Expendable but Unbowed

The LAV-25 in the Twilight War

Twilight: 2000

Introduction

The LAV-25 is one of the most iconic vehicles to serve under American colors during the Twilight War. It was present in every major theatre in which U.S. soldiers or Marines fought. In a time of increasingly-complex war machines, its relative simplicity and ease of maintenance kept it in the field long after more sophisticated equipment had broken down, and these same factors contribute to its longevity even today. In this article, we take a retrospective look at the LAV-25's origins, the ways in which the different services employed it, and selected highlights of its Twilight War service.

NOMENCLATURE CROSSWALK

This article introduces several new vehicles and deliberately confuses their U.S. Army and U.S. Marine Corps designations. The following table summarizes the family tree of LAV production variants:

Model	**Marines**	**Army**
base/personnel carrier	LAV-25	M15 Pulaski
ATGM	LAV-AT	M17 LAVAA
cargo	LAV-L	-
mortar	LAV-M	M19 LAVMC
command post	LAV-C2	M26 LAVCP
recovery	LAV-R	M28 LAVRV
electronic warfare	LAV-MEWSS	-
ADA (GAU-12)	LAV-AD	-
ADA (M61)	-	M20 LAV-PIVAD
engineer	-	M29 LAVCE
assault gun	MPGS-90	-

Development

The LAV-25 was the product of the Light Armored Vehicle (LAV) program, a joint U.S. Army and Marine Corps effort in the late 1970s. The LAV program was an outgrowth of the Rapid Deployment Force (RDF) concept, a Carter administration response to the need for forces that could swiftly intervene in Middle Eastern turmoil or other quickly-developing crises. Accordingly, the program's original intent was to equip both services with a light, rapidly-deployable armored vehicle to fill the gap between existing light and mechanized infantry capabilities. Congress directed that the procurement process be swift, focusing on off-the-shelf offerings rather than a "clean sheet" development cycle.

At the time, the Army was on the cusp of adopting new MBT and IFV designs in the respective forms of the M1 Abrams and M2 Bradley. However, both of these vehicles were too heavy for the RDF's strategic mobility requirements. The Marines, meanwhile, had not yet joined the M1 program (eventually signing on for M1A1s in the mid-1980s), had no need for the Bradley, and had been without a lightweight infantry support vehicle since the Ontos' removal from service in 1969.

Four candidate vehicles met the services' joint requirements. Alvis submitted a variant of the FV101 Scorpion light tank. Cadillac Gage proposed both a new design, the V-300, and an upgrade of its existing V-150 Commando armored car. General Motors of Canada offered a license-built 8x8 derivative of the Swiss MOWAG Piranha, a chassis which it was already manufacturing in 6x6 versions for the Canadian military. In late 1982, GM of Canada won the contract for the LAV-25 and what would become a wide array of specialized variations on the basic platform.

The program hit a speed bump in 1983, when the Army's proposed restructuring of its light infantry divisions shifted away from LAV requirements. Marine Corps procurement of the LAV continued but the Army's was placed on hold while the 9th Infantry Division experimented with doctrine and tactics for the new "motorized infantry" concept. Exercises with the 9th ID demonstrated that motorized infantry remained vulnerable to artillery and lacked the ability to deal with enemy mechanized forces.

By the time the Army re-engaged with the LAV program in 1986, it was in the rare (and uncomfortable) position of having to play catch-up with the Marine Corps, which had already directed the specifications for several LAV variants and had activated two of an eventual four LAV battalions. The Army's vastly superior buying power would come to dominate the program in later years, but the LAV-25's initial capabilities were shaped largely by the Marine Corps. Among other factors, this resulted in the vehicle's initial Army type designation of XM1047 and eventual re-designation of M15 both being historical footnotes, universally ignored in favor of the Marines' nomenclature. Similarly, its official nickname, Pulaski, saw use only in official documents.

Design and Variants

The LAV-25 was an eight-wheeled vehicle, capable of operating in four- or eight-wheel drive. The front four wheels were steerable. It was amphibious in calm water, with two rear propellers receiving engine power and a retractable forward trim vane providing stability. Propulsion came from a 275-horsepower Detroit Diesel 6V53T turbocharged diesel engine, which was also common in commercial applications (a logistical factor which kept many LAV-25s operational during the late war and early postwar years, and which continues to benefit military vehicle collectors today)

The vehicle's turret and hull were welded steel, rated against artillery fragments and 7.62mm rounds. It was not, however, proof against the heavier 12.7mm and 14.5mm machine guns common among Warsaw Pact reconnaissance vehicles, let alone RPG-7 warheads or light autocannon rounds. Several add-on armor kits were developed in the 1990s but neither the Army nor Marine Corps purchased them, and none are known to have been deployed in the war.

The LAV-25's name derived from the caliber of its main armament, the 25mm M242 Bushmaster autocannon (specified for commonality with the M2 Bradley). For secondary armament, it mounted the then-new M240 7.62mm machine gun. A pintle mount at the commander's hatch typically carried a second M240, though field-expedient substitutions were common in the war's later years. A pair of quad-tube smoke dischargers were mounted on either side of the main gun.

The driver was seated on the left side of the bow, with the engine compartment directly to his right. He was provided with a hatch on the vehicle's hull deck. The gunner and commander occupied the turret, each with their own hatch on the turret deck. The rear compartment had six troop seats, double rear doors, and double overhead hatches. Mounted troops frequently left these latter hatches open to facilitate 360º threat awareness. An additional emergency escape hatch was located on the left side of the hull, just forward of the turret ring. Each side of the rear compartment had three firing ports, though Marines and soldiers considered them inadequate at best and usually ignored them, covering them with external stores.

