



# Marine Corps Equipment After Iraq

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### Executive Summary

The United States has understandably focused on the tremendous human costs of the war in Iraq, yet there are other costs that must be addressed as well. Earlier this year the Center for American Progress and the Lexington Institute compiled a report examining the impact of the war in Iraq on Army equipment. This report does the same for the Marine Corps, the other service that has borne the brunt of the occupation.

Over the past three years the Marine Corps has maintained 40 percent of its ground equipment, 50 percent of its communications equipment, and 20 percent of its aviation assets in Iraq. This equipment is used at as much as nine times its planned rate, abused by a harsh environment, and depleted due to losses in combat. To maintain acceptable readiness levels, the Marines have been taking equipment from non-deployed units and drawing down Maritime Prepositioned stocks, including equipment stored in Europe, thus limiting their ability to respond to contingencies outside of Iraq.

Resetting and recovering the force will be expensive. The cost of restoring the Marines' ground and aviation equipment to its pre-Iraq level, as of the summer of 2006, will require \$12 billion plus an additional \$5 billion for each year the Marines remain in Iraq.

Recovery will also not be easy. The Marine Corps, like the Army, must incorporate the lessons of Iraq into its future procurement plans while upgrading its forces. The Marines may prefer expeditionary operations to acting as an occupying force, but urban counter-insurgency and peacekeeping operations will more likely be the rule rather than the exception in the future.

***Near-term recommendations:*** In order to ensure that the Marines' equipment readiness fully recovers from operations in Iraq, six near-term steps are needed.

- Congress should fully fund the Marine Corps' request for \$6.8 billion reset funding in fiscal year 2007, and should provide at least \$5.3 billion for reset for each additional year the Marine Corps maintains a major presence in Iraq.
- Congress should provide additional resources to cover the procurement and depot maintenance items contained in the Marines' \$2.5 billion in unfunded requirements for FY 2007.<sup>1</sup>



- Once the deployed forces depart Iraq, Congress should continue funding reset for at least two years to assure full resolution of all war-related equipment problems.
- The Marines should cease deferring recapitalization of aging equipment and request a level of reset funding consistent with fully revitalizing the force for future challenges.
- The Department of Defense should conduct and submit to Congress a comprehensive review of new equipment needed for the active and reserve components of the Marine Corps to recover fully from deployments to Iraq and to meet future commitments at home and abroad.
- The Department of Defense and Congress should fund the reset program through the normal budget process and not through supplemental budgets, as has been the case since the beginning of operations in Iraq. The Congressional Research Service aptly notes that the requests in the supplemental budget may overlap with the baseline budget since both involve the procurement of new equipment. Furthermore, “since war funding is not subject to budget resolution constraints, it is in the interest of both the DOD and defense advocates in Congress to maximize the costs covered in war appropriations.” Circumventing the regular budget process makes “it difficult for Congress to gauge whether the amounts requested by DOD are too high, too low, or about right.”<sup>2</sup> For instance, four CH-46E Sea Knight helicopters have been destroyed due to combat operations and the Marines have requested funds to replace them with new MV-22s Ospreys. While it is appropriate for this to be considered war funding, the Marines were planning on purchasing new MV-22s anyway to replace the Vietnam era helicopter.

***Long-term recommendations.*** The war in Iraq has taught the Marine Corps invaluable lessons about which capacities it must bolster over the long term. In order to assure that the Marines can cope with the diverse challenges they will face in the years after U.S. forces depart Iraq, five long-term steps are essential.

- Unless the defense topline budget is changed, the Marines should receive an increase in their share of the Navy budget from 14 percent to 17 percent and their overall share of the defense budget should increase from 4 percent to 5 percent.
- The Marines should join the Army in producing and funding a comprehensive plan for the continuous enhancement of heavy armored vehicles, such as the Abrams main battle tank and Bradley infantry fighting vehicle. The Marines should consider purchasing Stryker Armored Vehicles in addition to the Light Armored Vehicle (LAV). The Marines should also continue funding the Medium Tactical Vehicle Replacement (MTVR) and the Logistics Vehicle Systems Replacement (LVSr) to complete the replacement of its Cold War medium and heavy truck fleet, while identifying funding requirements for long term sustainment of the High-Mobility Multipurpose Wheeled Vehicle (Humvee).



- The Marines should consider purchasing MH-60 Knight Hawk and H-92 Super Hawk helicopters to bridge the gap between the time the CH-46E Sea Knight and CH-53E Super Stallion helicopters wear out and the MV-22 Ospreys reach full operational status. This will also enable the Marines to hedge against the possibility that purchasing all of the planned 360 Ospreys will become unaffordable.
- Congress must fund Marine Corps procurement at a steady rate of \$3.0 billion per year (in constant FY 06 dollars).
- The Marines need a new Armored Personnel Carrier (APC) to replace the Amphibious Assault Vehicle (AAV), but it is not clear that the service can fill all of its future needs with the Expeditionary Fighting Vehicle (EFV) given the system's high cost. The Marines should seriously consider cutting back the number of EFVs that they plan to purchase from 1000 to between 600 and 700 vehicles. The Marines should instead consider purchasing a mix of EFVs and LAV II vehicles or other similar APCs. While these vehicles are not amphibious, the likelihood of the Marines storming heavily fortified beaches on the scale of WWII remains remote. Instead, the Marines should maintain a sizeable portion of the legacy AAV fleet as a strategic reserve in case there is a need to undertake a substantial amphibious operation.



## **Introduction**

The United States military has maintained a force of 130,000 to 150,000 troops in Iraq since the invasion in March 2003. The Marine Corps contributes approximately 25,000 of this total in a Marine Air Ground Task Force, most of them in the dangerous Al-Anbar province.

The Bush administration failed to anticipate that the Marines would play such a large role in the occupation of Iraq. The Marine Corps initially sent home its 30,000 Marines who were part of the 150,000 ground forces that invaded Iraq in the summer of 2003 to prepare themselves for the next expedition.

It soon became clear that the Army was not large enough to maintain the occupation by itself even after mobilizing a large number of reserve components. The Marines were needed and sent back to Iraq in the fall of 2003.

Since the invasion of Iraq, more than 2,600 American servicemen and women have lost their lives, including more than 700 Marines. Nearly 20,000 have been wounded, almost all of them soldiers and Marines. These Marines, many of whom have served multiple tours in Iraq, continue to battle bravely against the growing insurgency and the rapidly developing civil war.

The United States has understandably focused on the tremendous human cost of the war in Iraq. Yet other costs must also be addressed. In an earlier report, we examined the problems that the war in Iraq has caused for Army equipment. This report will do the same for the Marine Corps.

This report will analyze:

- The impact of the war in Iraq on the readiness and reliability of Marine Corps equipment;
- The lessons learned from the Iraq operation about equipment deficiencies in the Marine's active and reserve forces;
- The near-term steps required to repair or modify equipment so that the Marine Corps can support continued operations in Iraq and other commitments such as the counter-insurgency campaign in Afghanistan or a campaign on the Korean peninsula;
- The long-term steps required to rebuild or replace aging Marine Corps equipment so that it can participate in the fast-paced, networked military operations of the post-Iraq period.



