. It was when I became a deputy PEO that the light bulb turned on. PEOs routinely do portfolio management as a normal course of their daily duties.

Senior leaders of the Pentagon must learn how to harness this inherent capability they themselves have chartered PEOs to do and roll it up to a more corporate level. This would require that members of individual service headquarters staffs trust, and work closer with, their USD(AT&L) counterparts than is the case today in order to more effectively share information in a timely manner. Too much valuable information gets lost in the translation as a product is staffed through service staffs en route to USD(AT&L), not to mention the time lost. Not trivial, but doable and very much needed if BBP 2.0 is to achieve its full potential.

By having the understanding of what a PEO is and does, one can begin to understand why the JCGV construct is a powerful model – a model that could be applied to various other PEOs with "like" or related portfolios, a model that, if employed, could provide the building blocks for USD(AT&L) to have the ability to do portfolio management at the departmental or corporate level. After all, it is the PEOs who provide

U.S. Marines and sailors with the 24th Marine Expeditionary Unit drive HMMWVs toward the border of the Kingdom of Jordan after offloading from the Maritime Prepositioning Fleet ship USNS Sgt. William R. Button, during an MPF offload exercise in support of Exercise Eager Lion 12, May 7, 2012. The HMMWV is an example of a tactical vehicle used extensively by both the Army and Marine Corps, and is set to be replaced by the Joint Light Tactical Vehicle, an Army-Marine Corps joint program.

U.S. MARINE CORPS PHOTO BY CPL. MICHAEL PETERSHEIM

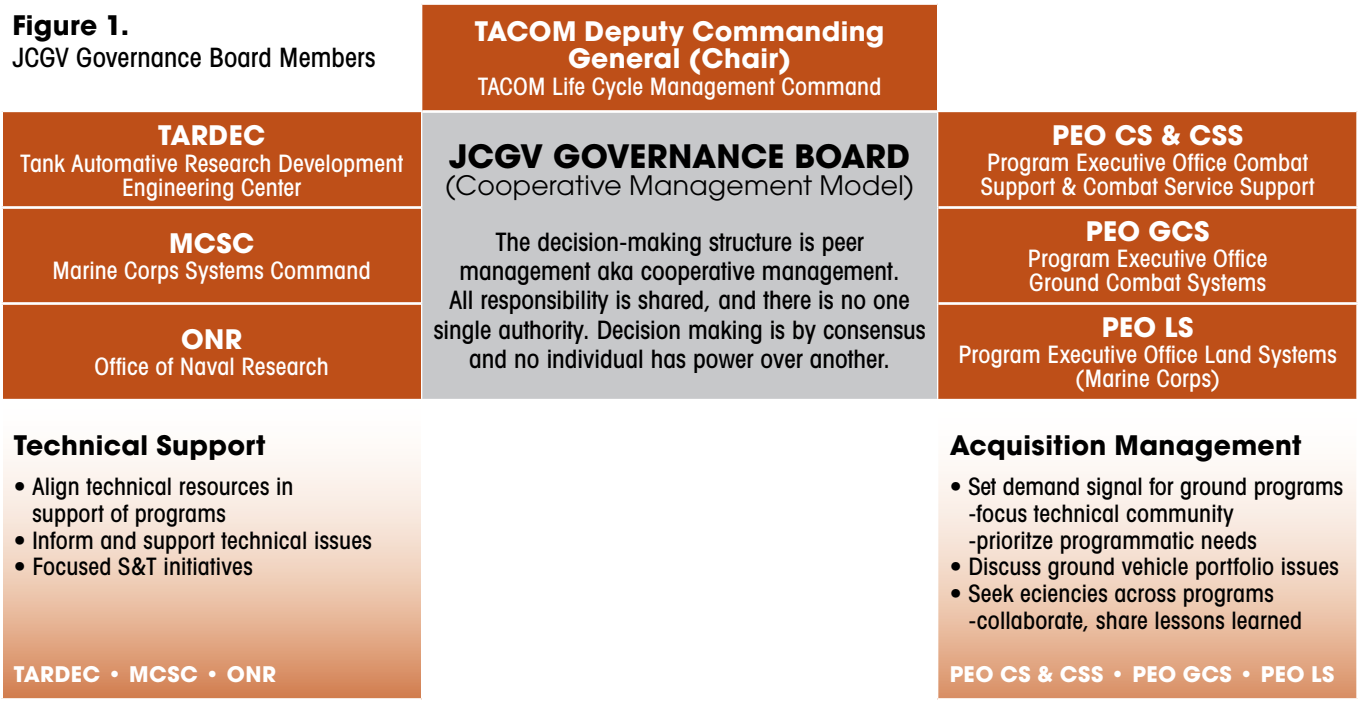
the routine direction and oversight of their assigned program managers (PMs) and have the most influence over their programs' success. Across and within the PEOs is where the majority of data and lessons learned exist from which to make meaningful change.

To reach their full potential, the JCGV model and BBP 2.0 demand better communication and routine collaboration from USD(AT&L) through the services to the PEOs and back to the USD(AT&L) without the laborious staffing processes currently established by each of the services' headquarters. A certain amount of trust and some ground rules must be developed to allow this level of collaboration.

Introducing the Joint Center for Ground Vehicles

Born from a "grassroots" effort as a Joint service construct, the Army-Marine Corps JCGV was launched three years ago by the organizations responsible for development, acquisition, and sustainment of the ground vehicle fleet. Today, the JCGV has the ability to provide a single authoritative voice in the ground vehicle community that could truly benefit the Department of Defense (DoD) and its industry partners by increasing efficiency, reducing costs, and synchronizing technology development – ultimately with the goal of improving the ground vehicle

Figure 1.
JCGV Governance Board Members



system development and acquisition domain across both the Army and the Marine Corps.

A key tenet of the JCGV is that it was formed from existing organizations and infrastructure with no additional layers of oversight. The JCGV does not exist in a physical building or change any existing authorities, but accomplishes its mission through open, centralized, collaborative governance, integrated planning and portfolio management, systems integration, technical expertise, and resource and data sharing. It exists throughout its founding organizations and infrastructure, with a center of mass at the Detroit Arsenal, the nation's Joint Center of Excellence for Ground Vehicles. The JCGV puts a deliberate focus on cross-cutting issues and synchronized technology development across the Army and Marine Corps ground vehicle efforts. This effort greatly enhances the technical community's ability to support our programs of record due to the sense of priorities and needs identified by the Governance Board.

The JCGV Governance Board

The key to the JCGV is the makeup of the Governance Board that guides and directs both the acquisition and technology communities in support of ground vehicle development (see Figure 1). The board is comprised of senior leadership from these organizations: PEO Ground Combat Systems (PEO GCS), PEO Combat Support & Combat Service Support (PEO CS&CSS), PEO Land Systems (Marine Corps) (PEO LS), Tank Automotive Research Development Engineering Center (TARDEC), Marine Corps Systems Command (MCSC), Office of Naval Research (ONR), and TACOM Life Cycle Management Command (TACOM LCMC) as the Governance Board chair. The makeup of this board, which meets quarterly with both acquisition and technical leaders, will better align technical efforts from across the Joint community to Programs of Record (PORs), providing checks and balances impacting investment decisions.

The board attempts to ensure member organizations function as an enterprise, looking at commonality across platforms and services and developing shared analytical services in systems engineering processes that result in accelerated acquisition.

The JCGV does not manage individual acquisition programs or limit existing authorities or responsibilities of the services; rather, it reduces costs and better aligns resources and initiatives. The board attempts to align the technical efforts across the joint community to match up with PORs. By placing a deliberate focus on cross-cutting issues that in the past were handled in "stovepipes," we now are providing essential checks and balances that impact investment decisions.

There have been numerous examples in the past few years where industry has directly engaged at the most senior levels of the services and USD (AT&L) with promises of system solutions seemingly effective for all their problems. Senior leaders expended a great many resources chasing these new "shiny objects" to no avail. The JCGV Governance Board could have been tasked to provide subject matter expert (SME) opinion and informational papers or reports that could have quickly contained these excursions with accurate data. There are many reasons industry goes around the technical community and acquisition chain straight to the top, the least of them an attempt to circumvent competition or accelerate the process. Our senior leaders need to prevent that and to trust their internal experts to better inform them of the true value and cost of what industry has presented. The JCGV

Governance Board has access to and represents the ground vehicle domain SMEs in their entirety and should be used appropriately as a sanity check by senior leaders who are approached by industry with proposed solutions.

Creating a Culture of Stewardship

The JCGV's quarterly Governance Board meetings, use of best practices, common tools, and processes, and continuous improvement to drive out inefficiencies, together with continued efforts to ensure a trained and ready workforce all add up to creating a culture of stewardship embodied in the recently released BBP 2.0. I don't want to overstate our actual progress with the JCGV effort. We still have much work to do. But such a model has great potential if properly employed and utilized at the USD(AT&L) level.

The JCGV can take ground vehicle development and acquisition to a whole new level. This will require senior-level buy-in and use of the Governance Board beyond how it now is used to run the JCGV. The JCGV's efforts ensure the member organizations function as an enterprise, looking at commonality across platforms and services and developing shared analytical services in systems engineering processes that result in more efficient and effective vehicle acquisition programs.

As a result of the JCGV-fostered collaboration, the science and technology programs between the Army and Marine Corps relative to ground vehicles never have been closer and more coordinated. One JCGV initiative seeks a common C4ISR architecture. Other JCGV initiatives include establishing common mobility requirements, common survivability testing standards, developing an operational energy evaluation and metrics definition, and documenting modeling and simulation tool sets/best practices.

Support of BBP 2.0 and Portfolio Management

The JCGV addresses the fundamental principles outlined in the BBP 2.0 Implementation Directive dated April 2, 2013. The Governance Board established under the JCGV is doing a lot of "thinking" by bringing together the three ground vehicle PEOs between the Army and the Marine Corps and the technology leaders who support them, chaired by the TACOM LCMC.

Together, they increase the professional judgment collectively across the joint ground vehicle domain. The Governance Board is focused on its workforce, our "people." We are forecasting the critical skill demands required in support of ground vehicle development to make sure the government maintains those skills needed for developing successful programs. The JCGV was built around "the basics" of what must be done to succeed, with an emphasis on our people, processes, organizations, and tools. We are able to "streamline" cross-cutting/cross-service "decisions" via the Governance Board.

