

Don't Harness an Ox to a Racehorse: Get the M113 Out of the Armored Brigade Combat Team ... Now, Please!

by COL William T. Nuckols Jr. and Dr. Robert S. Cameron

The armored brigade combat team (ABCT) constitutes the Army's only remaining heavy ground combat force. It possesses a unique set of capabilities crafted to ensure dominance over conventional and hybrid threats in varied terrain and operational environments. High cross-country mobility, strong ballistic protection and scalable, precision firepower provide this unit the means to seize, retain and exploit the initiative.

The mix of Abrams tanks, Bradley Fighting Vehicles and attached infantry and scout squads also makes the ABCT the only U.S. Army organization capable of both mounted and dismounted operations. Unfortunately, it remains constrained by the performance limitations of the antiquated M113. This vehicle lacks the survivability, mobility and digital-networking capability required for current and future operations, making it a liability on today's lethal, nonlinear battlefield. Nevertheless, it equips many of the combat-support and service-support elements and fully one third of the ABCT's tracked-vehicle strength. To eliminate this blight on the organization's otherwise high versatility, the Army must divest itself of the M113, and accelerate procurement and fielding of its designated successor, the Armored Multi-Purpose Vehicle (AMPV).

M113 in Vietnam

First produced in 1960, the M113 culminated efforts to field a reliable, fully-tracked armored personnel carrier. Conceived as a battlefield taxi, it was not designed to maneuver on the battlefields of Central Europe against a highly mechanized threat with a tactical nuclear capability. Against such lethality, the taxi concept left dismounted infantry highly vulnerable and largely immobile once removed from their transport.¹

In Vietnam, this design philosophy fared little better. The Army of the Republic of Vietnam (ARVN) employed M113s in counterinsurgency operations against the Viet Cong (VC). Dismounting from their carriers and advancing on foot, ARVN soldiers found that the VC simply withdrew before they could be engaged. The ARVN responded through the employment of their M113s in a tank-like role, conducting mounted assaults without stopping to dismount passengers. These tactics proved much more successful, but they resulted in high casualties among unprotected vehicle machinegunners. Field modifications resulted, adding more machineguns and gunshields — alterations that U.S. combat forces later adopted.²



Figure 1. M113s in Armored Cavalry Assault Vehicle configuration move into Saigon during the 1968 Tet Offensive. (Photo courtesy National Armor and Cavalry Museum)

Nevertheless, the M113 remained vulnerable. The combination of minimal armor and gasoline engine proved deadly, resulting in the vehicle bursting into flames when hit. Similarly, it offered little protection against the rocket-propelled grenades (RPGs) or mines the VC and North Vietnamese commonly used. Mines in particular tended to result in the complete destruction of the vehicle and its crew and passengers. They became the preferred weapon of choice against American armored combat organizations. Between November 1967 and March 1970, for example, mines accounted for 73 percent of all vehicle losses, including 1,342 M113s.³



Figure 2. M113 knocked out during Tet fighting, 1968. (Photo courtesy National Armor and Cavalry Museum)

Several actions resulted to reduce the M113's vulnerability. Replacement of the gasoline engine with a diesel one partially addressed the fire risk and marked the emergence of the M113A1.⁴ The Army also developed and fielded a vulnerability-reduction kit. It included a belly-armor plate for improved mine protection and rerouted the fuel lines above the floor to reduce the risk of fire after hitting a mine. Other measures, including a double-floor version and bolt-on kits for the installation of bar armor around the hull were never fielded. The double floor proved too complex, and the applique armor impacted the vehicle's ability to cross bridges, canals and other common terrain features.⁵

Therefore, American Soldiers in Vietnam improvised their own protective measures. The most successful proved to be the use of chain-link fencing to surround the vehicle when it remained stationary for more than a brief halt. The fencing caused the premature detonation of RPG warheads before they could penetrate the vehicle. Against mines, common practices included the addition of steel plating and sandbags to the vehicle exterior. Inside, a double layer of sandbags lined the hull floor. The additional weight eroded the vehicle's mobility, but the effectiveness of these measures proved problematic. Essentially an aluminum box on tracks, the M113 was not designed to deflect explosive blasts away from the vehicle. Inside, it proved little more a cramped, claustrophobic environment that provided passengers no situational awareness. By the latter stages of the war, Soldiers frequently preferred to ride atop the vehicle behind sandbag castles rather than await an uncertain fate inside.⁶



Figure 3. An M113 behind chain-link fencing intended to prematurely detonate incoming RPG rounds.

