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THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENT AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

ABSTRACT

Title: Full Spectrum LAR

Author: Major David W. Hudspeth, USMC

Thesis: The proffered solutions provide the additional fire and staying power necessary to conduct the limited offensive operations occurring throughout the full spectrum of warfare. Adoption of these solutions would provide the U. S. Marine Corps with a full warfare spectrum capable LAR battalion for the next 25 years.

Discussion: Marine Corps Light Armored Reconnaissance (LAR) battalions lack the organizational structure and equipment to prosecute missions ranging from the low to the high end of the warfare spectrum. LAR battalions currently lack reliable anti-armor defeating capabilities. These same unreliable anti-armor defeating capabilities cause LAR companies to have fewer infantry scouts. Fewer scouts diminish LAR's capabilities to prosecute Counterinsurgency Operations (COIN) where more foot mobile forces are needed. Organic LAR company mortars, currently comprising medium calibers, cannot range the doctrinal width screen lines and have limited effectiveness during urban operations. The LAR battalions have limited long haul recovery assets and limited long range communications capabilities available to support separate platoon operations. These deficiencies can be overcome.

Recommendation: (1) Upgrade the current capabilities of the existing LAV fleet through Service Life Extension Programs (SLEP) and the Inspect and Repair Only As Necessary (IROAN) programs where command control enhanced LAV-25 TOW variants are fielded (2) purchase the LAV-120 AMS to replace the LAV-M; (3) Increase the number of LAV-L’s for three to six LAV-L’s per LAR company; and (4) Expanding and reorganizing the LAR company from its current 25 vehicle mix to a proposed 28 vehicle mix.

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Light Armored Reconnaissance (LAR) Battalions have come a long way in the last 24 years; but there is still a ways to go. The Light Armored Vehicle (LAV) officially entered U.S. Marine Corps service in 1983 and was given an initial service life expectation of 2005.[1] Through service life extensions and modernization programs, the LAV's expected life is now projected to be 2024.[2] Beyond 2024, the Marine Corps continues to profess a willing to invest in future light armored vehicle capabilities.[3]

The Marine Corps currently has three active duty LAR battalions located in Camp Pendleton (1st), Camp Lejeune (2d), and Twenty-nine Palms (3d). The 4th LAR battalion is in the reserves. Each LAR battalion consists of four line companies and one Headquarters and Service Company. The LAR battalion mission is "is to conduct reconnaissance, security, and economy of force operations and, within its capabilities, to conduct limited offensive or delaying operations that exploit the unit's mobility and firepower."[4] Mission essential tasks consist of but are not limited to gathering "information well forward of the main MAGTF (Marine Air Ground Task Force) units, providing the MAGTF commander operational flexibility by giving him stand off distance . . . protecting flanks, performing screen missions and raids, and to conduct route and area reconnaissance."[5] While performing these tasks, LAR battalions "may function as an independent maneuver element in direct support of the MAGTF (Marine Expeditionary

[1] The website Olive Drab found at http://www.olive-drab.com/idphoto/id_photos_lav.php3 provides a detailed thumb-nail of the USMC's fielding history for the LAV.
[2] http://www.olive-drab.com/idphoto/id_photos_lav.php3
[3] Osborn, K. "Corps Refines Specs for Personnel Carriers." Marine Corps Times. 5 November 2007. p. 22.
[4] Anonymous. "Marine Battalions". Global Security.Org. Retrieved on May 13, 2008 from http://www.globalsecurity.org/military/agency/usmc/battalion.htm
[5] Anonymous. "Marine Battalions". Global Security.Org. Retrieved on May 13, 2008 from http://www.globalsecurity.org/military/agency/usmc/battalion.htm

Force/Brigade/Unit) or in direct support of the MAGTF's Ground Combat Element (Division or Regiment). A LAR battalion's subordinate companies may also be attached or in direct support of other tactical units as well.[6] LAR battalions are comparable to the U.S. Army's Stryker equipped cavalry squadrons.

LAR battalions lack the organizational structure and equipment to prosecute missions ranging from the low to the high end of the warfare spectrum. M. Robel reinforces this observation by stating, "The USMC LAI Battalion, while it has a large number of LAV-25's, has relatively little combat power when compared to the other forces due to the lack of dismounted ATGM's (Anti-Tank Guided Missiles) and its small dismounted infantry element."[7] Robel acknowledges the LAR battalions' mobility and excellent application for reconnaissance and security operations; however, Robel recommends that the LAR battalion "should be augmented before being assigned attack or defense missions" which equate to limited offensive roles[8] Colonel J. Bryant, the Marine Corps' Program Manager LAV (PM LAV), observes "Although the LAV was designed only for security and reconnaissance missions, it is actually doing a heck of a lot more including limited offensive operations."[9] Restraining the LAR battalions' abilities to prosecute limited offensives are the battalions' lack of reliable anti-armor defeating capabilities, their medium ranged fire support systems, insufficient long ranged communications capabilities at the platoon and company levels, insufficient long ranged towing capabilities and

[6] Anonymous. "Marine Battalions". Global Security.Org. Retrieved on May 13, 2008 from http://www.globalsecurity.org/military/agency/usmc/battalion.htm

[7] Michael K. Robel is a retired Army officer currently working for Northrop Grumman Information Technology as an operations researcher, developing the next generation of Army battle simulations. The uses of LAI and LAR are interchangeable because the battalion's structure and mission have remained unchanged.

