THE MARINE CORPS' AMPHIBIOUS ORGANIZATION, AN EXPEDITIONARY SYSTEM?

A MONOGRAPH
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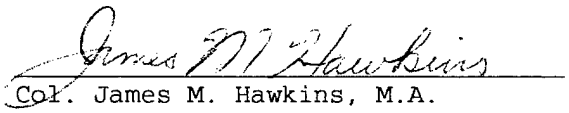

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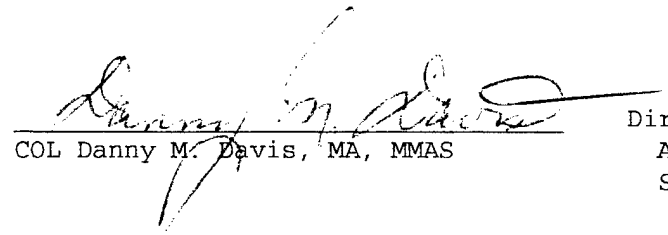

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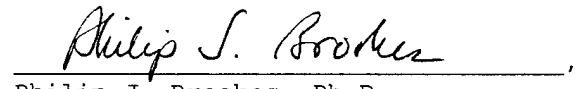

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ABSTRACT

THE MARINE CORPS' AMPHIBIOUS ORGANIZATION, AN EXPEDITIONARY SYSTEM? by Major Douglas M. King, USMC, 47 pages.

Protection of worldwide interests requires a capability to project power across a hostile shore. During World War II, a wide array of amphibious ships and landing craft provided this capability for the United States. However, do current Marine Corps' organizations provide the deployable organizations capable of littoral maneuver and expeditionary power projection? Meeting expeditionary requirements to operate across the spectrum of conflict requires synergistic combined arms organizations tailored to meet a varied threat. However, reduced infrastructures, airlift, and sealift require a force capable of littoral maneuver.

The monograph argues for a Marine Corps organization based on littoral maneuver and combined arms that includes increased amphibious maneuver capability to provide the deployability, flexibility and maneuverability for worldwide crisis response. Developing a family of amphibious vehicles and combat systems designed for amphibious shipping increases deployability and littoral maneuverability. Increased amphibious capability speeds the transition from sea to land maneuver, frees landing craft for other combat or supporting capabilities, and increases operational flexibility.

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INTRODUCTION

Whether requested by a nation in distress or as an invading force, the United States (US) requires expeditionary power projection capabilities to protect its interests. Naval forces designed to project power from a seabase provide expeditionary forces for operations across the operational spectrum. This monograph examines whether the Marine Corps' Ground Combat Element (GCE) provides the deployable landing force organization for ship-to-objective maneuver as expressed in the Naval operational concept of Operational Maneuver From the Sea (OMFTS). The monograph's endstate is identification of a future landing force organization.

Background

When a friendly nation requests US' assistance, generally the host-nation airfields or ports are available for the deployment. However, regional infrastructure that cannot support or limits the ability to introduce shipping or aircraft complicates the response. Additional complications arise, when the US determines it is in the national interest to introduce military forces forcibly. Both this situation and the previous one require an expeditionary power-projection capability not reliant on supporting infrastructure and host-nation support agreements. Finally, further complicating power projection is the degree of opposition to a power-projection operation. US' forces must expect degrees of opposition whether invited or during forcible entry. The spectrum of opposition includes public demonstration,

unconventional forces, and regular armies. Therefore, a power-projection capability includes multi-purpose and adaptable forcible entry capabilities suitable for opposed or unopposed entry. The United States' forcible entry capabilities as described in Fleet Marine Force Manual 1-2, The Role of the Marine Corps in the National Defense, are either amphibious or airborne forces.[1]

Worldwide power-projection requires a sustainable force independent of adjacent land bases, forward staging bases, overflight rights and other politically dependent support. The sea offers the ability to seabase forces and support, independent of political entanglements. The US Navy and Marine Corps provide a forward deployed, amphibious power-projection force ready to assist a friendly nation in need of disaster relief or to counter the entire spectrum of armed threats. When operating from a seabase protected by US naval dominance, naval expeditionary forces project power into the littorals. The Naval Services interpret littorals as an area next to the sea and extending up to 300 miles inland. These regions are increasingly important to national interests.

> While representing a relatively small portion of the world's surface, littorals provide homes to over three-quarters of the world, locations for over eighty percent of the world's capital cities, and nearly all of the marketplaces for international trade. Therefore, the littorals are also the place where most of the world's more important conflicts are likely to occur. Moreover, ninety-nine percent of U.S. exports by weight travel on the seas, with many of the important choke points controlled by states in crisis. Outside of the industrialized democracies, many national infrastructures are in decay and ruin. Few airfields in the Third World can receive America's strategic aircraft; many port facilities are unable to handle the larger sealift ships; and roads and railroads are poorly managed or non-existent.[2]

The Naval Services initiated its response to the littoral challenges with the operational concept of OMFTS. OMFTS projects the requirements for maneuver through and from the sea into the next century.

Defining OMFTS

Historically, amphibious operations have been linear operations occurring in distinct phases: maneuver in ships to a suitable beach; ship-to-shore movement; phased buildup of combat power ashore and establishing the beachhead; and, finally, subsequent inland maneuver. The support range of ships; their landing craft; combat support capability; and combat service support and combat power build-up restricted operations to limited ranges inland. Capability increases and proliferation of modern weapons and increased situational awareness makes the opposed and traditional amphibious assault a costly alternative. Nonetheless, the nation requires the rapid power projection from the sea. OMFTS is the Naval Services response to the challenge.[3]

OMFTS departs from misconceptions that amphibious operations are assaults against defended beaches and exploits the mobility advantages offered through operations from and through the sea. Simply put, OMFTS is the applications of Marine Corps' maneuver warfare philosophy, as described in Fleet Marine Force Manual 1, Warfighting, to amphibious operations.[4] The aim of maneuver warfare is to desynchronize the enemy's combat power and destroy his cohesion through maneuver and fires rather than destroying him incrementally through attrition. Through seaward and landward maneuver, the landing force gains a position of

advantage. Successfully applying OMFTS provides the United States a capability to protect its interests and respond to worldwide crises.[5]

Exploiting US' naval dominance by sustaining and supporting the inland maneuver from a well-protected seabase further increases the security, flexibility, and tactical options available to the amphibious force. Inherent in the operation is the ability to seamlessly maneuver combined arms forces from a distant seabase to inland objectives. Seamless maneuver to inland objectives requires combined arms forces to move from and through the sea as conventional forces move on land. The sea and littorals no longer restrict maneuver, but are viewed as a mobility corridor. An organization maneuvering under this concept must consider its combat, combat support, and combat service support forces and the inland and amphibious maneuver capability as a single system. Moreover, this concept projects the requirements for maneuver through and from the sea into the next century.[6]

Additionally, with increased tactical mobility and range, assault forces can subsequently maneuver from positions ashore through the sea to subsequent inland objectives, while being supported from a seabase.[7] Traditional beachheads lose their relevance for operations across the operational spectrum. Applying OMFTS to operations such as, non-combatant evacuation, humanitarian assistance, and peace operations significantly improves the Nation's ability to respond. These are often the operations where ports, airfields, and infrastructure do not support introduction of forces. Illustrating this point is a recent study of African ports.

> From Richards Bay, South Africa to Djibouti there is one port on the entire East African littoral (Mombassa, Kenya) in which over 75% of ship classes have access. From Djibouti to the Suez Canal there is only one more port equally capable, Port Sudan, Sudan. In

> Southwest Asia the distance from Al Agebal, Jordan to Yanbu, Saudi Arabia (next accessible port) is over 400 miles.[8]

The same capabilities that enhance maneuver in the assault from the sea improve support of all operations across the operational spectrum:

> Nonetheless, future naval expeditionary forces will, thanks to the equipment and training associated with OMFTS, have an enhanced ability to conduct operations other than war. Sea basing will free Marines from the need to set up facilities ashore prior to devoting their full energies to relief efforts. Improvements in ship-to-objective mobility will allow help to be delivered directly to areas where it is needed most to include places far from ports and airfields.[9]

The enhanced maneuverability and capability described in OMFTS effect landing force organization and design.

Landing Forces

Combined arms capabilities and specific landing force missions guide landing force organization. The Marine Air Ground Task Force (MAGTF) including a Command Element (CE), Air Combat Element (ACE), Combat Service Support Element (CSSE)), and Ground Combat Element (GCE) provides landing forces. The GCE, supported by the other MAGTF elements, is the cornerstone of an assaulting landing force. Deploying and maneuvering the combat power of the GCE determines success in ship-to-objective maneuver. The monograph focuses on GCE organization and includes dismounted, mounted, and helicopterborne operations.

Operations on Okinawa during WWII provide historical insights into the requirements for successful landing force organization. Ship-to-objective maneuver capability during this operation was a product of many years of combat development and real-world experiences. These requirements provide a basis for examining present and future landing force organization and capability. The requirements include

combined arms landing force, amphibious ship and landing craft availability, and surface and helicopterborne amphibious maneuver capability. Additionally, the monograph examines the ability to build combat power ashore. The build-up of combat power determines tactical mobility and landing force capability inland. These factors provide a basis for examining ship-to-objective maneuver capabilities and the effectiveness of current and future Marine Corps organizations supporting OMFTS.

Methodology

The monograph initially examines the organizational requirements and principles for successful maneuver from the sea to inland objectives. Operations Iceberg, the WWII operation to seize Okinawa, provides a historical basis for examining organizational requirements for ship-to-shore movement and the transition to land warfare.

Examining current landing force capability within the Marine Corps establishes a baseline for comparison of past, present, and future capability. Current MAGTF organizations, exercise scenarios studied at the Marine Corps' Amphibious Warfare School, and previous studies assessing notional amphibious lift capability and surface tactical mobility assets provide resources for examining the ability to conduct ship-to-objective maneuver. Critical to the monograph is the capability for seamless sea and land maneuver of combined arms forces. Additionally the monograph examines capabilities to maneuver through the sea to subsequent objectives.