The only variations between Marine LAV-25s and Army M15s were minor differences in electronics and the configuration of internal and external stores racks. Crews from one branch of service could (and, after 1997, frequently did) transition to vehicles originally assigned to the other branch without need for retraining.

The LAV-25 was the base design and the most numerous version, but the LAV family grew to encompass nearly a dozen unique variants. Most of these developed in response to Marine Corps requirements and were later adopted by the Army, but the latter service's needs did spawn several designs as well.

ATGM Carriers

The Marine Corps and Army both recognized the need for anti-armor capabilities in LAV-25 formations. The M242's 25mm rounds were suitable for killing light armor, but woefully inadequate in any encounter with even an obsolescent MBT (such as the T-54/T-55 common in the RDF's originally-intended area of operations). Thus, the first LAV-25 variation was an ATGM carrier equipped with the same "hammerhead" TOW launcher as the Army's M901. The Marine Corps designated this variant the LAV-AT (Anti-Tank). Upon re-engaging with the LAV program, the Army applied its own designation of M17 LAVAA (Anti-Armor).

The LAV-AT was designed for a crew of four – driver, commander, gunner, and loader – though wartime personnel shortages often reduced crews to three. In addition to the TOW launcher, it was equipped with a pintle mount at the commander's hatch, usually carrying an M240. The gunner's optics included a 3x/13x day sight and a 4x/12x night sight, superior to the sights of the LAV-25. These observation capabilities often led commanders to deploy LAV-ATs as reconnaissance assets or convoy point vehicles, even after their TOWs were exhausted. Crews assigned to such duties sought to upgrade their vehicles' secondary (and often only) armament.

Cargo Carriers

Early Marine Corps conceptualization called for LAV companies to be self-supporting for extended operations. Thus, several support variants were required to maintain parts commonality, to ease crews' movement between different types, and to ensure uniform mobility across the formation. The LAV-L (Logistics) formed the basis for this sub-family. It featured a raised roof to increase storage space within the aft compartment. The rear doors had no divider and the aft compartment had a large overhead hatch with a 1-ton hoist, both modifications designed to facilitate easy loading and unloading of cargo. The LAV-L was one of only two variants equipped for towing other LAVs.

The LAV-L was designed for a crew of three: a driver and commander in the forward hull, plus a loadmaster seated in the aft compartment. The latter crewmember's duty was to manage the 650kg of ammunition and 2 tons of miscellaneous supplies that were its standard load. As vehicle losses mounted, some units pressed LAV-Ls into service as personnel carriers, frequently replacing the commander's standard pintle-mounted M240 with an M2 for increased firepower.

The Army considered its existing truck-based transportation units to be adequate for its LAV formations' supply needs. It never adopted the LAV-L.

Mortar Carriers

Designing the LAV-25's mortar carrier variant was a joint Army/Marine Corps effort, with the result being a single vehicle whose differences across the services extended only to armament, ammo stowage, and name. The Marines' LAV-M (Mortar) carried an 81mm mortar, while the Army's M19 LAVMC (Mortar Carrier) mounted the same 4.2" mortar found on the venerable M106. In fact, many M19s re-used M30s taken from decommissioned M106s as the latter vehicles were replaced in mechanized units by the Bradley-based M18. The vehicle could also accept the M121 120mm mortar, and this was an occasional consolidation measure among late-war mortar platoons.

The LAV-M/M19 included a three-section overhead hatch, which allowed use of the mortar without dismounting (though it did carry a baseplate for dismounted fire). It had a crew of five: driver, commander, and three mortarmen, the latter having folding troop seats in the aft compartment. The commander's hatch had a pintle mount for the standard M240.

Command Posts

The need for command and communication capabilities greater than those afforded by the LAV-25 gave rise to the LAV-C2 (Command and Control). This variant used the LAV-L's high-roofed hull to provide extra headroom and equipment space for a small battle staff. In addition to the driver and vehicle commander, the forward hull held a position for the unit's commander (in practice, frequently occupied by the unit's XO while the CO led from a LAV-25). The aft compartment held three seats for radio operators or staff down the right side, while racks for those crewmembers' radios and other equipment occupied the compartment's left side. For self-defense, the LAV-C2 was armed with the ubiquitous vehicle commander's M240. Unlike most LAV models, the LAV-C2 was equipped with air conditioning – not for crew comfort, but for maintaining its electronic equipment at safe operating temperatures.

The Marine Corps used the LAV-C2 in its LAV battalions as a company command vehicle, a battalion headquarters vehicle, and a mortar platoon fire direction center. The Army procured only a handful for the headquarters elements of its two LAV-25 cavalry squadrons, eventually designating the design as the M26 LAVCP (Command Post).

Recovery Vehicles

As the LAV-25 entered Marine Corps service, the Marines lacked a recovery vehicle in the appropriate weight class. The logical answer was to base a new vehicle on the LAV family platform. The LAV-R (Recovery) shared the LAV-L's raised roofline and improved rear compartment access. However, its aft compartment was outfitted as a field workshop, carrying tools, welding gear, an auxiliary generator, and spare parts for the LAV family. Its crew consisted of a driver, a commander, and a mechanic, with folding seats for two additional passengers.

The LAV-R mounted a 3-ton crane on its roof and a 14-ton recovery winch, as well as hydraulic outriggers to stabilize itself when using either piece of equipment. Like the LAV-L, it was built for extended towing of any LAV-25 variant (any member of the LAV family could tow a sister vehicle for brief periods but only the LAV-L and LAV-R could withstand extended towing without risking suspension damage). It carried the usual pintle-mounted M240.