Central Europe

After Vietnam, the Army's focus returned to Central Europe. Combat operations there were expected to be highly lethal and fast-paced, underscoring the importance of survivability. The M113's minimal armor offered protection against small arms and artillery fragmentation but not against hits from weapons of 14.5mm and higher. Although appliqué armor could be applied, it never became standard issue. Hence, the survivability deficiency exposed in Vietnam became more pronounced in Europe, where Warsaw Pact anti-armor capability greatly surpassed that of the VC and North Vietnamese.

This increased vulnerability did not prevent the M113's continued proliferation. The baseline platform's adaptability and ease of sustainment remained attractive qualities. Early variants included the M577 command-post vehicle and the M106 mortar carrier. The family of vehicles quickly expanded to include ambulance, medical treatment, flamethrower, air defense, cargo carrier, anti-tank guided missile, ballistic-missile carrier, repair and recovery and fire-support team variants. Many of these vehicles equipped the combat-support and service-support echelons of maneuver units. By 1999, total M113 production reached 80,000, which ensured continued support for the program as a whole. Moreover, the scale of production kept the cost of the individual platform down, while the inclusion of multiple variants in a single organization simplified maintenance and supply. In short, the expansion of the M113 family of vehicles ensured its longevity, despite its survivability shortfall.⁷

Platform improvements did occur. After the replacement of the gasoline engine in 1964, the next major upgrade to the A2 version began in 1979. It featured better engine cooling and improved suspension for enhanced cross-country mobility. The A3 version began fielding in 1987. It possessed a more powerful engine and a new transmission. Survivability enhancements included spall liners inside the vehicle and mounting points for an external armor kit. The fuel tanks moved from inside the vehicle to an external armored mounting on either side of the rear door. This shift freed internal space, but the collective impact of these changes raised the vehicle's weight to 27,000 pounds.⁸ However, these upgrades did not include a significant change in ballistic protection. The vehicle remained vulnerable to a heavy machinegun. Mounting points for add-on armor simplified the attachment of additional protection, but the armor itself never became standard issue.

Operation Desert Storm

In the 1980s the more heavily armed and armored Bradley gradually replaced the M113 as the primary transport and fighting vehicle for mechanized infantry. Bradley fielding occurred simultaneously with that of the Abrams tank, and armored organizations benefited from the deliberately crafted combat partnership of these platforms. Designed to keep pace with the Abrams, the Bradley's dismount team and versatile armament complemented the heavy firepower of the tank. In its supporting role, however, the M113 lacked the mobility and speed of the Abrams/Bradley team.

Operation Desert Storm underscored this problem. The A2 version constituted the bulk of the M113s that went to war with armored combat units. Postwar analysis highlighted their inability to sustain the operational tempo, insufficient internal space and low survivability.⁹

The M981 Fire-Support Team vehicle, for example, housed a ground vehicle laser locator/designator. Its purpose lay in designating targets for artillery or aircraft to engage. It served as a mobile forward-observation post, employing a hammerhead turret to house its optics. The turret could be raised to permit observation of targets from behind concealment, but the vehicle could not move with the hammerhead raised. The M981's inability to keep pace with the Abrams/Bradley team forced armored units to slow operations, do without the fire-support team or improvise alternative target-designation methods. Faced with these options, 1st Cavalry Division opted to transfer the locator/designator equipment onto a Bradley. This *ad hoc* measure stimulated subsequent development and fielding of the Bradley Fire-Support Team Vehicle, which gradually replaced the M981.¹⁰

The M577, a modified M113A2 intended to facilitate command-and-control within armor and mechanized units, carried communications equipment and a large tent extension designed to be erected and attached to the rear of the vehicle. Once deployed, the combination of tent and vehicle became a command post with enough space to support limited unit-staff operations. However, the extra workspace only became available when the vehicle halted and the crew had time to set up the tent extension. During the continuous movement and combat characteristic of Operation Desert Storm, the slow speed of the M577 kept most crews in their vehicles for protracted periods, struggling to catch up with the faster Abrams and Bradley combat platforms.