Comparison of historical capabilities, current and planned organization and capabilities, and requirements described in the concept

of OMFTS allow the monograph to highlight potential organizational deficiencies in the GCE. From these findings, the monograph assesses the need to recommend organizational changes for improving overall expeditionary capability, deployability, and ship-to-objective maneuver capability without losing combined arms capabilities within the landing force.

Assumptions

Assumptions about the future operating environment are necessary to allow examination of projected capability. The first assumption is the Marine Corps continues to provide an expeditionary crisis-response capability capable of deploying into immature or devastated theaters. Second, declining port facilities, infrastructures and limitations of airlift require the capability to project combined arms forces across a friendly or hostile shore. Third, the Naval Services will continue to develop the capabilities required to support OMFTS. Fourth, technology of the next twenty-five years will not eliminate the need to support maneuver with close fires and logistics. Fifth, examining future capability assumes fielding of the MV-22, a family of amphibious vehicles, and Amphibious Transport Dock, LPD-17.[10]

OPERATION ICEBERG

Introduction

OMFTS includes a capability to seamlessly maneuver combined arms forces from a seabase to an inland objective and expands the requirement to include the sea as a mobility corridor in the same manner as a land avenue of approach. Using the sea as a tactical avenue of approach during subsequent maneuver ashore is a subset of the requirement.

Operations originating from a seabase rely on both amphibious maneuver and inland maneuver capabilities. The sea to land transition and combat power build-up are critical parts of developing inland maneuver capability. These factors provide a basis for examining ship-to-objective maneuver capabilities. Operation Iceberg, the campaign for Okinawa in 1945, provides a historical case illustrating many of the organizational capabilities required today. Operation Iceberg included ship-to-shore movement, maneuver from shore-to-shore through the sea, rapid inland maneuver. The operation covered the spectrum of combat operations in various combat environments and terrain.[11] The operation clearly illustrates the need for landing force organizations capable of combined arms operations and the flexibility to operate in varied combat environments.

Operation Iceberg represented a shift in standard operations in the Pacific. Okinawa was not the restrictive terrain experienced earlier in the Pacific theater. Maneuver characterized this operation. The Sixth Marine Division Special Action Report characterizes operations on Okinawa ". . . rapid movement embracing open warfare of a scope heretofore foreign to the Marine Corps."[12] Organizations required maneuverability at sea and in varied terrain. This operation required rapid maneuver inland across a damaged infrastructure and rugged terrain. A noted problem was a lack of immediately available transport and engineer support.[13]

Successful execution of an amphibious operations strategy was no different from warfare conducted on land. Generally shock, firepower, and deliberate movement across the beach characterize amphibious operations. However, some of the most successful operations have

emphasized maneuver to avoid enemy strength. The combination of sea and land maneuverability, combined arms, survivability, and a rapid transition to land combat are the overarching requirements for an amphibious organization.

Ship-to-Shore Capability

Initially, landing craft and amphibious ships provided a solution to moving equipment ashore. However, two general problems combined to lead amphibious developers to the next innovation. Coral reefs complicated matters as the water passing over them was generally too shallow for boats and there was often heavy surf breaking on the reef's edge. Second, students of amphibious operations realized the criticality of moving supplies and support rapidly through the beach area to support sustained combat ashore. The transition from sea to shore must be smooth and rapid. There was still a pause at the beach as the craft stopped, lowered its ramp, and disembarked troops or vehicles[14].

Development of the Landing Vehicle Tracked (LVT) solved this problem. This amphibious vehicle could climb over such impediments and continue on to the beach. Beginning in 1942, with the Battle of Guadalcanal, the LVTs transported supplies from ship-to-shore before landing wheeled vehicles. The LVTs exceeded the requirements for sea and inland maneuver. Their mobility across varied inland terrain resulted in the LVT's additional role as a forward logistics vehicle. Operations on Guadalcanal demonstrated the success of the WW II version of the amphibious assault. The operation demonstrated the integrated effects of naval gunfire, air, and a landing force capable of rapid

ship-to-shore movement. However, a landing force with landing craft and LVTs still had not landed against a well-integrated beach defense.

Operations at Tarawa provided the opportunity to test the amphibious capability against a well-integrated beach defense. Coral reefs at Tarawa prevented landing craft from reaching the shore. The LVT's unique land-sea capability transported landing forces across the reef to inland objectives. The LVT's success in this role at Tarawa validated the LVT as an assault conveyance. As a result, LVTs led all subsequent Marine Corps amphibious assaults.[15] The continued requirement for more LVTs led to the employment of 800 LVTs landing sixteen assault battalions at Okinawa.[16]

LVT employment at Tarawa caused significant developments in ship-to-shore maneuver capabilities and organizational change within the Marine Corps. Because of the capability LVTs added to ship-to-shore movement, the Commanding General of Fifth Amphibious Corps Major General H. M. Smith urged that more LVTs be produced and that they be fitted with more armor, more speed, better communications, and a ramp for ease in unloading. After-action reports from Tarawa highlighted a need for combined arms forces, immediately available light and medium tanks, and fire support. These assets were invaluable in meeting enemy pillboxes and hardened positions. Securing the landing area required self-propelled weapons of all sorts to provide the landing force the necessary firepower and mobility. Even with the great amount of naval gunfire available at the time, there was also an immediate need for artillery and rockets ashore to deliver close fires. Additionally, the landing force should never expect long range fires and close air support to destroy or neutralize enemy resistance. The report called attention

to the need for readily available resupply noting the LVT as the most reliable means of moving logistics ashore.[17] Lessons learned in previous operations led to expansion of the LVT fleet. Production of many armored variants ensued, transitioning the LVT from a combat-support role to a shock-troop role.[18]

Landing Force Organization

Combat development of amphibious ships, landing craft, and amphibious vehicles created an amphibious system designed to convey the landing force from the sea with readily available combat power. Finally, close air support and naval gunfire refinement increased support to landing forces.[19]

> For the first time in history there was a reliable way to make tanks, trucks, tractors, artillery, antiaircraft weapons, and heavy engineer equipment a part of the beach assault.[20]

However, this amphibious system development caused conceptual changes in ship-to-shore maneuver and new Marine Corps' organizations. The Regimental Combat Team (RCT) was the base organization for amphibious assaults. This combat organization included: an infantry regiment, a tank company, an engineer company, an artillery battalion, a provisional rocket detachment, a motor transport company, a medical company, a reconnaissance platoon, an ordnance platoon, a services platoon, a supply platoon, an amphibious truck detachment (DUKW), a shore party group, air liaison teams and naval gunfire liaison teams. Landing craft supported the ship to shore maneuver of combat support and tanks. However, an armored amphibian battalion and an amphibious tractor battalion also supported the RCT.[21]

The Armored Amphibian Battalion, equipped with the LVT(A), provided mobile protected firepower from the sea inland. The LVT(A) delivered close fires to support the landing and movement across the beach. Moreover, the LVT(A)'s could execute fire missions inland within 45 minutes of landing providing excellent means of early artillery support. Armored amphibians not used for immediate fire support directly supported ground maneuver. Additionally, armored amphibians also maneuvered through the sea to supporting positions not accessible through ground maneuver. From these positions, they directly supported ground maneuver and greatly aided the rapid advance inland.[22]

The salient characteristic of the Armored Amphibian Battalion was its versatility. Not only did it fulfill the primary role of close direct fire support covering the amphibious assault, but it seamlessly transitioned to artillery missions and inland maneuver providing immediate combat power to the landing force. The unit's flexibility to maneuver on land and sea exploited sea control and allowed maneuver in direct support of landing forces.[23]

The ability to maneuver rapidly through the sea and on land facilitated subsequent missions. On two occasions the Sixth Reconnaissance Company mounted armored amphibians (eight men per armored amphibian) and conducted reconnaissance in force of outlying islands. The armored amphibians provided sea and land mobility and heavy combat power once ashore. Infantry mounted in armored amphibians maneuvered inland and upon locating enemy forces armored amphibians provided direct fire and indirect fire support to the maneuver force. Additionally, in cases where the reconnaissance in force demanded maneuver in areas inaccessible to tracked vehicles the armored amphibians maneuvered

through the sea into a supporting position. This combined arms maneuver force was highly successful in both operations.[24]

Amphibian Tractor Battalions with embarked troops and equipment formed the assault waves and backbone of the landing force in their conventional role. After completing the assault wave mission, LVTs performed in various capacities. LVT's continued ship-to-shore movement of supplies and equipment. Early in the operation, motor transport assets were not ashore and were later found insufficient because of embarkation space limitations and terrain. Additionally, poor infrastructure and trafficability limited the ability to support inland maneuver forces. LVT support of inland maneuver forces became critical. The tracked Amphibian Tractor Battalion supported maneuver both from land and sea. The amphibious capability permitted its maneuvering at sea and along the coast to deliver logistics to maneuver forces. Moreover the protection and maneuverability of Amphibian Tractor Battalions assisted medical evacuation from forward areas.[25]

The devastated infrastructure and effects of terrain and weather overtaxed landing force engineers. There was an immediate need for bridging and road improvement to maneuver inland. This was principally necessary to support wheeled vehicle movement and non-amphibious vehicles. Recommendations called for engineer assets assigned to each landing team to provide immediate maneuver inland.[26]

Landing craft carried the preponderance of combat support such as tanks and artillery. Particularly in the Pacific theater, tanks operated in a reduced infrastructure and marshy terrain. However, fording equipment did not overcome varied depths of surf zone and reefs. On Okinawa the immediate need for tank and close fire support prompted

the use of pontoon devices to maneuver tanks from ship- to-shore. These devices allowed the tanks to deploy through the sea and provide immediate tank support to destroy bunkers, fortified positions, and enemy tanks. Subsequently, tank companies supported inland maneuver thirty minutes after the first landing force element arrived at the beach. Following the landing, tanks spearheaded advancing infantry columns along roads eighty miles to the northern tip of Okinawa.[27]

Although one fire-support ship (destroyer or larger) directly supported each battalion sized landing team, immediate close fire support was essential ashore.[28] Amphibious trucks or DUKWs moved artillery from ship to shore. Because the artillery, organic transportation, and equipment took fifty to seventy hours to deploy from ships to the shore, DUKWs initially served as prime movers for artillery emphasizing the flexibility of amphibious vehicles and the WW II amphibious system. However, DUKWs could not assist ship to shore movement. Saving the day were the Armored Amphibians that led the landing and provided immediate artillery support to the landing force. This organization had trained in both artillery missions and maneuver. Additionally, they provided artillery support inland when destroyed bridges halted the maneuver of conventional artillery forces inland.[29]

During Operation Iceberg combined arms forces maneuvered inland within thirty minutes of the first element landing. Landing force' self-deploying organizations, including the Armored Amphibian Battalion and tank battalions, provided the necessary combat power to support inland maneuver.

