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# ***MASTER OF MILITARY STUDIES***

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**POWER PROJECTION: THE CURRENT AND FUTURE RELEVANCE OF THE  
M1A1TANK TO MARINE CORPS CAPABILITIES**

SUBMITTED IN PARTIAL FULFILLMENT  
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## EXECUTIVE SUMMARY

**Title:** Power Projection: The current and future relevance of the M1A1Tank to Marine Corps Capabilities.

**Author:** Major Andrew D. Bianca, USMC

**Thesis:** The Marine Corps must continue to maintain and invest in improving the M1A1Tank. It remains a critical part of the balanced combined arms team that is the Marine Air Ground Task Force (MAGTF).

**Discussion:** Since their development, tanks have been employed irrespective of the level of intensity, or terrain, of the conflict. Tanks have been employed in highly urbanized areas, forests, and jungles, as well as the more commonly thought of open plains and desert. Despite the technological changes that have occurred since World War Two, tanks continue to function effectively across a broad spectrum of conflict. The modern main battle tank is the result of technical trade-offs between firepower, protection, and mobility, balanced against affordability. In a tactical sense, the M1A1 Abrams represents an optimized combination of these parameters given the technologies available at the time of its development.

Despite their logistical demands and cost, tanks continue to be developed and fielded by virtually every major country in the world. Tanks have been present in most conflicts since World War Two, and continue to be employed even in current peace operations. Examples of the current employment of Main Battle tanks include Marine Corps employment in Somalia and with Marine Expeditionary Units, Russian employment of tanks in the Chechnya conflict, Israeli use of tanks in Palestine, and NATO deployment of tanks to Bosnia.

Current Marine Corps doctrine recognizes the continuing need for the tank or “tank-like” capability. The Marine Corps warfighting concept is based on the combined-arms teams, and the M1A1Tank clearly has a role to play in that team. There are currently efforts underway within the Marine Corps to develop a replacement for the M1A1 by fiscal year 2020. But until a replacement for the capabilities that the M1A1 provides is fielded, the Marine Corps must continue to invest in its improvement. Some have argued that attaching US Army armor units when tanks are required will allow the Marine Corps to enjoy the capability, but not have to pay for it. But that argument taken to its logical conclusion could be used to eliminate the Marine Corps itself. The correct solution is to identify limitations and find methods to mitigate those limitations. There are significant issues that must be addressed if the tank is to remain relevant in the future. The M1A1 places a significant demand on the logistics capabilities of a deployed force, and the cost associated with maintaining the tank is high. Despite the cost and logistical demands of the M1A1, the capabilities that it provides to the MAGTF will remain critical until those capabilities can be replaced by another combat vehicle.

**Conclusion:** The strength of the MAGTF is in the synergy that it generates through a balanced, combined arms organization. The M1A1 is an important part of that team, and must continue to be upgraded and included in future warfighting concepts as they are developed.

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# **POWER PROJECTION: THE CURRENT AND FUTURE RELEVANCE OF THE M1A1TANK TO MARINE CORPS CAPABILITIES**

## **CHAPTER 1**

### **DEFINING THE ISSUES**

Winning Battles is our fundamental purpose and our reason for being. This is what America expects of its Marine Corps, and it is what we will continue to deliver.

Marine Corps Ground Board, *Ground Combat Element Campaign Plan 2001*.

The Marine Corps must continue to maintain and improve the M1A1 Tank, which will remain a relevant and crucial component of the balanced combined arms team that is the Marine Air Ground Task Force (MAGTF) for the next two decades. The reason the Marine Corps finds itself well positioned to handle the challenges of this new century is that it has never strayed from its *raison d'être* as noted above. However, limited resources and a changing world will continue to place a premium on innovative thinking and intelligent choices with regard the number, size, and type of units that comprise the Marine Corps, as well as the equipment required to allow that force structure to operate and win in battle.<sup>1</sup> There will always be the danger that in an effort to adapt and improve, an organization might destroy what makes it successful in the first place.

That is precisely the danger that the Marine Corps faces with the M1A1. In service with the Marine Corps since 1990, M1A1Tanks were initially borrowed from the Army to fight in the Gulf War. But the reality is that the Marine Corps has struggled with the need to have the M1A1 since the 1980's. The decision to acquire it was finally made in 1985, but so painful was the



decision that it ultimately spanned the tenures of five commandants.<sup>2</sup> Because of its weight and logistical demands, many Marine Corps leaders maintain the view that the M1A1 is ill-suited for the expeditionary operations that the Marine Corps is so proficient at conducting. Particularly in light of emerging concepts that emphasize sea-based operations and strategic mobility, many believe that the Marine Corps should forego the capabilities that the M1A1 Tank provides to the MAGTF.

### **Getting the Equipment Mix Right**

Determining the correct “equipment mix” for the Marine Corps, the major end items the Marine Corps needs to execute its mission, will always be a contentious issue. The concern over the correct equipment necessary to execute missions across the spectrum of conflict is neither new or unique, nor is it a bad thing. In effect, it is a crucial sign of a truly healthy organization. Every military service is struggling with the problem of how to stay relevant in the post cold war era. Each is attempting to reshape itself or “transform” into a more strategically responsive force, one that provides maximum utility to the nation it serves. Currently, the US Army is attempting to field the Interim Brigade Combat Team (IBCT) in order to have a flexible organization that can deploy rapidly with more combat power than its traditional light forces. The Navy and Air Force are addressing transformation through doctrinal and organizational changes.<sup>3</sup>

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<sup>1</sup> Joint Chiefs of Staff, Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: GPO, 12 April 2001, as amended through 23 Jan 2002), under the term “military capability.”

<sup>2</sup> Kenneth W. Estes, *Marines under Armor: The Marine Corps and the Armored Fighting Vehicle, 1916-2000* (Annapolis, MD: Naval institute Press, 2000), 183-184.

<sup>3</sup> General James L. Jones, USMC, “ ‘Expeditionary’ means more than just getting there quickly,” *Armed Forces Journal International*, October 2000, URL: < <http://www.afji.com/AFJI/Mags/2000/Oct./What'sInAWord.html>>, accessed 7 January 2002, 1.

The Marine Corps, although historically focused on the very types of contingencies that seem to be the norm in the post cold-war era, is also exploring new concepts and technologies in an effort to remain relevant. Expeditionary Maneuver Warfare is the Marine Corps' newest capstone concept that seeks to leverage the competencies that the Marine Corps already maintains, and continues to refine. The Expeditionary Maneuver Warfare concept is based on a maneuver warfare philosophy and an expeditionary mindset that will provide the Joint Forces Commander with a force capable of dealing with a multitude of challenges. However, it is optimized for forward presence, engagement, crises response, antiterrorism, and warfighting.<sup>4</sup> The organization that supports this concept must be balanced in order to function effectively across the broad range of missions it will be tasked to perform. "Procurement programs must balance mobility, ruggedness, maintainability, and ability to perform under austere conditions with the need to rapidly develop significant combat power."<sup>5</sup>

### **Strategic Mobility versus Combat Power**

At the heart of the question over the need for the M1A1 in the Marine Corps is the dichotomy between the requirement to get to the fight quickly and the requirement to have enough combat power to deter an aggressor or win a fight. In seeking the balance in force structure that allows both requirements to be met, there is a constant tension in equipment needs for the Marine Corps. The US Army's struggle to "transform" and to develop a medium weight fighting force is probably the finest indication of how successful the Marine Corps has been in attaining that balance.

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<sup>4</sup> Headquarters, United States Marine Corps, *Expeditionary Maneuver Warfare: Marine Corps Capstone Concept*, np, 2001. Cited hereafter as Expeditionary Maneuver Warfare.

<sup>5</sup> Jones, 8.

The Army already has forces that can be deployed quickly and forces that can employ overwhelming combat power, but it doesn't have units that can do both. Its light infantry units can be employed anywhere in the world within hours, but they don't have the vehicles to move quickly on the battlefield and they lack the firepower to take on an armored force. The Army's heavy armored units can go head-to-head against any military on the planet, but their equipment is so heavy that it needs to be moved by ship. That can take weeks or months. What the Army lacks is something in between—a unit that can be deployed quickly and still pack a serious punch when it arrives.<sup>6</sup>

What the Army seeks to field is a force that is similar to the Marine Corps. It is the need for overwhelming combat power that makes the M1A1 Tank an important part of the MAGTF. As a fighting vehicle, few would argue that it provides enormous capability to the MAGTF. But the penalty that must be paid to attain this capability manifests itself in system weight and a large logistics support structure. That penalty is not unique to the M1A1; it is simply a matter of scope.

