

M113 APC: Four Decades of Service and Still Showing Potential

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The first version of the M113 armored personnel carrier (APC) was introduced in 1960. Operated by a driver and track commander (TC), it was designed to transport a squad of 11 infantrymen across a hostile battlefield. To maximize strategic and tactical mobility, the M113 was made to be air-transportable, air-droppable, and swimmable, thereby enabling it to be employed in a wide range of combat scenarios.

In 1964 the original 209 horsepower (HP) gasoline engine was replaced by a more fuel-efficient 212 HP diesel package, which increased cruising range by 50 percent. Since diesel fuel is less flammable than gasoline, this change also improved crew survivability. This version — the M113A1 — was the primary ground combat vehicle used by American, Australian, and South Vietnamese forces in the Vietnam War.

The suspension and cooling system were upgraded in 1979, resulting in the M113A2. This variant was employed in the 1989 invasion of Panama, during Operation Just Cause, where it was a valuable asset to U.S. infantrymen. Large numbers of the A2 also participated in Operation Desert Storm, albeit in support roles, as combat duty in that 1991 action was the province of the M2 Bradley fighting vehicle.

Because the M113A2 had difficulty keeping pace with the Abrams tank and Bradley fighting vehicle, in 1987 the M113A3 was created. A 275 HP turbocharged engine increased top speed by more than 10 percent, producing cross-country performance that is officially considered comparable to the Abrams and Bradley. To enhance survivability of both men and machine, spall liners were installed and the single internal fuel tank was replaced by dual armored tanks mounted externally on the rear of the vehicle.

In a quest for even better performance, in 2002 the Australian Army initiated a program to “stretch” the M113 hull approximately three feet, adding another road wheel on each side. Together with increased suspension travel and a 350 HP diesel engine, these modifications give the Australian M113AS4 APC tactical mobility equal to, if not better than, the Bradley fighting vehicle. A similar long wheel base M113 variant was evaluated by the U.S. Army in the interim armored vehicle program, but was passed over in favor of the eight-wheel drive Stryker.

COUNTERINSURGENCY OPERATIONS – VIETNAM

When the United States provided M113 APCs to the Army of the Republic of Vietnam (ARVN) in 1962, American advisors tried to instill into the Vietnamese the official U.S. Army doctrine of employing the M113 only as a “battle taxi.” During a September 1962 attack against guerrilla forces in the Plain of Reeds, the U.S. advisor convinced the ARVN commander to have the infantry dismount and fight on foot. The troops immediately became



www.army.mil/cmh-pg

Soldiers in a M113 armored personnel carrier fire a .50 caliber machine gun during a South Vietnamese training exercise. The barrel of a side-mounted .30 caliber machine gun can be seen on the far side of the vehicle.

bogged down in the knee-deep water, enabling the enemy to inflict an alarming number of casualties.

To the consternation of the higher echelons of the American command, the ARVN refused to continue this practice, correctly reasoning that the troops were far more mobile and better protected when in the APC than when slogging through rice paddies with only a fatigue shirt between their bodies and the enemy’s bullets. In an effort to further improve combat effectiveness and Soldier survivability, the ARVN soon took another step to increase vehicle firepower and crew protection.

As issued, the M113 was armed with a single M2 HB .50 caliber machine gun, mounted out in the open on the front of the commander’s cupola, thereby exposing the TC to enemy fire. As a result of having 14 out of 17 track commanders killed in the 1963 battle of Ap Bac, the Vietnamese fabricated steel armor shields that were attached in front of the “fifty” on the APCs. They also installed an additional .30 caliber Browning machine gun — with armor shield — on each side of the cargo hatch. Thus was born the armored cavalry assault vehicle, or ACAV, a weapon system that was called “the champion VC killer of I Corps” by Colonel R. R. Battreall, an advisor to the South Vietnamese in 1965.

An improved version of the ACAV was fielded by the 11th Armored Cavalry Regiment when it deployed to Vietnam in 1966, and other American mechanized units also had their M113s equipped with armor shields and extra machine guns. According to General Donn Starry, in his 1989 book, *Mounted Combat in*

Vietnam (accessible online at www.army.mil/cmh-pg/books/Vietnam/mounted/index.htm), “more often than not U.S. mechanized infantry fought mounted, employing armored personnel carriers as assault vehicles to close with and destroy the enemy, and that mounted troops generally suffered fewer and less serious casualties than foot Soldiers.”