The Army initially declined to purchase the LAV-R, intending to rely on its then-new HEMTT wreckers for LAV

recovery. However, after experience showed that the truck-based platform was susceptible to damage when towing the LAV family, the Army ordered a quantity of LAV-Rs under the M28 LAVRV designation. It later placed a second order for additional vehicles to equip the engineer companies of its light motorized brigades, serving alongside its M29 LAVCEs.

Electronic Warfare Platforms

The least-produced LAV-25 variant was the LAV-MEWSS (Mobile Electronic Warfare Support System). Using the same basic hull as the LAV-C2, it mounted an extensive array of jamming and signals intelligence equipment, as well as a distinctive roof antenna array. Like all LAV-25 derivatives, it was armed with an M240 at the commander's hatch. Its crew consisted of driver, commander, and three systems operators, using an interior layout similar to the LAV-C2's. It also shared the latter design's air conditioning.

The LAV-MEWSS was unique to the Marines, as it added little to the Army's existing EW platforms.

Air Defense Vehicles

Unlike most LAV mission areas, which saw the Army and Marine Corps share identical (or at least very similar) designs, the two services had widely-divergent requirements for air defense. The Army was interested solely in self-propelled AAA guns, as it already had three tracked SAM platforms (Roland, Chaparral, and ADATS). The Marines, however, lacked SAM capabilities beyond man-portable systems and were intent on a hybrid gun/missile platform to manage the increasing threat of attack helicopters. The result was parallel development of two LAV-based air defense vehicles.

The Army's M20 LAV-PIVAD (Product Improved Vulcan Air Defense) was a direct replacement of the LAV-25's turret with the 20mm M163 Vulcan that had served for years atop the M741 PIVAD. This provided the Army with an easy off-the-shelf solution, using a system that was already in the supply chain. The M20 was fielded in four regular divisions and the Massachusetts National Guard at the same time those units received their first LAV-25s.

The Marine specification called for a turret combining the same 25mm GAU-12 autocannon found on the Corps' AV-8 Harrier, a four-box Stinger launcher, and a seven-tube launcher for unguided 70mm Hydra rockets. The latter requirement was eventually changed to a second Stinger quad-pack, but funding and development churn delayed delivery of the LAV-AD (Air Defense) until the early 1990s.

Both the M20 and the LAV-AD carried a three-person crew of driver, commander, and gunner, with secondary armament consisting of – of course – an M240 at the commander's hatch. Both designs were capable of depressing their turrets to engage ground targets, and surviving vehicles frequently were used in the direct infantry support role despite their prodigious ammunition consumption.

Engineer Vehicles

The first of the Army's infantry brigades to receive the LAV-25 had only single light motorized battalions and otherwise remained light infantry formations. However, as brigades within the 2nd Infantry Division and the National Guard began converting fully to the light motorized model, a need emerged for engineer vehicles that could keep pace with the maneuver elements. The M29 LAVCE (Combat Engineer) was conceived as the answer. It was the last LAV variant designed, and the most problematic.

Conceptually, the M29 began as an adaptation of the LAV-L, specialized for moving an engineer squad and its specialized equipment. However, requirements creep quickly set in, resulting in two major changes that would have far-reaching consequences for the design. The first was a shift in the base vehicle from the LAV-L to the LAV-25. The rationale was that engineers needed the 25mm chain gun for self-defense and for detonating unexploded ordnance at a safe stand-off distance. Consequently, the LAVCE lost what would have been expanded seating and cargo capacity in a LAV-L derivative. The LAV-25-based LAVCE retained a three-person crew and six troop seats, requiring a seven-engineer squad to span two vehicles (the remaining space being used for equipment).

The second major change was the addition of a modular equipment mount to the bow. This could accept a plow blade, a mine roller, or a mine/obstacle clearance blade. It also had emergency jettison capability in case the attachment became stuck on an obstacle. Unfortunately, it required the removal of the trim vane common to all other LAV-25 variants. Combined with the major change in the vehicle's weight distribution when an attachment was mounted, this made the LAVCE the only member of the family without amphibious mobility.

Other additions were forthcoming, too. Automatic lane marking systems were mounted on both aft corners (replacing the now-useless propellers). These used compressed air to fire reflective stakes into the ground at operator-determined intervals, indicating a safe path when the vehicle was clearing a path through a minefield. To mitigate the lack of interior cargo volume, external stores lockers on both flanks provided additional stowage for equipment and demolition supplies. The headlights were moved outboard to clear the largest bow attachments, and a collapsible lighting boom was mounted atop the turret.

All this equipment increased the M29's weight significantly above what the LAV-25's suspension was designed to accept. Throughout its short service life, it vied with the MPGS-90 for the title of most maintenance-intensive LAV variant. It also lacked a material handling solution, resulting in the Army's second round of M28 LAV-R purchases. The makeup of a LAV-based engineer platoon became two M28s, two M29s, and a mix of HMMWVs and trucks, with the latter vehicles negating the theoretical mobility advantages of LAV-mounted engineers. The Army steadfastly refused to admit error by replacing the trucks with LAV-Ls.

The Marines were not involved in the M29 program beyond a reluctant consulting role, and the Corps did not adopt the design. However, the U.S. Air Force expressed interest, eventually purchasing a quantity of M29s for the dual role of airbase defense and mine/cluster bomblet clearance from runways. USAF Security Police units were sufficiently admiring of the design (when compared to their aged armored cars) that the Air Force went on to order a number of LAV-ADs as well as several M15s. No more than a few of these were delivered before the November 1997 nuclear strikes. Most M29s, whether originally in Air Force or Army service, eventually wound up reallocated as infantry transports.

