The Department of the Navy should augment L-Class amphibious shipping with aviation-capable container ship conversions to increase rotary-wing and tilt-rotor aircraft available to the Amphibious Task Force (ATF) Commander. The Maersk S-Class conversion fits this need and could be integrated into the assault echelon of an amphibious operation.
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STANDARD FORM 298 Back (Rev. 8/98)
FUTURE WAR PAPER

A JEEP CARRIER FOR THE 21ST CENTURY:
INCREASING MARINE AVIATION IN THE ASSAULT ECHELON

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF OPERATIONAL STUDIES

MAJOR ROBERT S. BUNN
UNITED STATES MARINE CORPS

AY 2012-2013

Mentor: Dr Gordon W. Radd, Ph.D., Professor of Military History
Approved: [Signature]
Date: 16 MAY 2013
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Executive Summary

Title: A Jeep Carrier for the 21st Century: Increasing Marine Aviation in the Assault Echelon

Author: Major Robert S. Bunn, United States Marine Corps

Thesis: The Department of the Navy should augment L-Class amphibious shipping with aviation-capable container ship conversions to increase rotary-wing and tilt-rotor aircraft available to the Amphibious Task Force (ATF) Commander.

Discussion: The assault echelon Aviation Combat Element (ACE) of a future ATF is relatively small when compared to the projected fleet of Marine aircraft 10-15 years from now. While the lack of amphibious shipping affects all of the Marine Corps, lives and billions of dollars have been invested to modernize Marine aviation in the last twenty years. This makes realization of that investment in advanced Vertical Takeoff and Landing (VTOL) aircraft all the more important. Given that this modern amphibious air capability is well on its way, the Navy and Marine Corps must look at potential augments to purpose-built amphibious ships to ensure more of these aircraft are employed as the taxpayer expects: from the sea.

This problem is not new. World War II demonstrated the feasibility of converting merchant hulls into aircraft carriers for ferry duties, convoy escort, and in support of amphibious assaults. These Escort or “Jeep” Carriers proved successful despite being slower, smaller, and less protected than fleet carriers. In the Cold War, planners saw a gap in the protection of convoys bringing follow-on forces to Europe and developed a system that could convert a variety of merchant vessels into helicopter carriers for anti-submarine warfare duty. Both examples demonstrate the feasibility and potential success of the concept, while also revealing the challenges of survivability and service paradigms.

Plans currently exist within the civilian maritime industry to produce a modern aviation capable ship from a successful container ship design at a fraction of the cost of a purpose-built aviation capable amphibious ship. This design has many design features of modern aviation-capable ships: large certified flight deck, enclosed hangar deck, multiple aircraft elevators, hardened ordnance magazine, large aviation fuel stores, command and control, and life support facilities. Range and speed at sea are comparable to the newest Landing Platform Dock ships (LPD) with many crewing, leasing and purchase options to fit the desires of the Navy. Like the Escort Carriers of World War II, these merchant conversions lack redundancies in ship’s systems, armor, and fully integrated self-defense systems. Some level of risk would need to be accepted, but embarkation schemes and proper tactics for employment can mitigate some common concerns.

Conclusion: For the cost of one LPD, the U.S. Navy could lease three S-Class Conversion ships and gain upwards of 50 more aircraft in the assault echelon of a Western Pacific crisis and much-needed vessels for transport and training during times of peace or steady state operations. While incurring some risk to force, this could mitigate the greater risk of not properly supporting the assault echelon with aircraft that would otherwise remain stateside for lack of shipping.
Introduction: Confronting the Problem

Emerging from over a decade of conflict, the Marine Corps faces fiscal reductions and mission questions following its recent expansion to fight land campaigns in Iraq and Afghanistan. Despite recent small wars, the nation should sustain capabilities for large-scale operations against a peer competitor—a notion that is reinforced by guidance from political leaders to reorient on the Pacific.¹ If the Navy and Marine Corps believe in addressing a peer competitor scenario, the two services should begin to think differently to overcome current and forecasted shortfalls in amphibious shipping. More specifically, they should confront the challenges in deploying an Aviation Combat Element (ACE) heavily laden with aircraft unable to self-deploy to distant theaters. To help solve this problem, the Department of the Navy should augment L-Class amphibious shipping with aviation-capable container ship conversions to increase the rotary-wing and tilt-rotor aircraft available to the Amphibious Task Force (ATF) Commander.