The following evidence and recommendations reflect three basic facts about today's Marines and their fight against international terrorist networks:

- The nature of warfare is changing in ways that demand new tools, new tactics, and new organizations. It is not enough to restore Marine Corps equipment to its former state of readiness. The service must assimilate the benefits of new technology and new concepts of operation.
- Iraq has proven that the Marine Corps Reserve is a full partner with the active component in the “total force.” As such, it must have the tools to train and deploy quickly.
- The Marines will continue to be called upon to respond rapidly to situations around the globe, from combat missions in Iraq and Afghanistan, to peacekeeping in Haiti and Liberia, to disaster response in the Indian Ocean and Pakistan. The entire Marine Corps must be in a state of constant readiness. Degrading the Marines' equipment stocks, making them unable to train with the equipment that will be used in combat, harms the readiness of the Corps and will inhibit their ability, and consequently the ability of the United States, to respond effectively to situations around the world.



## The Impact of Iraq

The United States Marine Corps has maintained an occupation force of between 25,000 to 30,000 Marines in and around Iraq since the fall of 2003. This force is equivalent to a Marine expeditionary force when support elements are included. Because planners did not anticipate how lengthy and intense the counter-insurgency campaign would become, the Marines have had to draw personnel and equipment from both their active and reserve components, and they must continually adjust their approach to manning, equipping, and sustaining these forces.

Only about 15 percent of the total Marine Corps personnel are deployed to Iraq at any one time, but over the past three years the Corps has deployed about 40 percent of its ground equipment, 50 percent of its communications equipment, and 20 percent of its aircraft to Iraq.<sup>3</sup> Yet, according to a 2005 report by the Marine Corps Inspector General, the Marines in Iraq “don’t have enough weapons, communication gear, or properly outfitted vehicles.”<sup>4</sup>

Nevertheless, Marine Corps equipment in Iraq has generally performed well. The Corps sustains a high state of readiness in the theater of operations despite heavy use, a harsh environment, and frequent attacks.

This impressive performance has been achieved at a price. Like the strain on its personnel, the Marines’ inventory of equipment exhibits increasing signs of wear and tear. This stress is already eroding the readiness of units outside Iraq, and could eventually impede operations within Iraq. The impact on Marine Corps equipment is particularly apparent in four areas:

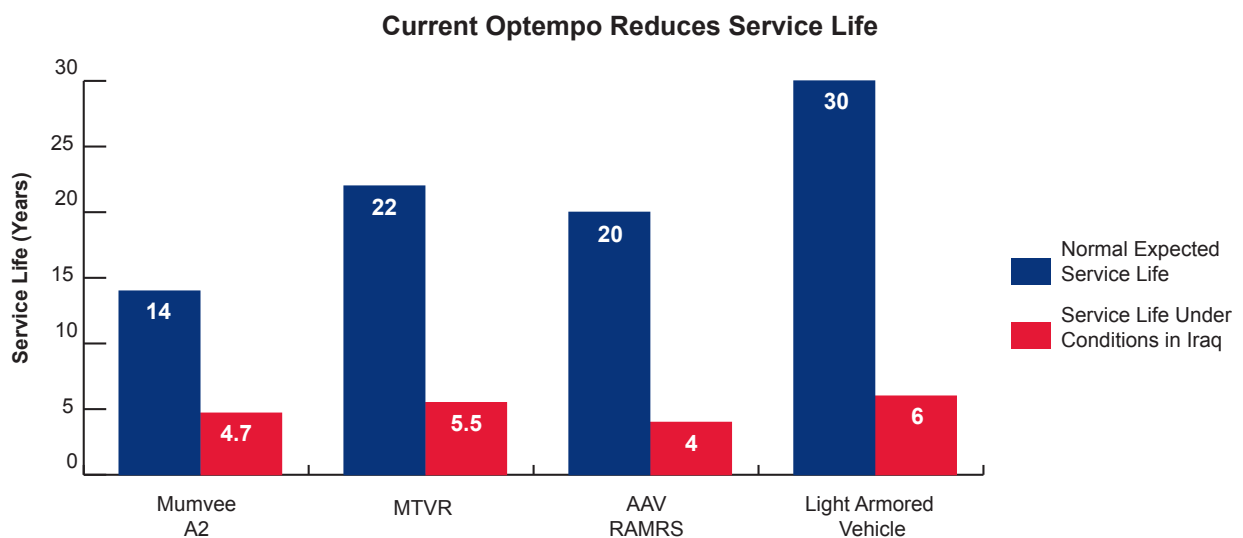
- High utilization rates of about four to nine times their planned usage and harsh operating conditions have greatly accelerated the aging of equipment;<sup>5</sup>
- Significant amounts of equipment are being destroyed through combat losses and the wear associated with constant use. About 3,500 principal end items of Marine Corps ground equipment have been destroyed;<sup>6</sup>
- Equipment readiness in deployed units has shown a gradual erosion as the service struggles to keep up with maintenance and replacement needs;
- Readiness in non-deployed units has plummeted as equipment is transferred to deploying units and left behind in Iraq after Marine Corps units depart.

***Equipment stress.*** The preferred measure of equipment usage is operational tempo, or “optempo.” Optempo is calculated as a multiple of the equipment use prevailing in



peacetime. Not surprisingly, operations in Iraq have led to high optempos for much of the Corps' equipment, which has resulted in accelerated aging of equipment.

Helicopter optempos in Iraq range from two to three times the normal rate, depending on the type of helicopter.<sup>7</sup> The M1A1 Abrams tank has an optempo of more than four times its usual rate.<sup>8</sup> The High Mobility Multipurpose Wheeled Vehicle, a light truck known as the Humvee, experiences a similar rate of use. Humvees are driven an average of 480 miles a month, five times their normal rate of use, 70 percent of which is off-road.<sup>9</sup> Humvees have an estimated useful life of 14 years, but they need to be replaced after only four years of operating in Iraq's harsh desert environment.<sup>10</sup>



*Source: Gen. Michael Hagee, Commandant USMC, "Testimony Before the House Armed Services Committee." June 27, 2006*

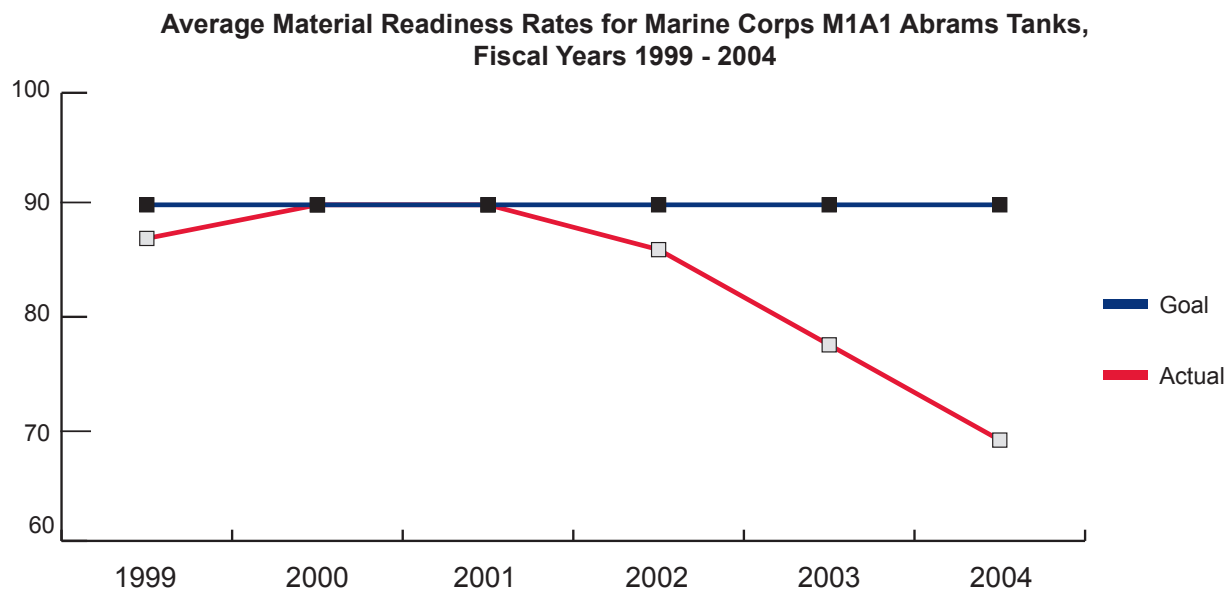
Combat systems quickly become unusable without frequent maintenance and repair at these elevated rates of utilization.<sup>11</sup> As Lt. Gen. John Sattler, commander of the 1st Marine Expeditionary Force observed, "If we bought something (to last) for 21 years, I'll be honest; I think we'll get three years out of it."<sup>12</sup>