The ACAV concept proved exceedingly effective on the nonlinear battlefield of Southeast Asia, even though the insurgents were well armed with RPG-2 and RPG-7 rocket launchers, as well as a variety of recoilless rifles. Despite this fact, after United States forces withdrew from South Vietnam, the gunshields and 7.62mm machine guns were removed from U.S. Army ACAVs, restoring the vehicles to prewar configuration. Consequently, when M113s were next employed in combat, during Operation Just Cause, track commanders were once again vulnerable to small arms fire. Fortunately, because the operation was brief and the opposition was ineffective, U.S. casualties were minimal.

URBAN COMBAT – LEBANON

At the same time that the U.S. Army was deleting the ACAV from its inventory, the Israeli Defence Force (IDF) enthusiastically adopted — and to this day continues to use — the concept. What the Americans learned in Vietnam, and then quickly forgot, is that a single machine gun does not deliver sufficient “steel on target” in the assault, nor does it have adequate capability to defend the vehicle against simultaneous attacks by multiple RPG teams. The Israelis, in contrast, still arm most of their M113s with three machine guns, and many of their infantry carriers have gunshields to protect the crews.

Operation Peace for Galilee (www.specialoperations.com/mout/pfg.html) was initiated in 1982, when the IDF sent mechanized forces into neighboring Lebanon in an effort to combat the Palestinian Liberation Organization (PLO). PLO fighters were well supplied with the RPG-7, which proved to be every bit as effective against IDF M113A1s as they had been when used against U.S. Army APCs a dozen years earlier.

To counter the RPG threat, the Israelis

quickly set about developing add-on armor packages to improve survivability of the M113 and its crew. The most prevalent type in use by the IDF is the “Waizata” spaced armor (commonly called “toga”). This is made of thin, lightweight sheets of perforated steel that are attached to a steel framework to create a “skirt” around the front and sides of the vehicle. The standoff provided by the skirt serves to detonate an RPG before it can come into contact with the hull, so that the effects of penetration and fragmentation are significantly reduced.

Because the effectiveness of spaced armor is very dependent upon the type of warhead and angle of impact, under many conditions the shaped charge “jet” is able to penetrate both the skirt and the hull. In an effort to provide a complete remedy to this problem, in the mid-1990s the IDF introduced the “Classical” M113, a variant that was fitted with explosive reactive armor (ERA). This version was first seen operating in Lebanon in 1996, and the ERA reportedly is successful at defeating the ubiquitous RPG. Unfortunately, the added weight of the armor suite not only strained the 212 horsepower engine of the Israeli’s M113A2s, but also caused vehicle speed and handling to suffer, and torsion bars to break. According to waronline.org, these

problems caused the M113 Classical to be removed from service.

Due to the ongoing threat imposed by the RPG-7 and other anti-armor weapons, israeli-weapons.com reports that the IDF is currently planning to equip a portion of its M113 fleet with the light vehicle armor system (LVAS). LVAS is a hybrid modular armor, with each module being constructed of layers of steel, rubber, ceramics, and ERA, to prevent penetrations by RPGs and some antitank guided missiles. If LVAS performs as claimed, it will greatly improve survivability of the M113, especially in urban combat.

URBAN COMBAT – IRAQ

The elegant simplicity of the M113’s box-like structure has enabled this versatile vehicle to be employed in many functions. Although superseded by the M2 Bradley in the role of infantry transporter, the “one-one-three” is still widely used by the U.S. Army as a medical evacuation vehicle and combat engineer vehicle. In the latter role, the M113 has seen action during Operation Iraqi Freedom much like that for which it was originally used four decades earlier.

When more than 100 Iraqi soldiers staged a surprise attack on Bravo Company, 11th Engineer Battalion near the Baghdad



Captain Bill Thompson/ First Lieutenant Jesse Delgado

Soldiers in an M113 APC from the 2nd Battalion, 7th Infantry Regiment, 3rd Infantry Division (Mechanized) operate outside Iraq’s Saddam International Airport in April 2003.

airport in early April 2003, Sergeant First Class Paul R. Smith climbed into the open hatch of an M113 and opened fire with the .50 caliber machine gun. After expending nearly 400 rounds of ammunition in an hour and a half of fighting, SFC Smith was mortally wounded. This is precisely the type of situation that caused gunshields to be created 40 years ago, but — like the overwhelming majority of M113s in Iraq — SFC Smith’s APC was not equipped with a shield. The widespread use of gunshields on U.S. Army M113 variants in Vietnam saved the lives of many crewmen in that conflict, and might also have prevented the loss of this courageous warrior.