This proposal will question some commonly held beliefs within the Navy and Marine Corps that keel-up, purpose-built vessels are the only ships appropriate for the assault echelon of an Amphibious Task Force (ATF). An investigation of the current shortfall in terms of aircraft capacity will reveal that even the proposed thirty-ship amphibious fleet requires significant augmentation to transport an ACE the size of a Marine Aircraft Group Reinforced (MAG REIN), or greater, to the objective area. An examination of historical examples ranging from Escort Carriers in World War II to modified merchant ships designed during the Cold War should dispel notions that only purpose-built ships can successfully participate in amphibious operations. Finally, a concept for employing a proposed merchant vessel design within the framework of a large-scale amphibious assault will demonstrate the validity and utility of the proposal.

¹
The Shortfall in Aviation-Capable Amphibious Shipping

While current schemes for amphibious operations focus primarily on the Marine Expeditionary Brigade (MEB) centered on a Regimental Landing Team, the utility of the MEB for forcible entry is limited due to its relatively small size. While much thought is currently being invested into schemes for employing the MEB, the schemes share a common drawback in that they only employ about an eighth of the active duty combat power of the Marine Corps and face challenges in deploying a full Reinforced MAG. ² What if the nation called upon the Marine Corps to conduct forcible entry operations for a follow-on land campaign? Could the Navy and Marine Corps transport an ACE to support a Marine Expeditionary Force-sized Landing Force (LF) to an objective area and conduct a forcible entry operation? After forecasting the amphibious fleet in the 2025-2027 time frame, ³ the current answer is no.

Consider a potential contingency operation in the Western Pacific (WESTPAC) in 2022 requiring an amphibious force to establish a lodgment for a subsequent land campaign on a hostile shore. Assuming current Marine Expeditionary Unit requirements, a Unit Deployment Program rotation, and planned aviation basing, ⁴ rotary-wing and tilt-rotor assets within Marine Forces Pacific (MARFORPAC) would be based in several locations across Southern California, Hawaii, and Okinawa. Furthermore, composite squadrons would already be embarked on two MEUs actively employed in disparate operations. Aggregating a MEB ACE on amphibious shipping presents some challenges, but what would such an ACE look like?

Marine Corps Combat Development Command (MCCDC) scenarios assume a MEF LF at least twice the size of the baseline MEB. ⁵ A double MEB ACE would include 250 aircraft: 60 F-35Bs, 96 MV-22Bs, 40 CH-53Ks, 30 AH-1Zs, 24 UH-1Ys. The ATF would also have to embark 20 Navy MH-60s for Search and Rescue (SAR), potentially more if the MH-60s assume
the Mine Counter-Measures (MCM) mission. The projected ATF would consist of 10 LHD/LHAs, 10 LPDs, and 10 LSDs.\textsuperscript{6} Considering that the LSD has limited aviation capabilities and would probably use some of its aviation-capable deck-space for excess cargo, the ATF would have 20 ships available to embark over 270 aircraft with 80 spots available for spotting and launching the first wave. This might seem an impressive capability, but aggregating this ATF given geographic dispersion of homeports, MEU deployment cycles, and even optimistic ship readiness rates might not be possible.

<table>
<thead>
<tr>
<th>Baseline MEB ACE</th>
<th>Notional Amphibious MEF ACE</th>
<th>2022 Deployable MEB ACE</th>
</tr>
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<tbody>
<tr>
<td>Airframe</td>
<td>Aircraft</td>
<td>Squadrans</td>
</tr>
<tr>
<td>F-35B</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>MV-22B</td>
<td>48</td>
<td>4</td>
</tr>
<tr>
<td>CH-53E</td>
<td>20</td>
<td>1.25</td>
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<tr>
<td>AH-1Z</td>
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</tr>
<tr>
<td>UH-1Y</td>
<td>12</td>
<td>1</td>
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Table 1: MEB ACEs shows the number of aircraft and equivalent squadrons in a MEB and MEF ACE. The far right column shows that an entire Baseline MEB ACE cannot deploy due to lack of amphibious shipping. Notice the paucity of HMLA and HMH capability.