Infantry operations required swift maneuver and small unit operations. Keys to swift maneuver were training, a synergistic landing

force, a predisposition to maneuver, and immediately available firepower. Firepower included mobile platforms such as armored amphibians, tanks, close air support, self-propelled howitzers, and mortars. However the heavy mortars in use were a problem area. Reports stated a requirement for a lightweight large caliber mortar (81mm or greater).[30]

Throughout the operation infantry organizations were faced with combat in many situations and environments. Mounted and dismounted combat required flexible organizations. As the operation moved inland combat occurred in open terrain heavy vegetation, and mountains. Additionally, forces encountered combat in urban areas and bunkers. These demands required large infantry forces adaptable to changing environments. Moreover, infantry, provided manpower for operations other than war.

A tremendous dislocated civilian problem effected organizations and operations on Okinawa. Plans included a military government organization to deal with civilians, villages, and civilian casualties. However, the task of controlling and safeguarding the population consumed military police and infantry battalion manpower. Finding the manpower and organizations to handle the amounts of civilians and administer the villages became a problem.[31] Fortunately, the landing team organization had a large manpower base within the infantry organizations.

Operation Iceberg Conclusion

Throughout the Okinawa Operation amphibious organizations and organizations equipped for operations in the littorals demonstrated

their effectiveness and flexibility. The immediate need for infantry manpower and firepower, armor- protected firepower, and supporting arms affected this operation. The overwhelming effect of combined arms and rapid inland maneuver led to success in the operation.

Contrasting the Okinawan operation is the large-scale amphibious invasion in Europe at Salerno, Italy which illustrates the effects of a lack of combined arms and amphibious maneuverability. During this operation no air or naval bombardment preceded the landing. Although Rangers had successfully infiltrated into the passes leading from the beaches, landing teams met with heavy resistance at the beach. The only available fires supporting the landing force were machine guns and limited rockets from landing craft. For two hours the heaviest firepower ashore was 50 caliber machine-guns. Tanks and artillery were not available until three hours after the landing teams crossed the beach. The result was a six day fight on the beach and a realization that integrating combined arms capability early would prevent loss of life and improve mission accomplishment.[32]

Both operations clearly demonstrate some key characteristics for amphibious organizations. First, the landing force must train for amphibious operations. Second, combined arms forces and self-deploying heavy combat power is critical to the landing force. Third, artillery and heavy firepower is needed in the initial landing teams. Moreover, it must immediately maneuver inland. Fourth, combined arms organizations capable of sea and land maneuver add flexibility to the landing force. Fifth, landing teams operate across the environmental and combat spectrum. Sufficient personnel and capability are necessary to handle dislocated civilians and devastated infrastructures. Finally,

the organization requires maneuver forces capable of exploiting the sea as a mobility corridor, transitioning from sea to land maneuver, and rapidly maneuvering inland without pause.

CURRENT CAPABILITY

Ship-to-Shore Capability

The Congressional Conference report of the 82d Congress supporting Title 10 legislation guides Marine Corps' organization.

> Such a force, versatile, fast-moving, and hard hitting, will have a very powerful impact in relation to minor international disturbances. Such a force can prevent the growth of potentially large conflagrations by prompt and vigorous action during their incipient stages . . . to provide a balanced force in readiness for a naval campaign and at the same time, a ground and air striking force ready to suppress or contain international disturbances short of large scale war.[33]

Meeting this guidance requires a sea-borne expeditionary force of combined arms capable of forward presence and crisis response missions. By nature it must deploy into any combat environment. Consistent with its statutory charter the US Marine Corps' organizes into Marine Air Ground Task Force (MAGTF)s for specific missions. Currently, four organizations exist: the Marine Expeditionary Unit (MEU), Marine Expeditionary Force (Forward) (MEF(FWD)), Marine Expeditionary Force (MEF) and a Special Purpose MAGTF. The design of these organizations supports amphibious operations and expeditionary power projection.[34]

Military down-sizing and a decline in amphibious shipping have also influenced MAGTF organization. During WWII, the amphibious fleet totaled 1,728 ships; today, the fleet totals around forty active amphibious ships. Near the end of WWII, 20,000 amphibious vehicles for

ship-to-shore maneuver existed. Currently, 1,300 Amphibious Assault Vehicles (AAV)s comprise the entire amphibious vehicle inventory.[1] A constrained budget permits an active-force goal of two and one-half Marine Expeditionary Brigades (MEB)s worth of amphibious shipping.[2] Amphibious lift considered with potential missions shapes a deploying organization.

The preeminent Soviet threat that prescribed weapons platforms and systems designed for the European Theater also influenced organizational development. Fiscal efficiency led the US Marine Corps into US Army led projects like the LAV, M1A1 Tank, Combat Breacher, Ribbon Bridge, and M198 howitzer. These are some of the best weapons systems in the world, but not for ship-to-shore movement or expeditionary operations. These systems require far more amphibious lift, tactical ship-to-objective maneuver capability, and inland mobility support than available or projected. As a result, equipment rather than mission drove Marine Corps' organization, logistics, and force design.

Amphibious lift limitations and deployment speed required a complementary capability to offset limitations. Maritime Prepositioned Shipping (MPS) provides an economical offset for reduced amphibious shipping. However, these ships are not only less survivable but have a deeper draft than an amphibious ship limiting their beach and port accessibility. Although they can be off-loaded at sea, they require calm seas and a benign staging area ashore. Therefore, an assault force must first secure a beach or port and a nearby airfield.[3] True power

projection and littoral exploitation require capabilities that permit flexible and rapid maneuver.

Examining landing-force organization involves considering all means of maneuver ashore, characteristics of units comprising today's landing force and the amphibious lift necessary to arrive in the amphibious objective area. The Marine Corps employs a triad of ship-to-objective maneuver capabilities: landing craft, amphibious vehicles, and helicopters.

Landing Craft

Older crafts include the Landing Craft, Mechanized (LCM-8), the Landing Craft, Mechanized (LCM-6), Landing Craft, Utility (LCU). These crafts travel at between nine and twelve knots and can be off-loaded through a bow ramp or by crane from the open cargo area. The LCM-6 lands medium-weight vehicles, equipment, personnel, or cargo. The LCM-8 lands heavy vehicles, equipment, personnel, or cargo. The current version of the WW II tank landing craft is the LCU. Originally designed to land tanks, its versatility and capacity of over two-hundred tons prompted its use in landing almost anything. The LCU is off-loaded through the bow or stern ramp or in a drive through configuration allowing it to form part of a causeway in ideal sea states.

These landing crafts' relative slow speeds and range do not allow assaults from over the horizon and lack the flexibility to maneuver at sea. Additionally, they only access 17 percent of the world's littorals. These characteristics restrict ship-to-shore movement to short range operations on predetermined beaches.[4]

The newest generation of amphibious assault landing craft is the Landing Craft Air Cushion (LCAC). LCACs employ air-cushion technology to deliver a seventy-five ton load from a distant sea base over 75% of the world's littorals independent of underwater beach gradients and obstacles, tides, and beach consistency to inland landing zones. LCU planning range is 100 to 150 nautical miles traveling up to forty nautical miles per hour. Moreover, traveling above water and land, the LCAC is less susceptible to mines. Presently there are seventy-five LCACs in the inventory, with contracts for ninety-one.[5]

The increased capabilities of LCACs facilitate a rapid build-up of combat power ashore and operations from over the horizon particularly when teamed with an helicopterborne operation. Employing armor aboard LCACs provides heavy combat power to secure key objectives in support of the assault. Although unarmored, LCAC's superior range and speed provide protection. Even if the enemy realized that an amphibious assault was occurring, the LCAC is flexible enough to bypass an enemy.[6] However, range and speed of other slower craft and AAVs often limit LCAC employment range.

Helicopters

The helicopter's role in ship-to-shore or objective maneuver has developed significantly. The helicopter bypasses the problems of establishing a beachhead, surf obstacles and mines, shore-based antiship missiles, and confronting an enemy at the beach. Helicopters make it possible to land assault forces in places impregnable to the surface assault. Moreover, helicopterborne assaults can launch from dispersed ships operating at safe distances from shore threats.[7]

The Marine Corps envisions ship-to-objective maneuver as a coordinated action, where the vertical assault and surface assault support each other. The Marine Corps' family of assault helicopters, the CH-46 and the CH-53, are the means for vertical assaults. The CH-46 primarily moves personnel and the CH-53 is the heavy lift helicopter for personnel, sustainment, and heavier warfighting assets. [8]

However, lift limitations and vulnerabilities preclude the helicopter's exclusive use for ship-to-objective maneuver. The helicopter carries predominately light forces. Helicopters can lift some heavier weapons, such as a HMMWV-mounted Tube-Launched, Optically Tracked, Wire-Guided Antitank Missile (TOW), heavy machine guns, mortars, and sustainment, but armored vehicles, heavy artillery or rockets, and medium air defense are too heavy. Although the CH-53 can sling lift the M198 howitzer to a desired area, without immediately lifting its prime mover and ammunition, the howitzer lacks any mobility or logistical support.[9] Moreover, only after stripping key components and some ammunition and fuel can LAVs be lifted. Neither load is maneuverable once airborne, reducing its practicality and survivability for a tactical operation.