Critics of the M1A1 contend that it is too heavy and requires too much logistical support to fit into the Marine Corps' warfighting concept. Further, critics believe that the M1A1 is not suited for the type of missions the Marine Corps finds itself increasingly executing in the post-cold war environment. Finally, critics believe that even if the M1A1 can contribute to missions across the spectrum of conflict, it does not justify the penalties that must be paid for that contribution. The author believes the critics are wrong, and that the M1A1 is both strategically mobile and logistically supportable. Both parameters have been proven repeatedly over the last ten years. It is only when the M1A1's strategic mobility and logistics demands are assessed relative to other platforms such as the Light Armored Vehicle (LAV) or High Mobility Multi-Wheeled Vehicle (HMMWV) that any legitimate argument can be made against it. To make that argument, critics must downplay the parameters of armor protection and firepower that caused the weight and logistics demands in the first place. When the M1A1 Tank is assessed relative to

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<sup>6</sup> Katherine McIntire Peters, "Fighting Weight," *Government Executive*, January 2002, 27.

other main battle tanks of the world, the impact of its weight and logistics demand are generally comparable. There are very good technical and tactical considerations that have driven tank designers throughout the world to the heavy, large armored fighting vehicle that is known as the modern main battle tank.

## CHAPTER 2

### THE DEVELOPMENT OF THE MODERN MAIN BATTLE TANK

The tank, therefore, fares well with an assured future. Even if it were far more vulnerable than it is, it would continue to stalk the battlefield simply because it has been built and paid for in very large numbers. Also, as yet, no equally satisfactory means has been found to dominate combat by terror and by immense striking power, high mobility and a reasonable level of protection in one, albeit very expensive, vehicle.

Kenneth Macksey, *Tank versus Tank*

#### Moving in the Firestorm

The genesis of the modern Main Battle Tank can be traced back to the earliest times, when warriors employed carts to move on the battlefield and provide a level of protection to its occupants.<sup>7</sup> Since then, armored fighting vehicles have steadily progressed, both in levels of complexity and capability. The goal of the continuing development of the armored fighting vehicle was simple, to be able to move in the storm of enemy fire that weapons development allowed. Whether that fire be arrows or high explosive projectiles, or the protection that allowed movement be two feet of armor or a shield made of animal hide, the problem has not changed over time<sup>8</sup>.

What is commonly thought of as the first tank made its appearance on the battlefield in September 1916. The term “tank” was applied to the vehicle in an effort to keep the program secret. The British hoped that enemy spies would think a water tank was being developed, rather than a new weapon. The British Mark I, known as “Mother,” would succeed beyond all expectations in accomplishing what it had been designed to do by crossing the trenches and “no-man’s land” of the western front, and suppressing the fire of enemy weapons. Unfortunately, in

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<sup>7</sup> Kenneth Macksey, *Tank versus Tank: The Illustrated Story of Armored Battlefield Conflict in the Twentieth Century* (Topsfield, MA: Salem House Publishers, 1988), 6.

<sup>8</sup> Orr Kelly, *King of the Killing Zone: The Story of the M-1, America’s Super Tank* (New York: Berkley Publishing Group, 1989), 43.

what would become a reoccurring theme for the early part of the century, there was no suitable doctrine developed for the tank's employment. Mother also suffered from severe mechanical reliability problems. What had promised to be a way to break the trench warfare deadlock ended in the majority of gains being lost when the infantry failed to follow-up, or the tanks broke down.<sup>9</sup> Despite its deficiencies, Mother's designers began the development of a weapon system that would dominate the ground battle for the rest of the century.

In the ensuing years to the present day, technological improvements have caused many to proclaim that the tank's dominance on the modern battlefield has ended. Yet even today tanks continue to have a major role in conflict.<sup>10</sup>

As long as there were people who were proclaiming the invincibility of the tank, then, not unnaturally, there were other people who saw their life's work as proving that the tank was not as invincible as thought by its protagonists. Thus, in one way and another, the pendulum began to swing. Today the tank was superior to all forms of defence; next day the defence had mastered the tank; then came a new and improved tank which restored its dominance on the field; and this was followed by a new and improved gun or rocket or grenade or mine which, again, swung the pendulum the other way and put the tank back in its proper place. In just this fashion, from 1916 to the present day, the pendulum has swung back and forth, in a varying rhythm to be sure, but it has swung inexorably and is still swinging.<sup>11</sup>

The improvements in technology that has allowed individual soldiers to challenge multi-million dollar tanks will also be the reason that tanks will remain relevant on the battlefield. Relevance does not equate to invincibility. Neither aircraft nor infantry are invincible, yet no one would seriously argue that they are irrelevant to the Marine Corps. Relevant is synonymous with "appropriate" and "suitable."<sup>12</sup> By providing the Marine Corps with mobile, armored protected

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<sup>9</sup> Macksey, 14-16.

<sup>10</sup> Headquarters, United States Marine Corps, *A Concept for Antiarmor Operations*, 2001, 1. Cited hereafter as *Antiarmor Operations*.

<sup>11</sup> Ian Hogg, *Tank Killing: Anti-Tank Warfare by Men and Machines* (New York: Sarpedon, 1996), 2.

<sup>12</sup> *The Random House College Dictionary*, Revised ed., 1982, under the word "relevant."

firepower that is capable of surviving severe enemy fire, particularly when employed as part of a combined arms team, it remains very much an appropriate and suitable part of the MAGTF.

### **Three parameters drive design**

As the development of the tank continued through the end of World War I and into the 1930's, trade-offs began to occur. In effect, the development of the tank was a series of advancements with regard to three variables: firepower, protection, and mobility. The extent to which one or two of these variables was increased generally had a corresponding negative effect on the others. Hence, different classifications of tanks were made, with specific missions assigned to each. Light tanks were lightly armored and designed for speed, while medium and heavy tanks with heavier armor and bigger guns were generally slower and meant as infantry support. The US Army Armored Force Field Manual of 1942 stated that the "missions of envelopment, pursuit, and the disruption of hostile areas belonged to the light tanks. Medium tanks were to assist the light tanks by neutralizing enemy antitank guns and artillery, and providing fire support."<sup>13</sup> Generally, tank weight in the Second World War ranged anywhere from the 10 ton French R35 light tank at the beginning of the war, to the massive 70 ton Tiger II that saw service at war's end.<sup>14</sup> In general, however, tank weight increased over time in order to keep pace with the increased penetration capability of improved guns and more effective munitions.

There were a variety of attempts to place lighter, less expensive vehicles in service that still carried the punch of heavier tanks. Most notably was the tank destroyer, or self-propelled

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<sup>13</sup> Christopher R. Gabel, "World War II Armor Operations in Europe," in *Camp Colt to Desert Storm: The History of U.S. Armored Forces*, eds. George Hofmann and Don A. Starry (Lexington, Ky: University Press of Kentucky, 1999), 147.

antitank gun concept. The tank destroyer was probably developed as an extension of the assault gun, which was simply an artillery piece mounted on a tank chassis with limited armor to protect the crew. Although the Germans devised the idea, virtually every country that fought in the Second World War developed assault guns. Shaped charge ammunition enabled the assault gun to function in a limited role against tanks. The tank destroyer concept took the assault gun concept a step further by providing a high-velocity gun that could penetrate the armor of a tank. The US Army formed tank destroyer battalions in 1941, with the idea that a swarm of the light, minimally armored vehicles would ambush or surprise heavier tanks. Their motto, “seek, strike, and destroy,” describes the mission they were expected to perform very well.<sup>15</sup> However, the only instance in which US Army tank destroyers attempted to follow its doctrine was in action near El Guettar in North Africa. In action against German tanks, tank destroyers turned back the attack, but lost the majority of its vehicles in doing so.<sup>16</sup> Even the tank destroyers eventually succumbed to the imperative of increased weight for increased performance, with the M18 Hellcat tipping the scale at 20 tons.<sup>17</sup>

### **Improvements up to the present**

Throughout World War Two, the pendulum swung back and forth between gun and armor. In 1943, both the Germans and the Russians introduced very large caliber guns ranging from 88mm to 122mm. Since the size of these guns precluded towed configurations, tanks were developed to mount them. Unfortunately, engine technology did not keep pace with the increased weight. Power-to-weight ratios dropped significantly in the super-heavy tanks,

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<sup>14</sup> Macksey, 64-139.