[8] Robel.

[9] Erwin, S. "Marine Corps Ponders Options to Expand Armor Forces in Iraq." National Defense. March 2005. Retrieved on December 30, 2008 from http://www.nationaldefensemagazine.org/issues/2005/Mar/UF-Marine_Corps.htm

logistics assets within the companies, and insufficient infantry scouts available to perform dismounted tasks.

These deficiencies can be overcome by: (1) upgrading the current capabilities of the existing LAV fleet through Service Life Extension Programs (SLEP) and the Inspect and Repair Only As Necessary (IROAN) programs ongoing at Marine Corps Logistics Bases Barstow and Albany, (2) purchasing and fielding available off-the-shelf variants, and (3) expanding and reorganizing the LAR company. The proffered solutions provide the additional fire and staying power necessary to conduct the limited offensive operations occurring throughout the full spectrum of warfare. Adoption of these solutions would provide the U. S. Marine Corps with a full warfare spectrum capable LAR battalion for the next 25 years.

Upgrading Existing Capabilities

The LAV-25 TOW Upgrade

LAR battalions currently field 16 Light Armored Vehicle - Anti Tank (LAV-AT) variants for armor defeating purposes. The LAV-AT employs the Emerson 901 TOW Under Armor (TUA) weapons system. When reliably operational, the Emerson 901 turret can still provide effective anti-armor fires as exemplified during April 2003 Diyala River individual anti-armor engagements and the Desert Storm OP Battles of 1991. The LAV-AT however proves inadequate during Counter Insurgent Operations (COIN)in Iraq. During Operation Iraqi Freedom II, the 1st LAR battalion's LAV-AT's deployed to Iraq with only ¾ their crews manned and carrying only four missiles per vehicle.[10] Since 2005, the LAR battalions no longer deploy

[10] 1st LAR deployed with sixteen LAV-AT's to OIF-II from February-October 2004. LtCol W. Costantini was the battalion commander during this deployment. Seeing no armor threat during this deployment, LtCol Costantini ordered that only four TOW missiles be carried per LAV-AT.

LAV-AT's to Iraq and conversely employs the 0352 missile men as 0311 infantry scouts and 0313 LAV crewmen.

Lack of COIN applicability stems from the Emerson 901 turret itself which weighs one-ton and cannot fire on the move. When mobile, the Emerson turret rides in a stowed position resting atop the loader's hatch. The turret's stowed position prevents the loader from being able employ his personal weapon from inside the vehicle to cover the LAV-AT's rear. Forward of the stowed turret, TOW gunners ride in closable cupolas. In order to employ personal weapons to the sides and front of the LAV-AT, TOW gunners must expose themselves from their chests up from opened cupolas. TOW gunners also cannot engage nor observe targets to the rear of the LAV-AT because the stowed turret creates a blind spot. Unless the vehicle is abandoned and left unsecured only two LAV-AT crewmen can effectively dismount to perform infantry scout related tasks

Together with its lack of COIN operations employability, the LAV-AT's conventional combat employability is also questionable. While conducting patrols along the Kuwaiti-Iraqi border in March 2003, Weapons Company, 1st LAR employed LAV-AT platoons in over watch of LAV-25 platoon patrols forward. The LAV-AT's red-black first generation thermal sights were so poor in granularity that even the company's best TOW gunners reported mirages when actually there were no actual targets present.[11]

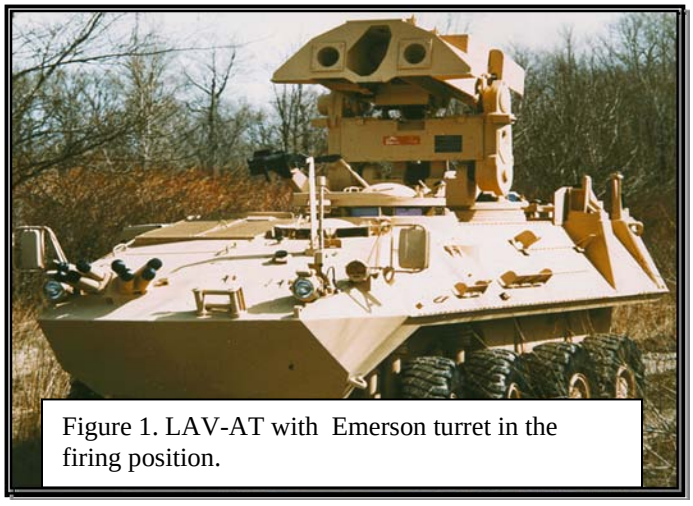

Figure 1. LAV-AT with Emerson turret in the firing position.