Assuming the U.S. Navy amphibious fleet reaches 33 ships as forecasted for 2022, at any given time an East Coast, Southern California (SoCal), and WESTPAC MEU would be deployed reducing the number of amphibious ships at homeport to 24. If the ships were split between Norfolk and San Diego, each coast would have about 12 L-Class ships—not enough shipping for a MEB, let alone a MEF. Factoring in the scheduled mid-life dry-dock of an LHD\textsuperscript{7} and an optimistic readiness rate of 90%\textsuperscript{8} (all non-mission capable ships are assumed at home port), the remaining amphibious fleet would be further reduced to 20 ships with 10 on each coast. At most, the 3\textsuperscript{rd} Fleet (San Diego) would have 4 big decks (LHD/LHA), and 4 LPDs to get 1 MEF’s ACE to a contingency area—from the projected 33-ship amphibious fleet.
Based on a simple proportional decrease, the available amphibious shipping could potentially transport and fight about 2.5 F-35B squadrons (VMFA), 3.2 MV-22B squadrons (VMM), 1 CH-53K squadron (HMH) and .8 AH-1Z/UH-1Y squadrons (HMLA). While this amphibious air force of a hundred aircraft certainly provides respectable combat power, in a West Coast deployment scenario, it leaves behind approximately six SoCal-based tilt-rotor and rotary-wing squadrons capable of operating from amphibious shipping and another four more squadrons in Hawaii. Leaving that much aviation combat power behind in a crisis notably reduces combat capacity and should open the door for considering non-traditional solutions.

The current limitation in deploying the Marine Corps’ existing and projected aviation is a deficiency that the Department of the Navy should address. Marines depend heavily on aviation for battlefield mobility and fire support during amphibious operations. Furthermore, if such a large portion of the Marine Corps’ rotary-wing fleet cannot get to a crisis area and the MV-22 and F-35B cannot employ their unique capabilities for lack of deck space then it raises the
question: ‘why have such a large and advanced amphibious air force?’ If the force exists, then how does the Navy and Marine Corps get more of it to the fight quicker? This problem is not new, and history provides potential solutions.

**Historical Precedent: Challenges and Successes of Converted Merchant Ships**

The problems the Navy and Marine Corps face today in deploying aircraft across the seas pale in comparison to the problems of the 1940s. Then, as now, there were few high-end carriers and correspondingly few shipyards capable of building them. Even prior to American entry into World War II, heavy carriers were strained, not by combat operations, but by ferry requirements for US Army aircraft to Pacific bases, Lend-Lease deliveries to Great Britain, and training duty for an expanding navy. This strain led to the first conversion of a merchant hull to a carrier vessel subsequently designated CVE-1 *USS Long Island*. However, Navy leadership resisted the merchant conversion concept. They believed any warship incapable of keeping up with the fleet and participating in fleet on fleet actions was a liability and opposed the purchase and employment of these vessels. Only President Roosevelt could overcome service resistance to converted merchant ships with a direct order to the Chief of Naval Operations to act on the escort carrier program “post haste” in September 1940.

Early success of escort carriers built on merchant C-3 hulls in the Battle of the Atlantic and TORCH landings prompted a demand for more such carriers built on hulls that the Maritime Commission could not supply. However, in June of 1942 the successful ship-builder Henry J. Kaiser proposed to the Bureau of Ships a plan to build 30 Escort Carriers in six months if the Navy accepted his design without modification. Again, the Navy resisted, requiring the Commander in Chief to overcome naval bureaucracy with a slight concession to allow the Maritime Commission to oversee the design and construction. As a result, over 50 Kaiser-built
Escort Carriers would serve in the Pacific Theater, where they gained the nom de guerre “Jeep Carrier” for their versatility and abundance.\textsuperscript{13}

Other than the use of CVEs during the Korean War, their employment faded as the speed and high capacity of super-carriers met the needs of the fleet. During the Cold War, however, the requirement to protect convoys reinforcing North Atlantic Treaty Organization (NATO) forces in Europe convinced planners to look for non-traditional means of transporting and employing aircraft at sea. In an economic climate similar to the present, planners in the 1970s sought a cost effective means of converting available merchant shipping to aviation-capable ships quickly and efficiently. The answer was an easily transportable, modular deck and facility system compatible with common merchant hull types that could be installed in a matter of days.\textsuperscript{14}