GCE and the Landing Force

Assault Amphibian Vehicle (AAV) Battalion

The AAV Battalion is the only surface organization capable of self-deploying from ships, maneuvering at sea, and continuing to maneuver inland. It provides mobility to surface assault elements of the landing force, supports mechanized operations ashore, and supports other operational requirements. Elements of the AAV Battalion are generally task organized under the command and control of infantry

organizations for amphibious operations. AAV Battalion employs the AAV, a 1972 vintage tracked armored personnel carrier, fielded in three variations: personnel carrier, command and control, and retriever. The AAV is unhindered by natural offshore obstacles that impede other landing craft. Once inland, the AAV negotiates almost any water obstacle regardless of current, width, and depth, is ideal for river crossings, and uses most waterways as avenues of approach. AAVs provide no anti-tank or heavy firepower. The AAV carries eighteen combat-loaded Marines (twenty-one including crew) or 10,000 pounds of cargo. For breaching, a three-shot, mine clearing line charge can replace embarked troops and cargo.[10]

The evolving threats and conceptual thinking preceding OMFTS, coupled with the age of the current AAV7A1, warranted the Marine Corps' assessment of the AAV's serviceability. The assessment highlighted significant deficiencies during both water and land operations, in offensive and defensive firepower, water speed, land speed, agility and mobility, armor protection, and overall system survivability.[11] The AAV's five to six nautical miles per hour speed is unsuitable for flexible maneuver at sea limiting the landing force to rigid linear ship-to-shore movement. Maneuver, the salient characteristic of OMFTS, was the most significant deficiency in the current AAV.

Light-Armored Reconnaissance Battalion (LAR)

LAR Battalion conducts reconnaissance, security, economy of force operations, and limited offensive or defensive missions exploiting its firepower and mobility.[12] The battalion employs the 1982 vintage, wheeled light-armored vehicle (LAV). Current LAV variant capabilities

include: LAV-25, reconnaissance and security and destruction of light armor; LAV-M, 81 millimeter mortar (potential for 120 millimeter mortar); LAV-R, recovery and maintenance; LAV-L, logistics; LAV-C2, command and control; and LAV-AT, antitank variant. Additionally, the LAV(AD), a mobile air-defense platform, and the LAV-based MEWSS, an electronic warfare system, provide additional capabilities. Rather than developing a full amphibious family of capability, the Marine Corps pursued the LAV family. LAVs provided a less expensive platform for operations ashore and were maneuverable in restricted infrastructure.[13]

Combining the LAV with the LCAC provides a method for the Marine Corps to maneuver armored vehicles ashore rapidly for use in reconnaissance and security roles and as a light-armor force. Employment of the LAV early in the ship-to-objective maneuver is essential in providing standoff and protection from enemy maneuvering to counter a landing.[14]

Infantry Battalion and Regiment

The infantry regiment provides the nucleus of landing forces. The mission is to locate, close with, and destroy the enemy by fire and maneuver, or repel its assault. When combined with combat support and combat service support the regiment forms a Regimental Landing Team (RLT) and subordinate Battalion Landing Team (BLT)s. Organic ground mobility is by foot with lightweight vehicles providing transportation for electronics, weapons, and limited logistics. An antitank platoon employing HMMWV mounted TOWs provides organic heavy anti-tank support to the regiment. Organizing a regiment with an AAV Battalion and landing

craft provides amphibious and land mechanized maneuver. The regiment is also capable of helicopterborne operations from a seabase.[15]

The infantry battalion can maneuver through the sea in one AAV company. However, much of its firepower must maneuver aboard landing craft or helicopters. These weapons include the Anti-armor Platoons TOWs and High Mobility Multi-purpose Wheeled Vehicle (HMMWVs), the Heavy Machine-gun Platoon, and HMMWVs for the 81mm Mortar Platoon. Appendix A describes major weapons systems in the current infantry regiment.

Tank Battalion

The maneuver empowerment that tank units provide ensures that the MAGTF is potent and survivable across a wide spectrum of missions. In most regions, mechanized forces are the ground gaining exploitation force. Mechanized forces require tanks to provide lethality and survivability. As evidenced in Desert Storm, static forces, without survivable firepower, are irrelevant on the modern battlefield. Although the Army can provide some armor support to the Marine Corps for sustained combat, this support is not expeditionary or guaranteed. The mobility, lethality, and survivability of the tank battalion provides the MAGTF a viable means of attacking enemy vulnerabilities, exploiting opportunities ashore, and defending against attacking tanks. Tanks also provide a versatile variety of ammunition and capability for the destruction of helicopters, equipment, and bunkers as well as the overwhelming combat power necessary for forcible entry and sustained combat ashore. Marine Corps tank battalions are the Nation's only tank forces trained and equipped for amphibious operations. The principle means for deploying the entire tank battalion is an Maritime

Prepositioning Force (MPF) operation. This capability remains complementary to employing tanks aboard amphibious shipping. The tank battalion is task-organized for amphibious operations as a part of a landing team. Under this task-organization, tank companies or platoons maneuver ashore supporting infantry organizations. Because of the M1A1 main battle tank's weight only two types of landing craft are capable of maneuvering it ashore. The LCAC transports one M1A1, while the LCU can transport two M1A1s. This limitation severely restricts the ability to maneuver tanks in the littorals.[16]

Artillery Regiment

Artillery provides close and continuous fires to neutralize or destroy targets threatening the success of the supported unit. Its operations support maneuver forces: infantry battalions and regiments, LAR Battalion, and Tank Battalion. The M198 howitzer is the current means for delivering fire support to the landing force once ashore. The M198 delivers superb firepower, but it requires landing craft for deploying the howitzer, is difficult to maneuver, requires vehicular transportation, command and control, and extensive logistics once ashore. As a result, artillery organizations require detailed coordination to maneuver ashore and then provide support inland. During the early phases of an amphibious operation, Naval Surface Fire Support (NSFS) substitutes for Landing Force organic artillery. Once organic artillery is operational ashore, Naval Surface Fire Support will complement the firepower available from artillery and close air support. Currently, down-sizing of the fleet and retiring of battleships limits available NSFS. Marine Corps Air support offsets the need for a large

amount of artillery however the close responsive fires are integral to combat power necessary for inland maneuver.[17]

Engineer

Studies assessing the Marine Corps capability to conduct maneuver from the sea have shown weaknesses in overcoming man-made and natural obstacles both in the surf zone and ashore. Current MAGTF organizations lack self-deploying organizations capable of breaching enroute to landing areas. Compounding maneuver problems are limitations in rapidly detecting, breaching, and marking minefields.[18]

Current Ship-to-Objective Maneuver Capability

The MEU is specifically organized for forward presence operations at sea. Embarked aboard Amphibious Ready Group (ARG)s, MEUs operate across the conflict and operational spectrum. Each MEU includes a CE, GCE (BLT), CSSE (MEU Service Support Group), and an ACE (a composite air squadron). The battalion landing team's ground combat power includes an infantry battalion, artillery battery, AAV platoon, Light Armored Reconnaissance platoon to company, and under some circumstances a tank platoon. The AAV Platoon supports maneuver of one reinforced infantry company. The remainder of the infantry battalion maneuvers in either landing craft or helicopters. Artillery, Light Armored Reconnaissance, tanks, and other heavy combat support compete for landing craft to conduct ship to shore movement.

During the next five years, ARG ship mixes limit supporting landing craft mixes to between one LCU and three LCACs to four LCUs and four LCACs. Given these mixes, the landing force is capable of

pre-boating part of an LAV company and an artillery platoon for over the horizon operations. The round-trip transit time is 90 minutes from 30 nautical miles. If the personnel and equipment could sustain the maneuver in an LCU, it would take almost 325 minutes for an LCU round trip. Clearly, the limited assets do not provide the desired capability.[19] Studies conducted during ARG 2-91 Work-up training examined LCAC operations for one ship of an ARG/MEU. The study used three LCACs for a ship to shore maneuver averaging twenty nautical miles. The landing craft maneuvered ashore: 7 LAVs; 27 HMMWVs (9 TOW, 6 Heavy Machine-gun Platoon, 2 Air Defense, 10 command and control and logistics); and 3 howitzers with prime movers, ammunition, and command and control in approximately 5.5 hours. In conjunction with the surface maneuver, helicopters (6 CH-46 and 2 CH-53s) flew 37 sorties and maneuvered 326 troops and 10 vehicles ashore (a reinforced infantry company, headquarters, and an artillery platoon). Five hours into the operation the MEU had maneuvered ashore an infantry company, a reinforced LAR platoon, an artillery battery and command and control. The key point is that after the initial landing recycling the LCACs took approximately two hours for the craft to maneuver to the beach again including time on the beach (average: 31 minutes), in the ship (average: 48 minutes) and transit times (average: 60 minutes). Given three to four LCACs per MEU, it would appear that projecting power from a distant seabase is a constrained capability; immediate maneuver inland other than a raid is not viable; and that the beach transition and transit times are the biggest source of friction. AAVs were excluded from the study. However, the distance of twenty nautical miles would require approximately 5 hours, clearly beyond vehicle and

personnel endurance. The alternative of embarking AAV aboard LCACs further exaggerates maneuver times.[20]

Exercise and notional planning scenarios present larger landing forces for examination. One planning exercise used for training at the Marine Corps' Amphibious Warfare School employs fifteen amphibious ships carrying a Regimental Landing Team (RLT) and a mixture of ship-to-shore maneuver assets. The maneuver assets included: helicopters, two companies of AAVs; twelve LCACs; thirteen LCUs; eight LCM-8s; and eleven LCM-6s. Leading the maneuver from the sea in the scenario is a LAR Company (24 LAVs) reinforced with a tank platoon (4 tanks) embarked on ten LCACs. This force seizes key terrain to protect the main landing forces maneuver from the sea. Thirty minutes after the LARs arrive ashore, AAVs self-deploy with two battalions of infantry and are ashore within one hour. Two tank companies, pre-boated in LCUs, land in the first two hours of the assault. One infantry battalion is simultaneously air-assaulted to an inland objective. All assaulting infantry battalions maneuver ashore with heavy machine-guns and TOW antitank weapons mounted on HMMWVs.