The details of how the JCGV addresses or could address many of the seven areas of BBP 2.0 can be the subject of another article. My contention is that, if the model that the JCGV represents is embraced by our service leaders, department heads, and Congress, we could achieve much greater efficiencies and savings at the department level. From a portfolio perspective, each PEO in and of itself represents a portfolio. By grouping other "like" or related PEOs together as the JCGV has done, the building blocks would be assembled for portfolio management at the departmental, cross-service level. We just need to work through the service-level issues that impede or slow direct collaboration between the PEOs and USD(AT&L). This is recommended not to circumvent service leadership, or trump service positions, but rather to provide the USD(AT&L) with the most relevant and timely SME information to aid sound DoD decision making. ■

This article first appeared in *Defense AT&L*.

PM ADVANCED AMPHIBIOUS ASSAULT

By Scott R. Gourley

■ The late October 2013 release of a Request For Proposal (RFP) for the Assault Amphibious Vehicle (AAV) Survivability Upgrade Program is just one more example of the increasing tempo of activity within PEO Land Systems' Office of Program Manager, Advanced Amphibious Assault (PM AAA).

The new engineering and manufacturing development (EMD) program effort addresses design and integration services to improve the force protection of the Marine Corps legacy AAV personnel carrier variant platform.

Initially fielded in 1971, the AAV remains the primary general-support armored personnel carrier (APC) for Marine infantry. The AAV7A1 Reliability, Availability, Maintainability/Rebuild to Standard (RAM/RS) Family of Vehicles (FoV) previously underwent a series of capability enhancements to improve mobility and reliability and to extend the platforms' service life.

The Marine Corps' AAV FoV consists of the AAVP7A1 (Personnel) RAM/RS APC and two supporting mission-role variants: the AAVC7A1 RAM/RS Command vehicle and AAVR7A1 RAM/RS Recovery vehicle. The AAV7A1 RAM/RS FoV provides ship-to-shore-to-objective mobility as well as direct fire support with organic weapons.

As of this writing, the Marine Corps AAV fleet size is 1,063 RAM/RS vehicles in Personnel, Command, and Recovery variants.

Programmed for eventual replacement by a new Amphibious Combat Vehicle (ACV), the AAV7A1 RAM/RS FoV will continue to serve the Marine Corps until at least 2035. It is perhaps noteworthy that the new 2035 lifespan projection for the FoV is 10 years longer than service projections made as little as one year ago.

The AAV Survivability Upgrade Program, which will affect 392 of the Personnel variants, will further improve force projection while maintaining the current land and water mobility of the AAV, serving as a capability bridge to fielding and replacement by the new ACV. The 392 platforms included in the AAV Survivability Upgrade will provide the Marine Corps operational forces with four battalions of lift plus some additional support capabilities.

Marines maneuver Assault Amphibious Vehicles through the water in formation, Camp Schwab, Okinawa, March 5, 2013. The Marines used the training evolution to work on communication and teamwork between AAV crews. With the October 2013 issue of a Request For Proposal for the AAV Survivability Upgrade Program, improvements to the AAV fleet are set to begin.

U.S. MARINE CORPS PHOTO BY CPL. MARK W. STROUD

The Survivability Upgrade initiative will improve force protection and platform survivability by integrating technically mature upgrades into the existing hull. These upgrades include belly and sponson armor, blast-mitigating seats, and spall liners. The upgrades may also include fuel tank protection, and automotive and suspension upgrades to maintain current land and water mobility characteristics despite increased weight growth.

"The AAV Survivability Upgrade RFP is largely about force protection and platform survivability," observed Dennis Boucher, program director for AAV Systems within PM AAA, PEO Land Systems. "The RFP is essentially for a design concept, with options for follow-on prototype development and low rate initial production [LRIP] efforts. And we'll see what happens after that."

"The concept award should be in the spring of 2014," he said. "Prototype development is planned to start in the third quarter of FY 15, followed by low rate initial production projected for third quarter of FY 17. Initial Operational Capability [IOC] is currently targeted for FY 19, reflecting a minor slip from previous schedules."

Although not addressing any specifics about ACV, Boucher emphasized that the AAV Survivability Upgrade Program is designed to serve as "a bridge" to whenever the Marine Corps fields its ACV.

Asked about the remainder of the AAV fleet, Boucher noted that no specific plan exists for those vehicle platforms at present, offering, "We are

Marines from 2nd Battalion, 5th Marine Regiment, 3rd Assault Amphibian Battalion, conducted amphibious landings on Red Beach with Assault Amphibious Vehicles (AAV) as a part of exercise Dawn Blitz, June 24, 2013.

U.S. MARINE CORPS PHOTO LANCE CPL. SCOTT REEL

exploring a few new things, but that's all we are doing at the present time."

He reiterated, "The Marine Corps is committed to getting its operational forces the latest and greatest capabilities that they can for the AAV. And the AAV Survivability Upgrade Program, which is a much needed bridge to the ACV capability, will continue to make this vehicle a relevant asset to the Marine Corps."

"In addition to the AAV Survivability Upgrade Program, I would also point to an increased emphasis for our modifications line in order to improve some of the AAV subsystems that are approaching obsolescence," he continued. "That would include things like bilge pumps, electrical systems, and intercom."

Boucher also pointed to recent improvements in system readiness levels, quantifying the combination of subsystem obsolescence modifications and increased programmatic emphasis on readiness issues. He noted that his office had expanded its close involvement with fleet operators in the identification of their needs and had then worked closely with the fleet to further enhance that readiness.

"Particularly with the focus on the Pacific, there is an increased emphasis on readiness issues, including issues like corrosion and other challenges of a global environment," he noted.

"Another modification that will be fielded in FY 14 will be the Emergency Egress Lighting System [EELS]," Boucher added. "That safety enhancement automatically turns on lighting in the event that an AAV starts taking on water. Particularly at night, if a vehicle goes underwater, it allows the Marines to get to an exit. We are really replicating a capability that was going to be on the Expeditionary Fighting Vehicle and is already mounted in Marine helicopters."

EELS was developed and engineered for the AAV FoV in coordination with the Naval Surface Warfare Center Panama City. The system has already been installed in the first unit

The U.S. Naval Surface Warfare Center and Marine Corps have developed an Emergency Egress Lighting System (EELS) for the Assault Amphibious Vehicle (AAV). The EELS will enable personnel to escape an AAV in a submersible emergency and can turn on a set of lights to guide crew members to the exit hatches. The new system is a modified version of the EELS that are currently deployed onboard the UH-60 Black Hawk helicopter.

U.S. MARINE CORPS PHOTO

and is under evaluation by a Marine Expeditionary Unit prior to expanded fielding planned for early in 2014.

Returning to the planned AAV Survivability Upgrade, Boucher acknowledged that the underlying concept is far more than simply "hanging armor" on an amphibious vehicle.

"A better term for it is 'force protection,'" he explained. "Typically, in a finite world, 'survivability' generally refers to the ability of a vehicle to survive. By comparison, 'force protection' refers to the Marines that are riding in that vehicle. However, the two things often go hand in hand, and in all likelihood we are adding armor to the vehicle. That will increase its weight and obviously there is a balancing act there where we can't add so much armor that it will be incapable of amphibious operations. But the other parts of survivability that are tied to the Marines in those vehicles are things like blast mitigating seats of the types in our mine-resistant ambush-protected [MRAP] vehicles. So, as opposed to the bench seats that have been in the AAV since the vehicle originated in the early 1970s, we will be including blast mitigating seats."

"That's a force protection capability," he continued. "Because a lot of times an under vehicle belly blast sends a shock wave through the floor and into the bench seats. These new seats will mitigate that."

The redesign will take the vehicle from approximately 21 bench seat spaces to 17 blast-mitigating seats.

Summarizing the program efforts, Boucher offered, "With the projected service life extension of the AAV to 2035, PEO Land Systems and PM AAA are taking a very hard look at those capabilities that need to be refreshed in order to maintain system viability longer than previously planned. There are a number of capabilities that are approaching obsolescence. Marines know what they are because they live them every day. We are now looking at updating these critical capabilities."

"With the AAV Survivability Upgrade RFP now released, the level of work for our team in PM AAA is on an accelerated pace," he concluded. "That pace is required to meet our prototype and LRIP time lines as well as other critical EMD milestones so that we can get these capabilities into the hands of our operational forces." ■

A TAV-8B Harrier passes over the Direct Air Support Center (DASC) drill aboard Cherry Point June 5, 2013.

U.S. MARINE CORPS PHOTO BY LANCE CPL. GLEN SANTY

PM AIR COMMAND AND CONTROL AND SENSOR NETTING

Marine Air Command and Control System, Composite Tracking Network, and Common Aviation Command and Control System are now all part of AC2SN.

By Scott R. Gourley

When it came under the PEO Land Systems umbrella just a few years ago, the Marine Corps' Common Aviation Command and Control System (CAC2S) program was nearing its planned Initial Operational Test and Evaluation (IOT&E) milestone. However, there were many who felt that the proposed solution still fell short of the capability desired by the service.

"With the CAC2S program coming into the PEO, Mr. [William] Taylor took a really critical look at it," explained Col. Rey Masinsin, Program Manager for Air Command and Control and Sensor Netting (PM AC2SN). "And he knew that it was just not going to make it. And that's why we had to restructure into our current two-phase effort."

Today, the restructured CAC2S is just one of the programs under the recently renamed AC2SN. Far more than just a name change, the new program office reflects an expanded portfolio that consolidates future capabilities with the legacy systems that they will ultimately replace.

"Based on a Decision Memorandum signed by Assistant Secretary of the Navy for Research, Development and Acquisition [ASN (RDA)] Mr. [Sean J.] Stackley in January 2012, the consolidation was intended to provide synergies of the legacy systems falling under the management of the modernization program manager, so that we can better and more efficiently use resources allocated for those systems," Masinsin said.

The new portfolio includes three major programs.

"The first is the Marine [Air] Command and Control System [MACCS] Sustainment Program, a collection of Abbreviated Acquisition Programs [AAP] that incorporates all of the legacy systems that are currently fielded in the operating forces," he said. "Second is the Composite Tracking Network [CTN], which is an ACAT [Acquisition Category] III program. The CTN is analogous to the Navy CEC [Cooperative Engagement Capability] and is the Marine Corps' implementation of CEC. The third program is the Common Aviation Command and Control System, which is an ACAT IAC Major Automated Information System [MAIS] program that will replace several disparate fielded legacy systems out there being used within the Marine Air Command and Control System."

Asked about the systems that will be replaced by CAC2S, Masinsin pointed to legacy equipment in three different agencies.