Mechanical and electronic systems, such as those in the Abrams tank, are exposed to fine sand, extreme heat, and other conditions rarely seen in peacetime. Rather than operating on the soft ground of open country for which they were designed, M1A1s in Iraq often travel on paved roads that damage treads and other moving parts. They are also subjected to attacks by insurgents employing rocket-propelled grenades and improvised explosive devices (IEDs). The Abrams is better equipped than most vehicles to withstand such stresses, but it still experiences significant wear and tear. The Marines' fleet of about 400 M1A1 tanks experiences rates of use similar to the Army's fleet in Iraq. In a normal year an M1A1 drives about 800 miles. Those deployed in Iraq cover about 5,000 miles per year, giving the Abrams an optempo of four to six times the usual rate.<sup>13</sup>





Marine aviation's aging fleet of helicopters and fixed wing tactical fighters is experiencing the same harsh conditions and high optempo as the ground forces. Desert sand takes a heavy toll on rotary wing aircraft, which now deteriorate at four times the normal rate due to extra wear on the rotor blades and delicate turbine engines. For example, a Cobra helicopter sent to a depot in Corpus Christi after a tour in Iraq was found to have 75 pounds of sand in its tail, which normally weighs only 150 pounds. The Marine Corps has created an aircraft depot in theater and has made modifications to its helicopters in an effort to mitigate the increasing equipment strain. The Marines also utilize the Army Materiel Command Depot in Kuwait, but the challenge of maintaining Marine aviation readiness will only increase.



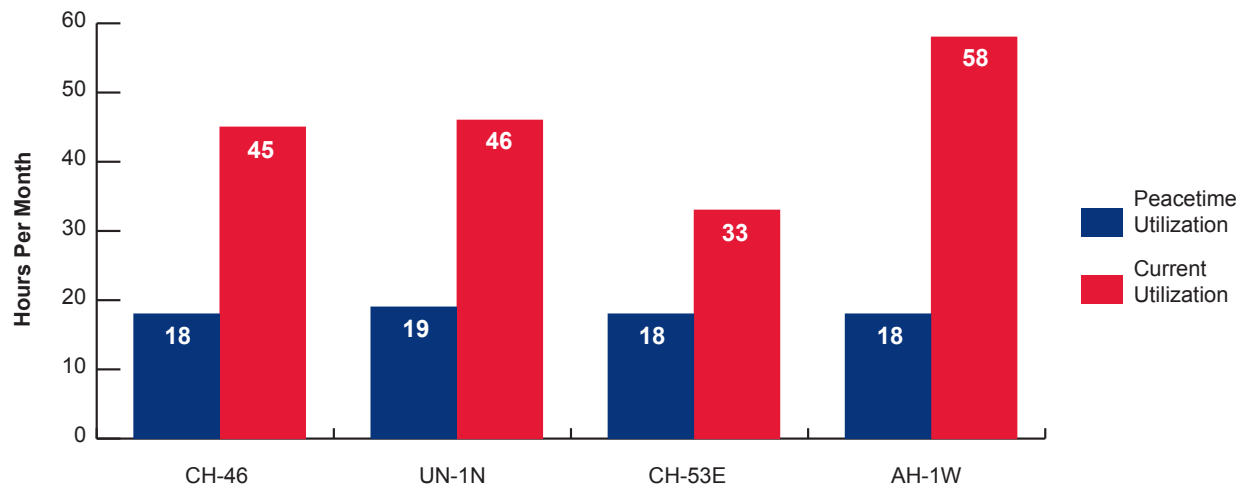
*Source: GAO, Military Readiness: DoD Needs to Identify and Address Gaps and Potential Risks in Program Strategies and Funding Priorities for Selected Equipment, October 2005*

Compounding the problem, the limited quantities of equipment require most of the equipment to remain in Iraq rather than rotating home with the troops. The Army has been forced to do the same, but the Corps has additional problems because it has less equipment than the Army. The Marines can rarely remove equipment from combat for out of theater depot maintenance, which is much more effective at restoring equipment to its original condition.<sup>14</sup> Delaying depot repairs while continuing to operate at high rates increases equipment damage and results in increasing amounts of equipment becoming “washed out” or used beyond repair. The Marines therefore defer necessary depot maintenance and wear out equipment to the point that it must be replaced with brand new equipment.<sup>15</sup> This ultimately leads to higher reset and procurement costs to repair or replace equipment than previously estimated.

The cumulative loss over time from combat damage and heavy usage is significant. More than 5,500 major pieces of Marine Corps equipment have either been destroyed or degraded to the point that they must be rebuilt and replaced.<sup>16</sup>



### Aircraft Utilization Rates



Source: Gen. Michael Hagee, Commandant USMC, "Testimony Before the House Armed Services Committee." June 27, 2006

**Readiness trends for active-duty.** Despite all the factors that degrade systems deployed in Iraq, both the Marines' active and reserve forces have sustained high rates of readiness for most categories of equipment deployed to Iraq. This has been achieved at a significant cost to the readiness rates of units outside of Iraq.

The service's preferred metric for readiness is the mission-capable rate, which measures the portion of a force prepared to participate in operations on short notice. According to the Deputy Commandant for Plans, Programs, and Operations, the Marines are sustaining mission-capable rates above 90 percent for their ground equipment.<sup>17</sup> The Government Accountability Office (GAO) notes consistently high mission-capable rates for newer medium trucks and Humvee light trucks. Unfortunately, the same is not true for Marine Corps aviation, where mission-capable rates have fallen to 74 percent for units in garrison and 82 percent for deployed units because of exceedingly high rates of use, particularly in the Marine Corps helicopter fleet.<sup>18</sup>

The GAO notes a gradual slippage since the war began in many categories of equipment as increased maintenance needs, troop rotations, and efforts to add armor to wheeled vehicles—which increases the weight of the vehicle, putting more strain on the engine, frames, axles, and suspension systems—have complicated the task of sustaining a high state of readiness. This is true even in the case of systems with relatively high mission-capable rates, as almost all systems face readiness challenges due to shortages of spare parts and maintenance technicians. Systems such as the CH-46 and CH-53 cargo helicopters exhibit consistently lower readiness rates due to age and heavy usage. The CH-46E Sea Knight helicopter's mission-capable rate has declined to 83 percent. The GAO classified the condition of the Marine Corps M1A1 Abrams fleet as "red," since it has repeatedly failed to meet its stated readiness goal of 90 percent.<sup>19</sup> Furthermore, the