The assault forces maneuver ashore quickly but, LCAC dedication to combat units slows maneuver of combat support and combat service support. These assets require recycling landing craft for the maneuver ashore. This particular operation occurs from near the shore rather than as an over-the-horizon assault. Amphibious shipping maneuvers near the beaches (within 5000 meters). The operation is linear with no flexibility to use alternate beaches or littoral penetration points. The operation requires several hours to build sufficient forces with combat support and combat service support for an attack inland. While

the build-up occurs, the enemy can maneuver to counter the landing and attrit the landing force. Additional capabilities such as higher echelon command and control vehicles, engineer vehicles, or bridging directly compete with LAVs, tanks, and artillery and impact on ship-to-shore maneuver and combat power build-up.[21]

Another notional force discussed by Marine Corps planners consists of nine-to-twelve amphibious ships as a surge response to a crisis.[22] This force deploys with twenty-four LCACs, helicopters, and AAVs for surface tactical maneuver. The added LCACs improve the capability for amphibious standoff and maneuver speed. Initially, the LCACs lift LAVs, artillery, and tanks ashore, but turn-around time is still necessary to reload combat support and service support slowing the operation. Following the LCACs, an infantry battalion maneuvers inland in helicopters while two infantry battalions maneuver through the sea in AAVs. However, the limited range and speed of the AAV require the amphibious ships to maneuver close to the beach. The additional LCACs support a quicker transition to maneuver inland. However, the speed, range, and combat capability of AAVs, LCAC turn-around time required for maneuvering combat and combat service support are limitations in ship-to-objective maneuver capability. Although LCAC provides for flexible seaward maneuver from a distant seabase, the AAVs must deploy from a sea base near the shore. Using LCACs to ferry AAVs from a distant sea base to near the shore is an option, but severely reduces available lift for other assets. Increased LCACs support the maneuver of a mechanized combined arms team. This mechanized force coupled with an helicopterborne infantry battalion and close air support provide for limited rapid inland maneuver.

These two scenarios illustrate the contribution the LCAC makes to ship-to-shore maneuver. In both scenarios, assault forces in pre-loaded landing craft move ashore rapidly. However, the slower speed and limited range of the current AAV, turn-around time required for landing craft and LCAC, and lift capabilities of helicopters limit the landing forces initial combat power and its ability to transition to combat ashore. Moreover, a lack of combat and combat service support restrict the capability for immediate or seamless operations ashore. The combined requirement for turn-around trips of LCACs or landing craft limits the standoff of amphibious ships, curtails the flexibility of maneuver from the sea, and reduces survivability of the sea base and landing force.

Limitations imposed by current equipment on landing forces restrict flexible maneuver and build-up of combat power. LCAC and helicopters support flexible maneuver of smaller landing forces. For example, LCAC lifted forces and heliborne forces employed in advance, can isolate a landing area for slower AAVs and landing craft. However, present speed and range of the AAV, conventional landing craft limitations, and LCAC availability limit the landing force's ability to use the sea as maneuver space.

Current Capability Conclusion

OMFTS requires rapid maneuver of mobile survivable firepower throughout the battlefield. Maneuver is the key, but maneuver is inextricably linked to firepower. The transition from sea to land maneuver, transit times for landing craft, and AAV capabilities are the greatest obstacle. Current organizations find rapid or seamless

transition from the sea to land difficult due to a reliance on slower AAVs and landing craft. The similar water speeds of AAV family, LCMs, and LCUs, although complementary, are a maneuver deficiency for OMFTS. Flexibility in seaward maneuver is not available to the entire combined arms landing force. The characteristic of combined arms versatility evident on Okinawa is lacking in today's amphibious vehicles. The amphibious fire support, reconnaissance, and direct fire amphibious platforms employed on Okinawa along with the recommended amphibious engineer platform are missing.[23] Additionally, no air-defense variant exists, an essential element on today's battlefields. These deficiencies require employment of LAVs, HMMWVs, towed artillery, and tanks in conjunction with LCACs or helicopterborne ship-to-shore movement to meet combined arms requirements for firepower, mobile reconnaissance, security, C2, and air defense needs. Moreover, the continued use of landing areas to build-up combat power negates the advantages gained by maneuver at sea and exposes the Naval Expeditionary Force to weapons of mass destruction, tactical ballistic missiles, and mechanized forces.[24]

FUTURE CAPABILITY

Ship-to-Objective Maneuver Capability

The Marine Corps bases its future expeditionary capability on the enhanced mobility provided by the Advanced Amphibious Assault Vehicle (AAAV), V-22 Osprey (V-22) helicopter replacement, a continuation of the LCAC program, and Amphibious Transport Dock Ship (LPD) 17.[25] These enhancements improve lift to the objective area and ship to objective

maneuver capability. No substantial organizational change occurs with these enhancements.

The AAAV complements the LCAC and V-22, significantly improving tactical mobility of Marine Corps' landing forces. The AAAV's increased speed and maneuver range contribute to the survivability, maneuver flexibility, and build-up of combat power ashore. AAAV capabilities include: operational range of seventy nautical miles; twenty-five knots sustained water speed; M1A1 main battle tank equivalent mobility and speed; capacity for a reinforced Marine rifle squad or 2,210 kilograms of cargo; ability to defeat light armored vehicles frontally at greater than 1500 meters, while moving, and in darkness and adverse weather; and turret design facilitating addition of antitank missiles. Additionally, AAAV operates in riverine environments with equal effectiveness and has mobility through flooded or marshy terrain.[26]

The LCAC is the single landing craft possessing the range and speed necessary to operate in a flexible maneuver-based style. Limited numbers of LCACs aboard amphibious shipping require multiple sorties by LCACs to maneuver landing forces ashore. Moreover, LCAC survivability remains a concern in future operations. A Center for Naval Analyses study conducted in 1988, stated that adding armor protection would increase survivability from direct or indirect fire, but would also reduce the speed, capacity, and load mixes.[27]

The future Amphibious Fleet with the Amphibious Transport Dock (LPD-17) improves vehicle lift and LCAC and aircraft availability aboard amphibious shipping. The future amphibious fleet includes twelve Amphibious Ready Groups (ARGs), structured around one "big deck" Amphibious Assault Ship (LHA or LHD), one Dock Landing Ship (LSD), and

one LPD-17.[28] Each ARG embarks six-to-nine LCACs. A notional twelve-ship amphibious group embarks approximately thirty LCACs. A notional twenty-four ship amphibious group embarks approximately sixty LCACs and carries an amphibious force similar to that employed during Desert Storm.[29]

The V-22 is the Marine Corps replacement for the aging medium-lift helicopter force. The V-22 characteristics include: capacity for twenty-four Marines or a 10,000 pound external load; 250 knots cruising speed; and worldwide self-deployability. V-22 provides the MAGTF with the speed, endurance, combat radius, payload, and survivability necessary for OMFTS. The V-22's inability to transport the HMMWV internally limits maneuver capability. HMMWVs provide organic mobility platforms for the infantry battalion's heavy machine-guns, TOWs, Javelins, and 81mm mortars once ashore.[30]

Modernization with LPD-17, LCAC, MV-22, and AAAV increases the range and maneuverability of amphibious forces. However, overall combined arms force maneuverability, deployability, and expeditionary capabilities of the MAGTF improve marginally. Although, infantry maneuvers from over-the-horizon seabases in AAAVs and V-22s, most of the MAGTF relies on landing craft support. Non-amphibious equipment (LAVs, HMMWVs, trucks, bridges, M1A1 tanks, breacher vehicles, artillery, MLRS, Avengers and Hawk air defense) severely taxes landing craft and helicopter capability. The reliance on external maneuver support restricts the MAGTF's freedom to maneuver from a seabase inland. Any subsequent maneuver from the shore and back through the sea depends on landing craft maneuvering to a beach, embarking a combined arms force, and then maneuvering through the sea with the AAAVs or V-22s. Also,

subsequent maneuver with landing craft requires amphibious ship proximity to the shore.

Landing craft reliance interrupts the smooth sea to land transition and slows combat power build-up while waiting for LCAC availability. A Center for Naval Analyses study, estimated six hours to maneuver twenty-four LCAC loads, twenty nautical miles from a three-ship ARG. Another Center for Naval Analyses study conducted during ARG 2-91 work-up training, projected approximately eight hours to maneuver twenty-four LCAC loads ashore when employing seven LCAC over a twenty nautical mile distance.[31] Twenty-four LCAC loads provides a MEU landing force with a combined arms capability (one artillery battery, one LAR Company(-), Heavy Machine-guns, TOW (AT), HMMW-Vs, air defense, a tank platoon, engineers, and logistics).

The AAAV Supplemental Analysis of May 1995 validated solutions and requirements for surface maneuver from the sea. The analysis plan included a notional amphibious task force of twenty-seven ships including fifty-four LCACs.[32] Additionally, the plan portrays projected capabilities of AAAV, LCAC, and V-22 in a common notional scenario involving two Marine Expeditionary Forces (MEF), one ashore and one afloat. The MEF ashore attacks from the south, while the MEF afloat lands north of the enemy to encircle and neutralize enemy forces between the two MEFs. In this scenario, regimental sized vertical assaults are conducted by both MEFs to: 1) remove artillery threats to the littoral penetration zone (MEF ashore); 2) establish blocking positions supporting the surface assault and preventing enemy quick response to the surface assault (MEF afloat); 3) establish an artillery battalion fire base to support the surface assault (MEF ashore). The MEF (afloat)

as part of a Naval Expeditionary Force (NEF) conducts a regimental surface assault with an infantry regiment, tank battalion, Light Armored Reconnaissance Battalion (LAVs), artillery regiment, and an AAAV Battalion as the main surface assault components. A fleet of twenty-seven future amphibious ships and fifty-four LCACs support the NEF. Vertical assaults from the MEF (afloat) occur when NEF is fifty nautical miles offshore and surface assaults occur when the NEF is twenty-five nautical miles from shore. The surface assault crosses two littoral penetration zones at night and rapidly seizes an inland objective. AAAV Bn, with 153 AAAV personnel carriers and ten AAAV C2, maneuvers assaulting infantry ashore within five hours. Additional combined arms elements require 118 LCAC sorties. Scrutiny of the LCAC sorties reveals only combat units, there are no logistics, or combat support units other than artillery built into these sorties. Sustaining and properly supporting this force requires additional LCAC support.[33]

The sea to land transition requires approximately five hours for a limited combined arms capability. Moreover, any subsequent maneuver of combined arms forces through the sea is dependent on LCAC sorties. The scenario demonstrates a forty-two percent faster combat power buildup and increased maneuverability with AAAV, LCAC, and V-22 than with current forces. However, LCAC survivability, lack of combat support, and sustainment impact on the organization's continued capability.[34]