"First is the Tactical Air Operations Center [TAOC], which is responsible for coordinating the anti-air warfare mission of the Marine Corps," he said. "CAC2S will replace the Tactical Air Operations Module [TAOM], which is already about 21 years old, as well as the TAOM's follow-on system called Mobile Tactical Air Operations Module. The next agency is the Direct Air Support Center [DASC], which is principally responsible for coordinating assault support and air support missions for the Marine Corps. CAC2S is a new system for the DASC. In the past, the DASC has been a manual agency that relied on paper maps and manual status boards for situational awareness. CAC2S provides the DASC with automated tools and data links, resulting in better awareness and efficiency. Finally, CAC2S will replace the legacy systems in the Tactical Air Command Center [TACC]. CAC2S provides the facilities for the Air Combat Element's command post and modernizes the tools for planning, monitoring, and executing the air battle plan. In addition, CAC2S upgrades the TACC's communications system from the old AN/MRQ-12 to the new AN/MRQ-13."

Reflecting on the CAC2S program restructuring that took place in 2009,

Masinsin noted, "Our new acquisition strategy called for delivering the capabilities identified in our Capability Production Document [CPD] in two sequential phases. There are a couple of reasons that we took this approach. The first reason is that we wanted to minimize the technical risk to the program by initially going after the capabilities that are already mature and allowing more time for the more technically challenging portions of the CPD to be developed. The second reason we adopted the two-phase approach is that we wanted to deliver militarily useable capabilities to the fleet as early as we can, because we have aging equipment out there.

"For Phase 1 there are two subsystems that we are deploying to the operating forces: the Processing and Display Subsystem, and the Communications Subsystem. The Processing and Display Subsystem is the infrastructure and the computing environment for the system. It provides the physical command post facilities – the tents, chairs, tables, headsets – and the computing environment – the servers, routers, switches, and laptops used for visualization to the operating forces. The Communications Subsystem provides the radios and communications equipment for CAC2S."

Noting that the new strategy also calls for using fielded systems as starting points for CAC2S Phase 1, he added, "So instead of us developing a new command post or developing a new communications system for aviation command and control, what we have done in the Marine Corps is to take the Combat Operations Center [COC], which is a currently fielded command post, as our starting point. Our task is to create a 'change kit' to upgrade that COC to make it into an air command and control system.

"We have an existing [command post] product already out there," he continued. "But it's not optimized for air command and control. We put in changes to make it optimized for air and ground C2 operations. That strategy not only reduces our technical risk but also provides cost avoidance by not having to buy new equipment."

Sgts. Joseph Colby (left) and Cody Crabb, tactical air defense controllers, Marine Air Control Squadron 24, 4th Marine Aircraft Wing, navigate the new Common Aviation Command and Control System (CAC2S) during the training portion of their Phase I fielding Sept. 12, 2013. The new system consolidates and improves upon the previous legacy command and control systems the squadron had been using.

"Likewise, for our Communications Subsystem we take our currently fielded AN/MRQ-12 and install modification kits that turn them into a more capable and improved AN/MRQ-13. The changes are fairly minor. Essentially the changes add more capabilities and markedly improve the system's information assurance posture," he said.

In addition to optimizing the current ground command posts for air and ground roles, the initial phase of CAC2S will significantly enhance situational awareness by incorporating both ground and air pictures.

As an illustration, Masinsin offered, "As it stands right now, in our air C2 agencies, we have the air situation picture well developed. But what is absent is an integrated depiction of the ground picture. When we command and control air assets that are directly in support of Marine Air-Ground Task Force operations, it's very important that we know exactly what the ground units are doing. So what we deliver in this first phase CAC2S capability is the combination of the ground picture and the air picture so that we can better develop synergies between the two.

"We are currently fielding CAC2S Phase 1 to the operating forces," he said. "We achieved the Limited Deployment Capability [LDC] milestone in February of 2012 when we fielded to our formal schoolhouse at Marine Corps Communication-Electronics School and the first unit equipped, which is Marine Air Support Squadron 3, part of the 3rd Marine Aircraft Wing at Camp Pendleton, Calif. Our successful fielding to those two entities was our criteria for declaring LDC.

"We recently completed the CAC2S Phase 1 fielding to the 2nd Marine Aircraft Wing at Cherry Point, N.C.," he continued. "At Cherry Point, we delivered equipment to Marine Air Support Squadron 1 [MASS-1], Marine Air Control Squadron 2 [MACS-2], and Marine Tactical Air Command Squadron 28 [MTACS-28]. Then the next fielding will be to our overseas unit in Okinawa, Japan, commencing in the second quarter of FY 13, and the final recipient of the first phase of CAC2S will

U.S. MARINE CORPS PHOTOS BY SGT. SCOTT MCADAM

Nathan Poole, chief operations instructor for the Common Aviation Command and Control System (CAC2S) Phase I, shows Lance Cpl. Ethan Weaver, an air control electronics operator, Marine Air Control Squadron 24, how to navigate a portion of the system. The MACS-24 Marines received in-depth training on the new system as a part of Phase I of the CAC2S program.

be to Marine Air Control Squadron 24 (MACS-24), 4th Marine Aircraft Wing, U.S. Marine Corps Forces Reserve."

Reiterating that the revised two-phase CAC2S strategy was "based on risk reduction and accelerated capability," Masinsin explained that the program plan for obtaining a Phase 2 capability is through a competitive contract process that included an initial demonstration effort as a precursor to the Phase 2 Request For Proposals (RFPs).

"During the demonstration phase we asked offerors to provide a prototype to demonstrate capabilities as identified in our CPD," he explained. "It's a 'come as you are party,' if you will. Basically we said, 'Here are our requirements. Under a fixed-price contract, build a prototype and demonstrate its capabilities against our CPD.' The four contractors that participated in the demonstration phase include Boeing, Northrop Grumman, General Dynamics, and Thales-Raytheon.

"That demonstration is yet another risk-mitigation step for the program," he stated. "By having the contractors clearly demonstrate capabilities, we can gauge where certain technologies are as far as maturity to meet our requirements. We asked them to sign up and declare how much of our CPD, as a percentage, that each of the contractors can meet. To prevent an offeror from saying that they might be at 90 percent by leaving off the 10 percent that were the hardest capabilities, we made some of the harder capabilities mandatory during the demonstration. Those mandatory capability areas include track management and data fusion."

Masinsin said that the contractor teams each received one month at the Naval Surface Warfare Center Dahlgren System Integration Lab (SIL), where they were able to finish the development of their prototype in a representative operational environment. Those sessions were then followed with a 10-day "run for record" assessed prototype demonstration at the Marine Corps Tactical Systems Support Activity (MCTSSA) System Test and Integration Lab (STIL) at Camp Pendleton.

"We ran the contractor prototypes through increasingly more difficult scenarios to gauge their behavior and capabilities," he said. "And we also collected data on their performance. In addition, we asked the contractors to generate two studies for us during the demonstration phase. One is a transportability study that includes things like how they would propose to package the system. The second is an architecture study to surface the design and architecture of their prototype for us."

Following the closure of the demonstration phase, the program released the RFP for the Phase 2 follow-on effort.

"This time we are going to use a fixed-price incentive contract with the competition restricted to the vendors that participated in the prototype demonstration phase," Masinsin said. "We are going to select one vendor to take us through the final design and fielding.

"One of the important things to note is that our evaluation and assessment of their performance during the prototype period was provided back to each vendor. The idea behind that is that they can, in turn, incorporate how they would attack any identified issues in their follow-on proposal," he added.

A Phase 2 contract was awarded to General Dynamics C3I Systems in Scottsdale, Ariz., in the fourth quarter of 2012.

"While Phase 1 is fielding and tackling those 'less technically challenging' capabilities, in Phase 2 we tackle the capabilities that are more technically challenging," Masinsin said. "Examples include capabilities like multi-source integration, which includes inputs from radars, data links, and the Composite Tracking Network, and then fusing all of that together to create a common tactical picture. Another capability involves tying in sensors, to include the G/ATOR [Ground/Air Task-Oriented Radar].

"We are looking for a Milestone C for Phase 2 in the first quarter of FY 15 and anticipate an IOT&E for Phase 2 in the second quarter of FY 16. The IOT&E results will then inform a Phase 2 Full Deployment Review with PEO LS during the fourth quarter of FY 16," he added.

He continued, "Now given that schedule, it means that I also have to sustain my legacy systems at least through the FY 16 to FY 18 period before I can 'sunset' them when I have enough CAC2S Phase 2 capabilities fielded to the operating forces. We have to care for and feed those currently fielded systems. I have to keep the legacy systems relevant. That is the issue. If the operating forces get a call to support a contingency today, our systems must be relevant with capabilities that are interoperable with our sister services.

"The plan is to not introduce any more 'new capability' to legacy systems but focus on system safety, maintaining information assurance capabilities, and other relevance issues," he said. "For example, if my service partners out there implement a new message for Link-16, then I am expected to also implement that in my legacy systems."

Asked about any lessons learned that may have emerged from the recent prototype demonstrations, Masinsin acknowledged, "The employment concept is a little bit different than what the Marines are accustomed to. So as they accrue more 'run time,' if you will, using CAC2S in local exercises and force level exercises, operators and maintainers are not only developing more proficiency but also developing new tactics, techniques, and procedures [TTPs] that are different than they were accustomed to with the old system.

"IT IS A POINT OF PRIDE FOR US THAT WE HAVE GIVEN MONEY BACK TO THE DEPARTMENT, TO THE TUNE OF $84 MILLION, BECAUSE OF EFFICIENT PROGRAM EXECUTION AND 'SHOULD COST' INITIATIVE SAVINGS."

"But that's all positive," he said. "Again, as an example noted earlier in the DASC, they didn't have a digital air picture. So how do you fight the DASC now that you have an air picture? How much better are you? How much more efficient are you? And I submit to you that their situational awareness has increased probably tenfold and they are far more efficient and effective."

He added, "In the past, you were relying on the aircrew to report that they were at Point A. In contrast, now operators in the DASC see that the aircrew really is at Point A. So if controllers have to deconflict fires, for example, they are able to do that with confidence that the airspace is really clear of friendly aircraft before they let artillery shoot."

In addition to greater situational awareness of where assets are located in the air and on the ground, CAC2S will also provide the DASC with automated and collaborative tools that will facilitate the exchange of information and automate request processes for the Joint Tactical Air Request (JTAR), Assault Support Request (ASR), and MEDEVAC/CASEVAC missions.

"There's also some interest from the Air Force on this, because we pretty much have the same mission set," Masinsin acknowledged. "The Air Force uses the same hardware as the TAOM so they have the same issues with diminishing manufacturing sources and obsolescence. So they are looking to see if the solution we are developing might be of interest to them."