In addition to the poor sight

[11] Cpl L.Williams, a former Division Crew Served Weapons Champion in 2001, reported an armored vehicle through his TOW thermal sight at an estimated range of 2 kilometers. When the company commander personally looked through the same thermal sight, no discernable target could be observed. Close range LAV-25 thermal sight sweep by the company commander from an estimated 200 meters later confirmed the absence of a target.

picture, the Emerson turret is slow. Emerson turrets consume approximately 30 seconds alone to transition from the stowed to the erect firing position once the LAV-AT becomes stationary. Once the turret is erect, TOW gunners themselves vary in their individual abilities to identify targets and engage them. Range to target, enemy mobility, concealment, and terrain mitigation influences the time variations per individual gunner to acquire and engage targets. The TOW missile itself requires 20-21 seconds to fly the maximum range of 3,750 meters. Adding the times together estimates slightly more than 60 seconds for an elite crew going from on-to-move to target destroyed. Colonel Bryant estimates this move-to-destruction time as being closer to two minutes.[12] When compared to main battle tank average capabilities to acquire and engage while on-the-move, the LAV-AT firing estimate in excess of one to two minute proves woefully inadequate.

An individual LAV-AT carries 16 missiles - two in the launcher and 14 stowed in the loader's compartment. Though two missiles are loaded in the launcher, the LAV-AT is capable of firing only one missile per engagement. Major T. Protzeller USMC, a Task Force Shepherd company commander during Operation Desert Storm's OP Battles, observed that the preferred method of engaging armor with the LAV-AT was to volley fire missiles.[13] Hypothetically, LAV-AT sections can engage four tanks simultaneously; however, the high rate of Emerson turret malfunctions renders four simultaneous successful engagements implausible.

Further confounding simultaneous missile engagements, LAR company screen lines in the open desert can be anticipated to be 5-7 kilometers wide as was 1st LAR's company screen lines north of the *Opening Gambit* Gas and Oil Separations Platforms (GOSP's). Four LAV-AT's

[12] Bryant, J., Col. USMC. Advanced Planning Briefing to Industry 2006 Independent Program Managers. 17 April 2006. Retrieved on December 30, 2007 from http://www.dtic.mil/ndia/2006mcsc_apbi/bryant.pdf

[13] Protzeller, T., Major USMC. 1st LAR CAST Trainer Exercise; Desert Fire Exercise 2001. Twenty-Nine Palms, California. 11 September 2001. Major Protzeller was the battalion XO and at the time was only officer in the battalion with Desert Storm combat experience. During this CAST trainer exercise, Major Protzeller served as the Red Cell. Captain D. Hudspeth, Captain S. Folsom, GySgt M. Musselman participated.

per LAR company alone cannot mass in coverage and volley fire their missiles when companies occupy such elongated screen lines.

The offered solution proposes that all LAV-AT's and all LAV-25's in each LAR battalion be replaced or upgraded to LAV-25 TOW specifications. The LAV-25 TOW is an upgraded LAV-25 turret that includes two side mounted or *saddlebag* TOW launchers. The U.S. Army employs a similar model already on its M2 series Bradley fighting vehicles. Additionally, General Dynamics Land Systems already manufacturers a LAV-25 TOW turret[14] Figure 3 shows the LAV-25 TOW system mounted on a LAV generation III.

Figure 2. LAV-25 TOW

Replacing the present LAR company's 14 existing LAV-25 turrets with LAV-25 TOW's provides the LAR company commander the option to volley fire 14 TOW missiles. Another 16 LAV-25 TOW variants procured to replace the LAR battalion's 16 existing LAV-AT's increases the option to volley fire up to 18 TOW missiles per company. Table 1 displays the increased anti-armor capabilities that a LAV-25 TOW equipped battalion possesses when compared to LAV-AT equipped LAR battalions now. In Table 1, each LAV-25 TOW variant carries four missiles total - two in the launchers and two stowed in the scout compartment. The current LAV-

[14] General Dynamics Land Systems is also the manufacturer for the LAV.

25's capability to carry at least four infantry scouts should remain unaffected when only two TOW missiles are stowed in the scout compartment.