These problems led the Army to consider alternatives, especially the Command-and-Control Vehicle. Built on a Bradley chassis, it significantly upgraded the ability to operate on the move and matched the mobility of the Abrams/Bradley team. However, the Army cancelled the program in 2000 before production began.¹¹



Figure 4. M577 command-post vehicle. (Photo courtesy National Armor and Cavalry Museum)

Humanitarian and peacekeeping operations

Army deployments increased in the 1990s to support a variety of humanitarian and peacekeeping operations. These actions often placed Soldiers in nonlinear operational environments that carried the potential to become combat zones with little warning. In the absence of established front lines, M113s could not avoid the possibility of coming under fire. When humanitarian support in Somalia necessitated combat actions, culminating in the October 1993 firefight in Mogadishu, M113 survivability concerns again received attention.

The Armor Center recommended the provision of add-on armor to M113s deploying overseas. This action failed. M113 survivability simply was not a high priority amid Army downsizing, digitization and competing futures programs. American Soldiers took this vehicle to the Balkans without any increase in ballistic protection, despite the ongoing ethnic warfare and a significant mine threat. A related effort to secure a commercially produced reactive armor package for the M113 similarly failed.¹² In the absence of funding and senior-leader support, efforts to resolve the M113's survivability deficiency through appliqué armor ended. Noting the danger associated with committing the vulnerable M113 to environments that included heavy machinegun, mine and RPG threats, one action officer lamented, "It seems as if we need another crisis (Soldiers killed) before someone acts."¹³

Operation Iraqi Freedom

In 2003, Operation Iraqi Freedom found the Army with a large fleet of M113s, many of which had yet to upgrade to A3 standards. However, enhancements did occur through the limited fielding of force-protection kits that included belly-armor plates, bolt-on armor and bar armor.¹⁴ However, these kits were not applied to the entire M113 fleet in Iraq. They were designed primarily for the A3 version of the basic carrier, the mortar carrier and the command-post vehicle. When these enhancements were applied, they raised the vehicle's weight to 31,000 pounds, further retarding its already sluggish speed.¹⁵

Still, the M113 seemed good enough when combat operations began. It supported operations in northern Iraq with Task Force 1-63 Armor, and it participated in 3rd Infantry Division's drive to Baghdad.

The highly publicized fighting in Fallujah in 2004 also witnessed the successful employment of the M113. However, this perception of success derived in part from the humvee's high loss rate. The M113's minimal armor still provided better protection than the unarmored humvees. By late 2004, humvee loss rates had reached unacceptable levels, which was accompanied by a growing number of related casualties. Congress recommended re-equipping Soldiers with M113s until enough numbers of uparmored M1114 humvees and mine-resistant, ambush-protected vehicles became available. In 2005, the Army opted to send more than 700 M113A3s to Iraq. Survivability enhancements included hardened side armor, slat armor, belly armor and a transparent gun shield.¹⁶



Figure 5. M113 mortar-carrier variant. (Photo courtesy National Armor and Cavalry Museum)

The humvee crisis directly impacted scout platoons. First equipped with humvees in 1990, maneuver-battalion scout platoons went to war in Operation Desert Storm with what they had available. Their lack of survivability led to their marginalization in that conflict, while concerns about their vulnerability intensified during subsequent Army operations in Somalia, Bosnia and Kosovo. Corrective action focused on digital capabilities to permit scouts to operate outside the direct-fire range of enemy forces, but this approach did not survive contact with Iraq's operational environment. Pure-humvee scout platoons reconfigured in theater included a mix of Bradley Cavalry Fighting Vehicles and humvees that provided more survivability and combat power for the organization as a whole. In 2013 the Maneuver Center of Excellence (MCoE) began efforts to restructure humvee scout platoons within the ABCT into pure-Bradley organizations with more scouts.¹⁷ The new organization possessed increased survivability and better compatibility with the tracked combat platforms found in the ABCT. Approved in 2015, it was scheduled for implementation the following year.