The OMFTS concept envisions employing precision munitions and advanced fires from air and distant naval platforms to offset combined arms deficiencies. The concept projects that the increased battlefield awareness of the information age coupled with long range precision

guided munitions will reduce requirements for combined arms forces.[35] However, future battlefield awareness will not eliminate uncertainty regarding enemy and friendly situation. The "data explosion" from the many sensors will provide plenty of potential targets however, detailed target information, prioritization, processing of the data, terrain and weather limitations, and the costs of precision weapons retard immediate target engagement with precision munitions. Data bits of information may flood commanders and fire support agencies while they determine how to employ these long range precision fires at the decisive point and time.[36] Force protection, rapid maneuver, targets of opportunity, and overcoming terrain, atmospheric, electronic warfare, and weather effects require a close fire capability within the maneuver force. The recent GAO Report, "Operation Desert Storm: Air War" 2 July 96, states that precision and high technology weapons effects are overstated. The report goes on to make the following conclusions:

> many advanced precision systems could not be used in adverse weather, . . . the effectiveness of many systems that incorporate complex or advanced technologies may be limited in future operations, since many of these systems require specific operating conditions to operate effectively, ... many manufacturer's postwar claims were overstated, misleading, and unverifiable, . . . that the US will not have airpower similar to Desert Storm due to down-sizing, . . . that the military should maintain a mix of capability.[37]

Technology and precision weapons provide advantages to future forces, but will not fulfill all the needs of maneuver forces. Combined arms capability requirements continue into the future, but limited amphibious vehicle options and landing craft limitations prevent a rapid and smooth transition of combined arms forces from the sea. Conventional infantry threats with personnel as a center of gravity and irregular forces lacking sophisticated technology, challenge forces reliant solely on

technology. Mines, inland waterways, terrain, and a thinking enemy disrupt inland maneuver of expeditionary forces. The expeditionary force requires combined arms capability enhanced with technology and precision weapons to respond across the operational and environmental spectrum. Ship-to-shore movement requiring several hours to transition maneuver forces to inland maneuver challenge future capabilities. A future combined arms force able to maneuver at sea and on land is not readily available without some change to organization and modernization. Understanding that change requires examination of future organizations.

Landing Force Organization

Future artillery regiments within each Marine Division will provide close fire support with the towed Lightweight 155mm howitzer (LW155). There are no specific plans to reorganize or mechanize artillery. Although the howitzer is lighter, the system remains logistics intensive. Its maneuver from the sea relies on LCAC as the primary conveyance and trucks for inland maneuver. Restricting and complicating maneuver and fire support in the littorals are an abundance of waterways, bridges, marshy terrain, and restricted beach approaches and outlets. The resulting poor mobility exposes artillery and landing forces to enemy fires. Helicopter maneuver of artillery provides a method to overcome these obstacles, but one howitzer requires multiple lifts for equipment, ammunition and personnel.

Replacing Marine Corps artillery with rocket systems to increase firepower is an idea presently under discussion. Rockets deliver long-range, accurate, and heavy volumes of fire.[38] However, logistical

support of the system detracts from its expeditionary role. Seabasing rockets provides a more attractive alternative for expeditionary forces. The arsenal-ship concept, although principally concerned with battlespace dominance and ballistic missile defense, contributes to successful littoral operations by preparing the battlespace for the introduction of expeditionary forces. Additionally, equipping the arsenal ship with a long-range gun or rocket system provides the means to overcome initial fire support problems.[39]

In the early stages of an expeditionary operation, Naval Surface Fire Support (NSFS) and aviation offset the lack of artillery positioned to support maneuver. Aggressive NSFS development will provide support to future landing forces.[40] However, during WW II, when NSFS was abundant, NSFS did not replace the need for close fires of mortars, artillery, rockets, and the armored amphibians.

Improving close fire support requires change similar to WW II development. Okinawa highlighted the importance of armored self-propelled amphibious fire support systems integrated into the landing force. Armored amphibians, integrated into the landing force, led the assault ashore and immediately maneuvered inland providing close fire support to the landing force. Additionally, heavy mortars for urban, rugged, and varied combat environments remains a critical capability.[41]

The proliferation of technology and arms sales continues the role of mechanized forces and modern tanks as a threat to expeditionary forces.[42] Inland maneuver requires mobile and survivable firepower to maneuver throughout the battlefield. Lacking maneuverable combat power, the MAGTF is unable to win. Executing the complexities of littoral

maneuver required by OMFTS requires a synergistic armor and anti-armor capability capable of using the sea as an avenue of approach. Armored organizations incapable of exploiting maneuver at sea and restricted by terrain, trafficability, bridges, and beach approaches are of little value to an amphibious expeditionary force. The MAGTF's heavy antitank systems, TOWs and M1A1 tanks, require LCACs for maneuver ashore and subsequent maneuver through the sea. MAGTF organic aviation alleviates some of the problem, but aviation already is supplementing for a lack of artillery support. The AH-1W four-blade upgrade that permits employment of sixteen Hellfire missiles per aircraft is critical to future anti-armor capabilities.[43]

The LAR Battalion proved its value to expeditionary operations in Desert Storm, Panama, and Somalia. However, these operations did not challenge maneuver from the sea capability or require subsequent maneuver through the sea. A noted problem with the LAR organization is a lack of firepower to engage armored forces or organically protect itself when disengaging from an enemy.[44] Reinforcing the LAR Battalion with armor, artillery, and aviation provides additional combat power for combat operations.

The infantry organization provides the manpower, firepower, and flexibility essential for expeditionary capabilities. Infantry organizations maneuver from the sea and inland with the AAAV and V-22. Infantry organizations, maneuvering from the sea in AAAVs, increase their firepower substantially and reduce the need for HMMWV mobility and heavy weapons. Infantry organizations in helicopterborne operations require HMMWV mounted equipment for mobility and firepower. These systems deploy from the sea aboard LCAC or externally with the V-22.

Surface landing force and helicopterborne forces both compete for LCAC lift and V-22 external loads for combat power build-up.

The basis of Marine Corps infantry organization is the fire team, which traces its origins to the jungle operations before WW II. The fire team and squad organization stabilized during extensive training and combat testing in WW II. The thirteen-man squad with three four-man fire teams provides the flexibility, ability to absorb casualties, firepower and manpower essential for continued operations. Lesser formations suffer from a lack of manpower to handle battlefield continuing actions, an inability to transport the squad's combat load, and an inability to absorb casualties and still function as a team.[45] The basic squad, platoon, and company organization meet the flexibility requirements for uncertain and expeditionary operations.

Marine Corps infantry is often a target for reduction given the size of squads, companies, and battalions. However, the size and capability make the organization adaptable to many situations. Manpower intensive operations in mountains, jungles, and urban terrain, as well as, humanitarian assistance operations require Marines, not tanks or armored vehicles.

Future engineer capabilities are expected to increase, particularly in detection of mines. Mines are an inexpensive method of denying areas to expeditionary forces. However, flexible maneuver permits bypassing these areas. Breaching occurs when mined areas are not avoidable. Current MAGTF breaching equipment, tank plows, line charges, and bulldozers, is heavy and tied to armored vehicles. Additionally, littoral areas include many bridges and water areas.

Breaching and bridging operations require LCACs to maneuver heavy equipment ashore increasing requirements on landing craft.

The LCAC provides tactical mobility for any MAGTF assets that cannot fit aboard the V-22 or AAAV. The V-22 adequately addresses helicopterborne operations. AAAV provides mobility for infantry organizations. However, a preponderance of the combat power, combat support, and combat service support of the combined arms force relies on landing craft availability and proximity of amphibious ships.[46] Increases in maneuverability and survivability derived from V-22 and AAAV employment are not applicable to the entire landing force. Accomplishment of OMFTS goals requires organizational change and additional technological improvement applied to landing forces combined arms capabilities.

Today's landing force and future combat developments portray a force capable of land warfare, but with a glutinous demand for landing craft deployability. "An ever-growing arsenal of trucks, logistics vehicles, vans, and support equipment all designed for extended land combat now overwhelms current and planned amphibious shipping."[47] Ship deployability, ship-to-objective maneuver capability, and the capability to exploit the littorals as maneuver space must guide the organizational design and combat development of the Marine Corps. Relieving pressure from over-employed LCACs requires development of self-deploying amphibious systems with combined arms capability. Technological insight from AAAV combat development provides a basis for expanding amphibious platforms to an amphibious family of vehicles.

Currently, the AAAV requirement is approximately 1013 vehicles. The AAAV program meets the requirement for ten to eleven active force

assault amphibian companies. The program includes procurement of personnel and command and control variants of the AAAV. The requirement includes fielding two companies of AAAVs per Maritime Prepositioning Squadron (MPSRON) and training and support requirements. Limitations in amphibious lift, landing force requirements for combined arms capability, and limited landing craft availability require increased MAGTF maneuverability. Revising the AAAV requirement to incorporate a family of combined arms capabilities provides one solution. A family of amphibious vehicles reduces strain on LCAC support, speeds ship-to-objective maneuver, and increases landing force flexibility.

Family of Amphibious Vehicles

An amphibious family of vehicles improves the littoral maneuver capability of the Marine Corps and frees LCACs to support non-amphibious systems. However, the combined arms and maneuver needs require capability beyond the basic AAAV. Developing a family of combat vehicles based on a deployable, amphibious platform increases maneuver, combined arms, and expeditionary capability within the Marine Corps. Included in these capabilities are: armored reconnaissance; tank or assault gun; fire support such as the 120mm turreted mortar; engineer; electronic and information warfare, logistics, and maintenance-recovery. Although each capability may not be available immediately, each potential system adopted into the amphibious family frees LCACs for maneuver of other MAGTF and Joint-force equipment. Basing a family of systems on future capability, force structure, and planning guidance maintains the viability of the MAGTF. Deployability, littoral

maneuverability, and multi-role combat development guidelines must further guide Marine Corps combat development.