Known as the Arapaho system, it gained efficiencies through the use of standard containers allowing transportation by various modes and simple installation, thus demonstrating the technical feasibility of merchant ship conversions. In 1982, the Navy installed an Arapaho system on the 18,000-ton Export Leader of the James River Reserve Fleet to test transportability, installation procedures, and flight worthiness. The Arapaho system had a flight deck, hangar module, fuel system, night lighting, power supply, and damage control systems for successful tests involving six different types of military helicopters. With a capacity to deploy four to six SH-3-sized helicopters with organizational maintenance, life support systems, and command and control (C2) modules, the Arapaho system transformed a common ship into a capable helicopter carrier in a matter of hours.\textsuperscript{15} Despite waning US Navy interest, the Royal Navy considered the test effective enough to borrow the system\textsuperscript{16} for a successful deployment to Lebanon installed on a fleet auxiliary ship, thereby reinforcing the feasibility of the concept.\textsuperscript{17}
Despite 13 years of research, development, successful testing, and an operational deployment by an ally, the Arapaho program succumbed to budget pressures and service paradigms and was cancelled in 1985. Officially, the Navy cited the lack of a requirement with the projection of a 600-ship navy, strains on its helicopter fleet, and inability to train and man the detachments required to employ the concept as rationale for letting the Arapaho die. Unofficially, service paradigms contributed as well since converted merchant ships were not high-end combat ships such as Aegis cruisers or destroyers. Yet, the system proved decidedly feasible in both technical and operational terms.

The World War II escort carrier and Arapaho experiences exhibit phenomena common to the quest of developing sufficient aircraft-carrying capacity for crisis situations. These examples indicate the maturity of engineering and construction capabilities required to convert merchant ships into small carriers. Unfortunately, these examples also demonstrate an institutional reluctance to build anything other than “best in class” for the U.S. Navy. Service parochialism aside, concern for the safety and survivability of a platform designed with ease of development and deployment as its hallmarks is warranted and presents challenges to merchant ship conversions. While only forceful political leadership may overcome service paradigms, any merchant ship conversion design must directly address the issues of safety and survivability. Fortunately, today’s maritime industry has well-developed plans that address survivability, provide ample capability, and do so at less than a quarter of the cost of a new LHA which may help address service reluctance in a degrading economic climate.

A Proposed Design: The Maersk S-Class Conversion

Submitted in response to the original Afloat Forward Staging Base (AFSB) concept for special operations and proposed for the Maritime Prepositioning Force of the Future MPF(F), the
Maersk Line Limited (MLL) S-Class Conversion adapts a proven hull and power plant design that could meet the needs of seaborne aviation at a fraction of the cost of a new LHA. While the future of the MPF(F) and AFSB remains unclear, the S-Class conversion, even when analyzed in isolation from its parent concepts, remains a capable design with the potential to dramatically increase aircraft available for an amphibious assault. Furthermore, Maersk has already completed detailed designs under the supervision of Military Sealift Command (MSC), meaning the proposed capabilities are engineered solutions that have already overcome significant technical and bureaucratic hurdles.

![Figure 1: Maersk S-Class Conversion](image)

With regard to aircraft capacity for both ferry and operational missions, the Maersk design offers significant capability. In a ferry role, the S-Class Conversion would stow 72 H-46 equivalent sized aircraft in an environmentally controlled hangar below the flight deck. This equates to 58 AH-1Zs or 32 MV-22s in terms of contemporary aircraft. The Maersk Company
claims the flight deck can accommodate the launch and recovery of 12 to 15 MV-22s. With a Naval Air Systems Command (NAVAIR) certified flight deck 660 feet long and 120 feet wide, two elevators, access to ordnance magazines, and flight deck refueling from the 1 million gallons on board, the S-Class conversion has the potential to move and employ operationally relevant numbers of aircraft. Although the commercial design does not incorporate the same level of compartmentalization and redundancies as contemporary L-Class warships, the Maersk design incorporates two-compartment damage stability, Chemical Biological Radiological Nuclear (CBRN) protection features, and hardened ordnance magazines among other survivability characteristics. While risk to both mission and force in terms of survivability is higher when compared to L-Class ships, the S-Class compensates in terms of capability and both time and cost for construction and deployment.

Much like the escort carriers of World War II and the Arapaho concept, Maersk builds upon a proven and readily available merchant hull in the S-Class container ship. As a merchant vessel, the S-Class carefully balances efficiency with capacity in its design to remain competitive in an industry known for thin profit margins. Thus, the baseline vessel can sustain 25 knots with a range of 15,000 miles before refueling. The conversion allows Underway Replenishment (UNREP) capability by both vertical (VERTREP) and alongside connected (CONREP) methods. These characteristics are comparable to the U.S. Navy’s newest amphibious ships, the LPD-17 San Antonio class, which can steam at 22 knots for 10,000 nautical miles. Therefore, the S-Class can keep up with a modern ATF.