The success of the new CAC2S strategy was publicly highlighted on June 15, 2012, when Under Secretary of the Navy Robert O. Work and Stackley recognized a number of individuals and commands for outstanding acquisition practices with a combined cost savings to the government of more than $2.5 billion.

PEO Land Systems' CAC2S Program Office (now AC2SN) earned the 2012 Major Acquisition Activity Award in recognition of "creative and effective practices that lead to lower costs and better technical performance."

"It is a point of pride for us that we have given money back to the department, to the tune of $84 million, because of efficient program execution and 'should cost' initiative savings," Masinsin said.

"The story is that we went from the verge of cancellation in '08 to delivering capabilities in '12," he concluded. "And from program restructure to delivery of a Phase 1 solution to the fleet took just 25 months – all under ACAT I scrutiny and oversight. That clearly shows validity of the program office and PEO and the ability to recognize how to turn around problem areas and make them successful." ■

CAC2S Phase 1 Achieves Full Operating Capability with Fielding to Marine Air Control Squadron 24

By Sgt. Scott McAdam, U.S. Marine Corps Forces Command

■ Marine Air Control Squadron 24 (MACS-24), 4th Marine Aircraft Wing, U.S. Marine Corps Forces Reserve, is the final recipient of the first phase of the Common Aviation Command and Control System (CAC2S). CAC2S is a coordinated modernization effort to replace the existing aviation command and control equipment of the Marine Air Command and Control System (MACCS) and provide the Aviation Combat Element (ACE) with the necessary hardware, software, equipment, and facilities to effectively command, control, and coordinate aviation operations. CAC2S will be accomplished through a two-phased approach. Phase 1 accommodates fielding of operationally relevant capabilities by upgrading fielded MACCS equipment with mature, ready technologies and will establish an initial product baseline Processing and Display System (PDS) and Communications System (CS). Phase 2 is structured to accommodate the integration of technologies necessary for the CAC2S Air Command and Control System (AC2S) to meet remaining ACE Battle Management and Command & Control requirements. With the delivery of the Phase 1 CAC2S in early September at MACS-24, the first installment of two phases constitutes Full Operating Capability (FOC) for the initial phase of the system.

For Phase 1, there are two systems that define CAC2S: the Processing and Display System (PDS) and the Communications System (CS). The PDS AN/TSQ-273 V (1) is the infrastructure that provides the Operational Facility (OPFAC) and the Operations Trailer (OT). The OPFAC provides the physical command post facilities: the BASE-X tents, tables, chairs, computers, and peripheral equipment to support 16 operator positions, expandable to 20 positions. The OT houses the networking and computing hardware to provide the operators with the necessary network services to execute the mission of the MACCS. The OT includes a Joint Range Extension (JRE) Server and Client, JRE Application Protocol (JREAP) A, B, C, a track manager to process JRE and Joint Tactical COP Work Station (JTCW) tracks, and various switches, routers, and components to provide the operator a secure separated voice and data network. The CS consists of the AN/MRQ-13 (V) 1, which provides VHF/UHF/HF/SATCOM radios housed in a S/788 Lightweight Multipurpose Shelter (LMS) and mounted on a High Mobility Multipurpose Wheeled Vehicle (HMMWV). The S/788 LMS provides the housing, interface, and environmental protection for the CS equipment. The first phase of the CAC2S capability is being fielded to the Marine Air Support Squadron (MASS) that provides the Direct Air Support Center (DASC) and the Marine Air Control Squadron (MACS) that provides the Tactical Air Operations Center (TAOC) and Early Warning Control (EWC) detachment for the Marine Aircraft Wings. The Phase 1 CAC2S provides the operators a common tactical operational display combining air and ground tracks on one display called the Tactical Display Framework (TDF) to provide the operator a "fused" picture to enhance decision making. The TDF provides the MACCS operator the information necessary to support the Marine Air-Ground Task Force (MAGTF), Joint, combined, and coalition forces with near-real time and non-real time information.

"Before CAC2S, there were multiple stove piped C2 systems that provided the operator specialized information, leaving the operator to process data separately," said Maj. Robert St. Croix, Phase 1 Fielding Officer, Program Executive Officer Land System (PEO LS), Marine Corps Systems Command, Marine Corps Base Quantico. "CAC2S combines this information into the TDF Common Operational Display, providing the operator the ability to filter information as required to enhance their decision-making ability."

The system is designed to be expeditionary, scalable, and provide common hardware across the MACCS.

"CAC2S provides the MACCS the ability to provide aviation command and control in an austere environment with the ability to tailor the size of the PDS and CS assets to the required mission. It enables the Marine to work in the BASE-X tents or remote the OPFAC to an existing structure like we have seen in OIF and OEF [Operation Iraqi Freedom and Operation Enduring Freedom]," said St. Croix.

The classroom training and practical application the Marines received during the fielding of CAC2S enable the Marines to quickly set up and be operational.

"Currently, their legacy systems can take up to a day – or half a day, best-case scenario – to get a complete system up and operational," said Nathan Poole, chief operations instructor for CAC2S. "This system allows the Marines to set up quicker; in fact, with a proficient maintainer and a proficient operator community, the system could be set up and ready to operate in 2½ hours."

Providing the MACCS with common C2 hardware is an advantage that the new system brings to the fight.

"We're all going to be working on the same system, so that's going to make passing that information to other agencies much smoother," said Sgt. Matthew Baldwin, a tactical air defense controller with MACS-24. "Having the same system is going to make the communication flow much easier and make all of the units much more effective."

Phase 2 of the CAC2S program will eventually replace the remaining legacy and Phase 1 equipment at the MASS and MACS agencies, as well as provide the Tactical Air Command Center (TACC) CAC2S equipment. CAC2S Phase 2 will provide continued improvements due to technological changes and the experience and feedback from the fleet Marines.

CAC2S achieved a Limited Deployment Capability (LDC) milestone in February 2012, when it was initially fielded to the formal learning center at Marine Corps Communication-Electronics School (MCCES) and the first operational unit equipped, which is MASS-3, part of the 3rd Marine Aircraft Wing at Camp Pendleton, Calif. It was later fielded to the 2nd Marine Aircraft Wing at Cherry Point, N.C., to Marine Air Support Squadron 1 (MASS-1), to Marine Air Control Squadron 2 (MACS-2), to Marine Tactical Air Command Squadron 28 (MTACS-28), and finally to 1st Marine Aircraft Wing units MASS-2 and MACS-4 in Okinawa, Japan.

The success of the new CAC2S technology was publicly highlighted on June 15, 2012, when former Under Secretary of the Navy Robert O. Work and Assistant Secretary of the Navy for Research, Development and Acquisition Sean Stackley recognized the CAC2S program as one of the Department of the Navy's Major Acquisition Activity Awards for its "creative and effective practices that lead to lower costs and better technical performance." ■

AN/TPS-80 Ground/
Air Task-Oriented
Radar (G/ATOR).

NORTHROP GRUMMAN PHOTO

PM GROUND BASED AIR DEFENSE-GROUND/AIR TASK-ORIENTED RADAR

By Scott R. Gourley

As the cornerstone of the Program Executive Office for Land Systems Program Management office for the Marine Corps Ground Based Air Defense (GBAD)-Ground/Air Task-Oriented Radar (G/ATOR), the AN/TPS-80 G/ATOR system is poised on the edge of low rate production, ready to provide Marines with a three-dimensional short-to-medium-range tactical radar designed to detect, identify, and track low-level cruise missiles, manned aircraft, and unmanned aerial vehicles (UAVs) as well as rockets and mortar and artillery fire.

Developed by prime contractor Northrop Grumman Electronic Systems in Baltimore, Md., G/ATOR will replace legacy radar systems to perform air surveillance, cue air defense weapons, determine hostile indirect fire firing locations, and provide data to air traffic controllers.

G/ATOR Program Manager Lee Bond characterized the AN/TPS-80 as "One system that will do everything from tracking that hostile UAV to vectoring the friendlies around the sky to watching for rockets, artillery, and mortars – so you can direct the counterfire."

Just over one year ago, Bond was anticipating that G/ATOR was well on the way toward the successful completion of several months of testing that would provide the final evidence supporting a favorable low rate production decision.

"The news surrounding G/ATOR is all good," he enthused at that time, pointing to the fact that Northrop Grumman had recently delivered the first system to the Marine Corps after hardware and software development integration and testing at its factory in the Baltimore area.

That system underwent the first phase of developmental testing at the Surface Combat Systems Center (SCSC) Wallops Island in Eastern Virginia with follow-on developmental testing and operational sssessments conducted at Yuma, Ariz.

In an era when the best laid plans frequently go awry, Bond continues his enthusiastic assessment of the past year's activities. As of this writing, final test reports are being written and other documents are being updated in expectation of a Milestone C low rate production decision briefing in January 2014.

"Looking back and forward again, we are mostly where we expected to be on the program," Bond said. "Like every other government agency, we've had a few ups and downs this past year; we've spent a little time on furlough and have seen our budgets reduced slightly through the process of sequestration. But we have endeavored to persevere."

Bond admitted that there had been some hope to have the low rate production approval and related contract award at this point, but quickly clarified that G/ATOR has experienced some minor program delays.