Unit Size	LAV-AT	Missiles	LAV-25 TOW		Missiles	
Company	4	64	14	18	56	72
Battalion	16	256	56	72	224	288
Volley Fire	16	---	56	72	-----	

Table 1: TOW Missile Comparison of LAV-AT and LAV-25 TOW equipped LAR units.

In addition to the LAV-25 TOW upgrades and procurements, one further LAV-25 specific upgrade is required to create the full warfare spectrum capable LAR battalion. A communications upgrade should be undertaken for at minimum five LAV-25 TOW variants per LAR company[15]. This LAV-25 TOW communications upgrade would include the installation of an On-The-Move Tactical Satellite (TACSAT) radio terminal and antennae per vehicle. Currently each LAV-25 variant has two Very High Frequency (VHF) Single Channel Ground and Airborne Radios (SINCGAR). The range of communications for the SINCGAR radios, depending upon weather, terrain, and vehicle power availability conditions, is up to 35 kilometers. Since 2004, LAR battalions have operated in Areas Of Responsibility (AOR) characterized by 22,000 square kilometers of western Iraq. Throughout this immense AOR, individual LAR platoons have been detached to guard logistical packages, attached to rifle battalions conducting raids, and operate separately on special missions often occurring several hundred kilometers away from their companies and well outside VHF range. When these platoons were detached for their long range operations, they were outfitted with one of the

[15] Five TACSAT radios equates to the four platoon commanders and the company commander having an on-the-move TACSAT radio in their LAV-25 TOW variants. Optimally nine of the company's 16 LAV-25 TOW variants should be upgraded to include on-the-move TACSAT radios. The additional four radios would include platoon sergeants and provide redundancy within the platoons in the event of combat loss. The company's LAV-C2 variant also has an on-the-move TACSAT radio capability.

battalion's man packed TACSAT radios. The current suite of available TACSAT radios in the LAR battalion makes it possible to outfit only two of the battalion's 16 line platoons for long distance separate platoon missions without adversely effecting on-going battalion and company operations. When needing to report or request assistance, a separate LAR platoon commander using a man packed TACSAT radio must stop his vehicle, set-up the man portable radio, and report. Not an ideal situation if the platoon commander is more than 35 kilometers away and is under fire. A LAV-25 TOW communications upgrade to include a LAV mounted *on-the-move* TACSAT radio transceiver would facilitate mission continuance and reporting simultaneously. A separate platoon commander while under fire would thus be able to communicate while continuing to direct his platoon simultaneously. This upgrade would also facilitate greater freedom of movement and expanded control for the LAR company commander because having at least one TACSAT radio in each platoon would allow each company to expand individual platoon operational reaches beyond 35 kilometers without risk of losing communications or assuming greater risk. Finally, the communications upgrade should not be obvious during enemy observation thus allowing the enemy to discern which LAV-25 TOW possesses an enhanced communications capability and is most probably carrying the organizational leadership being confronted.

The opportune times to complete the fire power and communications upgrades to the LAV-25 TOW variants would be through currently underway SLEP and IROAN programs. Colonel Bryant reports funding through 2010 for LAV-25 SLEP firepower upgrades.[16] The funded lethality upgrades include new thermal sights, laser range finders, and the procurement of uranium depleted ammunition and recoil mechanisms already fielded in the U.S. Army's M2

[16] Bryant.

Bradley fighting vehicles.[17] The combination of TOW systems, depleted uranium sabot firing capabilities, and a new thermal sight makes the LAV-25 TOW an extremely lethal anti-armor platform. All upgrades require each individual LAV-25 turret to be stripped and rebuilt providing the opportunity to include the installations of LAV-25 TOW and TACSAT radio components. Colonel Bryant also reports that five additional companies of LAV have also received funding.[18] The reported new LAV acquisitions themselves present yet another opportunity for the Marine Corps to obtain LAV-25 TOW capabilities through built-to-order purchases.

The funds needed to pay for LAV-25 TOW upgrades are available. Colonel Bryant observes, "A bare-bones LAV hull costs about $1 million [however] the priciest piece is the weapons turret, which ranges from $1.5 million to $2.5 million each."[19] Were the Marine Corps to replace only its 95 existing LAV-AT's with the new LAV-25 TOW's equates approximately to $333 million when using $3.5 million per vehicle as an estimate.[20] Add modifications needed to convert the Marine Corps' remaining LAV-25 fleet to LAV-25 TOW's and the $333 million estimate grows significantly. Though this cost appears insurmountable, Colonel Bryant reports PM LAV fiscal year 2006 funds as $234.9 million making the proposed costs seem realistically attainable especially when completed over the course of several years.[21]

Purchasing Existing Variants Off-The-Shelf

The LAV-Logistics (LAV-L)

[17] Bryant.
[18] Bryant.
[19] Bryant.
[20] Erwin, S. "Marine Corps Ponders Options to Expand Armor Forces in Iraq." National Defense. March 2005. Retrieved on December 30, 2008 from http://www.nationaldefensemagazine.org/issues/2005/Mar/UF-Marine_Corps.htm
[21] Bryant.