For those who wish to use them, the cupola armor kits are still in the system (frontal shield only has NSN 2541-01-394-7280; frontal shield with left and right enclosures has NSN 2541-01-497-9999), and can be ordered through normal channels. It is uncertain if the cargo hatch shields and elbow mounts for 7.62mm machine guns are still in the inventory since they have not been seen on U.S. Army M113s for many years.

Also missing from M113s is bolt-on armor that would protect against the effects of shoulder-fired anti-armor weapons like the RPG-7, which has been encountered in massive numbers in Operation Iraqi Freedom. Even though the M113A3 — production of which began in 1987 — was manufactured with provision for attachment of additional armor, no type of passive or reactive armor has ever been acquired.

However, a partial solution to the RPG problem was found in the form of a field expedient modification to increase stowage space by attaching cargo racks to the sides of the vehicle. A side effect of these steel-framed racks, together with the supplies and gear stowed in them, is that they acted as improvised spaced armor and detonated RPGs with some standoff distance from the hull.

One combat engineer reported that, “When RPGs hit [a cargo rack], they would hit a rucksack or a hard equipment case and go off, and fail to do more than gouge a hole in the vehicle’s side.” However, Task Force 1-64 Armor’s after action review (accessible at www.strategypage.com/dls/articles/20030912.asp) noted that external stores helped, but did not always prevent penetrations by RPG and recoilless rifle rounds.

A more effective spaced armor was designed at Anniston Army Depot in May 2004, creating a “kit” that enables the side skirts and ramp armor taken from older, out-of-service M2A0 Bradleys to be bolted onto M113A3s. The Bradley spaced laminate armor, together with additional ballistic plates on the vehicle front, would give 360-degree protection against 14.5mm projectiles at short range, as well as increasing the capability to survive RPG hits and



Courtesy photo

Using the modified Bradley A0 armor would be one way to significantly upgrade the protection level of the M113A3 at a low cost.

roadside bombs. Use of the modified Bradley A0 armor would be an elegant way to significantly upgrade the protection level of the M113A3, at extremely low cost.

An M113A3 with additional, well-designed armor bolted onto the sides and front would be able to absorb multiple RPG hits without the concomitant risk of fire. Spaced armor is an inexpensive upgrade, sufficiently lightweight so as to put little strain on engine, transmission, and suspension components, but clearly not the most effective option.

Reactive armor would be far superior to spaced armor, as would passive armor like that developed for the M8 armored gun system. The M8’s passive armor modules are already type-classified, and could be readily adapted for installation on the M113.

As was learned four decades ago, providing a gunshield for the M2 .50 caliber machine gun would substantially improve TC survivability. The complete kit offers good protection from small arms projectiles, but requires that the gunner expose much of his upper body when reloading the “fifty.” Because of this factor, using the frontal shield by itself might be a better alternative, one that offers protection over the frontal arc, while retaining the flexibility and ease of operation of an unshielded weapon.

Installing and manning a 7.62mm machine gun at each side of the cargo hatch would greatly improve situational awareness by having continuous observation of three quadrants, and allow instant return fire against multiple RPG teams. This is impossible on vehicles armed with only a single weapon, and has resulted in the loss of a number of vehicles in Iraq, including M113s, HMMWVs, Bradleys, and at least one Stryker. Two extra machine guns, and the personnel to man them, would provide an “active defense” against the RPG threat, substantially improving survivability and combat effectiveness.

The M113 has served the U.S. Army well in combat and peacekeeping operations for close to half a century, and is destined to remain in service for many years to come. While it has been eclipsed by the M2 Bradley for high intensity conflicts such as were once considered possible with the Soviet Union, the M113 still has much potential for use as an infantry vehicle for counterinsurgency operations, particularly in urban terrain. The hope is that this article will provide some insight on how that potential has been utilized in the past, so that it might be further built upon in the present and future.

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