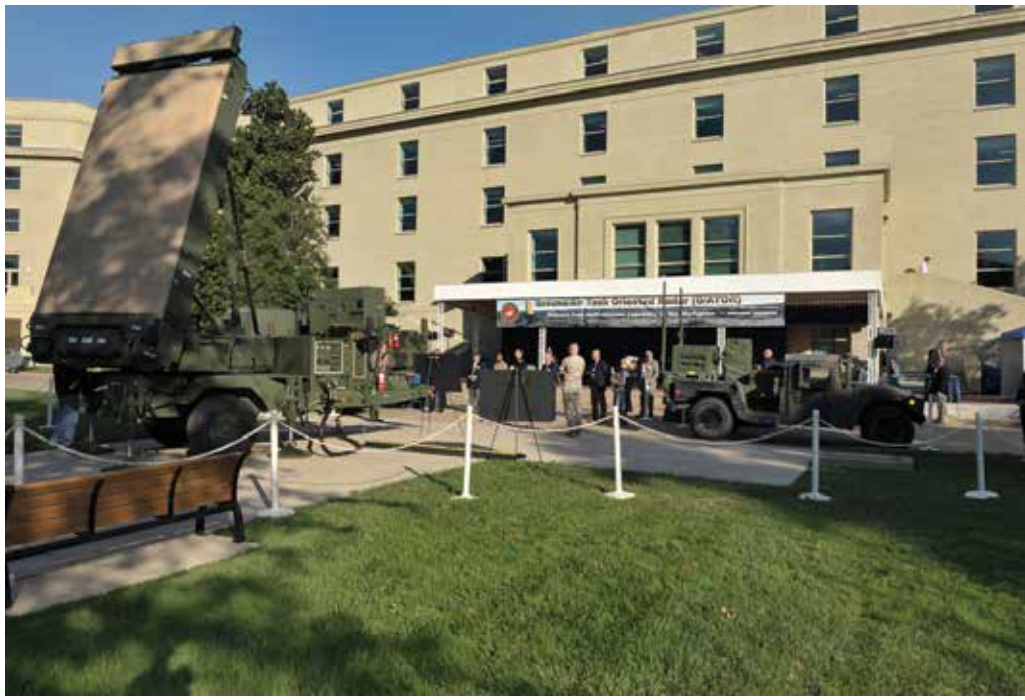
"Where I thought we would be right now is through with all the testing and on the verge of awarding the first low rate production contract to Northrop Grumman," he said. "But things have slowed down just enough that we have concluded all testing at Wallops Island very successfully and then transitioned to Yuma, which presents our most challenging operational environment. Basically, we found one 'glitch' while we were out there."

Bond characterized the "glitch" as "times when the software was a little temperamental," but quickly likened those instances as "a bit like an early version of Windows in that you can still use it; you just live with the temperamental aspect with the knowledge that it will be fixed in the next update. And that's where we are now. We've gone through that process and seen the fix make the improvements that we expected it to."

"So we basically stayed out at Yuma for two rounds of testing instead of just one," he said. "We just completed the second round very successfully and we're now looking toward 'all systems go' to move into that early low rate production phase. We just have to write some test reports, conduct some reviews, and complete the process of awarding that next contract."

"But everything we forecast a year ago has or is coming true – just on a slightly stretched schedule from what we might have originally anticipated," he added. "And that schedule stretch is only the result of everybody in the government being squeezed a little bit with regard to resources and then the extra round of testing at Yuma just to be sure that we had it right before we went ahead and committed 'nine figures' to our first low rate production contract."

The Yuma testing was also where the program had the most direct interaction with Marines using G/ATOR in more of an operational mode in contrast to the engineering approach taken in earlier tests.



Northrop Grumman Corporation and the U.S. Marine Corps Program Executive Officer for Land Systems demonstrated the AN/TPS-80 Ground/Air Task-Oriented Radar (G/ATOR) system for senior Department of Defense leaders at the Pentagon, Oct. 6, 2011.

NORTHROP GRUMMAN PHOTO

With government and industry technical and test experts supporting in the background, the Yuma testing was conducted by Marines from the MACCS-X (Marine Air Command and Control Squadron – Experimental) Training Squadron, out of Camp Pendleton, Calif., and MAWTS-1 (Marine Aviation Weapons and Tactics Squadron One), based in Yuma.

Asked about any surprises that might have emerged over the past year, Bond offered the "positive surprise" of just how much the participating Marines liked the system.

"We knew that they would like it," he began. "But basically the question I get from Marines is, 'Can I take the older radar that I have and drive it off a cliff so that we can keep the G/ATOR and deploy with it instead?' Unfortunately, there are only two of them in the world; one of which is being tested by the government while the other is a Northrop Grumman capital asset."

Confirming that the recent Marine user comments came on the heels of previous U.S. Central Command (CENTCOM) inquiries about how

soon the system could deploy, Bond explained, "We are basically there. If directed by higher authority we could deploy it, although I wouldn't recommend that because it still does have a few warts, which we will address as we move into low rate production. So if you wait just a couple of years, you can have the best one that we could possibly make, having learned what we have learned over the last couple years."

"But even the one that we have is pretty darn good and has worked extremely well," he continued. "And I suppose 'if push came to shove' we would whistle up the crew that just took it through the final rounds at Yuma and say, 'OK Marines, you get to do it all again now, but this time on a contingency deployment scenario.' And they would be proud to go do it, because everybody who touches this radar basically becomes a believer."

"All the Marines who have seen this in action – those who have actually used it and those who have been playing the role of the on-scene commander tasking and then seeing the information it provides – have been extremely, extremely impressed with it and look forward to a time where we can give them one that we don't insist on taking back," he said.

In addition to the testing, the G/ATOR team has also continued to proceed on a separate technology pathway that will support the transition to G/ATOR's current gallium arsenide (GaAs) semiconductor technology to a next-generation gallium nitride (GaN) semiconductor technology.

"I continue to be amazed at what this team can do," Bond offered. "Because as much as we've focused on getting through testing, writing the reports, planning for the milestone, planning for the contract award, we have never flagged in carrying forward the parallel effort to mature the gallium nitride technology and a few other things, like redesign for producibility and process improvements. Those are sort of 'three legs' of making a system more affordable: putting in a more capable technology; improve the process you use to build it; or tweak the design so that it is easier to build."

"We've worked in all those areas and discovered that the biggest bang for the buck is the transition to gallium nitride technology," he said. "But we haven't ignored the other aspects of the triad either. And our plan is still to enter low rate production and basically make what we had before with some very straightforward lessons learned and improvements injected into it. Then within two years we hope to shift to the more advanced design that is reflective of all those improvements that we will introduce to literally make it better, faster, and cheaper to produce. That's all very much part of the plan forward."

Future challenges have less to do with technology advances that funding decisions. But according to Bond, the G/ATOR program is well positioned for a leaner budgetary climate.

Emphasizing the importance of the Department of Defense Better Buying Power initiatives, Bond offered, "I couldn't be prouder to say that, as good as all that 'top cover' is, we were already going there on this program. It's truly gratifying when leadership says that we are all going to implement policy that is going to make our program better and then, when that policy rolls out to you, you see that you are already doing this stuff. And now we have a new taxonomy in which we can place the discussion."

Bond characterized the future as "a very interesting place," concluding, "Sometime after the Milestone C event we ought to be getting better insight into which version of the FY 14 and FY 15 budgets the president and Congress are leaning toward enacting. With the support of Headquarters Marine Corps, we've examined numerous scenarios to try to get ahead of that, and provide the complete spectrum of program possibilities. However the future unfolds, I remain confident the G/ATOR program will provide exceptional capability to the Marines and exceptional value to the American taxpayer." ■

PM LIGHT TACTICAL VEHICLES

By Scott R. Gourley

■ Reflecting a significant program expansion that occurred in December 2011, the current Program Management Office (PMO) Light Tactical Vehicles (LTV) portfolio spans Marine Corps involvement in the Joint Light Tactical Vehicle (JLTV) as well as myriad Marine Corps High Mobility Multipurpose Wheeled Vehicles (HMMWVs), the Internally Transportable Vehicle (ITV), associated trailers, and other related equipment. This program is under the leadership of Program Executive Office (PEO) Land Systems' Program Manager (PM) for Light Tactical Vehicles Lt. Col. Mike Burks.

As the designated lead service on the joint service JLTV program, the U.S. Army announced the three JLTV engineering and manufacturing development (EMD) awards on Aug. 22, 2012. The awards were made to AM General LLC, Lockheed Martin Corporation, and Oshkosh Corporation.

"We were very pleased with the robust industry response to the JLTV RFP [Request For Proposals]," said U.S. Army Program Executive Officer for Combat Support and Combat Service Support Kevin Fahey. "The source selection team worked diligently through the large volume of proposals submitted to ensure that the partners chosen for the EMD phase gave the services the best opportunity possible to take the next step in filling the affordable critical capability gaps within the light tactical vehicle fleet."

"The EMD contract awards reinforce the successful joint effort between the services on JLTV," added Marine Corps PEO for Land Systems William Taylor. "The strong Army-Marine Corps partnership recognizes that synergy is imperative in this austere budgetary environment, and is committed to the success of JLTV in filling the affordable critical capability gap that exists in both services' light tactical vehicle fleets."

In August 2013, each company delivered 22 full-up prototypes and provided contractor support to begin a comprehensive 14-month government test program, including blast testing, automotive testing, and user evaluation.

Asked about how the eventual fielding of JLTV will affect the planned sustainment of the Marine Corps' HMMWV fleet, Burks pointed to several "irons in the fire" surrounding the fleet evolution.

"With the strategic decision to commit to JLTV, the Marine Corps made the call to develop the light combat vehicle that is given to the operational commander for placing with all deliberate intent in harm's way," he said. "So it really crosses that boundary of light tactical vehicle and light combat vehicle. And, in fact, the Marine Corps is acquiring a disproportionate number of heavy gun trucks and close-combat weapons carriers as part of its JLTV acquisition. That number comes out to 5,500."

"In the meantime, 5,500 JLTVs does not come close to covering down on the requirement that exists for a light tactical vehicle to accomplish numerous other missions that do not require the vehicle to go into a high-intensity conflict scenario," he said. "And we address that with the HMMWV."

Plans call for the reduction of the Marine Corps HMMWV fleet, currently in excess of 24,000 vehicles, down to approximately 18,500, with 5,500 of those vehicles subsequently displaced by JLTV.

The remaining Marine Corps HMMWV fleet of approximately 12,900 to 13,000 vehicles will require sustainment and other viability actions.

"In divesting from '24 [thousand] and change' down to '18 [thousand] and change,' we're eliminating about one-fourth of the light tactical fleet," Burks explained. "But we still have to maintain 13,000 vehicles through 2030, and that entails a significant effort, because the HMMWV as it stands right now does not get deployed off of the forward operating base. Why? Because we have crushed it. We have crushed it under the armor necessary to secure the occupants' survivability, thereby stripping it, however, of driver control and stability – with lots of non-combat casualties because of that; mobility – you don't get it off the 'hard ball' road; reliability – it's awful – we're burning through brakes at quintuple the rate. We're burning out radiators. We're burning out engines in 45 minutes of hard driving. It's the dog of every convoy it's in. It's bad. But that's the state of the vehicle based on what we've done to it.

"It's not simply an IROAN [inspect and repair only as necessary] or a Reset," he added. "If we want to make the HMMWV operationally relevant, we've got to look beyond that. The good news is that both the Marine Corps and the Army have been conceptualizing for some time and ultimately made the decision to embrace JLTV at the high end of that capability deficiency.