Assault Guns

The first LAV-25 variant specified was also the last one fielded, with the Marines taking delivery of their initial order literally as 2nd MarDiv was embarking for Norway in December 1996. The MPGS-90 (Mobile Protected Gun System, 90mm) was an original RDF requirement, envisioned as a direct support weapon system for LAV-25-mounted infantry. However, difficulty integrating the Cockerill low-pressure 90mm gun led the Army to back away from it in favor of increased M17 LAVAA and Tank Breaker purchases and the light tank that would become the LAV-75. Marine-sponsored development continued through the 1980s and early '90s, interrupted several times by funding issues.

The production MPGS-90's featured a cramped three-seat turret with barely enough room for gunner, loader, and commander to operate. Small stature was an unwritten but universal criterion for MPGS-90 crew selection. The main gun's recoil brutally punished the vehicle's suspension and induced alarming sway when fired to the side. Shooting on the move, though technically possible, risked rollover in a design whose top-heaviness already made it unstable. In addition to the 90mm cannon, the MPGS-90 retained the LAV-25's secondary armament of coaxial and pintle M240s.

Despite its many shortcomings, the MPGS-90 was a welcome addition to the Marines' LAV battalions, and even moreso to the infantry units alongside which it operated. Commanders quickly learned that it had neither the armor nor mass of an MBT, and thus required a wider infantry screen and more careful route selection and use of cover. Within its limitations, though, it was highly effective in its assigned role, and was even capable of killing early-generation MBTs from ambush.

The Army never purchased the MPGS-90. However, shipments of replacement Marine vehicles were in port on both coasts when the nukes fell. The Army seized most of these for use within CONUS. They were much prized by the newly-created light infantry divisions that otherwise lacked organic AFVs.

Prototypes

The Army's initial interest in the LAV program focused on a pure gun carrier without provision for mounted troops. Accordingly, the XM1047's rear compartment omitted troop seats, instead being configured for storing extra ammunition and equipment. The eventual evolution of the LAV-25's role in the Army's light motorized battalions overtook this thinking, and all of the XM1047 testbed vehicles were converted to the standard LAV-25 configuration by the end of the 9th Infantry Division's experiments. The XM1047 was otherwise identical to the standard LAV-25.

ASSAULT GUNS

The MPGS-90 was the end result of a development process with several dead ends. Assault gun prototypes were built with with the same 75mm autocannon used on the LAV-75, as well as the 105mm M68A1 of the M1 Abrams. Mothballed at the Army's Aberdeen Proving Ground in Maryland, most of these were assigned to the 80th Infantry Division after its formation and saw action in Yugoslavia as its heaviest AFVs.

AIR DEFENSE VARIANTS

As noted in the LAV-AD entry, its early prototypes mounted a seven-tube 70mm Hydra rocket pod. The intent was to provide stand-off capability against Soviet helicopters engaging with ATGMs from outside Stinger range. The Hydra was wildly inaccurate at the six- to eight-kilometer expected ranges, though, resulting in its replacement with a second Stinger quad-pod. The Hydra mount was designed as a universal mount also capable of accepting Hellfire, TOW, RBS-70, or Starstreak launchers. While several LAV-ADs were rumored to have been equipped with ATGM launchers on this mount, there is no record of this capability having been developed beyond the proof of concept stage.

While the Marines were developing the LAV-AD, the Air Force was experimenting with its own LAV-based airbase defense vehicle. The Mobile Weapon System was a LAV-25 hull with a two-airman crew and an Air Force-specific turret, capable of both ground support and short-range air defense. The MWS mounted a 30mm GAU-13 rotary cannon and four Stinger tubes. The GAU-13 fired the same 30x173mm round as the A-10's GAU-8, making it highly effective against opposing light armor. The weapon's size limited the space available in the turret for a magazine, though, and combined gun and ammo exceeded the chassis' weight restrictions.

The Air Force shelved the MWS program for several years, waiting until the LAV-AD reached maturity (and allowing the Marines to absorb its development costs) before re-engaging. The second round of MWS testbeds were LAV-ADs mounting M163 Vulcans instead of GAU-12s, taking advantage of the copious amounts of 20mm ammunition already in the USAF supply chain. The Air Force's eventual acquisition of M29s and their 25mm Bushmasters made this a moot point, resulting in the service's LAV-AD acquisitions. All known MWS prototypes were warehoused at Eglin Air Force Base and were lost in the nuclear strike there.

LAV-25-TOW

General Motors of Canada offered a modified LAV-25 turret featuring a "sidesaddle" TOW launcher, with a single launch tube along the turret's port side and the gunsight optics on the starboard side. This effectively gave the LAV-25 the same firepower as the M2 Bradley, with six spare missiles carried in the troop compartment in place of one row of troop seats.

The design was a poor fit for Marine Corps doctrine, which labeled ATGM gunnery a distinct tactical role (and which consequently drove the LAV-AT's development). The Army was more interested in the configuration, but resistance from the mechanized infantry community (which saw the design as a threat to Bradley funding) ultimately scuttled it. The only known prototypes were returned to Canada, where they eventually saw action against Quebecois separatists.

Doctrine and Deployment

The best use of the LAV-25 was a matter of intense debate within the Department of Defense. Two main doctrines emerged, each ultimately adapted to the needs of its originating service – and, in turn, forcing adaptations therein.

Light Armored Reconnaissance Battalions

The U.S. Marine Corps formed its LAR battalions as division-level reconnaissance, security, and deep raiding assets. LAR doctrine called for each line company to be capable of extended independent operations. Accordingly, each company's headquarters section had LAV-C2s, LAV-Rs, and LAV-Ls in addition to its LAV-25s. A line company had three light armored reconnaissance (LAR) platoons, each with four LAV-25s, and a weapons platoon with four LAV-ATs and two LAV-Ms. The battalion fire support and command companies supplemented each line company with LAV-ADs and MPGS-90s as needed.