Currently LAR companies possess three LAV-L's and one LAV-Recovery (LAV-R). The unique capability offered by LAV-L and LAV-R are that these are the only two LAV variants to possess reinforced towing hitches and are deemed to be the only two LAV with towing capabilities.[22] Reinforced towing hitches enable these two types of LAV's to tow a damaged LAV for long distances without the associated risk of causing damage to towing vehicle themselves. The LAV-25 and other variants do possess limited towing capabilities; however, these are field expedient and short ranged towing opportunities only. Attempting to tow a damaged LAV while using a standard towing hitch will eventually cause the tow hitch to fail possibly leading to the towing vehicle's immobilization.

The LAV-L, unlike the LAV-R, fills multiple roles. The LAV-R fills the singular role of field recovery and repair primarily due to the vehicle's internal and external configuration. A 30,000 pounds capable winch, work bench, and welding rig are housed in the rear of the LAV-R thus there is no available space to carry ammunition resupplies, food, or under armor ambulance kits. On the other hand, the LAV-L's interior is largely free to manipulate allowing the vehicle to be specifically stocked in support of the unique missions often assigned to separate LAR platoons. During OIF-II, 1st LAR reinforced separate LAR platoons with a LAV-L from the battalion's Headquarters and Service Company allowing the line companies to maintain their three organic LAV-L's with the companies' main bodies.[23] The LAR battalion can reinforce two separate platoon operations simultaneously without reducing the battalion's capabilities.

The sheer size of low end warfare AO's however supports the notion that additional LAV-L's are needed within the LAR companies. An additional 12 LAV-L's per LAR battalion would facilitate the direct support of each of the battalion's 16 line platoons by an individual

[22] Anonymous. "The LAV-R". Military Analysis Network. Retrieved on May 9, 2008 from http://fas.org/man/dod-101/sys/land/lav-r.htm

[23] The H&S Company of a LAR battalion has 4 LAV-L's that support the battalion's field and combat trains.

LAV-L. A LAR platoon on a separate mission or long range patrol during low end warfare such as COIN could thus have a long ranged towing and unique mission capability embedded. During high end warfare, the LAR company would be able to fight longer without requiring resupply due to having three additional LAV-L's per company.

The LAV-120 Armored Mortar System (LAV-120 AMS)

An additional 12 LAV-L's discussed previously would also support the heavier ammunition requirements should the LAR battalions replace their LAV-25's and LAV-AT's with the LAV-25 TOW and should the LAV-Mortar (LAV-M) variants be replaced with the LAV-120 AMS. The LAV-M needs replacement because of its limited range and lethality. Colonel Bryant observes that a LAR battalion almost has to place its mortars "in direct fire range to even get them into the fight."[24] The Saudi Arabian National Guard currently employs the LAV-120 AMS. The LAV-120 AMS crews four, carries 40 rounds of 120mm mortar ammunition, and have a firing range of 9,200 meters. Comparatively, the U.S. Marine Corps' currently fielded LAV-M crews five, carries 94 rounds of 81mm ammunition, and have a firing range of 5,700 meters.

The Marine Corps is currently evaluating the LAV-Expeditionary Fire Support System (LAV-EFSS)for purchase. The LAV-EFSS houses an automated 120mm mortar system. The automated 120mm mortar system does have the extended ranges and lethality needed by the LAR battalion; however, the LAV-EFSS cannot be fired under armor protection or in the direct firing mode. Both the LAV-120 AMS and the LAV-EFSS offer the extended ranges and increased lethality that more ably facilitates the coverage elongated screen lines and the defeat of

[24] Anonymous. "Marines Ponder Upgrades for Light Armored Vehicles." The Free Library. Retrieved on May 13, 2008 from http://www.thefreelibrary.com/Marines+ponder+upgrades+for+light+armored+vehicles-a0108195832

improving armor fielded in today's infantry and cavalry fighting vehicles; however, the LAV-120 AMS however offers two capabilities that both the LAV-M and the LAV-EFSS do not offer.