<sup>15</sup> Hogg, 104-106.

<sup>16</sup> Gabel, 152.



which resulted in a corresponding decrease in mobility.<sup>18</sup> Technology would eventually provide a solution to the mobility problem in the form of better engines, but tank designs in the 70-ton range had been reached.

The introduction of very large, high-velocity guns posed tank designers with many problems, principally those of how to keep vehicle cost, size and weight within practical bounds. Similar problems also affected the design of simple anti-tank guns, of course: they too had become far too big and unwieldy.<sup>19</sup>

Following World War Two, there were many attempts to find weapons that could offer the same effect as these very large guns, however, most attempts at a solution had disadvantages of their own. The most innovative solution was the anti-tank guided missile, which could be flown to its target and depended on a shaped charge warhead to penetrate. Range was only restricted by the distance the missile could fly. However, the advantages of a high-velocity gun remained - better rates of fire, shorter time of flight and lower cost - and most nations continued to rely on them.<sup>20</sup>

As the penetration capability of high-velocity guns and shaped-charged warheads increased, armor protection improvements progressed, albeit at a slightly slower rate. Angles of obliquity could be changed to deflect impacts or armor could be added selectively to tanks to increase protection. But it was not until the British introduced Chobham armor in 1965 that a significant step was taken in armor technology. Chobham armor is basically a laminate armor, with ceramic, steel and titanium sandwiched together between ballistic nylon. Although Chobham armor's details are still a closely held secret, its existence provides significant protection to the crew of any tank protected by it.

Engine technology has progressed slowly also, with the amount of power generated tied to the size of the engine. Most modern Main Battle Tanks are powered by diesel engines

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<sup>17</sup> Gabel, 157.

<sup>18</sup> Macksey, 143.

<sup>19</sup> Macksey, 153.

because of the significant amount of horsepower required to move 50 to 70 tons. Two notable exceptions to this trend are the M1 series tank and the Russian T80, both of which are powered by gas turbine engines. Until recently, the gas turbine engine provided significant size and weight reductions for the same amount of power that a diesel engine provided. However, fuel consumption is greater in the gas turbine.<sup>21</sup> Recent advances in technology are beginning to close the gap between gas turbines and diesel engines. Gas turbine engines are being developed that consume less fuel, while smaller and lighter diesels are being developed that produce significant amounts of horsepower.

Despite the fact that there are very few new tanks being developed, there are significant efforts throughout the world to improve existing tanks. Militaries throughout the world recognize the utility of the main battle tank, but are often unwilling to pay the large investment in development funds to produce new tanks. Most countries are continuously upgrading what they have in order to protect the significant investment they have already made in their existing tanks. The development of the modern tank continues, primarily in an evolutionary fashion. The reason for this continued development is simple. Despite repeated claims to the contrary, the tank continues to dominate land battle. Those that seek to dominate the battlefield continue to develop tanks. And few efforts to develop a tank capable of dominating the battlefield have been as successful as the Abrams Program.

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<sup>20</sup> Macksey, 153.

<sup>21</sup> Richard Ogorkiewicz, "The Present and Future of Armour," URL: <[www.iss.co.za/pubs/mnonographs/no2/ogorkiewicz.html](http://www.iss.co.za/pubs/mnonographs/no2/ogorkiewicz.html)>, accessed 12 January 2002.

## CHAPTER 3

### CAPABILITIES AND LIMITATIONS OF THE M1A1

In NATO maneuvers the high speed of the Abrams and the quietness of its engine and tracks enabled the Americans to go rampaging through the enemy's rear areas and catch a Canadian unit, representing a hostile task force, totally by surprise. The Canadians neither saw nor heard the Americans until their amber lights began to blink. Shocked, they called the new tank Whispering Death.

Orr Kelly, *King of the Killing Zone*

#### Performance

Despite the contentious issue of whether or not the Marine Corps should have the M1A1 Abrams tank, there is little question about its performance. Arguably the finest tank in the world, the M1A1 incorporates a number of components that were revolutionary when first introduced, and still remain superb by anyone's standards even today. Compared to the first M1's fielded in the early 1980s, the M1A1 Common that the Marine Corps has fielded is significantly better in every respect. It has improved armor, more firepower, and unmatched battlefield mobility. Furthermore, since its initial fielding, the Marine Corps has continued to upgrade the M1A1.

The main gun of the M1A1 is a 120mm smoothbore cannon. Although the original M1s were fitted with the 105 mm rifled gun, the German designed 120 mm cannon allowed development of munitions that could provide a significant increase in penetration, as well as more design margin for improvements in the future. Against enemy tanks, the gun is capable of first-shot kills in excess of two miles.<sup>22</sup> The M1A1 carries an on-board load of 40 main-gun rounds. The Marine Corps is dependent on the US Army for the development of main gun

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<sup>22</sup> Harold Kennedy, "Army Overhauls Its 70-Ton Behemoth-the Abrams Tank," *National Defense*, September 2001, n.p., URL: < <http://www.nationaldefensemagazine.org/article.cfm?Id=594>>. Accessed 19 January 2002.

ammunition. There are currently two types of 120 mm tank ammunition available for US forces. The first is the Armor-Piercing, Fin-Stabilized, Discarding-Sabot (APFSDS) round that uses the kinetic energy of a long, depleted uranium rod to penetrate other armor vehicles. The depleted uranium is used because it has a density more than twice as high as steel and allows for high penetration characteristics. The most current version of APFSDS is the M829E3, which will improve lethality against even the most current threat, including those equipped with explosive reactive armor.<sup>23</sup> The second round available is the HEAT round. There are two versions currently available, the M830 HEAT-MP-T and MM830A1 Multi-purpose-Antitank, Tracer (MPAT-T) round. Both are chemical energy, multi-purpose projectiles with an anti-personnel capability. They are used to destroy armored vehicles, helicopters, buildings and other soft targets. The M830 is not in production anymore, but is still available in the inventory. The M830A1 features a proximity switch on the nose of the round. The round can either function upon target impact, or the loader can set the switch to proximity mode in order to defeat helicopters. This is a unique capability that tanks have never possessed before.<sup>24</sup> Although the two rounds available can service virtually any potential target necessary, there is also an attempt to increase the types of rounds available to the crews for use against special targets. When the U.S. Army was developing main gun ammunition for the 120 mm gun, a decision was made to limit the development of ammunition to two types of ammunition, with each having tank killing capability. In 1996, a decision was made to develop an anti-personnel round due to the changing

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<sup>23</sup> U.S. Army Training and Doctrine Command (TRADOC) System Manager-Abrams, *Abrams Tank Modernization Plan 2001* (Fort Knox, KY: U.S. Army TRADOC, May 2001), 13. Cited hereafter as Abrams Tank Modernization Plan.

<sup>24</sup> Federation of American Scientists Military Analysis Network, accessed under "M830A1 High Explosive Anti-Tank-Multi Purpose - Tracer (HEAT-MP-T)," URL: <<http://www.fas.org/man/dod-101/sys/land/m830a1.htm>>, accessed 3 January 2002.

threat. Currently in development, the canister round will fire a payload of over 1000 tungsten balls out to 500 meters and will be able to destroy a 30 man platoon in the open.<sup>25</sup>

In addition to the main gun, the M1A1 Tank has three machine guns with which to engage personnel and light targets. The .50 caliber tank commander's machine gun is the M2 heavy barrel machine gun that has been in the U.S. inventory for decades. It can be fired from under armor and has a range of 1800 meters. The coaxial machine gun is a 7.62 mm M240 machine gun, and is slaved to the tank's fire control system. This allows it to be extremely accurate out to 900 meters, as well as allowing a shoot on the move capability. The third machine gun is located on the roof of the M1A1 on a race ring around the loader's hatch. It is also a M240 machine gun, but does not have any fire control capability. Its purpose is primarily for self-defense against area targets. The M1A1 can carry a substantial amount of machine gun ammunition, with 11,400 rounds of 7.62 mm ammunition and 900 rounds of .50-caliber ammunition.<sup>26</sup>

The armor protection of the M1A1 is substantial. Across the front sixty-degree arc of the tank, it can withstand virtually any conventional munition. A case in point is an encounter that occurred between a M1A1 and three Iraqi T-72 tanks during Operation Desert Storm. Despite being hit repeatedly by Iraqi rounds, the M1A1 was undamaged and returned fire, destroying all of the threat tanks.<sup>27</sup> The key to the M1A1's superb protection is the addition of depleted uranium layers in addition to the Chobham armor developed by the British. Although increased armor protection has been the cause of 65% of the increase in weight of the Abrams tank since it was first introduced, it has ensured that the armor will remain proof against the most

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<sup>25</sup> *Abrams Tank Modernization Plan*, 13.