The Marines' employment of the LAV-25 was distinctly vehicle-centric rather than infantry-centric, emphasizing that the LAV was a reconnaissance vehicle, not an APC or IFV. Officers and NCOs/enlisted personnel in the vehicle crews had their own MOSes and training pipelines, and commanders from the platoon level up fought and led from the turret, not the ground. In addition to its crew, each LAV-25 was assigned three to four Marine riflemen who then received additional training in scouting and associated tasks when they arrived at their LAV battalions. These scouts were effectively considered additional sensor and weapon systems of the LAV-25, not a distinct infantry dismount element. Each platoon's command element also incorporated a mechanic and a corpsman.

The Marines maintained this doctrine throughout the war, even in the face of mounting vehicle losses. LAV-25s were occasionally pressed into service as infantry transports when nothing else was available for a swift move on an objective, but this remained the exception rather than the rule.

Heavy Motorized Companies

The U.S. Army, whose interest in the LAV-25 had originally been only as a gun platform, performed a near-total reversal in light of lessons learned from the 9th Infantry Division's exercises. When the light motorized battalion concept solidified, each battalion received a "heavy" motorized company, consisting of 14 M15s and an associated infantry complement. Unlike the Marines, the Army saw the LAV-25 as an APC first and foremost.

With that decision made, the headache then facing the Army was the organization of M15-based infantry platoons. The M2 Bradley's recent adoption had already forced the mismatched cross-loading of three nine-soldier squads across four seven-passenger vehicles. With a two-vehicle headquarters element and a trio of four-vehicle platoons,

each platoon in an M15 company had only 24 available troop slots. After various gyrations in which multiple working groups failed to fit 30-plus soldiers into 24 seats, the Army reluctantly took its cue from the Bundeswehr's Panzergrenadier formations.

The M15 infantry platoons that fought the Twilight War were organized into three squads of six soldiers, each paired with a single M15. Each squad was armed with an M249 SAW and an M203 grenade launcher in addition to M16 assault rifles. Two of the squads also were assigned Tank Breaker ATGM launchers. The third squad was intended to receive a Tank Breaker as well, but production bottlenecks never accommodated this. Units often compensated by acquiring additional off-the-books heavy weapons; the Carl Gustav recoilless rifle was a perennial favorite after it entered American service with the Rangers.

The command element rode the platoon's final M15 and consisted of the platoon leader, platoon sergeant, RTO, and attached medic. In practice, the platoon sergeant usually coordinated the platoon's vehicles while the platoon leader ran the infantry element. The platoon sergeant served as the vehicle commander for the platoon's #2 vehicle, displacing one of that vehicle's crew to a reserve role in the #1 vehicle.

Cavalry Squadrons

While the M15's primary role was in the light motorized battalions' "heavy" elements, the Army also pressed it into service as a cavalry vehicle. Procurement of M3 Bradley CFVs was insufficient to the force's full needs, so several National Guard cavalry units replaced their decrepit M113s with M15s in the early 1990s. These formations subsequently fought the war as the divisional cavalry squadrons of the 36th Infantry Division and the 44th Armored Division.

In the cavalry role, the M15 was crewed identically to the M3, with three scouts per vehicle. A troop consisted of three platoons, each with six vehicles. The troop command section included the commander's M15, an M26 LAVCP for long-range coordination and communication, and three M19 LAVMCs.

Both divisions were otherwise in the middle of transitioning from M60s and M113s to M1s and M2s when the war broke out. In these heavy mechanized formations, the M15 was a unique and mismatched asset. It was faster on pavement than the tracked vehicles but unable to keep pace with them cross-country, and it lacked integral anti-tank capability. Commanders struggled to use the squadrons to their full potential, often tasking them with convoy escort or rear-area security duty to keep them out of the way of the heavier mechanized units. Later in the war, attrition in those other units brought the LAVs to the forefront, as their superior fuel economy became a major advantage.

Service Highlights

Marine LAV-25s first saw combat during the 1989 Panamanian intervention. The National Guard's M15s were deployed throughout the 1990s as civil unrest in several major cities required Guard support of local law enforcement. However, the Twilight War was the design's true proving ground. The design saw service in the Norwegian, Korean, Polish, Iranian, and Yugoslavian theatres, as well as in both major North American defensive actions. Not counting units that acquired LAVs through irregular means or postnuclear emergency requisitions, a total of four Marine LAV battalions, two National Guard cavalry squadrons, and 72 regular, Reserve, and National Guard infantry battalions were equipped with it.

Within its limitations, the LAV-25 was an excellent skirmisher, raider, and vedette, and a prized asset for small units on independent operations. Commanders who treated it as an armored unit quickly learned better – if they survived the lesson. The critical word in "light armored vehicle" was *light*. While well-protected against small arms, the LAV-25 was vulnerable to side shots from heavy machine guns, and even its frontal armor could not withstand more than light autocannon fire. Against an enemy with equivalent or heavier AFVs, or the ubiquitous RPG-7, its best defenses were speed or cover and a well-integrated infantry screen.

In the late-war and postwar periods, the LAV-25 often took the field when heavier AFVs could not. Its relatively high fuel efficiency and ease of maintenance (including use of commercial automotive components) made it economical when tanks and IFVs were impractical. As vehicles became scarcer, even a single LAV was a decisive advantage in what would otherwise have been an infantry fight.

First Shots

The M15's first known engagement of the war occurred on 14 November 1996. Patrols from the U.S. 10th Mountain Division had been skirmishing with Soviet forces northeast of Bardufoss, Norway for several days when the positions of 2-14 Infantry came under intense artillery fire, followed by an aggressive push from the 76th Guards Air Assault Division. The 10th's commander had held his light motorized battalion, 1-22 Infantry, as a mobile reserve, and ordered it into the fight to support 2-14.