The LAV-120 AMS allows the mortar to be fired from while under armor protection. The crews of the LAV-M and the LAV-EFSS are exposed during firing. The LAV-120 AMS muzzle can be depressed down to five degrees thus allowing 120mm mortar rounds to be fired direct while on-the-move much like a tank cannon. Both the LAV-M and the

Figure 3. LAV-120 AMS

the LAV-EFSS mortars only provide stationary high angle fires. The utility of this specific difference would most likely been seen in urban combat scenarios where the LAV-M and LAV-EFSS could only provide illumination, smoke, and rooftop suppression missions. Comparatively, the LAV-120 AMS provides these same capabilities plus the additional capabilities of creating hasty breaches in building walls and targeting combatants engaging from individual windows. Though the LAV-M's larger five member crews have been used primarily to reinforce dismounted scouts during COIN, the one member crew reduction associated with the LAV-120's

fielding does not constitute a manpower reduction. LAR battalions would actually have more infantry scouts should both the LAV-25 TOW and the LAV-120 AMS be fielded simultaneously.

Table 2 provides a comparison of infantry scouts for LAR companies equipped with LAV-AT's and LAV-25 TOW. The numbers provided base upon a four scouts per LAV-25 formula. Granted, the table of organization calls for six scouts per LAV-25 variant; however, when corpsmen, mechanics, communications technicians, tool kits, ammunition, SL-3 gear, and additional weapons are stored on the vehicle during combat, four scouts realistically comprises the extent of what a LAV-25 troop compartments holds.

Unit Size	**LAV-AT**	**LAV-25 TOW**	**Difference**
Company	56	72	+ 16
Battalion	224	288	+ 64

Table 2: Scout Comparison of LAV-AT and LAV-25 TOW equipped LAR units.

Table 3 shows a personnel and ammunition comparison between LAR battalions and companies equipped with the LAV-M and the LAV-120 AMS.

Vehicle	**# in Bn/Co**	**Ammunition**	**Range**	**Personnel**
LAV-M	8/2	94 rounds	5,700 meters	40
LAV-120	8/2	40 rounds	9,200 meters	32

Table 3. LAV-M and LAV-120 Comparison.

Reorganizing the LAR Company

The fielding of LAV-25 TOW, LAV-120 AMS, and three additional LAV-L's per LAR company creates the need to slightly reorganize the current LAR company configuration. Figure

4 is a depiction of the current configuration of a 25 vehicle LAR company. Figure 5 is a depiction of a proposed 28 vehicle LAR company following the acquisition and fielding of the