<sup>26</sup> Technical Manual 9-2350-264-10-1, Tank, Combat, Full-tracked:120-MM Gun, M1A1 (2350-01-087-1095) General Abrams (Washington, DC: Department of the Army, 25 September 1990), 1-18.

<sup>27</sup> Kennedy, np.

current threats.<sup>28</sup> In addition to the armor of the M1A1, Marine Corps tanks also have a missile countermeasure device located on the turret roof. The Missile Countermeasure Device jams an incoming missiles guidance system by substituting its own infrared energy for the missiles. By doing so, it causes the missile to fly into the ground.

The tactical mobility of the M1A1 remains a benchmark by which many other vehicles are judged. For instance, the Marine Corps AAV cross-country land speed requirement is to keep up with the M1A1Tank.<sup>29</sup> The 1500 horsepower gas turbine engine allows the M1A1 to attain speeds of 45 miles per hour. It is capable of superb cross-country mobility, and despite its weight, it is capable of traversing terrain that most vehicles cannot due to its low ground pressure of only 15 pounds per square inch. The M1A1 is also capable of crossing 9-foot wide trenches and has a vertical obstacle crossing capability of 49 inches. Finally, the M1A1 can accelerate from a dead stop to 20 miles per hour in seven seconds and has a range of approximately 280 miles with onboard fuel.<sup>30</sup>

An important mobility capability that the M1A1Tank possesses that is often overlooked is the Track-Width Mine Plow (TWMP). The TWMP provides the Marine Corps with the only mechanical means to conduct an in-stride breach of enemy minefields. Although minefields can be cleared by hand, or with a bulldozer fitted with special equipment, both methods have significant shortcomings associated with them. Because obstacles such as a minefield are normally covered by enemy weapon systems, having engineers clear lanes manually is extremely risky and slow. Armored bulldozers require special transportation to get to the breach site, and only have protection from small arms fire. In contrast, M1A1Tanks fitted with TWMPs can

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<sup>28</sup> *Abrams Tank Modernization Plan*, 11.

<sup>29</sup> Federation of American Scientists Military Analysis Network, accessed under “Advanced Amphibious Assault Vehicle,” URL: < <http://www.fas.org/man/dod-101/sys/land/aaav.htm>>, accessed 10 January 2002.

<sup>30</sup> Technical Manual 9-2350-264-10-1, 1-16.

move with lead elements of a maneuver force, suffer little degradation in mobility and no degradation in armor protection. Interestingly, it is the M1A1's weight and tracks that allows it to push a plow through soil clearing mines up to 12 inches deep. This is a capability that cannot be provided by lighter vehicles such as the LAV or AAV.

## **Logistics**

Much has been made about the demands that the M1A1 requires in terms of logistics. However, since the Marine Corps has fielded the M1A1, it has always been able to sufficiently support it during peacetime and during expeditionary operations. Most critics point to the M1A1's significant demand for fuel as a major problem. The fact is that the M1A1 will burn approximately three to seven gallons of fuel per mile, the exact amount being dependent on terrain and idling time.<sup>31</sup> However, the M1A1 has an auxiliary power unit that powers all of the tanks systems without the turbine engine. This significantly reduces daily fuel consumption, and ultimately reduces total demand for fuel across the force.

The second most common problem associated with the M1A1 is the requisite large number of spare parts required to support it and their associated high cost. This is simply not a viable argument against having the M1A1. The high number of spare parts relative to less capable systems is a function of performance. The M1A1 has more spare parts because it has subsystems that give it more capability. Additionally, the cost of these parts appears high because the tank is built around Line Replaceable Units, or secondary repairables. The concept is that to increase availability of a system, subcomponents are removed and replaced by another serviceable subcomponent. The damaged part is then sent to maintenance for repair. By doing

so, the availability of the total system is improved. This concept enabled the Marine Corps' Second Tank battalion to maintain the M1A1's readiness rate of 95% or higher for the duration of its deployment during Operation Desert Shield/Desert Storm.<sup>32</sup>

## **Transportability**

The biggest misconception about the M1A1 is that it is not transportable, and by implication, that it is not strategically mobile. In fact, the introduction of the M1A1 to replace the M60A1 tank has not resulted in any degradation in strategic mobility. Both ship to shore and air transportability remains the same. The C-5 aircraft can transport one M1A1 Tank, and the newer C-17 transport plane is capable of the same thing. Although it is not possible to transport the M1A1 on the C-130, its maximum cargo capacity of 45,000 pounds allows it to transport only the very lightest vehicles.<sup>33</sup>

The M1A1 Tank can be moved ship to shore by Landing Craft, Air Cushioned (LCAC) or Landing Craft, Utility (LCU). One M1A1 can be carried by a LCAC, and two can be carried by a LCU. The LCU is actually capable of carrying three M1A1s, but due to safety reasons the maximum has been set to two. The M1A1 Tank is fully compatible with amphibious shipping. By gaining the capability of the M1A1, the Marine Corps essentially maintained the same air, land, and ship transportability that it had when it was fielding the M60A1.<sup>34</sup> There is some truth to the argument that ship-to-shore throughput may be reduced relative to the M60A1, but only in

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<sup>31</sup> John F. Lynn, "Silent Knight: Fact and Fiction and the M1A1," *Marine Corps Gazette*, June 1990, 67.

<sup>32</sup> Major Richard V. Mancini, USMC, *Placing the M1A1 Common Tank Aboard Deploying Marine Expeditionary Units, Special Operations Capable Forces*, MMS thesis (Quantico, VA: Marine Corps Command & Staff College, 1995), np.

<sup>33</sup> Federation of American Scientists Military Analysis Network, accessed under "C-130 Hercules," URL: <<http://www.fas.org/man/dod-101/sys/ac/c-130.htm>>, accessed 15 January 2002.

<sup>34</sup> Lynn, 66.



a limited sense. For instance, three M60A1s could be brought ashore in a single LCU load, compared to two M1A1s. Additionally, the LCM-8 could carry one M60A1, but cannot carry the M1A1. However, the LCM would not normally be utilized to move tanks ashore, so there is little practical degradation to throughput. As far as the degradation to LCU throughput, the increased capability of the M1A1 more than offsets the loss of a single tank per boat load.

The transportability issues surrounding the M1A1 are further mitigated by the existence of the Maritime Prepositioning Force. Three battalion sets of tanks are currently aboard MPF ships. In most contingencies, MPF assets can respond quickly and be in the area to be met by the Fly-In echelon. In cases in which a required response time exceeds the capabilities of the MPF assets, tanks can be introduced into theater after the initial forces have landed. By doing so, even the M1A1s weight becomes less of an issue. Nor is the phasing of appropriate assets into a contingency a new concept. The Marine Corps has traditionally phased assets ashore, and will continue to do so in the future, irrespective of the M1A1. There is simply not enough lift to do otherwise.

In effect, the lack of strategic mobility is simply a myth. It is a myth borne of a myopic view of how the Marine Corps enters a theatre, or will enter a theatre in the future. “Mission, enemy and terrain drive optimum task organization, not weight.”<sup>35</sup> By focusing strictly on weight, the Marine Corps may find itself devoid of “forces capable of winning decisive victories in littoral areas”<sup>36</sup>. The Marine Corps’ success has always been based on a balanced, fully integrated combined arms team, and it must be based on it in the future.

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<sup>35</sup> Lynn, 67.

<sup>36</sup> Headquarters, United States Marine Corps, *Operational Maneuver from the Sea: A Concept for the Projection of Naval Power Ashore, 1997*, np, URL: <<http://www.concepts.quantico.usmc.mil/omfts.htm>>, accessed 17 Dec 2001. Cited hereafter as *Operational Maneuver from the Sea*.