Combat engineers in armored units pursued a similar solution. They planned for the replacement of the M113 with a Bradley vehicle, but the transition remained in progress when Operation Iraqi Freedom began. Engineer squads

went to war in M113s towing trailers carrying the unit's mine-clearing line charge (MICLIC) that relied on 2,000 pounds of explosives to blast a lane through a minefield. During the 2003 drive to Baghdad, engineer vehicles from 3rd Infantry Division came under fire from small arms and RPGs. After-action inspection revealed the trailers had had their wheels shot out, and the trailers themselves were riddled with bullet holes. In effect, the M113s had dragged tireless trailers packed with explosives through a fire zone. This experience led the engineers to abandon the trailers and their MICLICs rather than accept the risk of further reducing the M113's survivability.¹⁸ Clearly, the engineers required a more survivable vehicle able to keep pace with maneuver units, and the Bradley ultimately fulfilled this role.

Despite its early success relative to the humvee, the M113 remained vulnerable. It was not optimized for operations in close, complex terrain against an adaptive enemy employing a mix of conventional and unconventional attacks at close range. Survivability concerns increased as the capabilities of terrorists and insurgents in Iraq grew, eroding still further the M113's utility. In response, the Army awarded a contract to upgrade more than 300 M113s to the A3 standard. The specific variants addressed included the M577 command post carrier, M1064 mortar carrier and the M1068 standard integrated command-post carrier. However, this contract only upgraded about 40 percent of the M113 fleet. The vehicle was considered "not suitable for an era of persistent conflict due to survivability shortfalls and space, power and weight constraints." The rising threat level effectively stranded the M113 on forward operating bases and underscored its obsolescence.¹⁹



Figure 6. M113 ambulance variant. (Photo courtesy National Armor and Cavalry Museum)

Israeli experience

The Israelis faced similar problems with the M113. However, they opted to improve the vehicle's survivability through upgrade programs that targeted the threats posed by heavy machineguns, chemical weapons, anti-tank missiles and improvised explosive devices (IED). These measures still did not suffice for those carriers transporting mechanized infantry into battle. Therefore, the Israelis modified a number of captured T-54/55 main battle tanks into infantry fighting vehicles by removing the turret and modifying the hull.²⁰

They also developed a purpose-built vehicle better suited to the threats facing Israel in the Gaza Strip and on the Golan Heights. Based on a Merkava I hull, the resultant Namer offered mobility equivalent to that of its tank fleet, improved armor protection supplemented with an active defense system and a network capability commensurate with combat maneuver units. Given the nonlinear nature of operations, the highest level of armor protection was expanded from the traditional frontal arc to include the sides and rear. Special belly armor further improved survivability against mines. The Israelis considered these measures a worthwhile investment in soldier protection despite their impact on the vehicle's weight and cost.

Moreover, the program emphasized reliability, the capacity to accommodate future upgrades and minimization of lifecycle costs. Namer constituted a family of vehicles that included command post, weapons carrier, medical evacuation, technical support and recovery versions in addition to the basic infantry-fighting-vehicle configuration. It was the preferred solution to the M113 in these roles for the Israelis. Ironically, while the U.S. Army continued to make do with the M113, the Israeli Namer program benefited from American industrial support.²¹

Russian experience

Russian military experience also suggested the need to improve the survivability of support vehicles. During fighting in the Chechen capital of Grozny in 1994-1995 and again in 1999-2000, Chechen fighters exploited the nonlinear, urban battlefield to attack vehicles from multiple heights and directions. Mobile ambushes, RPG “showers,” sniper attacks and extensive use of mines served to damage and destroy Russian vehicles and restrict their freedom of maneuver. The Chechens further deliberately targeted combat-support and service-support vehicles and personnel, noting the adverse impact of such attacks upon Russian morale and combat effectiveness. During the initial battle for the city, the Russians lacked an ambulance with sufficient survivability to evacuate casualties from combat zones. They resorted to the improvised use of the *bronetransportyor* (BTR) 80 in this role, though survivability concerns limited casualty evacuations to the hours of darkness. In 1999, the Russians employed the tracked *boyeva mashina pekhoty* (BMP) as an armored ambulance. However, both platforms remained highly vulnerable to Chechen attacks, particularly from the sides, top and rear.²²



Figure 7. M113 and M3 Cavalry Fighting Vehicle in battle positions at the National Training Center.