The S-Class ship operates with economy in mind. More so than navy ships, merchant vessels must keep manpower costs at a minimum. Consequently, Maersk has developed operating and maintenance procedures that keep the crew of an average S-Class vessel at about
and 82 for a ship fully loaded with troops.\textsuperscript{25} Maersk keeps manpower low through automation of systems from navigation to power plants and industry standard maintenance techniques.\textsuperscript{26} The modularized nature of the Maersk design provides flexibility in meeting a variety of mission sets while remaining adaptable to changing threats and requirements over the life of the vessel.\textsuperscript{27} The components of the conversion are predominantly modules based on International Standards Organization (ISO) 40ft shipping containers and can be installed by American shipyards in 18 months for about $450 million.\textsuperscript{28} Ranging from command and control to life support variants, these modules allow for a wide array of adaptations that can meet unforeseen challenges, thereby increasing the versatility of such ships.

Maersk further enhances versatility with robust cargo capacity and transfer features. The conversion optimized for Marine use would provide berthing for at least 1,000 troops, storage for the equivalent of 144 High Mobility Multipurpose Wheeled Vehicles (HMMWV), and selective offload capacity for up to 200 ISO containers while maintaining previously described aviation capabilities.\textsuperscript{29} The design can accommodate hospital modules with an option for a transverse tunnel with dry well capability for Landing Craft Air Cushion (LCAC) loading launch and recovery. Although these design features may signify the same design creep seen in other military projects, basing the conversion on standard containers, commercial hulls, and powerplants should restrain cost and add to the overall utility of the S-Class conversion ship.

In addition to developing a robust design, Maersk has a proven track record with the U.S. Government in other maritime programs, which might ease integration with the U.S. Navy. As an American based company owned by the Danish AP Moeller-Maersk Group, Maersk Line Limited (MLL) contributes over 30 vessels to the American flagged merchant fleet,\textsuperscript{30} participates in the Voluntary Intermodal Sealift Agreement, Maritime Security Program, and has been
involved in the MPF since its inception. Building on this relationship, the MLL proposal includes a 5-year charter contract that includes crew, maintenance and an option to buy the vessel at the end of the charter. If the government decides not to renew the program, the modular design allows for return to merchant shipping or potential strategic sealift thereby reducing risk to both the government and MLL. Although the particulars of the contract and requested features could easily increase the cost, the U.S. Navy could replace one planned LPD-17 costing $1.3 billion for three S-Class conversions, with a significant increase in aircraft lift.

Although the conversion could occur in American shipyards, the hull and power plant are not built in the United States, which might decrease political and bureaucratic support for the design. The employment of civilian mariners on potential combatants complicates employment of the vessel in potential war zones, though experiences in WWII and the current MPF construct seem to diminish those concerns. Finally, the risks associated with platforms designed to different survivability standards than U.S. Navy warships may detract from the appeal of the Maersk design. The S-Class, however, would not be employed in a hostile maritime environment unescorted. During his tenure as the Commanding General of MCCDC, General James N. Mattis supported limited survivability for MPF(F) platforms while suggesting employment in the assault echelon to benefit from defensive systems on accompanying U.S. Navy warships. In spite of the drawbacks, Maersk’s S-class conversion demonstrates that economical and adaptable solutions exist and are ripe for exploitation given the will to accept a modest increase in risk.

What remains is a concept for employment.

**Potential Employment of the S-Class Conversion**

Given current fiscal constraints, funding for the S-Class conversion would likely come at the expense of another platform. Therefore, the following scenario investigates a situation where
the purchase of one LPD-17 is replaced by three S-Class conversions. As the exchange suggests, the S-Class conversions would be included in the Assault Echelon of large ATF formations and integrated into training and exercise schedules to maximize utilization. Since a major component of the current problem is simply getting combat power into a theater of operations, these vessels should be based near large concentrations of U.S. Marine aviation formations to enhance mobilization. For the purposes of this scenario, these ships might be designated Escort Carrier, Conversion (CVEC) and could be based in Pearl Harbor, Hawaii (CVEC-1), Wilmington, NC (CVEC-2), and San Diego, CA (CVEC-3). Basing these vessels near garrisoned forces is critical to exploiting their flexible and adaptable nature for training, crisis response, and non-combat contingencies.

<table>
<thead>
<tr>
<th>Ship</th>
<th>Location</th>
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<tbody>
<tr>
<td>CVEC-1</td>
<td>Pearl Harbor, HI</td>
</tr>
<tr>
<td>CVEC-2</td>
<td>Wilmington, NC</td>
</tr>
<tr>
<td>CVEC-3</td>
<td>San Diego, CA</td>
</tr>
</tbody>
</table>

Table 5: CVEC Locations depicts basing of S-Class conversion vessels, designated as CVECs in this scenario.