## CHAPTER 4

### THE TANK IN MODERN CONFLICT

The main impact of the tank in the territories is deterrence. The main effectiveness of the tank is its weapon systems-most importantly its night vision.

Arieh O'Sullivan, *The Jerusalem Post*

#### Reoccurring Theme

A reoccurring theme for the successful employment of armor throughout the world is the distinct need for combined arms operations. Despite the costs and drawbacks associated with them, tanks continue to be used in conflict throughout the world. There are numerous countries that possess near state-of-the-art tanks and armored vehicles. Additionally, many countries possess less-capable tanks that are still lethal. Overall, over 100,000 tanks will probably be in service in 2015.<sup>37</sup> Moreover, countries continue to employ tanks in every type of conflict and in every type of terrain. More often than not, the success or failure of forces employing tanks has hinged on how the tank is employed, rather than if the tank is employed. Normally, tanks fare poorly when they are employed independent of infantry. This is especially true in low intensity conflict. But in cases where the tank is a part of a combined arms team, they continue to demonstrate significant utility on the battlefield. Fundamentally, "...tanks are effective not because they can never be defeated but because they can operate in the battlefield environment in the face of many threats and because it takes special weapons or measures to destroy them."<sup>38</sup> A

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<sup>37</sup> *Antiarmor Operations*, 1.

<sup>38</sup> R. M. Ogorkiewicz, "Interview with Isreal's Major General Tal," *International Defense Review*, September 1991, 977.

look at the recent employment of tanks throughout the world will highlight the practical value they provide irrespective of the nature of the conflict.

## **Lebanon and Palestine**

The Israeli's continue to emphasize the role of the main battle tank, even in highly urban settings and anti-terrorism roles. In fact, their experiences in these types of operations has had a significant impact on the design of their most modern tank, the Merkava. Israeli combat experience has been that armor protection is the critical parameter, so it is one of the heaviest tanks in the world<sup>39</sup>. The Israeli's also emphasize tank-infantry cooperation, often conducting foot patrols over-watched by tanks. The tank provides direct fire support to the infantry with its main gun and machine guns. Another technique is to employ tanks during mobile search and destroy operations, again supporting the infantry in the direct fire role. Tank crews have also used advanced optics to reduce their vulnerability by locating and destroying Hezbollah antitank guided missile teams during missile flight. The tank crews emphasize battle drills and situational awareness to avoid friendly fire incidents and to provide the necessary quick reaction to survive such encounters.<sup>40</sup> Israeli tankers must also contend with the possibility of hostile personnel boarding the tank, as well as the threat of anti-tank rockets. In an effort to reduce the tank crew's vulnerability, a "dead zone" is established around the tank that no one is allowed to enter.<sup>41</sup> By emphasizing crew training and evolving tactics, techniques and procedures, the Israeli Defense Force has operated main battle tanks continuously in an environment not normally associated

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<sup>39</sup> David Miller and Christopher F. Foss, *Modern Land Combat* (New York: Portland House, 1987), 94.

<sup>40</sup> Lieutenant Colonel David Eshel, "Armored Anti-Guerrilla Combat In South Lebanon," *Armor*, July-August 1997, URL: < [knox-www.army.mil/dtdd/armormag/ja97/4idf97.html](http://knox-www.army.mil/dtdd/armormag/ja97/4idf97.html) >, accessed 9 January 2002.

<sup>41</sup> Arie O'Sullivan, "The Army Banks on its Tanks," *Armor*, November-December 2001, 13.

with armor operations. The armor protection and direct fire capability of the tank has proven effective in reducing casualties and has assisted in accomplishing the mission during security operations in a hostile urban environment.

## **Chechnya**

The Russian experience in Chechnya provides both positive and negative examples of armor operations in an urban environment against a determined enemy. In particular, it serves to reinforce the lessons that the Israeli's have learned through their own experiences. Tanks operating independent of infantry fared poorly.

Tanks and personnel carriers in the city without preceding dismounted infantry cover were easy targets to antitank gunners firing from the flanks or from above. The initial Russian armored columns were swallowed up in the city streets and destroyed by Chechen gunners. The Russians lost 105 of 120 tanks and personnel carriers and fell back to consolidate for the long, building-by-building battle.<sup>42</sup>

The staggering losses in tanks and armored personnel carriers seem to support the belief that tanks are inappropriate for urban battle. However, that would be the wrong lesson to take from the Russian experience. The cause of such tremendous losses was attributable to the antithesis of the Israeli experience. Russian forces lacked appropriate tactics, techniques and procedures, and the crews lacked training.

“Some destroyed Russian tanks were hit more than 20 times by RPGs.”<sup>43</sup> Rather than concluding that tanks are vulnerable to light antitank rockets, an observer should ask how a tank was hit 20 times. It was the lack of coordination and combined arms that allowed the Chechens

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<sup>42</sup> Mr. Lester W. Grau, “Changing Russian Urban Tactics: The Aftermath of the Battle for Grozny,” URL: <<http://www.fas.org/man/dod-101/ops/war/docs/grozny.htm>>, accessed 11 August 2001.

<sup>43</sup> Timothy L. Thomas, “The Battle of Grozny: Deadly Classroom for Urban Combat,” URL: <<http://www.fas.org/man/dod-101/ops/war/docs/990000-battle.htm>>, accessed 11 August 2001.

to be as successful as they were. However, tanks became more effective over time, as the Russians applied lessons learned.

Tanks were advised to seal off city blocks, repel counterattacks, and provide cover. In providing supporting fires along streets, tanks were expected to occupy covered positions or operate only in areas controlled by motorized rifle units. During movement, tanks would move behind infantry at a distance beyond the effective range of enemy antitank weapons, but close enough to support the infantry with grazing fire from machine guns. The same principle was to be used for calculating the follow-on distance for other armored vehicles. Additionally, metal nets and screens were mounted 25 to 30 centimeters away from the armor to create protection from Chechen antitank rounds.<sup>44</sup>

Another technique that the Russians began to employ was to ambush the ambushers. They began to establish ambush sites of their own, and then use the Chechen practice of moving to the sound of engine noise against them. By using tanks as bait, they would lure anti-tank hunter killer teams into an ambush of their own.<sup>45</sup> Faced with the necessity of reducing urban areas building by building, and lacking the infantry strength to do so, they employed armor to assist because they had no other choice.<sup>46</sup> Nor were the Russian tanks optimized for urban combat. Because of their small size, they have a severely restricted range of elevation and depression of the main gun that is substantially less than western tanks. Additionally, they lack the level of armor protection that many western tanks enjoy. When combined with inadequate training and doctrine, the tank crews had to learn the lessons of combat the hard way. “The Russian experience does not prove that armor was the wrong answer, only that the Russians had the wrong kind of armor-and used that badly.”<sup>47</sup>

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<sup>44</sup> Thomas, np.

<sup>45</sup> Grau, np.

<sup>46</sup> Ralph Peters, “The future of Armored Warfare,” *Parameters*, Autumn 1997, 51.

<sup>47</sup> Peters, 51-52.

## Somalia

During the Marine Corps participation in Operation Restore Hope in Somalia from 1992 to 1993, Marine M1A1 Tanks were employed in support of operations ashore. The deployment of tanks to Somalia was not part of the original plan, but was subsequently conducted due to the presence of some older Soviet and American tanks maintained by Somalia warlords. Because a partial Maritime Prepositioning Force offload had been conducted to support operations, there were M1A1s unloaded on the pier without crews. A small contingent of Marine tankers was deployed to crew the tanks, and began conducting operations. The tank platoon functioned in a number of roles, to include: surveillance and patrolling, show of force, raids and limited objective attacks, convoy escort, mobility enhancement, etc.<sup>48</sup> In one instance, the M1A1 platoon fought a tank duel with six tanks, even though the M1A1s had no main gun ammunition. The Somali's apparently believed the M1A1s were ranging them with machine guns before they fired the main gun, and abandoned their tanks.<sup>49</sup> Although a humorous story, it serves to illustrate the potential that tanks, simply by their presence, deter aggression and dominate Military operations other than War. A Pakistani Officer who participated in Operation Restore Hope remarked that casualties would have been higher if it had not been for the presence of the tanks<sup>50</sup>. This point is driven home with remarkable force by the events of 3-4 October 1993 when Task Force Ranger lost 16 American lives during combat operations. Although the situation was clearly one in which tanks could have played an important role in extracting the trapped rangers, political considerations and traditional approaches to urban combat precluded

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<sup>48</sup> Mancini, np.