Humvee, according to a 2005 Marine Corps Inspector General report, could expect to see its readiness rates decline to below 50 percent in the next few years unless necessary action is taken.<sup>20</sup>

***Reserve readiness.*** Equipment readiness outside the war zone is much worse, especially among the reserves. The overall readiness rates of ground and aviation equipment outside of Iraq is about 10 percent less than in Iraq.<sup>21</sup> For the past three years, the Corps has been cannibalizing the vehicles and weapons used in training to keep its troops in Iraq outfitted. When a helicopter like the CH-46 is destroyed, the Corps cannot buy another because the production line is closed. This means that a non-deployed unit must give up a helicopter, and the first units affected are the reserves. According to the National Guard and Reserve Equipment Report for FY 2007, more than 1,800 major Marine Corps equipment items, valued at \$94.3 million, have been destroyed, and an additional 2,300 require depot maintenance.<sup>22</sup>

This “cross-leveling,” or redistribution of equipment to units about to deploy, degrades the ability of units at home to train and prepare for their future deployments. This is especially critical since 97 percent of all Marine Corps reserve units have been activated since September 11, 2001.<sup>23</sup>

To maintain the required readiness levels for its forces, the Marine Corps has been drawing from the stocks of equipment placed in its Maritime Pre-positioning Force. The equipment readiness of the prepositioned squadrons—which consist of 16 ships in three squadrons located in Guam, Diego Garcia, and the Mediterranean—have been significantly degraded. Two of the three squadrons have seen a 70 percent reduction in their capacity, and Congress must fully fund the Marines’ reset every fiscal year in order to restore the squadrons’ capacity by 2009.<sup>24</sup> Consequently, the Maritime Prepositioning Force does not have enough equipment and supplies to fulfill its mission of sustaining a Marine expeditionary brigade (about 15,000 Marines) for up to 30 days.

Additionally, the Marine Corps Pre-positioning Program, located in Norway, has been significantly degraded to support operations in Iraq. Pre-positioned stocks of equipment in Europe have been depleted by 40 percent.<sup>25</sup> The depletion of these stocks means that if the Marines are called on to respond to situations outside of Iraq, their response readiness and capability will be in doubt.<sup>26</sup>

## **Lessons of Iraq**

The Iraq war has presented military planners with a series of unpleasant surprises. Although the initial, conventional phase of operations unfolded largely as planned, the insurgency that followed has been lasting and demanding – so much so that the number of U.S. casualties in 2005 was nearly identical to the number in 2004, and it shows



no sign of declining in 2006. It is now clear that some of the key assumptions driving the original invasion were flawed and that subsequent mistakes enabled a tenacious resistance to become firmly rooted. The most egregious errors were made by senior civilians in the Bush administration, and the Corps, like the Army, has been forced to cope with the consequences of those errors.

The unexpected use of the Corps as an occupying force in places like the dangerous Al-Anbar province meant that the Marines were in many ways caught off guard and often lacked necessary quantities of equipment, such as body armor. The use of Marines as an occupying force also raises questions concerning future procurement. While the Corps must maintain its expeditionary and amphibious capabilities, it must also be prepared to serve as a peacekeeping and occupying force.

The service has worked hard to learn from both its successes and failures in Iraq. It is too early to definitively assess the significance of the Iraq campaign, but several lessons concerning Marine Corps equipment are already apparent.

***Force protection.*** If the Marines continue participating in stability operations, such as the Iraq occupation and counter-insurgency campaign, they will need to invest more in force protection. The Marines may prefer expeditionary operations to acting as an occupying force, but urban counter-insurgency and peacekeeping are more likely to be the rule rather than the exception in the future. Iraq has shown extremists around the world the effectiveness of guerrilla tactics against the U.S. military. The United States' inability to fully secure the cities and countryside, placing U.S. ground forces in continuous danger whenever they leave their guarded compounds, has been a central feature of the Iraq conflict.

Much of the current inventory of Marine Corps equipment was developed for fighting conventional adversaries on clearly demarcated battlefields. Counterinsurgency campaigns seldom unfold under such circumstances, and Iraq is no exception. The Marines have to assume that there will be a persistent need in the future to equip all personnel with body armor, reinforce the structures of all vehicles, and monitor all routes for improvised explosive devices. Modernization plans must reflect an increased awareness of new requirements for force protection.

***Situational awareness.*** Iraq has also shown that Marines, like soldiers, often lack an adequate understanding of what is going on around them. In Iraq, this lack of situational awareness is traceable mainly to the Corps' dearth of foreign language skills and sufficient human intelligence resources.

The Pentagon has belatedly begun to recognize the importance of language and cultural training. The Department of Defense has increased the monthly foreign language proficiency bonus from \$300 to \$1,000 for selected languages.<sup>27</sup> The military has also set



up a five-day course for troops deploying to Iraq. The House version of the 2007 defense authorization bill requires an assessment of the service academies' language and cultural training. This assessment is intended to serve as the basis for further action.<sup>28</sup>

The Marine Corps itself has also made some progress. Lt. Gen Mattis, Commander of the Marine Corps Combat Development Command, wants to have all Marine Corps officers specialize in a particular region of the world.<sup>29</sup> The Corps established the Center for Advanced Cultural Learning at Quantico in May 2005 and the Marines' Command and Staff College has added foreign language courses.

No amount of new technology can make up for the fact that the vast majority of Marines do not speak Arabic and do not have sufficient reliable local sources. However, there are some technologies that could enhance situational awareness beyond these fundamentals. The after action report of the Army's Third Infantry Division stressed that divisions and brigades need their own unmanned aerial vehicles for collecting imagery and targeting intelligence.

The Marine Corps 1<sup>st</sup> Division after action report praised a new battlefield network called Blue Force Tracker that relies on satellite communications and information fusion to keep track of all friendly and hostile forces in an area of operations.<sup>30</sup> Systems such as these give individual warfighting units unprecedented awareness and operational options that do not depend on action from higher echelons. This kind of flexibility will prove increasingly important in the fluid warfighting environments of the future and should be employed by the entire Marine Corps.

***Tactical communications.*** The variability of communications systems in Iraq highlights the need for an over-haul. Marines rarely received sufficient supplies of a single type of communication system, and they were often overwhelmed by the different types of systems they were forced to operate. The Marines frequently employed multiple types of systems to communicate with UAVs, SEAL teams, Army units, and even with other Marines. As a Marine Field Liaison report noted, "There were too many different devices that provided redundant capabilities."<sup>31</sup> Line-of-sight communications systems – Mobile Subscriber Equipment, Enhanced Position Location Reporting System, Single Channel Ground, and Airborne Radio System – are so antiquated that they pose a danger to effective military operations. These line-of-sight systems proved unreliable, especially with units that were constantly on the move over various types of terrain. This is no surprise; Army planners have been warned for years by opposition force commanders at the National Training Center that existing links are easy to destroy or degrade.<sup>32</sup> The development of the Joint Tactical Radio System, which is a transformational DoD-wide program that will create an all-service family of radios, will greatly streamline the various communications systems.