For example, 2.5 to 3 MEBs of amphibious lift provides for approximately six companies of AAAV, including any MEU deployments. Active structure should therefore provide AAAV structure for two active battalions of AAA(P) and AAAV(C), supporting three regiments of infantry and one additional AAAV battalion in the reserve force supporting additional follow-on forces. Maritime Prepositioning of one AAAV company per squadron provides adequate war reserve and additional mobility to allow a total of four mechanized regiments when employing all AAAVs and crews. Appendix B provides a detailed laydown of the AAAV battalion.

Marine Corps infantry organizations provide adaptable organizations suited for expeditionary operations. However, heavier equipment within infantry organizations such as HMMWV mounted TOWs (or its replacement) and heavy machine-guns need adjustment. AAAV increased capabilities warrant reduction of HMMWV mounted TOW and heavy machine-guns for mechanized infantry, but helicopterborne, foot-mobile, or truck-mounted infantry requires the mobile firepower of these systems. Consolidating TOW and heavy machine-guns into one regimental platoon retains the capability, facilitates training, reduces overhead of personnel and equipment, and allows task organization. Appendix C describes the detailed organizational changes in the infantry regiment.

Improving armor capability and maneuverability involves reorganizing the tank battalion and the LAR Battalion into one combined arms organization similar to a US Army Armored Cavalry Regiment. The new organization would employ amphibious reconnaissance vehicles and

amphibious gun variants. The reconnaissance variant is similar to the current LAV but is amphibious. The gun variant provides a direct fire system capable of destroying tanks and providing heavy direct fire capability to the MAGTF. The organization also employs a 120mm turreted mortar for immediate fire support. This organization leads maneuver from the sea and provides maneuverable and flexible firepower against mechanized threats. Inherent mobile armor-protected combined arms capability allows the Marine Corps armored cavalry battalion to perform reconnaissance, security, and economy of force operations. The battalion's significant firepower provides a significant defensive and ground-gaining capability. Additionally, the amphibious and combined arms capability of this organization provides a core for subsequent maneuver through the sea. Appendix D describes this organization in detail.

Self-propelled amphibious vehicles capable of delivering immediate fire support are essential to maneuver at sea and inland. Towed artillery can not readily support maneuver ashore. Breech-loading turreted 120mm mortars mounted on an amphibious or light armored chassis provide a similar capability to the armored amphibians of WWII. Future 120mm range extends to 12-14 kilometers with effectiveness equal to 155mm artillery rounds. Mortars are also flexible for use in urban and mountainous terrain and turreted mortars provide direct fire. Transportable artillery with 25-35 km range is necessary to address the battlefield in depth once the MAGTF is ashore. The LW 155 provides a light system that is transportable by motor transport and aviation. Rockets provide a superb deep fire, SEAD, and counterfire capability. The MAGTF can use seabased rockets and NSFS when operating within

support of shipping. Additionally, a lightweight ground-rocket-artillery system complementing aviation provides depth to the MAGTF's fires. Appendix E for a detailed organization of MAGTF artillery.

Potential applications for the family include: logistics vehicles for immediate resupply and medical evacuation, recovery and maintenance, air defense, and engineer breaching and detecting, and information warfare systems. Each additional amphibious capability integrated into the landing force increases overall MAGTF maneuverability and reduces requirements for landing craft and aviation.

An amphibious family appears expensive. However, development of the organizations and procurement of the family of amphibious vehicles should coincide with replacing existing systems. Using one platform for a base vehicle and streamlining organizations reduces overhead in maintenance, supply, training, equipment, and manpower. Numbers of armored vehicles alone reduce from over 2,100 armored vehicles to less than 1,500. Even though the Marine Corps reduces numbers of combat vehicles, the deployable combat power is increased. The MAGTF's equipment, particularly its heavy combat power is expeditionary and maneuverable both on land and sea.

CONCLUSION

Amphibious operations with inherent ship-to-shore maneuver continue as a vital tool. In the Liberian noncombatant evacuation operation, 5 to 22 August 1990, amphibious forces evacuated 1,647 civilians. Political constraints required amphibious ships to remain over the horizon, too far for conventional amphibious vehicles, and forced helicopter forces to conduct the entire operation. A single

landing zone and weather problems slowed conduct of the operation. An organization with enhanced surface capability could have overcome these constraints.[48] Somalia's poor infrastructure and ports restricted deployment of forces. However, Marine forces had immediate tactical mobility ashore with amphibious vehicles assaulting across the beach and AAVs immediately participating in operations ashore.[49] Although neither operation was a forcible entry, they illustrate the benefits of ship-to-objective maneuver with capable forces.

Helicopterborne operations coupled with LCAC employment provide some current capability for OMFTS. A future capability exists with AAAV, LCAC, and V-22, but future landing force requirements overtax LCAC capabilities. Modernization of equipment without affecting the organization leaves the MAGTF with the current problems in ship-to-objective maneuver. Additionally, future organizations face many challenges in expeditionary capabilities, maneuver at sea, transition from sea to land, land maneuver, and combat power. Improving these capabilities requires planned investment and design of organizations capable of executing the complexities of littoral operations and expeditionary power projection in regional conflicts, operations that deter war, and operations that promote peace.

Expeditionary Marine Corps' organizations employing immediately deployable equipment support the Marine Corps' role as a crisis response force. Although maritime prepositioning provides near term assistance to increase response capabilities, this compromise system requires ports and airfields and lacks the necessary characteristics of an expeditionary force. Once employed, maritime prepositioning forces still require ship-to-objective maneuver capability to exploit littoral

maneuver. Moreover, joint warfare requires the follow on of additional combat power such as, armor, artillery, and engineering to sustain combat ashore.

Deployable organizations capable of littoral maneuver define the Marine Corps' organizational design objectives. The organization must provide synergistic combined arms organizations tailored to meet a varied threat, while retaining amphibious shipping deployability and littoral maneuverability. Developing a family of amphibious vehicles facilitates an organization meeting these objectives. The increased amphibious maneuver capability speeds the transition from sea to land maneuver and frees LCACs for maneuver of other combat or combat support capabilities. The resulting organization based on littoral maneuver, combined arms, and including an amphibious maneuver system provides the deployability, flexibility and maneuverability for worldwide crisis response.

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[36]Naval Audit Service, *Audit Report, Navy Amphibious Fleet Requirements*, (Washington DC: Naval Audit Service, 1995), 11 and 51 and A MEB is a term describing a notional Marine Corps organization built around an infantry regiment, composite air group, and brigade service support group. MEB is currently referred to when discussing amphibious lift. Largely due to vehicle square limitations about 2.0 MEBs of lift exist in active shipping today. The additional required lift is available in reserve shipping. Amphibious lift will improve over the next several years to reach the 2.5 MEB active shipping goal.

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[63]Christopher M. Wode, "The Forward Warriors: The United States Must Revitalize Its Amphibious Fleet," *Armed Forces Journal International* 131 (March 1994): 26 and *Audit Report, Navy Amphibious Fleet Requirements*, 5.

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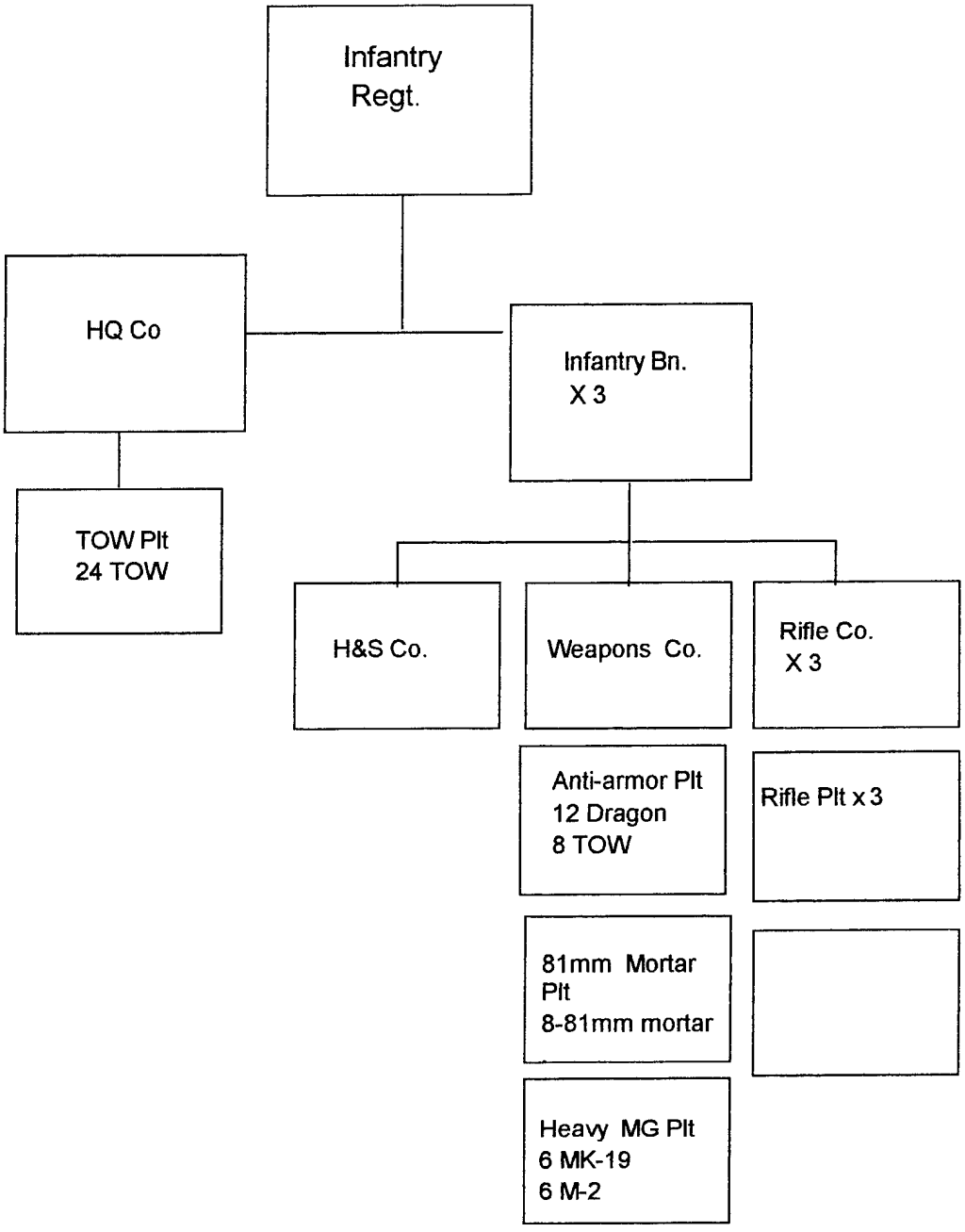
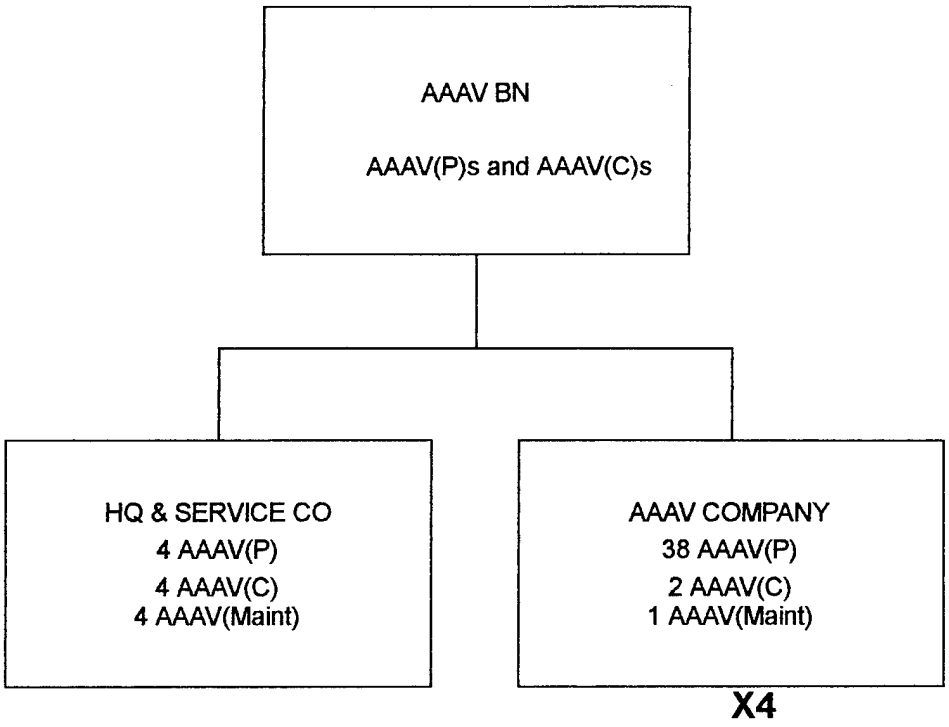
Current Infantry Organization
Major Combat Power