<sup>49</sup> Estes, 192-193.

<sup>50</sup> Mancini, np.

their use.<sup>51</sup> Although the level of combat intensity in Somalia did not approach those found in the Israeli or Russian experiences, it does offer another example of the capabilities the tank can provide in any level of conflict.

## **The Balkans**

The Balkan Conflict provides an example of the myriad of armor vehicle types that can be found in an area, and may well represent an example of the most dangerous situations that the Marine Corps could face in the future. It also demonstrates the contribution of the main battle tank to peace operations, regardless of terrain. Since the NATO and United Nations involvement in peace operations in the former Yugoslavia, there have been a significant number of main battle tanks introduced and employed in the region, in addition to the tanks that belong to the Yugoslav Republics. During Operations Joint Endeavor, Joint Guard, and Joint Forge, NATO forces consistently deployed main battle tanks in support of the peacekeeping missions. The same can be said of UN forces involved in Operation Joint Guardian in Kosovo. In early 1996, an estimate of the number of tanks associated with the armies on both sides of the Balkans conflict was approximately 1440.<sup>52</sup> In addition to those tanks, the United States deployed M1A1 Tanks; Britain deployed the Challenger, while Belgium, Canada, Denmark, Germany and Italy deployed the Leopard I/II. France and the United Arab Emirates deployed the LeClerc, and Turkey deployed M60A3 Patton Tanks. Because of the large number of main battle tanks in the region, and despite the fact that the majority of them were older, less capable Soviet variants such as the T-34 and T-55, both NATO and the UN considered them a serious threat.

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<sup>51</sup> Peters, 51.

The tanks were employed in a variety of roles, but were most often used in an overwatch role for road checkpoints, as a rapid reaction force, and on mounted patrols. Often it was the tanks mere presence that contributed to maintaining the peace. In one example, US soldiers were attempting to confiscate weapons, when a crowd gathered to stop them. The crowd immediately dispersed when M1A1s were brought forward.<sup>53</sup> Although only a single example, it demonstrates an important point that UN and NATO planners had in mind when they deployed main battle tanks in support of operations; it is not just the tremendous firepower and armor protection that makes tanks so useful in these operations, but the potential that they possess. In other words, the metric to judge the main battle tank's contribution to peace operations may not be effectiveness in a firefight, but in the number of firefights that were avoided by having them on the scene.

The example described above was not an uncommon event. The performance of the U.S. First armored Division in 1996 highlights the extent to which main battle tanks participated in daily operations in the Balkans. In a four month period the Division's M1A1s averaged 1,500 miles.<sup>54</sup> By integrating the main battle tank with light vehicles and dismounted patrols, NATO and UN forces dramatically reduced the probability of hostilities by giving their soldiers a credible deterrent. At the same time they substantially increased their own force protection.

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<sup>52</sup> "History of the Balkan conflict," *USA Today*, 14 February 1996, URL:

<[www.usatoday.com/news/index/bosnia/nbos002.htm](http://www.usatoday.com/news/index/bosnia/nbos002.htm)>, accessed 20 January 2002.

<sup>53</sup> "The M1A1 Abrams Tank: Keeping the peace in Bosnia," *Bridgehead Sentinel*, Spring 1997. URL:

<[www.bigredone.org/bridgehead/bhs97/tank.htm](http://www.bigredone.org/bridgehead/bhs97/tank.htm)>, accessed 20 January 2002.

<sup>54</sup> "U.S. Tankers end mission in Bosnia, Return to Germany," *American Forces Information Service*, 28 August 1996. URL: <[www.defenselink.mil/news/Aug1996/n08281996\\_9608289.html](http://www.defenselink.mil/news/Aug1996/n08281996_9608289.html)>, accessed 20 January 2002.



## **Additional Examples**

The four examples described above are only a snapshot of the continuing role of tanks on the modern battlefield. There are certainly more, to include the Iran-Iraq War, Operations Desert Shield/Desert Storm, Afghanistan, and more. What is notable about the examples described in detail above is that each transcended the type of role for tanks that many critics of the main battle tank claim it is ill suited to operate in. These common misconceptions of the role of the main battle tank being limited to massed formations moving across open fields in a high-intensity conflict is not born out by modern conflict. The principal reason these misconceptions exist is because the tank is viewed as a special platform best employed to destroy similar platforms. In fact, the main battle tank is simply a different combination of firepower, mobility and armor protection than that of armored cars or lighter vehicles. If one views the main battle tank as a combination of capabilities, its employment in “non-traditional” roles becomes much easier to understand. Having the ability to survive enemy fire, combined with the ability to destroy that enemy with organic firepower, and move that combination where you need it will always be relevant. In effect, world events continue to support the contention that the main battle tank can get to the fight, and once there, can dramatically influence events.

## CHAPTER 5

### MARINE CORPS CONCEPTS AND THE M1A1

If potential enemies continue to invest in heavy armor and America doesn't, then heavy armor will be tomorrow's asymmetric threat.

Daniel Goure and Loren Thompson, *Land Warfare: Heavy Metal Has a Future*

#### Expeditionary Maneuver Warfare

The Marine Corps' new capstone concept continues the long tradition of focusing on our core competencies, and combining them with maneuver warfare and an expeditionary heritage.<sup>55</sup> It forms the basis from which the Marine Corps' Integrating and Operational Concepts are derived. The M1A1 Tank is fully compatible with those concepts, and will remain a critical platform to make execution of those concepts a reality. When critics of the M1A1 complain that it is too heavy to fit into the Marine Corps expeditionary force structure, they are making the mistake of thinking of the tank as analogous with heavy forces. The Marine Corps M1A1s are not heavy forces; they are platforms within the Marine Corps expeditionary force. The term "expeditionary" means more than just light.

To Marines, the term "expeditionary describes a pervasive mindset, a perspective that influences all aspects of organization, training, and equipment. We propose that an appropriate description of an expeditionary force is 'an agile and flexible force organized to accomplish a broad range of military objectives in a foreign country or region. Such a force must be able to deploy rapidly, enter the objective through forcible means, sustain itself for an extended period of time, withdraw quickly, and reconstitute rapidly to execute follow-on missions.'" <sup>56</sup>

The M1A1 clearly fits within this construct. It deploys rapidly as part of an amphibious MAGTF, or through Maritime Prepositioning Ships. It is an ideal platform to enter an objective

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<sup>55</sup> Expeditionary Maneuver Warfare, np.

<sup>56</sup> Jones, 3.

through forcible means, providing accurate, direct fire support to the rest of the MAGTF. It can be sustained for extended periods of time by the fully integrated combat service support element (CSSE) of the MAGTF. Its ability to withdraw and reconstitute is fully compatible with other elements of the MAGTF. Because expeditionary is the Marine Corps ethos, it resides in the minds and hearts of Marines, not in the technical characteristics of its equipment. To be sure, equipment incompatible with amphibious ships or strategic air transport is decidedly not expeditionary in nature, and has no business being in the Marine Corps inventory. The expeditionary culture shared by all Marines provides the Marine Corps with an advantage over other services because by our very nature we are a force in readiness that can operate within the full range of military operations.<sup>57</sup> The M1A1 is well suited to contribute to the integrated fires that Expeditionary Maneuver Warfare demands. Its psychological impact on an adversary is tremendous, and its fully integrated fire control system allows it to provide lethal, direct fire in any weather condition, day or night.

### **Operational Maneuver from the Sea (OMFTS)**

OMFTS is an operational concept that supports Expeditionary Maneuver Warfare (EMW). It is an approach to expeditionary, littoral, and amphibious warfare. It seeks to exploit an enemy's weaknesses by maneuvering naval forces at the operational level. However, the idea of simply moving forces around is not OMFTS. In fact, if movement cannot result in a decisive result, then it cannot qualify as operational maneuver.<sup>58</sup> Maneuver is distinguished from movement by two aspects; relationship to the enemy and firepower. With respect to OMFTS,

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<sup>57</sup> Expeditionary Maneuver Warfare, np.