Experiences in Iraq and Afghanistan underscore the urgent need to shift to satellite-based communications that can circumvent surface obstacles while maintaining



connectivity with troops on the move.<sup>33</sup> The Iridium satellite phones proved highly reliable.<sup>34</sup> Blue Force Tracker also represents a good start on such communications. The Marine Corps deployed Blue Force Tracker along with the Mounted Digital Automated Communications Terminal (MDACT) program during the invasion, but these different systems could not talk to each other, and the MDACT was dependent on line-of-sight systems, thereby proving less reliable. The Marine Corps 1<sup>st</sup> Division after action report recommended eliminating the MDACT system and employing the Blue Force Tracker – a step that should be completed as soon as possible.<sup>35</sup> The Marines must also move expeditiously to provide all units with wireless broadband links that assure communications on the move regardless of weather or terrain.

***Information warfare.*** The signal environment in Iraq has shown that the Marines, like the Army, need to upgrade their capacity for intercepting, analyzing, and jamming electronic signals. As the after-action report of the Army’s 3<sup>rd</sup> Infantry Division noted, “The signal environment in current and future battlefields runs the gamut from tactical FM radios, to [high frequency] radios, to mobile secure cell phones, to fiber optics.”<sup>36</sup> These signals facilitate every facet of enemy operations from the sharing of information to the command of forces and the remote detonation of hidden explosives.

The Marines need an agile, precise system that can assist combat units in dissecting the local electromagnetic environment and selectively jamming threat signals. The need for better signal intelligence and countermeasures is not confined to periods of intense warfighting. The Army currently monitors more than 80,000 frequencies in the Baghdad area and has determined that certain types of threats generate specific electromagnetic profiles. Deficiencies in software code for some of the service’s latest intelligence tools have prevented quick tracking and integration of these diverse signals. Operational units are writing their own software to get around these defects, but the services need to develop tools that do not impose unnecessary constraints on the ability of soldiers and Marines to monitor and manipulate enemy transmissions.

***Heavy armor.*** Iraq has demonstrated that heavy armor will continue to play a critical role in military campaigns. Tanks and armored personnel carriers have been out of favor with the advocates of “military transformation” for so long that their value and versatility in Iraq has come as something of a revelation. Not only have they provided critical capabilities in waging urban battles, but they have proven surprisingly relevant to the conduct of counter-insurgency operations. As one Marine Corps infantry officer in Iraq pointed out, “everybody wanted tanks.”<sup>37</sup> The heavy armor possessed by tanks compensated for limited situational awareness, because tanks are able to absorb enemy fire without being disabled, which exposes the enemy’s position and allows supporting forces to take action.<sup>38</sup>

The Marines have used their Amphibious Assault Vehicle (AAV)—built to assault fortified beaches and provide armored troop transport and fire support—as an armored



personnel carrier. The AAV holds about 20 Marines, which is more than double the Army's Bradley, but the Bradley possesses stronger armor and more firepower.<sup>39</sup> The Marines plan to begin replacing the AAV with the Expeditionary Fighting Vehicle (EFV), which has many advantages over the aging AAV. It is significantly faster on the water, slightly faster on land, and has better armor and firepower than the AAV. On land, the EFV is also larger, more powerful, and has better communications than other armored personnel carriers, including the Army's Bradley. It only lacks increased armor protection, which the Marines have willingly sacrificed for greater mobility. Even though the cost of the EFV has jumped to more than \$12 million per vehicle, which has forced the Marines to consider scaling back the number they would like to buy, the Corps still hopes to purchase more than 1000 EFVs.<sup>40</sup>

The Light Armored Vehicle (LAV) has also been used extensively by the Marines in Iraq. The LAV's mobility and durability has made it effective in the sparsely populated Al-Anbar province. Yet, because the LAV has averaged 98 hours of use and 1238 miles per month, a 2005 Marine Corps Inspector General report predicts that its readiness rate could plummet to 30 percent. The LAV has proven its effectiveness, but it has also been vulnerable to IEDs and enemy fire. The Marines are therefore in the process of implementing a "service-life extension" program, which will upgrade the electronics and control panels.<sup>41</sup> The Marines are also fitting their 700 LAVs with "survivability" enhancements, which consist of improved armor and a fire extinguishing system that can better protect them against IEDs and RPGs.<sup>42</sup>

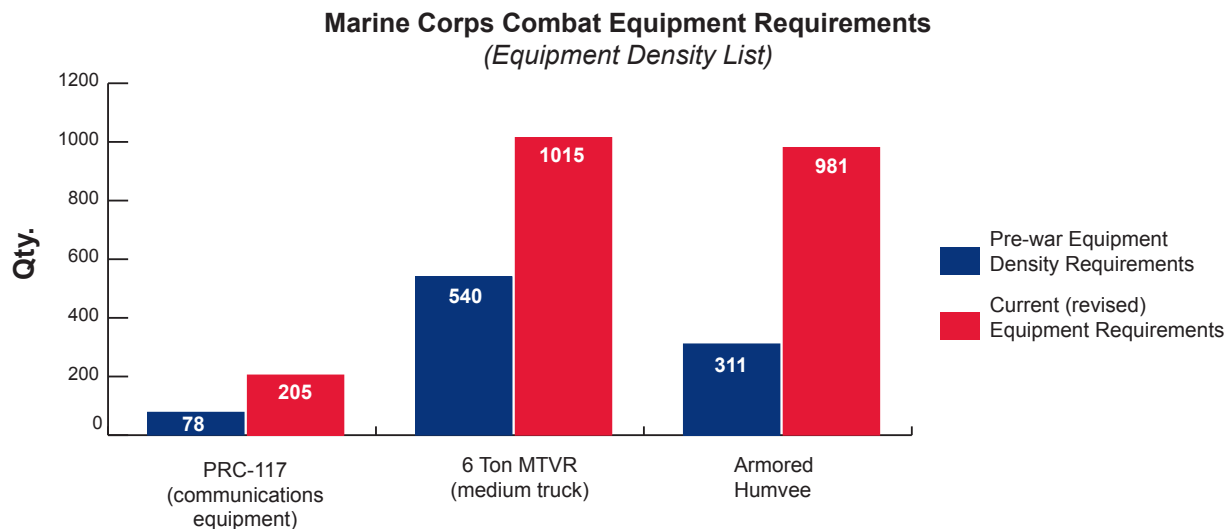
Light Armored Vehicles like the LAV and the Army's Stryker have proven important in Iraq. The Stryker departs from a long tradition in the Army's armor community by using wheels rather than tracks. Although more lightly armored than an Abrams tank, the Stryker has survived hundreds of hits by rocket-propelled grenades while giving soldiers on patrol in dangerous areas greater flexibility.<sup>43</sup> The unexpected frequency and lethality of insurgent attacks has led the Army to rethink its future plans for armor, placing greater emphasis on the Stryker while increasing modernization funds for the Abrams, Bradley, and other legacy armored systems. With necessary connectivity and sensor upgrades, these vehicles are now expected to remain in the Army's inventory through the middle of the century.<sup>44</sup> In making their long-range plans, the Marines should consider making the investments necessary to maintain these types of systems as well.

***Reserve forces.*** Iraq has proven that the longstanding practice of under-equipping the reserve component in order to outfit the active force with the latest technology no longer makes sense. Using a tiered resourcing strategy, the Marines have traditionally provided first-deploying units with the best and most abundant equipment, while the Marine Reserve receives older equipment in lesser amounts. This was a reasonable approach for a fiscally constrained organization concerned mainly with waging conventional warfare in far-away places. However, threats today are more likely to be unconventional ("asymmetric") than conventional, and the length of wars may be longer and less intense.



In such circumstances, the Reserve needs to be better equipped, even if this means using some of the active-duty's under-utilized equipment such as air defense missiles or artillery.