The demonstrated vulnerability of the BTR and BMP encouraged the conversion of older tank models into infantry fighting vehicles to ensure greater survivability in urban environments. In 2009, development started on the Armata Universal Combat Platform, essentially a family of vehicles based on a tracked, heavily armored main-battle-tank chassis. Initial prototypes were debuted during the 2015 Moscow Victory Day Parade. The T-14 tank quickly gained media attention in the West, but the family of vehicles also included various support platforms.²³

Combat operations in the Ukraine encouraged this trend toward more heavily armored vehicles. The BTR and BMP models in service with the Ukrainian army and separatist forces proved highly susceptible to anti-tank weapons,

artillery and thermobaric warheads. The high loss rates resulted in efforts to keep the vehicles removed from direct-fire threats and to disperse passengers to minimize casualties in the event of vehicle loss.²⁴

U.S. way ahead

The United States faces an array of real and potential threats whose capabilities will likely exceed those demonstrated by terrorist and insurgent forces encountered in Iraq and Afghanistan. Chechen tactics employed against the Russians in the 1990s have been refined and proliferated throughout the Middle East. The Islamic State has secured armored vehicles, including a small number of tanks, anti-tank guided-missile systems and artillery. These systems complement more traditional small arms and mortars. IEDs remain a weapon of choice, but the Islamic State has elevated their lethality by attaching them to armored vehicles operated by suicide drivers.

A similar mix of capabilities can be found among many of the Syrian rebel organizations fighting against the Assad regime. Syrian government forces have employed conventional, thermobaric and chemical weapons, while their Hezbollah allies possess capabilities similar to those of the Islamic State.

An operational environment in which these or similar threats exist underscores the importance of survivability considerations, particularly for specialized support platforms.

The known vulnerability of the M113 makes it a targeted platform. No simple upgrade or modernization path exists for the M113 family of vehicles. The platform lacks the ability to host future command-and-control networks considered vital to ABCT modernization. It has reached the end of its effective service life. The Army acknowledged this reality in 2007 when it terminated the program.²⁵ Sustainment support remained for those platforms still in service, but this knowledge provides cold comfort to Soldiers required to operate the M113. The current array of conventional and hybrid threats ensures that employment of this vehicle in any operational environment will constitute a high risk.

The AMPV constitutes the Army's intended replacement for the M113 within the ABCT. In the wake of the M113's termination, the AMPV program offered a more survivable and mobile platform with the capacity to accommodate digital systems and future upgrades. The Army's decision to base the AMPV on the Bradley offered more benefits. The mortar carrier, mission command, medical treatment, medical evacuation and general-purpose variants of the AMPV will possess comparable mobility to the combat vehicles within the ABCT.²⁶ Moreover, they share automotive components, parts and supply requirements with the Bradley vehicles used by the engineers and scout platoons.

A lesser degree of commonality also exists with some of the parts and components of the Bradley-derived chassis of the Paladin Integrated Management M109A7, intended to re-equip the ABCT's mobile-artillery component. With the exception of the Abrams tank and the M88 Recovery Vehicle, most of the tracked vehicles in the brigade will share the same power train and suspension system, greatly streamlining maintenance and supply.²⁷



Figure 8. M113A3s from 3-7 Cavalry during the invasion of Iraq in 2003.

In addition to simplified vehicle and organizational sustainment, the AMPV offers advantages in space, power and cooling over the M113. The AMPV provides more internal space and boosts electrical power through the inclusion of two 400-amp generators. This combination of space and power capacity enables the new vehicle family to carry the latest digital-networking systems and support future upgrades. These improvements benefit all the AMPV variants. They are especially valuable to the mission-command platform, which possesses the means to collect and share data while remaining forward with combat elements. It constitutes a critical command-and-control node whose digital-networking systems facilitate data analysis and command decisions. Similarly, improved survivability permits the medical-evacuation variant to recover casualties from forward areas.²⁸

The AMPV's Bradley basis makes it eligible to accommodate upgrades intended for the Bradley family of vehicles. MCoE began a modernization initiative for the Bradley in 2007, the same year the Army terminated the M113 program. In 2011, the Army's Vice Chief of Staff directed modernization to proceed via incremental engineering change proposals (ECP). Consequently, near-term upgrades to the Bradley were grouped into ECP I and II. The first focused upon the track and suspension, while ECP II addressed electrical and mechanical improvements. Once implemented, these latter changes will boost the vehicle's automotive power, transmission, electronics, digital capabilities and power distribution.²⁹ Some of these upgrades are already included in the AMPV design, and further upgrades to the Bradley family of vehicles will likely apply to the AMPV as well.