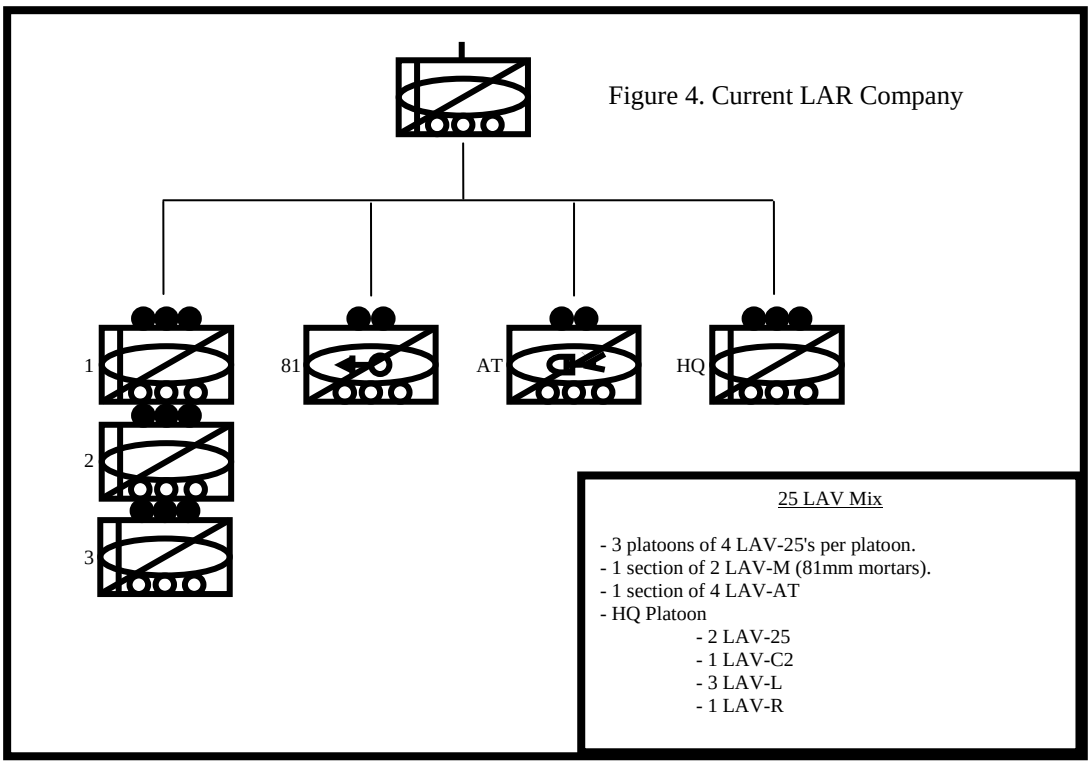

Figure 4. Current LAR Company

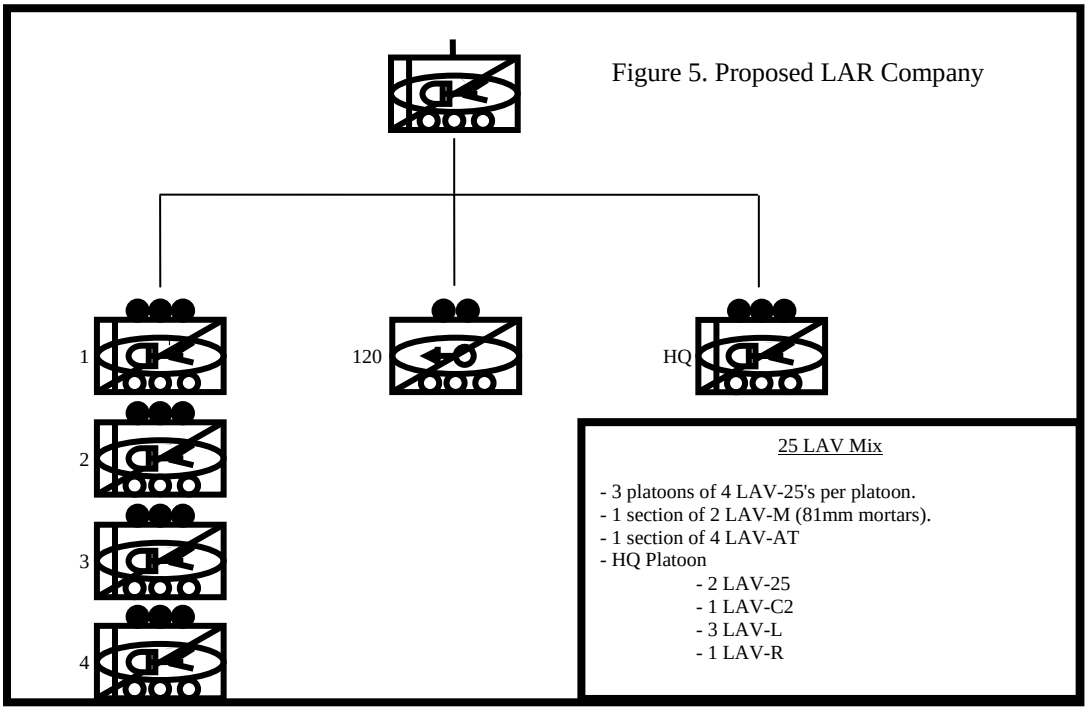

Figure 5. Proposed LAR Company

the LAV-25 TOW, the LAV-120 AMS, and three additional LAV-L's per company. The proposed reconfiguration offers the LAR company a fourth maneuver platoon. Due to its operational commitments at the time and its unique organization, 1st LAR was able to field a third line company during OIF-II while follow-on battalions could field only two companies.[25] The addition of a third line company increased the 1st LAR's operational reach. The addition of a fourth platoon in the proposed organization affords the future LAR company and battalion commanders the opportunity to maintain their operational reach while supporting separate platoon operations.

The four staff non-commissioned officers needed to lead the four additional line platoons would come from the current LAV-AT table of organization where each LAV-AT section was lead by a staff sergeant. The commissioned officers needed to lead the platoons are available through the 0302 infantry officer and 0203 ground intelligence officer personnel pipelines. From 2001-2004, 1st LAR Battalion was staffed with seven additional 0203 officers above its table of organization. These 0203 officers served as line platoon commanders and company executive officers. The non-commissioned officers and enlisted Marines forming the additional LAV-25 TOW crews would also come from the reorganized LAV-AT and LAV-M sections.

Though internal reorganization and personnel reassignments with the LAR battalion accounts for some of the manpower requirements created by the proposals discussed in this essay; an increase to the battalions' T/O to accommodate the required additional scouts and 12 LAV-L crews would have to be filled by the Marine Corps personnel system. Following internal

[25] 1st LAR had a fifth line company called Weapons Company. I MEF supplied MEUSOC's had one LAR Company (-) on deployment and one LAR Co (-) locked on to deploy. The two line companies left behind one LAV-25, one LAV-L, the LAV-M section, and the LAV-AT section. These remain behind units were placed into Weapons Company which had two LAV-25 Platoons, two LAV-AT sections, a HQ platoon, and two LAV-M sections. The resultant mix was a 28 vehicle anti-tank heavy LAR company. Conversely at the same time, 2nd LAR supplied II MEF's MEUSOC with smaller mixtures of a LAR platoon reinforced. 3rd LAR supported Combat Assault Battalion on Okinawa with a LAR Company. Both 2nd and 3rd LAR had deployed and locked on to deploy units reducing their abilities to forward deploy more than two line companies during OIF-II/B and OIF-III/A.