**Equipment quantity.** A final lesson of Iraq is that the Marines must be prepared to act as both an expeditionary force and an occupying force. Learning from their experience of occupying the Al-Anbar province, the Marine Corps has revised its “Equipment Density List,” which iterates the equipment needed for deployed units. The Corps has determined that it needs access to significantly more equipment, including more than triple the number of armored Humvees, almost double the number of Medium Tactical Vehicle Replacement (MTVR) trucks, and more than double the number of PRC-117 communications systems currently deployed to Iraq.<sup>45</sup>



Source: Gen. Michael Hagee, Commandant USMC, “Testimony Before the House Armed Services Committee.” June 27, 2006

Many other lessons from Iraq should affect future equipment requirements, from the types of munitions most useful in modern warfare, to the challenge of maintaining fragile electronic equipment in harsh operating environments. All lead to a clear conclusion: the Marines will require elevated levels of funding for years after they leave Iraq. The additional money will be needed to reset worn-out equipment and implement the lessons learned from the campaign. The Marines often complain about not getting a share of the defense budget – a debatable position when accounting for the amounts of money other services spend on supporting the Marines. The simple truth today is that the Marines have carried a significant share of the burden in Iraq and thereby deserve privileged treatment in future defense budgets.

**Reset or recovery process.** What the Marines often term “recovery” and the Army calls “reset,” describes a process of restoring or replacing equipment that was damaged or destroyed as a result of combat operations. This covers a range of actions, some of which





are relatively simple and cheap, and others which are complex and costly. The actions required depend on the condition of a particular item and the Marines Corps' plans for using that item in the future. Typical maintenance actions on a Humvee in the field may only cost a few hundred dollars, but repairing a damaged Humvee in a military depot may cost a few thousand dollars.

Restoring or replacing the equipment of deployed Marine units is the largest category of systems subject to the reset process, but it is by no means the only one. In addition to the thousands of items that returning troops bring back to the United States with them, the Marines must also reset so-called "stay-behind equipment" such as up-armored vehicles that were left in Iraq for use by follow-on forces, pre-positioned equipment drawn from stores maintained in the Pacific and Europe, and equipment losses resulting from combat or extreme wear. Current reset practices are designed to keep up with the restoration or replacement of equipment carried by deploying units as they rotate out of Iraq, but that approach does not work with stay-behind or pre-positioned items, which can only be fully restored when hostilities end.

All reset actions share the aim of returning equipment to a high state of readiness to make them available for use in military operations on short notice. The Congressional Budget Office identifies five levels of reset activity defined by their complexity and cost:<sup>46</sup>

- Sustainment, meaning routine maintenance such as oil changes and minor parts replacement, which is typically accomplished in the field by the unit operating the equipment;
- Restoration to standard in theater, meaning repairs that require specialized skills but can be accomplished within the theater of operations, like the Army Materiel Command Depot in Kuwait, which is used by both the Army and the Marines;
- Restoration to standard in depot, meaning the most complex repairs and overhauls, which must be carried out in a dedicated repair center (usually in the U.S.);
- Recapitalization, meaning a complete rebuilding of equipment intended to return it to a like new state, which is accomplished either at a government depot or in a contractor facility;
- Replacement, meaning the production of new systems to take the place of destroyed equipment, an activity usually performed at private-sector industrial sites.

Major equipment items will eventually have to pass through every one of these stages if they are to remain in a high state of readiness. Combined with initial development and manufacture, the various stages of sustainment, restoration, recapitalization, and



replacement comprise what is known as the “product life-cycle” of a military system. In peacetime, this cycle may extend over several decades, but the stresses of war accelerate the process so that each stage of support is compressed and intensified. Within those categories, there are many subsystems and components that will require individual attention. The electronic equipment carried on vehicles, for example, is usually more fragile than the mechanical systems and will require very different remedial treatment than engines or transmissions. Delaying repair or recapitalization once equipment has reached a specified level of wear may result in premature loss to the force because the less demanding stages of support cannot address fundamental problems.

### **Near-term Needs**

In order to sustain the current pace of military operations in Iraq without leaving the nation vulnerable to aggression in other locations (including the homeland), the Department of Defense must continuously repair, rebuild, and replace equipment worn out or destroyed by the war effort. Up through the FY 2007 budget, funding for this effort has been provided outside the regular defense budget in the form of emergency supplemental appropriations. Since the Marine Corps is carrying a large amount of the burden of the campaign, it should receive a significant portion of the supplemental funding.

***Funding reset.*** In FY 2006, the Marines received their first supplemental funding, which amounted to \$1.6 billion. Despite the fact that the Marines had lost 3500 pieces of ground equipment and 27 helicopters prior to 2006, this was their first reset funding, while the Army meanwhile has received about \$20 billion in reset funds in the supplementals.<sup>47</sup>

The Marine Corps estimated that as of October 1, 2005, it would cost \$11.7 billion to reset the force to its pre-invasion level. The Marines received an additional \$5.1 billion for reset when the total 2006 supplemental was passed. This was \$1.6 billion less than the Marine Corps requested. In early August 2006, the Senate passed an amendment to the FY 2007 Defense Authorization bill that will allocate an additional \$5.3 billion for the Marine Corps in the supplemental bridge fund. This will help ease the strain on the Marine Corps until the total 2007 supplemental is enacted. Even with the \$5.1 billion allocated in the FY 2006 supplemental and the \$5.3 billion in the bridge fund, the Marine Corps will need an additional \$6.8 billion in FY 2007 to reset its equipment and an additional \$5.3 billion each year the war continues. The Marine Corps contends it will also need supplemental appropriations for at least two years after such a cessation to fully accomplish its reset goals.

The Marine Corps remains concerned about maintaining funding for equipment modernization. According to a study by the Center for Naval Analysis and the Marine



Corps Systems Command, the Marine Corps procurement budget for ground equipment is already under-funded by 22 percent, or about \$1 billion. The accelerated operating tempo for equipment has decreased the planned service life of the current inventory of ground equipment and will require an additional \$920 million dollars per year to sustain the current inventory at the accelerated operating tempo. To continue funding the modernization of Marine Corps ground equipment, the study claims that an additional \$330 million per year is needed to support a limited modernization, while a further \$1.7 billion year is required to fund major modernization that would include funding for the EFV and the Marine Expeditionary Family of Fighting Vehicles. This will mean an increase of about \$2 billion a year to the Marine budget for procuring ground equipment.

***Accumulating problems.*** Despite maintaining comparatively high rates of readiness in the war zone, the Marines, like the Army, are experiencing an increasing backlog of equipment deficiencies that will require longer-term solutions. First, much of the equipment sent to Iraq was already relatively old, and heavy use will undoubtedly accelerate its removal from service. Second, the high cost of recapitalization – restoring equipment to zero-hours/zero-miles status – has led the service in many cases to substitute simpler repair and restoration measures rather than rebuilding systems, which will eventually have negative consequences for the readiness of the force. Third, non-deploying reserve units have been stripped of much of their equipment, a large portion of which will never return due to wear in the war zone. Finally, the Marines’ practice of rebuilding helicopters and ground vehicles rather than buying new ones has reduced the flow of used systems into the reserves, which means the service has smaller, older inventories of equipment on standby status for national emergencies.

***Near-term recommendations.*** In order to assure that Marine Corps equipment readiness does not decline further as a result of the protracted military campaign in Iraq, five near-term steps are necessary.