"So where does that leave us? It leaves us – and industry – with the ability to leverage a lot of mature and production-ready designs that are already based on extensive testing and research and development across the industrial base," Burks continued. "The Sustainment Modification Initiative proposes to leverage these advances and through that restore the existing expanded capacity variant of the HMMWV to pre-armoring levels – in terms of safety, performance, and reliability."

Noting that the 2004 Operational Requirements Document and the associated key performance parameters

The Joint Light Tactical Vehicle (JLTV) Joint Program Office (JPO) (Army and Marine Corps) received 66 of the engineering and manufacturing development (EMD) phase prototype vehicles of the three JLTV contenders produced by AM General (top), Lockheed Martin (middle), and Oshkosh (bottom) in late August 2013. They are currently undergoing ballistic; reliability, availability, and maintainability (RAM); and performance testing.

Deputy Defense Secretary Ash Carter, left, presents the David Packard Excellence in Acquisition Award in a ceremony at the Pentagon, Nov. 25, 2013, to Col. John R. Cavedo Jr., USA, Project Manager, Joint Program Office, Joint Light Tactical Vehicles; Lt. Col. Michael Burks, USMC, Program Manager Light Tactical Vehicles, Military Deputy Joint Program Office, Joint Light Tactical Vehicles; and Scott Rideout, Deputy Program Manager, Light Tactical Vehicles, PEO Land Systems.

for the HMMWV Expanded Capacity Vehicle (ECV) articulate many of the capabilities being sought, he acknowledged that "cost is king and affordability constraints are paramount. Those are the limitations of the day and everything we do is bounded by that," he said. "So that means we go after a few things here. We can't go after everything. But some of these are mission essential. We've got to restore that reliability piece. We have to at least retain if not outright improve mobility. It can't get any worse and preferably it gets a lot better. O&M [operations and maintenance] costs are another huge area. With reliability so degraded, we are paying for it. We are paying for it in so many areas of consumables and repairables, and fuel efficiency is out the window. We are focusing on those things that improve the logistics footprint and the energy efficiency when it operates in an expeditionary environment."

"Something else that goes along with that is payload," he added. "The current HMMWV is operating thousands of pounds beyond its gross vehicle weight rating. It's crushed from the moment it comes off the production line, and then the Marines just heap that much more stuff on them. It's what they need to do to accomplish the mission. But the vehicle doesn't support it. We break many different pieces of the vehicle in doing so."

According to Burks, improving HMMWV protection levels is "the last thing among the priorities."

"Force protection is not an outright priority at this point, since JLTV is going to be armored to take those shots," he said. "But other considerations that are associated with protective features are still very relevant. Consider what we would do to protect gas tanks, as an example, or to improve the vulnerabilities of some sub-assemblies to compromise in the event of taking a hit. Think of things that make the vehicle sufficiently survivable for egress following an impact. Those are all part of that focus on the remaining HMMWVs."

While the ECV requirements help to identify target capabilities for a large slice of the HMMWV fleet, the fact is that the approximately 13,000 HMMWVs that will remain with the Marine Corps will include approximately 5,000 A2 models.

Burks noted that efforts are already under way at the Nevada Automotive Test Center (NATC) to explore some of the technical possibilities surrounding HMMWV fleet sustainment. "NATC has been assisting us with some concept development and evaluation based on what we have established as basically four distinct concepts that are bound by certain capabilities and cost constraints," he said. "Essentially it's cost and performance trades associated with each concept. The user community is fully engaged with us throughout this. Then ultimately, as we reach the end of this process, that user community – the requirements folks – will 'pull the trigger' on one of these concepts. And then that's what we will compete, full and open, to industry."

Burks emphasized that the NATC testing "does not inform any type of competition. Instead, it informs the requirement. It informs the user community and really establishes for them: At what level is the juice worth the squeeze in terms of the level of capability that this restores to the HMMWV?"

Turning to the ITV, Burks explained that it was initially fielded as a system of systems.

"You had two basic variants: the Light Strike Vehicle to support reconnaissance and infantry; and the prime mover, which was developed to tow the Expeditionary Fire Support System – the rifled towed mortar system," he said. "The ITV production line ended in FY 12, and last quarter we competitively awarded a Contractor Logistics Support [CLS] award, which is part of a transition from CLS to organic support. It could last up to a few years, but in the interim provides technical and parts support until the completion of ongoing provisioning efforts and current fielding that will not end until late FY 13."

In addition to the recent CLS contract, Burks highlighted the positive resolution of a recent issue surrounding the ITV.

"In March 2012, we issued something that the Marine Corps only does a few times a decade – specifically a Deadline Statement of Use Message for the entire ITV fleet," he said. "And that was associated with a throttle binding issue. Nobody was hurt. No equipment was damaged, beyond some cosmetic damage to the grille of one ITV when it contacted the baseplate of the mortar that was being towed in front of it. It was during a new equipment training evolution and they found out that it just wouldn't stop. So it met that rifled towed mortar at about 5 miles an hour and picked up a little grille damage, but not a scratch on the mortar. Thank goodness nobody was hurt, because what we came to find out upon further inquiry was that this was not a unique circumstance and there were some variances associated with the throttle

DOD PHOTO BY ERIN A. KIRK-CUOMO

U.S. Marine Corps Pvt. 1st Class Ethan A. Carson, a Motor Transport Operator with Combat Logistics Battalion Three (CLB-3), provides cover and support from behind the front of a High Mobility Multipurpose Wheeled Vehicle (HMMWV) during a humanitarian assistance disaster relief operation at Marine Corps Training Area Bellows, Hawaii, May 15, 2013. PM LTV aims to restore mobility, reliability, and payload to a HMMWV fleet crushed under the weight of its armor.

U.S. MARINE CORPS PHOTO

position sensor that otherwise could result in this happening in other vehicles. In fact, when we dug into some of our FSR [field service representatives] reports in our archives, we found out that there were some anomalies that popped up in as many as 15 fielded vehicles that, for lack of a better term, were precursors to this issue developing. We were so fortunate that from the time we had a hint that this could happen, we had the opportunity to pull the string. It was worth deadlining the entire fleet over. We dug down immediately with the vendor, pulling the whole team in and developing some inspection and corrective action procedures. I would offer that the vendor was very cooperative on this as well and we were able, inside of two weeks, to release a follow-on message that authorized implementation and 'by vehicle' restoration of operational status."

As a representative example of the many other activities under way in his program office, Burks pointed to development of a Marine Corps Transparent Armor Gun Shield (MCTAGS) design with "reducible height" capability. This development effort has included automotive, ballistic, and human factors testing, all of which have yielded promising results.

"This effort is specifically focused on Marine Expeditionary Units and on those assets that get stored on Maritime Prepositioning Ships," he explained. "But there's actually quite a bit of interest outside of the Marine Corps in this – SOCOM [Special Operations Command], the Army. Wherever you put these vehicles for deployment you greatly reduce the cube space they take up. If you've got a MCTAGS or a GPK [Gunner Protection Kit] that collapses on top of a vehicle without hours spent taking that thing off and finding somewhere else to put it, that's huge. Embarkation and deployment take on a whole other sense when you're able to do that." ■

JLTV Program Office Hosts Vehicle Demonstration, Gets Ready to Test Vehicle Prototypes

BY BILL JOHNSON-MILES, MCSC CORPORATE COMMUNICATIONS, QUANTICO, VA.

■ Senior Marine Corps, Army, and Department of Defense leadership got a hands-on look at the Joint Light Tactical Vehicle (JLTV) during a demonstration on Marine Corps Base Quantico June 3-14, 2013. JLTV prototypes from three vendors were on display and road tested at the Transportation Demonstration Support Area (TDSA), a nearly 400-acre site managed by the Marine Corps Program Executive Officer Land Systems (PEO LS).

"The site allowed both senior military leadership and congressional members and staff to engage the competing JLTV prime vendors over static displays," said Lt. Col. Michael Burks, JLTV military deputy. "They also rode in the prototype vehicles themselves and experienced some of the capabilities JLTV will field to the joint warfighter."

The JLTV program, a joint effort by the Army and Marine Corps, addresses gaps in the services' light tactical vehicle fleets. The Marine Corps portion of the program is managed by PEO LS and supported by Marine Corps Systems Command (MCSC).

"We cannot do this without the Marine Corps," said Army Col. John Cavedo, JLTV joint project manager. "It is definitely a joint effort."

According to the Joint Program Office, the requirement for new vehicles came about because recent combat experiences drove a need to substantially increase vehicle protection, thus creating an imbalance in tactical vehicle payload, performance, and protection.

Officials said the JLTV program is designed to restore that balance. It also meets the unique requirements of both services while fielding the first vehicle purpose-built to host emerging network capabilities.

"The light tactical vehicle capability gap will be closed with the JLTV," Cavedo said.

Closing that gap began in August 2012 when the three vendors – AM General, Lockheed-Martin, and Oshkosh Defense – received engineering and manufacturing development (EMD) contracts. The vendors have delivered a total of 66 vehicles to undergo a government test phase commencing this year.

"We need a light tactical vehicle, employable in a forward-deployed expeditionary environment, which can also take a serious hit like an MRAP and bring our warfighters back alive, mission accomplished ... That's the JLTV, where it successfully targets – and overcomes – the critical gap in light tactical vehicle capabilities."

"There is fierce competition with these three vendors," Cavedo said. "The JLTV prototype vehicles here at TDSA are part of the 22 vehicles each vendor [delivered] in late August 2013, when they all will undergo 14 months of intensive testing."

"We need a light tactical vehicle, employable in a forward-deployed expeditionary environment, which can also take a serious hit like an MRAP and bring our warfighters back alive, mission accomplished," Burks said. "That's the JLTV, where it successfully targets – and overcomes – the critical gap in light tactical vehicle capabilities." ■

A U.S. Marine with Battalion Landing Team, Weapons Company, 2nd Battalion, 4th Marine Regiment, 31st Marine Expeditionary Unit, fires an M777A2 towed 155 mm howitzer during an integrated live-fire exercise at the Bradshaw Field Training Area, Northern Territory, Australia, Sept. 3, 2013, during Koolendong 2013. Koolendong is an amphibious and live-fire exercise designed to increase interoperability between the U.S. Marine Corps and Australian Defense Force.

U.S. DEPARTMENT OF DEFENSE PHOTO BY SGT. JONATHAN WRIGHT, U.S. MARINE CORPS

PM TOWED ARTILLERY SYSTEMS

M777A2 entering sustainment phase of program

By Scott R. Gourley

This past year has seen the final M777A2 production deliveries for the Marine Corps and Army completing a highly successful production run that started in 2005 for this joint program managed by Program Manager, Towed Artillery Systems (PM-TAS). But the mission is far from being concluded. While Marine Corps fielding is complete, the PM will be fielding the M777A2 to the Army's Infantry Brigade Combat Teams (IBCTs) through 2017. In addition, much of the PM focus has shifted to sustainment and completing pre-planned upgrades to the system as well as the "refresh" of electronic components based on late 1990s technology that are now facing supportability issues.