With the assistance of local Norwegian hunting guides, C Company's M15s deployed via a logging road. The company paused to deploy its infantry under cover, then emerged from a forested area within a kilometer of the 76th Guards' southern flank. Despite knowing that no allied troops were in the area, the first Soviets to see the M15s misidentified them as BTRs, the first instance of a mistake that both NATO and Warsaw Pact troops would make throughout the war. The paratroopers realized their error only when the first BMDs began exploding under Bushmaster and Tank Breaker fire.

In the ensuing 45-minute fight, the M15's speed and ability to fire on the move were decisive advantages over the Soviets' BMDs and their heavier, but unstabilized, guns. C Company accounted for nine BMDs while losing only two of its own LAVs. Infantry casualties were proportionate, with five American losses to 19 Soviets KIA.

Operation Safari

On 24 July 1997, the 1st Marine Division completed its drive to Yazd, seizing the airfield complex there and overrunning the remnants of several Soviet aviation units that had overstayed their welcome. Celebration was short-lived, though: on 01 August, a Soviet counter-attack cut the division's last supply route to the port city of Bandar Abbas. 1 MarDiv was encircled and besieged. Planning immediately began for Operation Safari, the division's breakout and withdrawal to the coast.

Operation Safari began on 18 August. The LAV-25s of 1st Light Armored Reconnaissance Battalion had sortied nightly over the preceding two weeks, harassing the Soviets and withdrawing before the enemy could concentrate force against them. Having been trained to expect another set of 25mm wasp stings, the Soviets were unprepared for three simultaneous pushes from the battalion's line companies. The breakout plan called for the Marines to concentrate fire at the first point the Soviet line began to buckle. That became the sector assigned to Bravo Company on the city's east side when the company's LAV-ATs destroyed the enemy battalion commander's T-64.

Over the following month, 1 MarDiv moved steadily southward, harried by pursuing Soviet forces. On the terrain where the LAV-25 had originally been intended to fight, and unhampered by the fuel demands that hobbled the division's remaining tanks, 1st LAR Battalion was 1 MarDiv's most mobile force, constantly skirmishing. Most of Bravo Company was lost to a tactical nuclear strike on 06 September, but the remainder of the battalion was largely intact when the division linked up with 3 MarDiv on 17 September. The LAV-25s were down to 40 rounds per gun; the rest of the battalion had shot out its entire inventory of TOW missiles, 90mm rounds, and mortar shells; not a single vehicle was undamaged; but 1st LAR Battalion had been instrumental to the division's survival.

The Anabasis of Ivan Eater

The war's most iconic LAV-25, Ivan Eater, began its service life in E Troop, 31st Cavalry of the Alabama National Guard's 31st Armored Brigade. When the brigade was federalized in early 1997, E Troop merged with its Tennessean and South Carolinian counterparts to form the 44th Cavalry Squadron (Composite), the divisional cavalry squadron of the freshly-flagged 44th Armored Division.

Unique among the 44th Cavalry, all six of Ivan Eater's crew and dismounts survived the war. The M15 itself sustained crippling damage twice, first losing its entire right-side suspension to an RPG volley outside Legnica, then suffering an engine hit from a T-55's main gun near Karlovy Vary. Both times, the 44th Cavalry's legendary mechanics (many of whom had been pit crew for NASCAR teams based out of Hueytown, AL) were able to return Ivan Eater to service. Perhaps due to these soldiers' influence, the vehicle's flamboyant paint scheme expanded steadily throughout the war.

Ivan Eater and its crew accompanied the 44th AD in the European phase of Operation Omega. Under the terms of the agreement with German authorities, the M15 was one of many pieces of heavy equipment left behind when American troops embarked from Bremerhaven. On 14 November 2000, in a tearful parting captured by an NBC camera crew, the six troopers bade farewell to the vehicle that had carried them through three years of hell.

Following the American departure, Ivan Eater was taken into service with the 21st Panzergrenadier Division. Its distinctive artwork was replaced with the standard Bundeswehr camouflage scheme, though not before an admiring German maintenance officer captured comprehensive photographs. The M15 subsequently served in the division for several years.

In March 2006, Ivan Eater sustained its third major combat wound, this time suffering a fuel fire during a border incident near Saarbrucken. Its crew abandoned it before its automatic extinguisher system dealt with the fire, and it was subsequently salvaged by the victorious French troops. It was repaired and returned to service briefly, but the French lacked access to the stockpile of ex-American spares that had kept the M15 running during its time in German service. Sometime in 2010, the Armée de Terre stripped it for usable parts and consigned the hulk to a boneyard near Lyon.

Several decades later, French cinematographer Vespasien Fabron stumbled upon Ivan Eater's rusted-out hull while searching for restorable period vehicles to use in an upcoming production. Intrigued by the presence of an American design amid French and German AFVs, Fabron recorded the hulk's serial numbers and spent the next year attempting to trace it as a side project. This led him to the 21st Panzergrenadiers' divisional historian, whose collection included the late 2000 photographs of the M15's American livery, as well as a fragmentary history of the vehicle as recorded by German soldiers present for the Bremerhaven handover.

Now captivated by the story he was unearthing, Fabron reached out to the U.S. Army for research assistance. The Army put him in contact with CBS, whose archives contained significant quantities of footage shot by the crew embedded with the 44th AD, as well as U.S. Senator Phoebe Butziger, the daughter of Ivan Eater's original commander. The ensuing research and restoration project was the subject of Fabron's award-winning but little-known film Pulaski. The documentary closes with an annual reunion of the 44th Armored Division Society, at which the four still-living members of Ivan Eater's American crew were reintroduced to their fully-restored comrade in arms.