- Congress should fully fund the Marine Corps’ request for \$6.8 billion reset funding in fiscal year 2007, and should provide at least \$5.3 billion for reset for each additional year the Marine Corps maintains a major presence in Iraq.
- Congress should provide additional resources to cover the procurement and depot maintenance items contained in the Marines’ \$2.5 billion in unfunded requirements for FY 2007.<sup>48</sup>
- Once the deployed forces depart Iraq, Congress should continue funding reset for at least two years to assure full resolution of all war-related equipment problems.
- The Marines should cease deferring recapitalization of aging equipment and request a level of reset funding consistent with fully revitalizing the force for future challenges.



- The Department of Defense should conduct and submit to Congress a comprehensive review of new equipment needed for the Marine Corps to recover fully from Iraq deployments and the reserve component to meet future commitments at home and abroad.
- The Department of Defense and Congress should fund the reset program through the normal budget process and not through supplemental budgets, as has been the case since the beginning of operations in Iraq. The Congressional Research Service aptly notes that the requests in the supplemental budget may overlap with the baseline budget since both involve the procurement of new equipment. Furthermore, “since war funding is not subject to budget resolution constraints, it is in the interest of both the DOD and defense advocates in Congress to maximize the costs covered in war appropriations.” Circumventing the regular budget process makes “it difficult for Congress to gauge whether the amounts requested by DOD are too high, too low, or about right.”<sup>49</sup> For instance, four CH-46E Sea Knight helicopters have been destroyed due to combat operations and the Marines have requested funds to replace them with new MV-22s Ospreys. While it is appropriate for this to be considered war funding, the Marines were planning on purchasing new MV-22s anyway to replace the Vietnam era helicopter.

### **Long-term Plans**

To understand the long-term steps that must be taken to make the Marine Corps whole, it is important to be aware of the unique role that the Marine Corps occupies in the Department of Defense.

The Corps is the smallest of the four armed services in terms of both size and resources. The total Marine Corps, active and reserves, consists of about 200,000 Marines organized into three active divisions, one reserve division, and three active and one reserve air wing. The total Army—Active, Reserve, and National Guard—numbers about 1 million and is organized into ten active and eight reserve divisions.

The Corps’ budget is also the smallest of the four armed services. For FY 07, the Marines requested about \$18 billion, while the FY 07 Army budget will amount to about \$110 billion. Even on a per capita basis, procurement for land forces in the Marines is 35 percent less than the Army. The Marines must compete for scarce defense dollars with other branches of the Pentagon and also compete for funding within the Navy Department. Unlike the Army, the Marines do not have their own separate military department. The Corps is part of the Department of the Navy, and in FY 07 they received 14 percent—or \$18 billion—of the Navy’s \$129 billion budget.

The share of the overall budget allocated to the three military departments has remained relatively fixed over the last 30 years, which means an increase in the Marine Corps



budget share must normally come at the expense of the Navy, rather than from the Army or the Air Force.

The Marines are also unique because they have their own fixed-wing air support. The Army relies on the Air Force to provide close air support and maintain air superiority, but Marines have about 350 combat capable fixed-wing tactical aircraft organized into three active and one reserve air wing.

The Marines can piggyback on the other services for some of their needs. The Army pays for the majority of development costs for vehicles like the Abrams tank, while the Navy pays for much of the development costs for combat aircraft like the F/A-18 and the F-35 (Joint Strike Fighter). Navy ships, which transport Marines to trouble spots around the globe and provide a platform for the deployment of amphibious assault vehicles and Marine aircraft, are covered in the Navy budget. The Navy supplies medical support to the Corps and the Army provides logistical support to Marines after they are ashore for more than 30 days.

The one major system currently funded primarily by the Marines is the MV-22 Osprey. To date the Marines have spent about \$18 billion developing the plane and plan to buy 360 of them to replace the CH-46 helicopter. The Air Force and Navy will buy another 100. The program will cost about \$50 billion and the Marine Corps share will be at least \$30 billion. In FY 2007, the Marines requested \$1.5 billion to purchase 14 of Ospreys, almost 70 percent of their entire annual procurement budget.

The Marine Corps has crafted a complex, decades-long plan to transform its warfighting capabilities. Its strategic planning identifies five central initiatives for force transformation: fielding a new family of combat vehicles, stabilizing the force, developing sea-basing capabilities, forming a robust communications network, and rebalancing responsibilities between active and reserve components. The manner in which each of these initiatives is implemented will significantly impact how the Marines modernize their equipment to cope with future challenges.

***Military transformation.*** The fundamental goal of Marine Corps modernization, like that of the Army, is to use new technology to maximum effect, fashioning a more agile and aware force that can be quickly concentrated or dispersed as circumstances require. Unlike the Army, the Marines do not have to change their organizational structure. They can already mix and match their units into expeditionary forces of various sizes.

The desire to modernize the force while waging a multi-front military campaign presents Marine Corps leaders with difficult investment choices. First, they must balance the near-term need to maintain aging Cold War equipment against the long-term promise of new technology. Money spent fixing existing equipment may not be available to develop



next-generation systems. Second, they must balance conventional military capabilities optimized for fighting the militaries of other countries against the more unconventional capabilities needed to cope with global terrorist networks and insurgencies. Money spent on heavy armor or artillery may not be available for body armor or armoring Humvees. Third, they must balance active-duty capabilities with reserve-component capabilities. Given the high cost of active duty personnel (over \$100,000 per Marine per year and the fact that military personnel costs already consume 62 percent of the budget), the Marines will rely increasingly on their reserve component in future conflicts.

Each of these tradeoffs becomes harder when set against a backdrop of profound uncertainty about future military challenges. Policymakers have made so many mistakes concerning the timing and character of threats in recent years that military planners no longer assume they know which capabilities will be most important in the future. This drives the Marines to continue emphasizing versatility and flexibility in its forces, while also harboring a fair degree of skepticism about whether current thinking regarding military change will prove valid over the long run. The much touted agility of helicopters in conducting fast-paced operations, for example, has been called into question by the vulnerability of such aircraft to attacks by lightly-armed Iraqi insurgents, while heavy armor is now considered a crucial factor in winning urban battles in places like Fallujah and Ramadi.

Military planners believe that their service will field a mix of traditional and newer combat systems until the mid-century. Emerging technologies such as mobile satellite communications, multi-spectral sensors, and robotic vehicles will enhance the capabilities of the future force, but tanks, trucks, and helicopters will continue to play a central role in land warfare. The persistence of such signature systems in the military posture reflects the lessons of recent conflicts, as well as the technical challenges and budgetary obstacles that prevent the rapid development of the next-generation of weapons systems. It also reflects a realization that big gains in warfighting effectiveness can be obtained at a relatively modest cost by introducing new technologies into existing systems, particularly technologies that bolster connectivity and awareness.

***Armor modernization.*** In the case of armor, the Marine Corps fleet of Abrams tanks, LAVs, and AAVs are at various stages of modernization.

The Marines major long term modernization project for its ground forces is the Marine Expeditionary Family of Fighting Vehicles (MEFFV). The MEFFV is designed to replace the M1A1 and the LAV when their service life comes to an end in 2020 and 2015 respectively. The MEFFV is still in its preliminary phase, but the designers have developed concrete parameters. The MEFFV is a “family” of vehicles meaning that each vehicle has a base platform capable of incorporating different “plug and play” modules. This adaptability will allow one vehicle to adopt different roles depending on



the situation, giving mission commanders substantial flexibility. The vehicles will also decrease the size, weight, and logistical requirements, which will make them more fuel efficient and easier to transport. The new vehicles will have a 68-inch height limit so they can be stored in amphibious vessels and so they will be less vulnerable to line-of-sight antitank missiles, which normally fly at altitudes higher than 68 inches.