reorganization, the T/O of each LAR battalion would need to be increased by 76 personnel with 40 filling infantry scout billets and 36 filling LAV crewmen billets. Given that the Marine Corps is fielding five new LAR companies and is increasing in overall size by another 20,000 personnel between 2007 -2011, obtaining the personnel to fill the 76vacanies in each LAR battalion should not prove difficult. The maintenance, communications, and medical personnel needed to support the structure increases already exist within the battalions themselves.[26] Currently each LAV-25 platoon, LAV-AT section, and LAV-M sections are supported by communications technicians, corpsmen, and mechanics that are embedded from battalion.

The infantry training pipeline would also require slight reconfiguration. The creation of an all encompassing 0313 LAV crewman Military Occupational Specialty may lend itself to aiding this configuration. The training requirements created by fielding the LAV-25 TOW and the additional LAV-L's would be overcome by expanding the 0313 training curriculum to include scouting and TOW missile gunnery since the 0313 would be performing both new skills. Perhaps the first phase of LAV School would develop a 0313 scout capabilities. The second phase would be focused on the LAV chassis where students would be taught to drive and maintain the LAV regardless its variant type. The final phase of the basic crewman's course would focus on 25mm gunnery, TOW missile gunnery, and 120mm gunnery and could be further broken down according to specific specialty.

Finally the existing LAV-AT and LAV-M that will be replaced with this proposal do not need to be discarded or scrapped. These vehicles may be eventually sold to the New Iraqi Army or modified for other uses. One option allowing the continued employment of LAV-AT chassis

[26] During peacetime or garrison activities, corpsmen, communicators, and mechanics are centralized at the battalion's Communications Platoon, Maintenance Platoon, and Battalion Aid Station; however, when wartime operations ensue, the battalion pushes individual corpsmen, mechanics, and communicators down to the platoon and section levels. The LAR battalion does not possess the organic vehicle lift requirements within its H&S Company to lift all its assigned personnel otherwise.

involves vehicle conversion. For example, in 2006, the Canadian Department of Defense "awarded a $49.2 million contract to General Dynamics to convert 33 surplus LAV Tow Under Armor hulls into LAV infantry section carriers."[27] The Marine Personnel Carrier characteristics described in the introduction sound very similar to the LAV making it feasible that converted 95 LAV-AT infantry carriers perhaps might comprise a portion of the Marine Corps' proposed 600 new personnel carriers.

LAR battalions themselves represent possible organizations in need of converted LAV-AT infantry carriers. As previously discussed, one of the limitations barring LAR battalions from efficiently operating across the full spectrum has been an organic lack of infantry. Perhaps the 95 converted LAV-AT infantry carriers provide the basis on which a LAR battalion's fifth infantry centric company could form. Were these vehicle conversions indeed possible, each of the Marine Corps' four LAR battalions would receive a Light Armored Infantry (LAI) company. A LAI Company in addition to LAV-25 TOW fielded LAR companies provides the LAR battalions excellent opportunities to operate across full spectrum warfare successfully over the next two decades.

Conclusion

A reconfiguration and upgrade of the LAR company provides the U. S. Marine Corps a full spectrum warfare capable LAR battalion for the next 25 years. The Marine Corps will get 25more years of operational availability out of a proven combat platform through upgrading the current capabilities of the existing LAV fleet through Service Life Extension Programs (SLEP) and the Inspect and Repair Only As Necessary (IROAN) programs, purchasing and fielding available off-the-shelf variants, and expanding and reorganizing the LAR company.

[27] General Dynamics Land Systems. General Dynamics Land Systems News Release LAV TUA Hull Conversion to LAV Infantry Section Carriers. 03 August 2006. Retrieved on December 30, 2007 from http://www.sfu.ca/casr/doc-lav-tua-isc.htm

Fielding LAV-25 TOW and reorganizing each LAR battalion to have four gun platoons per company enables the LAR battalion to resume its full warfare spectrum capabilities. The fielding of the LAV-25 TOW facilitates effective, massed anti-armor fires on the high end of the spectrum, more infantry for low-end counterinsurgency operations, more individual maneuver elements employable across vast areas of operations, and the long haul communications to support them. The LAV-120 AMS provides more applicable heavier caliber direct fire options while the additional LAV-L's provides the proven towing capabilities and multi-role configures that facilitate continued operational reach. These changes are affordable and can be supported by existing manpower and available technology. The Marine Corps expects two more decades of use out of the LAR battalions. This proposal reloads LAR to fight throughout the range of military operations for that duration.

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