Having researched Ivan Eater's story, Fabron wanted to tell that story to the world. Following the release of Pulaski, his next project was I Sing of Arms and the Man (Ivan Eaters for its American release), a popularly-acclaimed dramatization of the wartime experiences of Ivan Eater's original crew on which all four survivors consulted extensively. After using Ivan Eater to portray its own younger self, Fabron subsequently donated it to the U.S. Veterans Memorial Museum in Huntsville, AL. It remains operational there today, a cornerstone of the institution's collection and a perennial crowd favorite in living history events.

Game Additions

While this article attempts to align with published material as much as possible, it does involve some divergence from **Twilight: 2000** canon, mainly in the area of TO&Es. It also introduces several real-world LAV-25 variants (and one fictional one) that have not been previously published. This section provides game rules and guidance for incorporating the preceding fiction into a campaign. All rules align with **Twilight: 2000** v2.2.

All changes presented herein are suggestions, not mandates. This is a fan work, and as such is not considered canonical.

TO&Es

The following TO&E modifications replace those presented in the *American Combat Vehicle Handbook*.

LIGHT MOTORIZED BATTALION

No changes. The "Doctrine and Deployment" section above is written to align with the published heavy motorized company's allotment of 14 LAV-25s (M15s) and 6 Tank Breaker launchers.

DIVISIONAL CAVALRY SQUADRON

As per the *American Combat Vehicle Handbook*, this assumes the 36th Infantry Division and 44th Armored Division's divisional cavalry squadrons were composite squadrons, each formed from three states' National Guard cavalry troops. Accordingly, these squadrons had no air cavalry components.

Headquarters Troop:

2 M15 (HQ)

4 M26 LAVCP (staff)

9 M15 (NBC recon platoon)

3 Cavalry Troops, each with:

19 M15 (1 command, 3 platoons of 6 each)

1 M26 LAVCP

3 M19 LAVMC

ADA BATTALION

Air defense units equipped with the LAV-PIVAD used M26 LAVCPs as command units in their gun batteries, replacing the listed M113A3s, but were otherwise aligned with the ADA TO&E presented in the *American Combat Vehicle Handbook*.

MARINE LAR BATTALION

This replaces the Marine LAV-25 battalion presented in the *American Combat Vehicle Handbook*. It aligns more closely with the Marines' historical (and modern) use of the LAV family of vehicles while still maintaining some **Twilight: 2000** uniquenesses.

Headquarters Company:

4 LAV-25 (HQ)

4 LAV-C2 (staff)

4 LAV-L

2 LAV-R

3 LAR Companies, each with:

14 LAV-25

1 LAV-C2

4 LAV-AT

2 LAV-M

3 LAV-L

1 LAV-R

Fire Support Company:

14 MPGS-90

2 LAV-L

1 LAV-R

Air Defense Battery:

1 LAV-C2 (HQ)

3 LAV-25 (HQ escort and platoon command)

24 LAV-AD (2 platoons, each 3x 4-LAV sections)

2 LAV-L

1 LAV-R

MARINE ANTIARMOR COMPANY

This replaces the Marine Antiarmor Company presented in the *American Combat Vehicle Handbook*. As above, it aligns more closely with the Marines' historical use of the LAV-AT over the M901 while still maintaining some **Twilight: 2000** uniquenesses. LAV-ATs were often attached to infantry companies as "wingman" pairs or trios when a mission required ATGM support but did not call for a full platoon.

1 LAV-C2 (HQ)

2 LAV-25 (HQ escort)

18 LAV-AT (3 platoons of 6 each)

4 LAV-L

1 LAV-R

Changes to Published Vehicles

Four of the LAV variants appearing in this article are already published in the *American Combat Vehicle Handbook*. The following minor changes bring them up to speed with the material presented here.

LAV-25

- Add MAG MG (C).

LAV-PIVAD

- Add MAG MG (C).

M17 LAVAA

- Add MAG MG (C).
- Increase TOW ammo to 16 (2 loaded + 14 stowed).
- Increase Crew to 4 (add a loader).
- Add thermal imaging night vision.

MPGS-90

- Add MAG MG (C).
- Delete the second loader from the damage record (which is probably an errata item anyway, as the *Crew:* entry lists only 4 personnel).
- Increase 90mm ammunition to 32 rounds.

New Vehicles

The following new vehicle profiles present only the traits in which each design diverges from the basic LAV-25.

LAV-L

Price: $70,000 (S/R)

Armament: MAG MG (C)

Load: 2.7 tons

Crew: 3 (driver, commander, loadmaster)

The LAV-L has no turret.

LAV-M

Armament: M252 81mm mortar; MAG MG (C)

Ammo: 90x81mm mortar

Load: 500 kg

Crew: 5 (driver, commander, 3 mortarmen)

The LAV-M has no turret.

M19 LAVMC

Armament: M30 107mm mortar (C)

Ammo: 56x107mm mortar

Load: 500 kg

Crew: 5 (driver, commander, 3 mortarmen)

The M19 has no turret.

LAV-C2/M26 LAVCP

Price: $150,000 (R/-)

Armament: MAG MG (C)

Load: 1 ton

Crew: 2 (driver, commander) +5

The LAV-C2 has no turret.

Battle staff are treated as passengers. On a radio damage result, roll randomly to determine which radio is hit: the commander's or one of the four battle staff radios.

LAV-R/M28 LAVRV

Price: $100,000 (R/-)

Armament: MAG MG (C)

Load: 1.5 tons

Veh Wt: 14 tons

Crew: 3 (driver, commander, rigger) +2

The LAV-R has no turret.