PM-TAS manages a portfolio that features the M777A2, a joint USMC/Army Lightweight 155 mm howitzer system also known as the LW155, as well as several Army programs. The M119A3, the Army's 105 mm howitzer system, is going through a significant upgrade, adding a Digital Fire Control System (DFCS), giving the system self-locating, navigation, and pointing capabilities. PM-TAS is performing as the system integrator for this upgrade while sustaining a mixed M119A2/A3 fleet of 823 howitzers.

The D-30, a Soviet 122 mm howitzer, was added to the PM-TAS portfolio in 2010 at the direction of the Army MILDEP to support the fielding of the Afghan National Army (ANA). To date, PM-TAS has delivered 204 D-30 howitzers in support of this effort. These howitzers were secured through a variety of sources, with PM-TAS managing the overhaul and final inspection of the weapons prior to delivery to the ANA.

PM-TAS also manages Target Acquisition Systems. The Improved Position and Azimuth Determining System (IPADS), in service with the USMC and Army, is going through an upgrade, adding GPS capability that results in the system being designated as the IPADS-G. The PM is looking forward, planning a replacement Computer Display Unit (CDU) for the IPADS-G to address obsolescence issues, ensuring the system's supportability for years to come. The IPADS has several active Foreign Military Sales (FMS), which are managed by the program management office (PMO).

Even with its expanded portfolio, the M777A2 remains the cornerstone of the PM-TAS portfolio. The system cannot only deliver long-range artillery fire in support of ground troops, but its capabilities are further enhanced with an advanced DFCS to precisely and accurately locate and aim the weapon as well as provide the ability to fire the M982 "Excalibur" precision-guided munition.

The M777A2 is capable of firing standard (unassisted) projectiles to a range of 15 miles (24 kilometers), assisted projectiles to 19 miles (30.5 kilometers), and the Excalibur munition to ranges in excess of 25 miles (40 kilometers).

As the world's first artillery weapon to make widespread use of titanium and aluminum alloys, the lightweight M777A2 can be airlifted into remote high-altitude locations inaccessible by ground transportation and is capable of being transported by the Marine Corps' V-22 Osprey and medium-lift and heavy-lift helicopters.

As of this writing, there are 1,071 M777 howitzers on contract. That figure includes 511 for the Marine Corps, which reaches the Marine Corps Authorized Acquisition Objective (AAO), and 488 for the Army, short of the Army's AAO of 524. As a result of force structure changes, the Marine Corps just transferred 30 M777A2s to the Army, which reduces the USMC AAO to 481. More than 1,000 of the 1,071 howitzers have been delivered to date, with current schedules reflecting the delivery of the final guns in January 2014. PM-TAS does not foresee any additional production from the United States at this time.

In addition to the U.S. Marine Corps and Army, there are 54 M777A2 howitzers under FMS for Australia, with 35 of those already delivered, and 37 M777 howitzers – that's in the basic "glass and iron sights" configuration – that have been delivered to Canada. Subsequent to the delivery of the M777s, the Canadians equipped the guns with their own DFCSs. Canada's rapid embrace of the program was also evident in the fact that the Canadians

Deputy Program Executive Officer Land Systems Marine Corps Daniel Pierson, first in front row from left, joins Keith T. Gooding, program manager, Lightweight 155 (M777), Picatinny Arsenal, N.J., third in front row from right, and others in marking the delivery of the LW155 (M777) to the National Museum of the Marine Corps at Quantico, Va., in September.

U.S. MARINE CORPS SYSTEMS COMMAND BY MONIQUE RANDOLPH

were the first to fire the M777 in Operation Enduring Freedom.

Both services are "pure fleeted" with M777A2 guns (the "A2" can fire Excalibur), with the only difference between Army and Marine Corps configurations being that the Marine Corps howitzers do not have the run-flat tires used on Army guns. A key performance parameter (KPP) for the M777A2 is a maximum 10,000 pound weight, allowing external airlift by the Osprey. Eliminating the run-flats saved around 120 pounds, providing "a little cushion" that had been sought by Marine Corps planners.

PM-TAS was approved for a sustainment strategy that features a Performance Based Life Cycle Sustainment (PBLCS) approach that focuses on performance vice traditional transaction-based strategies. The LCS contract, competitively awarded in May 2013, provides end-to-end supply chain management of approximately 1,500 unique M777A2 parts and approximately 300 non-unique parts. This includes establishing Performance Based Agreements (PBAs) with the Tank-automotive and Armaments Command (TACOM)/Defense Logistics Agency (DLA) and the Marine Corps Logistics Center to ensure that unique and common spare parts are available to meet the Not Mission Capable Supply (NMCS) resolution rate metric. As such, parts for dead-lined howitzers will be delivered to the unit four days after notification of the deadline or requisition date in 85 percent of all cases, and will not exceed 30 days for all others. This will also ensure that the operational availability rate of 90 percent is achieved. The LCS contract will provide engineering support to include configuration management for the unique parts and management of the technical manuals. This strategy will represent a significant improvement to the organic system utilized on similar programs. Prior to LCS, the program relied on an Interim Contractor Support (ICS) contract for unique spares. Several of the LCS tenets were implemented during

ICS and have now been expanded since the March contract award. To date, this strategy has resulted in a greater than 95 percent operational availability for the M777A2.

Seeing this success, the Canadians and Australians have requested a project arrangement under the existing Memorandum of Understanding, signed by Assistant Secretary of the Navy for Research, Development and Acquisition Sean Stackley, which will allow both countries to leverage the U.S. LCS contract and allow all three nations to continue to work cooperatively on sustainment issues.

Pre-planned improvements have been integrated with PM-TAS efforts to "refresh" its DFCS. The DFCS has provided leap-ahead technology for towed artillery and transformed how Marines and soldiers use artillery, having the embedded capability of the Excalibur precision round, which has been used very effectively in Afghanistan.

As part of the M777A2 pre-planned improvements, in 2014 fielding of an integrated Muzzle Velocity Sensor System (MVSS) along with a software upgrade that brings on-board ballistic computation capability to the system platform will commence. The MVSS will provide "real-time" muzzle velocity measurements that will feed ballistic calculations, further improving the system's accuracy. The MVSS has also been qualified for use on the M119A3 howitzer. This is another benefit of having one program office manage all platforms. PM-TAS continuously looks for "commonality" opportunities across the portfolio while modernizing its platforms. This approach not only helps in reducing acquisition and sustainment costs, but also supports "cross-platform" training for soldiers in the Army's IBCTs, where both the M777A2 and M119A3 system will be fielded.

Obsolescence issues combined with feedback from Marines and soldiers have resulted in several modernization efforts for the M777A2 DFCS. In 2014, an Improved Power Conditioning and Control Module (I-PCCM) will commence fielding and will replace the current PCCM, addressing power issues reported from Marines in Afghanistan. The I-PCCM will also be forward compatible with "smart" power technologies, like lithium ion batteries, currently being evaluated. These technologies have the potential to more than double the DFCS runtime while improving cold temperature performance and charging.

Improved gunners displays will also commence fielding in 2014. In addition to addressing obsolescence issues, the display utilizes LCD technology, providing greatly improved sunlight visibility and reliability, all at a reduced cost. These displays are a direct replacement for the current display, so fielding will be conducted via a maintenance instruction with displays shipped to units.

A new Mission System Computer (MSC) and Chief of Section Display (CSD) start qualification testing in 2014, with fielding planned for 2016. The new MSC will be smaller and lighter than the current MSC, providing faster processing while using less power. The CSD will utilize touchscreen LCD technology that provides superior sunlight visibility and less power demand. Just think of your circa 2000 computer compared to today's models, which offer greater performance at a reduced cost.

Work on upgrades to the components in the M777A2 Communications Location Enclosure (CLE) has just commenced. Plans include the replacement of the current Defense Advanced GPS Receiver (DAGR) and Platform Integration Kit (PIK) with the I-PIK. The I-PIK will combine the functionality of the PIK and DAGR into a single, more reliable component. As part of this effort, PM-TAS is looking at radios that support newer waveforms while providing simultaneous voice and digital communications.

While production may be ending for the M777A2, the mission is far from accomplished, and PM-TAS is well positioned to support the M777A2 and all the platforms it manages well into the future. ■

An LVSR equipped with the Underbody Improvement Kit (UIK) crosses a water obstacle at speed. The UIK was tested but never procured by the Marine Corps. The LVSR is the replacement vehicle for the legacy Logistics Vehicle System (LVS). Production of the LVSR is now complete and it is nearing Full Operational Capability (FOC).

PEO LAND SYSTEMS PHOTO

PM MEDIUM AND HEAVY TACTICAL VEHICLES

By Scott R. Gourley

One broad area that has witnessed significant programmatic transformation encompasses the Marine Corps Medium and Heavy Tactical Vehicle (M&HTV) fleets.

Original Portfolio

The original PEO Land Systems portfolio contained two tactical vehicle systems: the Medium Tactical Vehicle Replacement (MTVR) and the Logistics Vehicle System Replacement (LVSR).

MTVR is a family of vehicles that performs a growing variety of logistics and tactical functions. Often called the "7-ton" due to its cross-country maximum load, it can carry up to 15 tons on the road. Manufactured by Oshkosh Defense, the vehicles were first fielded in 2001 as replacements for the obsolete M813 series, M923 series, and M925 series vehicles.

The platforms have an on-road cruising range of 300 miles (483 kilometers), the ability to ford 5 feet (1.5 meters) of water, and can traverse a 60 percent gradient and 30 percent side slope with the maximum cross-country load. Operational performance is further enhanced by advanced technologies like the Oshkosh TAK-4® independent suspension system and Command Zone™ integrated control and diagnostics system.

MTVR variants include: Standard Cargo and Extended Wheel Base Cargo Trucks; dump trucks; tractors; wreckers; and High Mobility Artillery Rocket System Resupply Trucks. The vehicles are reducible or non-reducible height and about half are armored.

The LVSR system serves as the "heavy logistics" counterpart to the MTVR. The LVSR is replacing the Marine Corps' aging Logistics Vehicle System (LVS), which incorporates the MK 48/MK 48A1 front power unit with associated Rear Body Units (RBU) to transport large quantities of supplies around the battlefield.