The Light Armored Vehicle (LAV) has been used extensively by the Marines in Iraq, where its mobility and durability have made it effective in the sparse province of Al-Anbar where the Marines have been deployed. Yet according to the Marine Corps Inspector General report, the LAV is in danger of having its readiness rate plummet to 30 percent this year. The LAV has proven its effectiveness, but it has also been vulnerable to IEDs and enemy fire. The Marines are now in the process of upgrading the armor and fire extinguishing system on almost all of their 700 LAVs.<sup>50</sup>

The Marine Corps' fleet of Amphibious Assault Vehicles (AAV) has an average age of 30 years and has been used extensively in Iraq as an armored personnel carrier. The AAV, which is intended for ship to shore movements, lacks the armor and fire power of the Army's Bradley.<sup>51</sup>

The Marines are beginning to replace the AAV with the Expeditionary Fighting Vehicle (EFV). The EFV is a significant upgrade over the AAV, but the cost of the EFV has jumped by 45 percent, to more than \$12 million per vehicle. The EFV will account for more than a quarter of the Marine acquisition budget over the next five years even though the EFV's reliability requirements have decreased from 70 hours of continuous operation to 44 hours.<sup>52</sup> The Marines still intend to purchase more than 1000, but this may be reduced by as much as half due to the escalating costs.<sup>53</sup> The EFV reflects the priority the Marine Corps still gives to amphibious operations, since it is a vehicle that is built to assault fortified beaches and transport troops to shore—operations that have not occurred since the Inchon landing in the early days of the Korean War.

**Truck modernization.** The Marine Corps' truck program is in much better shape than the Army's. The Marines' medium truck, the Medium Tactical Vehicle Replacement (MTVR), has recently become operational, and its heavy truck, the Logistics Vehicle Systems Replacement (LVSR), should be in use by 2009. The GAO gave the MTVR a readiness rating of "green," because it has maintained a readiness rate above 85 percent and has increased the capabilities of the current generation. The MTVR will continue to replace aging Cold War trucks.<sup>54</sup>

The Marines are still in the very early stages of designing the next generation of Humvee. The average Humvee is 14 years old, and although these vehicles will require extensive recapitalization and/or replacement, they will be the primary light trucks for the foreseeable future.



When designing the next generation of Humvees and light trucks, as well as developing the Marine Expeditionary Family of Fighting Vehicles, the Marines must ensure that their vehicles have sufficient armor even if it means sacrificing some speed, as these new vehicles must be capable of successfully operating in urban combat operations similar to those in Iraq.

***Helicopter modernization.*** The Marines face significant challenges in maintaining their aviation readiness. The Corps' already aging fleet of helicopters is operating at a very high optempo due to strenuous conditions in Iraq, and the Marines have few active or "hot" production lines available to replace aircraft that have been destroyed.

The heavy lift CH-53E Super Stallion, which came into use in 1981, is experiencing high rates of attrition. The Ch-53E was built to serve as a supply helicopter and was not intended for "hot zones," but it is increasingly put into harm's way and the Corps is already experiencing shortages. The Corps only has 150 CH-53Es of the 160 it needs. Exacerbating the problem, the Marines may have to take about 15 Super Stallions out of service for a year starting in 2010.<sup>55</sup> The replacement for the Super Stallion, the CH-53K, is not expected to be available until 2016, with the complete replacement fleet of 156 helicopters delivered by 2021. The attrition and extensive wear on the fleet of heavy lift helicopters raises real concern about whether the Marine Corps will be able to hold on until the complete replacement fleet is available. To bridge the gap, the Marines will have to spend a substantial amount on refitting these aging helicopters—possibly \$8.5 million per aircraft—on maintenance and modernization, since all the helicopters will need "airframe surgery."<sup>56</sup>

The Marines are also banking on the next generation of aircraft becoming available on schedule. The CH-46E Sea Knight helicopters are completely outdated, as they have an average of 36 years. The replacement for the CH-46E is the MV-22 Osprey, which has been in development since 1983, and has so far experienced significant technical and cost problems.

The Marines have generally done a good job of planning future acquisitions for their ground forces. Many of the older ground weapon systems currently being depleted through their use in Iraq are scheduled to be replaced by newer equipment in the next few years. Yet when it comes to aviation, the Marines have been too dependent on a single airframe—the MV-22—and now face critical shortages as a result.

There are four challenges that could adversely affect the Marine Corps' modernization plans:

- The service does not know when its forces will depart Iraq and what the cumulative impact of operations will be on its equipment;





- The Marines have come to rely on supplemental appropriations for much of their recapitalization and replacement funding;
- There is no way of knowing when this infusion of additional money will disappear;
- The Marine Corps does not know how much equipment it will have to leave behind for the Iraqi army. Currently the Iraqi army lacks proper equipment, as the U.S. has been hesitant to fully arm such an unstable force. If the Iraqi security forces are to be capable of “standing up,” it will require significant additional equipment, much of which will have to come from the Marines.

***Long-term recommendations.*** In order to assure that the Corps is ready to cope with the diverse challenges it will face in the years after U.S. forces depart Iraq, five long-term steps are essential.

- Unless the defense topline budget is changed, the Marines should receive an increase in their share of the Navy budget from 14 percent to 17 percent and their overall share of the defense budget should increase from 4 percent to 5 percent.
- The Marines should join the Army in producing and funding a comprehensive plan for the continuous enhancement of heavy armored vehicles, such as the Abrams main battle tank and Bradley infantry fighting vehicle. The Marines should consider purchasing Stryker Armored Vehicles in addition to the Light Armored Vehicle (LAV). The Marines should also continue funding the Medium Tactical Vehicle Replacement (MTVR) and the Logistics Vehicle Systems Replacement (LVSR) to complete the replacement of its Cold War medium and heavy truck fleet, while identifying funding requirements for long term sustainment of the High-Mobility Multipurpose Wheeled Vehicle (Humvee).
- The Marines should consider purchasing MH-60 Knight Hawk and H-92 Super Hawk helicopters to bridge the gap between the time the CH-46E Sea Knight and CH-53E Super Stallion helicopters wear out and the MV-22 Ospreys reach full operational status. This will also enable the Marines to hedge against the possibility that purchasing all of the planned 360 Ospreys will become unaffordable.
- Congress must fund Marine Corps procurement at a steady rate of \$3.0 billion per year (in constant FY 06 dollars).
- The Marines need a new Armored Personnel Carrier (APC) to replace the Amphibious Assault Vehicle (AAV), but it is not clear that the service can fill all of its future needs with the Expeditionary Fighting Vehicle (EFV) given the system’s high cost. The Marines should seriously consider cutting back the number of EFVs that they plan to purchase from 1000 to between 600 and 700 vehicles. The Marines should instead



consider purchasing a mix of EFVs and LAV II vehicles or other similar APCs. While these vehicles are not amphibious, the likelihood of the Marines storming heavily fortified beaches on the scale of WWII remains remote. Instead, the Marines should maintain a sizeable portion of the legacy AAV fleet as a strategic reserve in case there is a need to undertake a substantial amphibious operation.



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