The LAV-R's crane is considered a small turret for hit location purposes. It takes damage as if it were a tracked vehicle suspension with an armor value of 2. Minor damage reduces its weight capacity to 1 ton. Major damage immobilizes it.

LAV-MEWSS

Price: $175,000 (R/-)

Armament: MAG MG (C)

Load: 1 ton

Crew: 2 (driver, commander) +3

The LAV-MEWSS has no turret.

Electronic warfare operators are treated as passengers. On a radio damage result, roll randomly to determine which system is hit: radio, signal jammer, radio direction-finder, or intelligence acquisition radio receiver.

LAV-AD

Price: $100,000 (R/-)

Armament: GAU-12 25mm ADA autocannon, 8 Stinger missile launch tubes, MAG MG (C)

Ammo: 990x25mm, 16xStinger

Load: 400 kg

Crew: 3 (driver, commander, gunner)

The GAU-12 accepts the same 25x137mm ammunition as the LAV-25's M242 Bushmaster. It has ROF 30. Its other traits are identical to the M242's.

M29 LAVCE

Price: $100,000 (R/-)

Mnt: 8

Load: 1.5 tons

Veh Wt: 13 tons

The M29 has no amphibious capability.

When engineering equipment (plow blade, mine roller, or mine/obstacle clearance blade) is mounted, hull hits from the front have a 33% chance of striking it. This increases HF armor to 9-Sp. If the vehicle suffers minor damage through the engineering equipment, the equipment itself also receives minor damage and is stuck in its current position (either raised or lowered). If the vehicle suffers major damage or a second minor damage result through the engineering equipment, the equipment itself receives major damage and is unusable.

MPGS-75 PROTOTYPE

The 75mm MPGS prototype uses the base traits of the MPGS-90.

Price: $250,000 (-/-)

Armament: 75mm autocannon, MAG MG (C)

Ammo: 36x75mm

The MPGS-75's autocannon is the same as that mounted on the LAV-75.

MPGS-105 PROTOTYPE

The 105mm MPGS prototype uses the base traits of the MPGS-90.

Price: $250,000 (-/-)

Armament: 105mm gun, MAG MG (C)

Ammo: 30x105mm

Mnt: 10

The MPGS-105's gun is the same as that mounted on the M60 and M1.

AIR FORCE MWS PROTOTYPE, GENERATION 1

Price: $100,000 (-/-)

Armament: GAU-13 30mm ADA autocannon, 4 Stinger missile launch tubes

Ammo: 400x30mm, 4 x Stinger

Load: 250 kg

Crew: 2 (driver, gunner)

Mnt: 10

The GAU-13 accepts the same 30x137mm ammunition as the A-10's GAU-8 (*Nautical/Aviation Handbook*, pp. 11 and 15). It has ROF 60 and Rng 250. Its other traits are identical to the GAU-8's.

AIR FORCE MWS PROTOTYPE, GENERATION 2

Price: $100,000 (-/-)

Armament: Vulcan 20mm ADA autocannon, 8 Stinger missile launch tubes, MAG MG (C)

Ammo: 1800x20mm, 16xStinger

Load: 400 kg

Crew: 3 (driver, commander, gunner)

LAV-25-TOW PROTOTYPE

Price: $125,000 (-/-)

Armament: 25mm autocannon, twin TOW launcher, MAG MG, MAG MG (C)

Ammo: 297x25mm, 8xTOW II

Crew: 3 (driver, commander, gunner) +3

Character Options

Both the Army and Marine Corps considered LAV units to fundamentally be infantry units (even, from a training perspective, the Army's two cavalry squadrons – though these troopers were still cavalry by institutional culture). Accordingly, build combat crews of LAV-25, ATGM, mortar, and assault gun LAVs with the Enlisted Infantry and Infantry Officer careers. As appropriate for the assigned vehicle's main armament, substitute Autogun, Tac Missile, or Heavy Gun for the first term Grenade Launcher of the basic Enlisted Infantry career, and add the substituted skill to the subsequent term skill list if it isn't already represented. Mortarmen, of course, retain Grenade Launcher.

Air defense LAV crews were air defense artillery personnel, an arm of service that does not appear in **Twilight: 2000**. Treat these as Artillery Arm troops, but for both first term and subsequent skill allocations, replace Heavy Artillery with Tac Missile, Forward Observer with Observation, and Ground Vehicle (Tracked) with Ground Vehicle (Wheeled). This applies equally to Army, Marine Corps, and Air Force personnel in this role.

LAV-mounted combat engineers were still combat engineers. No changes are required for the standard Engineer Arm careers.

Recovery, maintenance, and logistics personnel from LAV units use the standard Support Arm careers.

Command post staff and electronic warfare Marines can be represented through the Support Arm, with the player's choice of Computer or Electronics replacing Mechanic in enlisted first term skills.

Outside the aforementioned air defense role, all Air Force users of M15s were Security Police units. Generate SPs as Air Force personnel with the Enlisted Infantry and Infantry Officer careers. The Air Force's M29s were assigned to engineering units; build these personnel as Engineer Arm airmen.

Credits

Writing

All writing by Clayton A. Oliver.

Art

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Revision History

Version 1.0a of this work released 05 June 2020.

Version 1.1 of this work released 11 June 2020:

- Added Air Force MWS information.
- Added game stats for MWS and LAV-25-TOW prototypes.
- Added character creation notes for Air Force LAV crews.
- Updated Marine LAR Battalion TO&E to reflect original concept for LAV-AD employment.
- Added art on p.6.
- Corrected typos and word choice throughout.

Version 1.2 of this work released 30 October 2020:

- Ported layout to Adobe InDesign 2019.
- Added cover in Twilight: 2000 v1 style.
- Added art on p. 12.
- Corrected minor typos and word choice issues.