However, not until December 2014, seven years after the M113's termination, did the Army award an engineering and manufacturing development contract for the AMPV to BAE Systems Land and Armaments, L.P. This contract covered a 52-month period during which BAE Systems agreed to build 29 vehicles over four years for testing to ensure they meet Army AMPV requirements. The contract also included a low-rate initial-production option under which BAE systems would build 289 more platforms. A subsequent contract for full-rate production of another 2,897 vehicles will replace M113s in all ABCTs. Budget restrictions and a production rate capped at 180 vehicles per year further ensures full fielding will not complete before the mid-2020s.³⁰

Congressional concerns regarding the replacement of M113s in echelons above brigade threatened even this leisurely development and production schedule, necessitating an Army report on its plans and assessment of the viability of a wheeled vehicle for these organizations. The report requirement reflected the corporate dispute between BAE and General Dynamics Land Systems, which supported a wheeled version of the AMPV. Having opted not to contest the Army's decision for a tracked platform for the ABCT, General Dynamics continued to advocate for a wheeled vehicle suited for employment in other organizations.³¹ These developments, coupled with the uncertainty surrounding the Fiscal Year 2016 budget, cloud the AMPV's future.

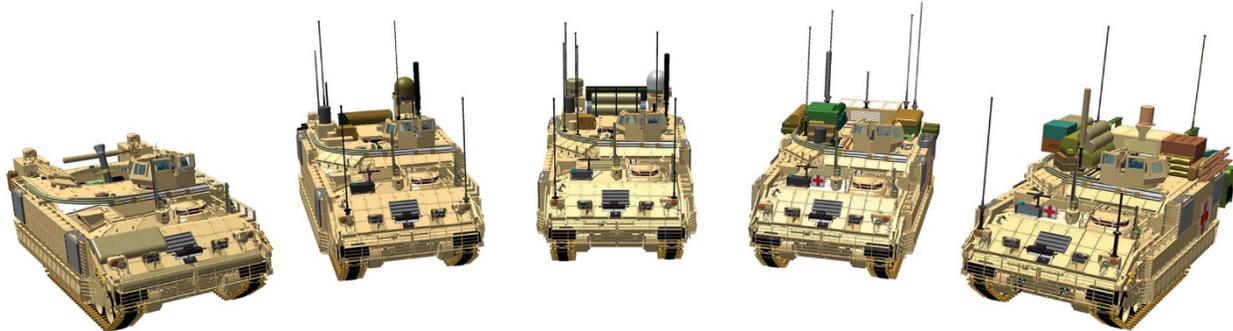


Figure 9. Artist depiction of the AMPV variants. From left to right, they are the mortar carrier, general-purpose, mission command, medical evacuation and medical treatment vehicles.

For Soldiers assigned to M113s in the ABCT, AMPV fielding dates in the 2020s mean little. They serve in an obsolescent platform whose vulnerabilities are common knowledge to friend and foe. Nor is their longevity improved by the M113's deadly combination of a specialized role and minimal ballistic protection. The vehicle is a lucrative target whose loss will impair parent unit operations.

Required network upgrades to the ABCT remain in abeyance since the M113 cannot currently accommodate them. Unable to keep pace with the Abrams/Bradley team it is supposed to support, vulnerable to hybrid and conventional threats alike, the M113 is overdue for replacement. Hence, the AMPV program requires acceleration. Waiting years for the first AMPV platforms to reach the field is an avoidable risk that makes little sense — particularly for the Soldiers who will enter combat in the interim with the M113. Until the ABCT is completely purged of the M113, it will continue to endanger Soldiers and degrade armored brigade operations. Should the AMPV program become the next acquisition casualty, this state of affairs will continue in perpetuity.

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