<sup>58</sup> Operational Maneuver from the Sea, np

the emphasis is on placing forces in a position of advantage relative to the enemy. However, at any level of war, “successful maneuver requires not only fire and movement but also agility and versatility of thought, plans, operations, and organizations.”<sup>59</sup> What distinguishes Operational Maneuver from the Sea from other forms of operational maneuver is simply the extensive use of the sea to attain the necessary advantage.<sup>60</sup> The M1A1 will remain relevant within the constraints of OMFTS because it can provide the naval force with the requisite power projection capability that will make it decisive, and therefore successful. Additionally, it is fully compatible with amphibious shipping, so the Marine Corps will not have to wait for a future capability; it exists right now.

As discussed earlier, several recent conflicts have demonstrated that the main battle tank can and should play a role in the full spectrum of operations. Interestingly, one of the most often used examples of OMFTS is the landing at Inchon during the Korean War.<sup>61</sup> The fact that Marine tanks landed and provided critical armor-protected, direct fire support is often overlooked. The Marine tanks proved key to breaking through enemy positions time after time, allowing the capture of Seoul quickly, and with minimal casualties.

The key to OMFTS success is in maintaining and building a force that can respond to a variety of conflicts, not just the most common ones. Because the M1A1 places a demand on logistics and lift, the temptation is to emphasize scenarios in which the main battle tank provides too much combat power, such as disaster relief. But the Marine Corps must be able to handle any mission the nation asks to be accomplished, against any enemy. Clearly there will be

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<sup>59</sup> Joint Chiefs of Staff, *Joint Doctrine Encyclopedia*, (Washington, DC: GPO, 16 July 1997), 481.

<sup>60</sup> Operational Maneuver from the Sea, np.

<sup>61</sup> Operational Maneuver from the Sea, np.

instances where the M1A1 will not be needed. But the latent combat power that it provides will still be necessary in the vast number of future scenarios involving Marines.

### **Sustained Operations Ashore**

Although the Marine Corps has historically participated in numerous sustained operations ashore, it is the nature of future operations that this concept focuses on. The Marine Air Ground Task Force will remain a general-purpose force, but capitalize on its seabased character to be the force of choice for decisive operations.<sup>62</sup> Employed as an Operational Maneuver Element, the Marine Air Ground Task Force will normally conduct operational-level missions as an independent force, and relying on its organic capabilities.<sup>63</sup> When the MAGTF is involved in sustained operations ashore, it can serve as an enabler for follow on forces, as the decisive force in conjunction with other joint forces, or as an exploitation force when an opportunity arises. The M1A1's capabilities fit neatly in to each operation, giving the MAGTF commander the necessary firepower to conduct all three. Sustainment of the MAGTF will remain seabased when possible. However, the concept of sustained operations ashore recognizes that in some cases, operational requirements will demand that combat service support may necessitate positioning ashore.<sup>64</sup> In either case, the MAGTF elements, to include M1A1 Tank units can be supported indefinitely as long as they are within reach of seabased aviation. It is important to recognize that even a small MAGTF will demand extensive logistics support ashore, particularly when engaged in combat operations. When seabasing is discussed, it "includes all elements of Navy and Marine units tailored for the execution of a specific expeditionary mission...the seabase would likely consist of a MAGTF, amphibious shipping, Maritime Prepositioning Force

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<sup>62</sup> Headquarters, United States Marine Corps, *The MAGTF in Sustained Operations Ashore*, 4 January 1996, IV-3, URL: < <http://www.concepts.quantico.usmc.mil/omfts.htm>>, accessed 21 November 2001. Cited hereafter as Sustained Operations Ashore.

2010 elements, and one or more carrier battle groups.”<sup>65</sup> Because of the demands that logistics places on any MAGTF, augmentation will almost always be necessary. The danger facing Marines is that in attempting to reduce the logistics tail, they may eliminate the requisite firepower and mobility (combat power) necessary to remain relevant, decisive, and distinct from the Army’s rapidly deployable units. Maneuver forces require discretionary firepower and the ability to react to local conditions, two capabilities the M1A1 Tank can and does provide to the MAGTF commander.

### **Ship to Objective Maneuver**

Of all the concepts that the Marine Corps is developing, Ship-to Objective Maneuver is one that most clearly benefits from the capabilities provided by the M1A1. Ship-to Objective Maneuver “adapts combined arms penetration and exploitation operations to the environment described in *Operational Maneuver from the Sea*.”<sup>66</sup> A principle of Ship-to Objective Maneuver is the ability to create overwhelming tempo and momentum, and this will place a premium on the capabilities that the M1A1 provides. The significant speed and intrinsic firepower of the M1A1 are the *sine qua non* for its existence and make it very suitable for the first aspect. When combined with the future capability of the Advance Amphibious Assault Vehicle, a surface mobility force will have unmatched mobility to create tempo and momentum. The armor protection afforded by both systems will allow the maneuver force to bypass enemy units on its way to the objective, or to destroy them using a combination of organic and supporting arms. The speed of the M1A1 will allow it to rapidly reinforce success, or to be redirected to an area

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<sup>63</sup> Sustained Operations Ashore, IV-4.

<sup>64</sup> Sustained Operations Ashore, IV-7.

<sup>65</sup> Sustained Operations Ashore, IV-10.

<sup>66</sup> Headquarters, United States Marine Corps, *Ship to Objective Maneuver*, 25 July 1997, np, URL: < <http://www.concepts.quantico.usmc.mil/stom.htm> >, accessed 21 November 2001.

where its inherent capabilities could protect friendly forces. By utilizing the LCAC as a mobility enhancer, the M1A1 Tank can maneuver operationally from as far out to sea as the future AAV. In fact, the existing LCU can be utilized for the same effect, as long as launch times are allowed for. One of the most difficult aspects of Ship to Objective Maneuver will be the time phasing of different units from over the horizon to littoral penetration points (LPP). Although the LCU lacks the speed of the LCAC, it has more than double the capacity. If the situation allows, the LCU can remain a relevant lift asset. By launching the LCUs early and then allowing the AAV and LCACs to launch at some point thereafter, the entire force can arrive at the LPP at the same time, with significantly more combat power than could otherwise be attained. By utilizing the complimentary capabilities of both future and current platforms, future MAGTF commanders will have a unique capability that is unmatched in the world.

## CHAPTER 6

### RECOMMENDATIONS FOR THE FUTURE

The key to the future of armored warfare lies in disregarding what we expect a tank to be in order to focus on what we need the tank of the future to do.

Ralph Peters, *Fighting for the Future: Will America Triumph?*

#### **Cost is the Independent Variable**

The M1A1 remains a relevant and critical part of the Marine Corps' expeditionary force structure. It will remain so in the future simply because of affordability. If one assumes that the Marine Corps, as well as the rest of the services, will continue to have requirements that exceed the allocated budget, then cost becomes the independent variable. In other words, the number of requirements that can be met is dependent on the amount of funding the Marine Corps will receive in future budgets. No one would argue that having the same capability as the M1A1 in a vehicle without the same weight and logistics restrictions is not a commendable goal. Unfortunately, to develop and field such a vehicle may be problematic. To do so will require substantially more funding than the Marine Corps is likely to receive in the foreseeable future. The technology to attain such a goal will probably be within our reach in the next two decades, but the funding to leverage it may not. In the interim, it is important for the Marine Corps to continue to invest in fielded systems. Consistent and progressive M1A1 upgrades will be necessary to retain both current capabilities, as well as developing new ones. This is true of any vehicle currently in the Marine Corps inventory. The Light Armored Vehicle is currently undergoing a System Life Extension Program to provide an overhaul of the Marine Corps'



current fleet of vehicles.<sup>67</sup> The Amphibious Assault Vehicle is being upgraded and rebuilt with the Reliability, Availability, and Maintainability-Return to Standard Program. Both programs represent the kind of commitment the Marine Corps must continue to have to support its warfighters. The key will be in making the right kinds of investments with the limited amount of funding that is available.

## **Firepower**

The M1A1 Firepower Enhancements Program is currently funded through the Fiscal year Defense Plan. It will provide an improved thermal sight and Far Target Location Capability to the crew of the M1A1. In most combat simulations, the ability to detect the enemy first is the single greatest combat multiplier that can be invested in. By providing the M1A1 with an improved target acquisition capability, both lethality and survivability can be increased. Additionally, allowing gunners to see the target more clearly will reduce fratricide. It allows identification of friend or foe outside the effective range of main gun. The Far Target Location capability will improve the crew's situational awareness and enable dramatically more accurate supporting fires. Target coordinates within 50 meters can be provided to fire support agencies by utilizing a combination of Global Positioning System coordinates, laser rangefinder data and azimuth data from a North finding module. This level of accuracy will allow artillery to "Fire for Effect" immediately, rather than having to "Adjust Fire" on to target. The logistics burden to the MAGTF will be reduced through improved lethality and significant reductions in ammunition expenditures. It will also enable more effective Close Air Support and may

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<sup>67</sup> Ground Combat Element Campaign Plan 2001, 17.

ultimately allow the MAGTF commander to receive strategic precision fires by providing an accurate target location.