Appendix A

Advanced Amphibious Assault Vehicle Battalion



- Two active and one reserve AAAV Battalion with four companies provides lift for four infantry regiments.
- Each reserve company has a training allowance of 13 AAAV(P) and 1 AAAV(C).
- Each MPSRON includes 40 AAAV(P), 4 AAAV(C), and 2 AAAV(Maint).

Appendix B

Infantry Organization Changes

- All heavy anti-tank and heavy machine-guns consolidated at regiment.

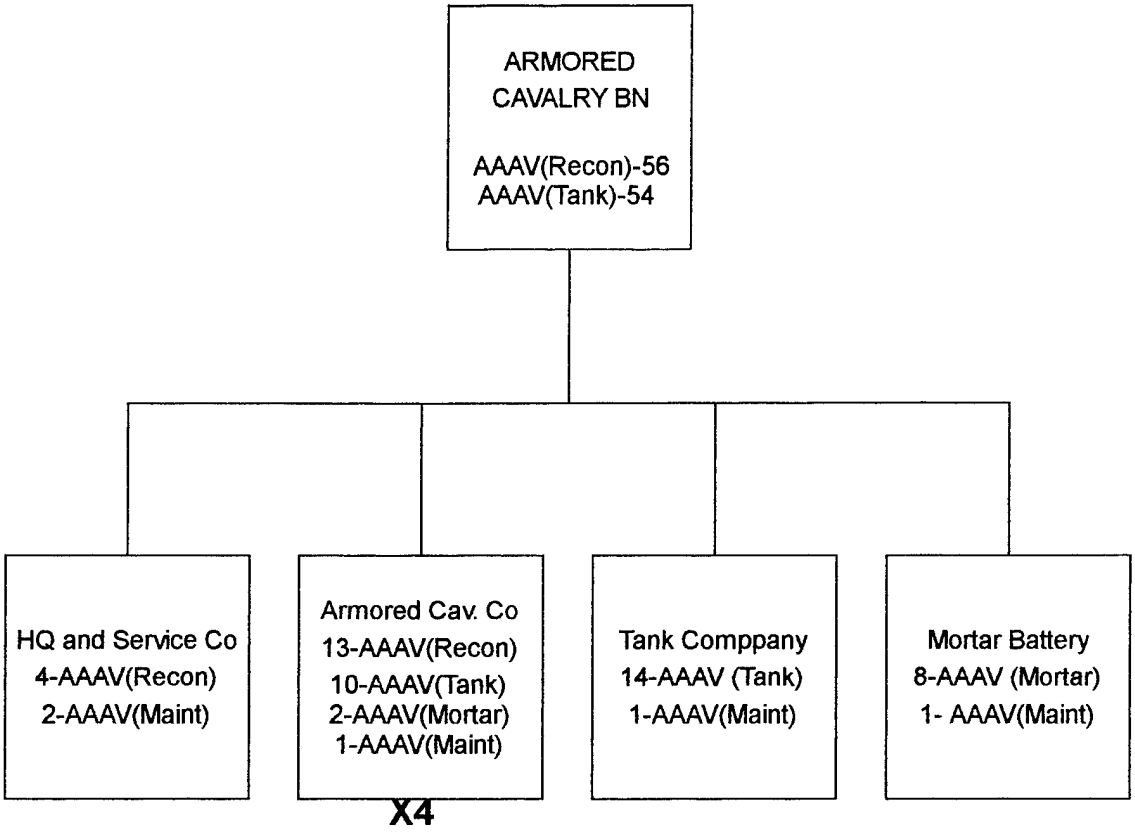
- Weapons Company, Antiarmor Platoon
  - 1 JAVELIN Section
  - 1 SRAW or equivalent section
- Weapons Company, Heavy Machine-gun Platoon
  - removed from structure

- Weapons Company, 81mm Mortar Platoon
  - remains intact

- Regimental Weapons Company (NEW)
  - 1 Heavy Antiarmor Platoon (12 systems-TOW replacement)
  - 1 Heavy Machine-gun Platoon (12 systems)
  - 1 Heavy Mortar 120mm (Towed) (6 systems)

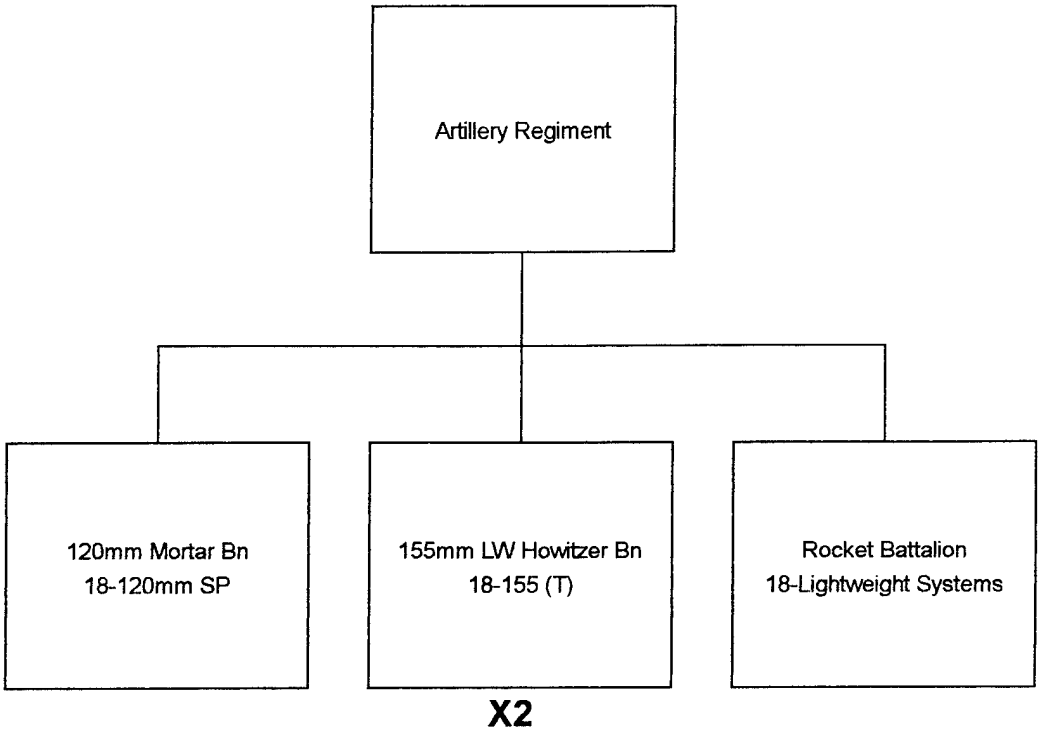
- Infantry Battalions, Companies, and Platoons retain their remaining existing structure.

Armor Organization



- LAR and Tank Battalions are combined into one armored cavalry organization.
  - The battalion performs reconnaissance, security, and advance operations.
  - Additionally it provides a mobile ground-gaining force with significant armor protected firepower.
- There are two active and one reserve Armored Cavalry Battalion.
  - The reserve battalion is identical to the active organization except the battalion is equipped with a training allowance. Each Armored Cavalry Company includes 6 AAAV (Recon) and 4 AAAV (Tank), the separate tank company includes 8 AAAV (Tank), and the Mortar Battery has 6 AAAV (Mortar).
- MPSRONs include one armored cavalry company and a tank company.

Artillery Organization



- One Regiment per 1st and 2d Marine Division.
- 3d Marine Division includes one mortar battalion and one 155 battalion.
- 4th Marine Division includes one rocket battalion, one mortar battalion, and one 155 battalion.

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