Developed by Oshkosh Defense, the LVSR includes three variants: MKR 18 Cargo, MKR 16 Tractor, and MKR 15 Wrecker. Company descriptions highlight the system as: "One of the world's most technologically-advanced logistics platforms," pointing to its 22.5-ton (20,412 kilograms) on-road/16.5-ton (14,969 kilograms) off-road payload, 600 horsepower diesel engine, Command Zone integrated control and diagnostics, and factory-installed armor integrated into the initial vehicle design.

PEO LAND SYSTEMS PHOTOS

Program Realignments

Both the end of 2011 and 2012 witnessed a significant portfolio expansion through the directed realignment of the entire Motor Transport portfolio from the former Marine Corps Systems Command Product Group 15 to PEO. The realignment, which focused on the synergies to be obtained from consolidating similar capabilities, brought in programs like the current LVS, the P-19 series fire truck, and multiple trailer programs affiliated with medium and heavy tactical vehicles.

According to Program Manager Medium and Heavy Tactical Vehicles Bryan Prosser of PEO Land Systems, the program consolidation did not come as a complete surprise.

"I will admit that we went through several weeks if not a couple of months of anticipation and expectation without any of the specific details on the 'who, what, and when' of the new portfolio. But we were still trying to plan for it and getting ready to make it happen," he said.

"As part of that process, we started out trying to expand our connections with the folks in 'Motor T,'" he explained. "Obviously there were already connections between our two offices on some level, but the new connections focused on 'one team' of Medium and Heavy Tactical Vehicles."

The new team set about identifying a set of common issues surrounding the expanded portfolio, ranging from program status to key issues to upcoming decision points.

"Wouldn't you know that every one of these programs was facing a major milestone decision in the near term," Prosser said. "And in many cases those had to be adjusted because there were other issues which needed to be resolved first and this impacted the schedules. It would have been nice if we could have started the process a little earlier, but in the end the team did an excellent job adjusting with the schedule realities."

Acknowledging that one structure for the expanded organization could have inserted the former MARCORSYSCOM elements as "their own team," Prosser countered, "I really didn't want to do that because that would have fostered an 'us and them' mentality. So we worked with the structure by creating a Medium

ABOVE: The Marine Corps had already reached its MTVR Authorized Acquisition Objective (AAO), but when Marine Corps Combat Development and Integration changed the AAO, the variant mix also changed, and now a few more MTVRs are being procured from Oshkosh.

ABOVE RIGHT: The Marine Corps is procuring 164 P-19R Aircraft Rescue Fire Fighting Vehicles to replace P-19A Aircraft Crash and Structure Fire Fighting Trucks, which have now been in service twice as long as intended.

Team and a Heavy Team. I worked with the leadership team to integrate the programs which transitioned to the PEO into the two teams that we had, spreading them out to not only make them a part of the team but to give them an opportunity to possibly work on other things than just the programs they had arrived with.

"And every day since has been a new adventure," he added.

Recent and Pending Milestones

Asked about recent and pending milestones across the M&HTV fleets, Prosser highlighted the P-19R fire truck replacement as well as the Flatrack Refueling Capability (FRC), which is now in full rate production. Heil manufactures the FRC, describing the program as: "… a fueling/defueling system built in an ISO container. It's designed to transport, store and distribute JP-8, JP-5, DF-2 and other kerosene-based fuels in the expeditionary environment for Marine Corps aircraft and tactical ground vehicles. The fuel capacity of the FRC is approximately 2,500 gallons. The FRC is capable of being loaded, secured, transported and unloaded by the LVSR cargo variant using the LVSR's integral method of loading ISO containers or flatracks. The FRC is fully operational as a stand-alone system, or integrated with the LVSR. The FRC minimizes fleet operating costs, enhances performance and supportability, and meets all applicable military requirements. Standard equipment includes a fuel filter separator, relaxation chamber, meter, hose reels, pressure and vacuum vents, portable grounding rod, static discharge system, vapor recovery, electronic liquid level indicator, engine and pump assembly. The FRC is air transportable, rail transportable, RO-RO [roll-on/roll-off] capable with top lift and tie down eyes."

"The FRC will provide an enhanced refueling/defueling capability," Prosser continued. "It is definitely expeditionary, a feature that becomes obvious when you compare it to driving out with your big tanker truck. Now we will have a 2,500-gallon fuel tank that can be transported on our LVSR, which has tremendous capability both on road and off road. So you can get this fuel capability to anywhere you want and you can leave it on the LVSR or offload the flatrack and leave it sitting at an air station or forward operating base.

Other ongoing activities surround sustaining the MTVR.

"In the aggregate, we have procured our MTVR AAO [Authorized Acquisition Objective]," Prosser said. "But when they [Combat Development & Integration] changed the AAO, they also changed the mix of variants that were required. Essentially, we bought more vehicles than the AAO specified, but we didn't have the right mix. Therefore, we are in the process of procuring a few more vehicles from Oshkosh. It won't get us the whole way, but it will get us closer to the mix we want. The PMO [program management office] is considering a wide variety of options to divest of excess variants."

Another pending milestone surrounds the associated MTVR trailers. However, according to Prosser, the situation is a little bit complicated.

"The MTVR trailer has already had a full rate production decision," he began. "And there are three variants of that trailer: cargo, general purpose, and a water tank variant. Well, the one prototype that was built of the water trailer was apparently down at Blount Island Command in Jacksonville, Fla., and they took a picture of their forklift not able to lift it. That picture drew the attention of some who immediately criticized the program in light of our goals to lighten the MAGTF [Marine Air-Ground Task Force]. The result was that all work was stopped on the water and general purpose trailers so that the Marine Corps could determine the direction they wanted to take. At the same time, they recognized that they still needed to pursue the cargo variant because we still don't have a new trailer for behind the MTVR. We still have the 'old' trailer. But it can't keep up and the MTVR loses capability by pulling it – you're limited in where you can drive and what you can do."

The decision that emerged from the trailer quandary was to keep the chassis of the trailer as it was. Those chassis elements were already being built by Choctaw Defense (in Oklahoma) because of the earlier full rate production decision. But the cargo trailer bed was redesigned to be both lighter and able to haul more cargo.

"So in the end we have less total weight but we're hauling more cargo," Prosser noted. "And we are working toward a full rate production decision on that new cargo variant trailer bed, which will then be taken and married up to the chassis that are already built. That decision may happen late this calendar year or early next year."

At about that same time, the program management office will be addressing the acquisition milestone for a new fire truck. Designed to replace the current fleet of A/S32-P19A Aircraft Crash and Structure Fire Fighting Trucks with Aircraft Rescue Fire Fighting (ARFF) trucks, the new P-19 Replacement ARFF Vehicle (P-19R) represents the first new Marine Corps fire truck procurement in 30 years.

The P-19A was introduced into service in 1984, with an intended service life of 12 years, but has been in service in excess of 28 years. The P-19R Aircraft Rescue Fire Fighting vehicle will meet both the 2012 National Fire Protection Association 414 standards and the expeditionary fire fighting and aircraft rescue requirements of the U.S. Marine Corps. This program will replace P-19As at both Operational Force (OPFOR) units and garrison mobile equipment (GME) at Marine Corps Air Facilities.

In May 2013, Oshkosh Defense was awarded an engineering, manufacturing, and development (EMD) contract to build 164 fire trucks for the Marine Corps.

Tactical Performance/Future Challenges

Prosser's takeaway messages highlighted the performance of both medium and heavy fleet vehicles in theater as well as future program challenges.

"The MTVR, especially, is the workhorse of the medium fleet," he said. "It's been out there longer. And it is being used in tactical and geographic environments that, quite frankly, were not expected when the vehicle was acquired. Take a look at things like the armoring we have applied to them or equipping them with a manned weapon station. Now I'm not going to say that they look like a combat vehicle; but they certainly don't look like a truck either.

"In fact, those are some of the big issues that the Marine Corps is facing in terms of what we do with some of those 'armored up' vehicles," he added. "We really need to evaluate how many armored MTVRs and armored LVSRs we need running around Camp Lejeune and Camp Pendleton or anywhere else in the United States. We think we want to keep them in an armored configuration, but the question becomes, 'What we are going to do with them? – store them, use them for training, or continue to run them regularly as an armored vehicle?' So we have those things to work out along with the whole reset/reconstitution effort."

He continued, "Another thing I would highlight is that the last word in both truck names is 'Replacement,' so they were both replacements for old systems in the Marine Corps. They were both built with basically a 22-year service life. And at this point, the first MTVR vehicles that were fielded are halfway through their expected service lives. However, if you look at our budgets, it's clear that there's not a replacement for the MTVR or LVSR out there. If there was, we probably should be working on it already.

"Their planned 22-year service life did not include a depot maintenance rebuild program for them because of their technology and ruggedness," he stated. "And right now there is no SLEP [Service Life Extension Program] or modernization upgrade on the schedule. None of that is planned. So one of the things that this program office has to start thinking about is the point where we have to do a major overhaul on these vehicles, an upgrade, or a SLEP to keep them effective well into the future. We don't have the answers to that yet, but those are some of the things we are starting to explore." ■

Program Executive Officer Land Systems

MISSION

Program Executive Officer Land Systems (PEO LS) will meet the Warfighter's needs by devoting full-time attention to Marine Corps weapon systems acquisition, while partnering with Marine Corps Systems Command, in order to develop, deliver and provide life-cycle planning for assigned programs

VISION

To serve as the preeminent focal point and standard bearer for excellence and innovation in major land program acquisition management

Amphibious Vehicles

MRAP

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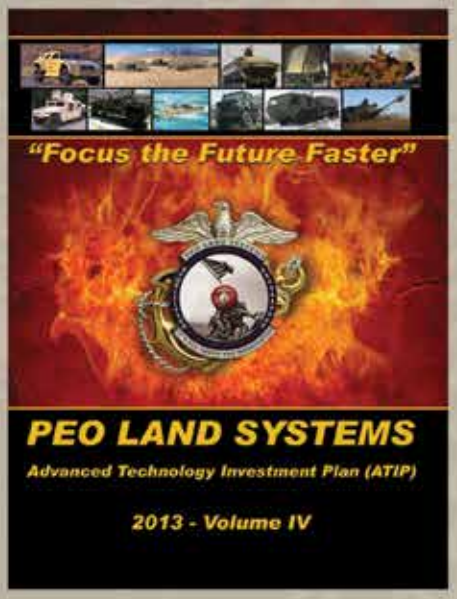

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