Another area where the Marine Corps has a need is the antipersonnel canister round currently in development by the Army. The Marine Corps should enter into a joint program with the Army and share the development costs. This approach would result in fielding this important capability sooner at a much-reduced cost. The Marine Corps should also continue to look at foreign sources for ammunition. For example, since the 120 mm main gun is a NATO standard, the Marine Corps could leverage any NATO country that develops a 120 mm capability for their own tanks. Avoiding the significant costs of developing ammunition is particularly attractive, because it enables the Marine Corps to field rapidly with significant savings.

## **Mobility**

Two areas where the Marine Corps can invest in mobility upgrades are in the track and engine. The Marine Corps is currently conducting limited testing of German and British track to determine if it will provide life cycle cost savings, as well as reduce weight. Tank track is extremely heavy and expensive, because of the significant amount of pressures it must bear. Significant savings can be realized if its life cycle can be extended, or replacement costs reduced. The Army also continues to invest in alternative track testing and development efforts, exploring venues to both reduce weight and increase the life of the track. Again, a joint program with the Army that allows costs to be shared would benefit both services and make any such program substantially more viable with the Secretary of Defense.

The second area that the Marine Corps should initiate a program in is the engine. Although the gas turbine that is currently being used is superb, it is not being built any more.

The last one procured was in 1992.<sup>68</sup> Because of this, the Army has initiated a “Repower” program to replace the current gas turbine with another gas turbine. The new engine is lighter, uses 30% less fuel, provides an increase of 25% in range, has 46% fewer parts, and promises to reduce operating costs by an amazing 76%. The Army expects to begin fielding sometime after 2003.<sup>69</sup> However, the investment cost will be significant and cannot be taken lightly. Prior to committing to another gas turbine, the Marine Corps should research possible diesel solutions as an alternative power plant for the future. Technology has allowed a significant reduction in the size of diesels with dramatically higher power output. Diesel power packs exist today with a volume of five square meters that can equal the power output of older eight-meter square engines.<sup>70</sup>

## **Protection**

Increases in protection should represent a cohesive approach that focuses on more than just avoiding penetration when hit. Technology may allow systems to assist in layering protection in the form of “don’t be seen, don’t be hit, and don’t be killed.” By using a holistic approach to protection upgrades, the inevitable increases in weight that are traditionally associated with increases in protection can be avoided.

Reducing the acoustic and thermal signature of the M1A1 should be one of the focuses of any survivability program. Reduction in the sound that the tank makes will assist in avoiding detection. Although the gas turbine that the M1A1 uses is already extremely quiet, further noise reduction can be accomplished. Additionally, track noise can be reduced, as well as the auxiliary

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<sup>68</sup> Abrams Tank Modernization Plan 2001, 19.

<sup>69</sup> Abrams Tank Modernization Plan 2001, 19.

<sup>70</sup> Ogorkiewicz, np.

power unit and onboard subsystems. Thermal emissivity can be reduced by simple measures such as special paints or treatments. Much like the discussion on tank ammunition, foreign sources may have already invested in these technologies. It may simply be a matter of testing what exists and modifying to fit the Marine Corps needs that is all that is required.

Laser Warning Receivers and Active protective Systems should also be looked at as a method of avoiding being hit once detected. Laser Warning Receivers provide the crew with an audio and visual cue that a potential ranging device is being directed at the tank and allows for appropriate countermeasures to be taken. Active Protective Systems work in a different manner. They sense the approach of an incoming munition and fire a counter munition to knock it down. The Russians have had a system fielded for years that works extremely well. Unfortunately, the system does not discriminate between an incoming missile and friendly troops on the ground. Such a system would never be appropriate for U.S. forces, but a modification to such a system might. There are other countries working on similar systems, and each is struggling to address the same problems. By leveraging the investments of others, the Marine Corps can get more “bang for its buck” and continue to upgrade the M1A1 at an affordable cost that the Marine Corps can bear under tight budget constraints.

## CHAPTER 7

### CONCLUSION

And the Lord was with Judah; and he drove out the inhabitants of the mountain; but could not drive out the inhabitants of the valley, because they had chariots of iron.

*Judges 1, Verse 19*

The Marine Corps is naval in character and has always struggled with the problem of weight and size with regard to its equipment. Given the space and lift restraints of amphibious ships, the M1A1 may seem to be an excessive luxury that the Marine Corps cannot afford to maintain. However, the Marine Corps has employed tanks in operations since their introduction on the battlefield during World War I. It has done so because it is an imperative that to move in the face of the enemy, and to project power, the three parameters of firepower, armor protection and mobility must be combined. The M1A1 delivers all of these to the MAGTF.

It is true that the M1A1, at 68 tons, is a heavy vehicle, demanding significant logistical support. However, it represents an optimization of the three parameters that allow success on the battlefield. It is the culmination of almost a century of main battle tank development. Its ability to function on the battlefield is unquestionable. The demands it places on the logistics of the MAGTF are manageable, and have been proven both in war and during numerous peacetime deployments. Furthermore, in dealing with the “chaos in the littorals” that *Operational Maneuver from the Sea* describes, the M1A1 Tank can save lives. Particularly in low intensity conflicts, enemy forces often have no way of dealing with the M1A1 Tank. It becomes, in effect, an asymmetrical threat to the enemy. Its significant firepower and protection can result in situations where only the enemy needs to die in combat. With the American public’s sensitivity

to casualties in “humanitarian intervention” conflicts, the M1A1 can dramatically reduce the probability of friendly casualties.

As a combat platform, it clearly fits into the Marine Corps philosophy of war, and as was discussed earlier, can make significant contributions to future concepts. It does so because it represents all-weather, day or night combat power. While it is true that integrated, combined arms fires are critical to the success of the MAGTF, it is also true that few commanders, past, present, or in the future will not want the responsiveness of the heavy, organic firepower that the M1A1 provides. It is notable that lighter, strategically mobile tank-like vehicles are almost never developed during a conflict. It is also notable that the Marine Corps has often found itself in need of an adequate tank when it has gone to war.

But by far the most eloquent argument in support of Marine Corps M1A1s is the fact that it already has them, and there are no other acceptable alternatives to replace them. Removing the M1A1 from the Marine Corps without replacing it with a similar capability will leave the ground combat element of the MAGTF devoid of any heavy, armor protected, direct fire capability. History is rife with examples of the critical need for such a capability in successful combat operations. The M1A1Tank will not be irrelevant to the Marine Corps until something else can provide the same or better capabilities. It is unlikely that any system will be capable of doing so in the near term. Eliminating the M1A1Tank from the Marine Corps in order to save money and reduce the logistics footprint without replacing the capability will also put the Marine Corps on a “slippery slope” to extinction. The very arguments used to justify eliminating the M1A1 from the Marine Corps can be used to eliminate virtually every part of the MAGTF. Fixed wing aviation can be more efficiently operated in the Air Force and Navy. The Army can provide the nation with the artillery, rotary wing aviation and infantry. The list can go on until the Marine

Corps ceases to exist. This is the very argument critics of the Marine Corps have used for years. The fact is that the Marine Corps is successful as a fighting force not because of the sum of its parts, but because of the synergy that results from the combination of its force structure and expeditionary culture.

As noted earlier, the Army already has many forces that can deploy rapidly without significant combat power. If the Marine Corps eliminates the firepower and mobility (combat power) of the M1A1 Tank, it becomes more like the Army forces that already exist, albeit with a naval tradition. The nation does not require another rapidly deployable, light force. It needs the full capabilities of the combined arms MAGTF.

If the funding becomes available and the technology necessary to develop a replacement matures to the point of being usable, then the Marine Corps should actively pursue a tank-like capability that reduces weight and the logistical burden relative to the M1A1. But until that time, the Marine Corps must continue to invest in upgrading and maintaining the capability that it already possesses. The M1A1 will remain a relevant and central element of the Marine Corps' ability to project power over the next two decades.

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