During periods of low operational tempo, the vessels at these locations could provide higher operational readiness through increased training availability. Active duty helicopter squadrons currently struggle to meet shipboard training requirements given the scarcity of amphibious ships. Qualifying the minimum number of pilots to meet the demands of the next MEU deployment remains a challenge today with almost no shipboard training opportunities available for non-MEU pilots. Furthermore, Hawaii-based squadrons of MAG 24 do not have locally based amphibious ships for training, which results in ad hoc measures for shipboard qualifications and reduced readiness. These training issues further complicate efforts to provide an ACE to the ATF and reinforce the need for an economical and readily available solution.

Basing the S-Class conversions near large concentrations of Marine aircraft not only improves readiness through increased training opportunities, it could accomplish this task for less than the approximately $100,000 per day cost of an LHD supporting rotary wing training.
Another potential use of the conversion during peacetime would be in disaster relief operations within the United States. In the aftermath of hurricane Katrina, several Navy ships deployed on short notice to provide a wide array of services including platforms for search and rescue aircraft, thereby increasing the strain to an already busy amphibious fleet. Employed in these scenarios, the commercial merchant roots of S-Class conversions would carry less stigma when compared to the presence of a warship, thereby further enhancing relief efforts. With modifications, the S-Class conversion might also be optimized with hospital and life support modules for short or long-term relief efforts.

Keeping these vessels operational and home-ported in the United States clearly offers advantages for training and humanitarian aid. The primary purpose in procuring these vessels, however, would be to participate in large ATFs. Since these vessels would not be incorporated into regular MEU deployments, they could quickly return from training sorties at the first sign of crisis to begin loading and aggregation with an ATF.

Loading of the ships would reflect the assets near their homeports more than an employment methodology specific to the design of the ship. However, the California and North Carolina-based vessels have potential for use similar to CVEs in WWII ATFs: as attack carriers. Given the density of H-1s in these two regions and the paucity of attack helicopters in the current MEB ACE construct, primarily loading H-1s on CVECs 2 and 3 could significantly increase combat power to both the ATF and Landing Force. This would free up space on the other ships for other assault support assets and reduce the strain on LHD/LHA deck cycles inherent in H-1 ordnance procedures. With such an approach, almost two HMLA squadrons of H-1s could be loaded in the hangar deck while six H-1s remain on the flight deck spotted for the initial wave. Reduction of operational landing spots for the transit could further increase the ferrying capacity
in this configuration. From a survivability perspective, this option would only embark essential ACE personnel and optimize remaining space for cargo, thereby decreasing material and personnel losses in the case of battle damage while increasing survivability of the fleet through increased aircraft available for defense of the ATF.

In the case of a WESTPAC crisis, upon loading the I MEF LF on to the assault shipping of an ATF—designated Task Force 36—it would sail west from San Diego and rendezvous in the Central Pacific with CVEC-1 from Hawaii. CVEC-1 would embark non-tiltrotor elements of MAG 24 since this group’s MV-22s could island hop to an advanced base at the first sign of crisis and participate in advanced force operations, possibly using TF 36 to refuel along the way. En route, CVECs 1 and 3 might combine with escorts for protection and appropriate naval C2 to form Task Group (TG) 36.5\(^\text{37}\) to steam under the defense afforded the rest of the task force, maximizing the symbiotic effects from defensive systems on more advanced platforms.

Closing on the objective area, if the primary threat is from mines, small boats, and land based anti-ship cruise missiles, TG 36.5 would echelon behind the majority of the landing forces to retain threat standoff, while remaining in range of the embarked aircraft. If aircraft, submarines, and more advanced surface forces are a threat, TG 36.5 would remain with the majority of TF 36 to maximize screening from escorts and air assets. In either case, the forward landing spot would support a SAR MH-60 while six more spots forward of the super structure would accommodate arrival and departure of division (3-4 aircraft) sized formations of AH-1s
and sections (2 aircraft) of UH-1s. Space would still remain for stowage of aircraft cycling on and off the flight deck known as “slashing” as depicted in Figure 3. The three deck spots aft of the superstructure would support cargo operations via CH-53 and VERTREP operations. In the echeloned scenario, the H-1s could use big decks and LPDs closer to the objective area as “lily pads” to refuel and rearm to maximize on station time and generate additional sorties prior to returning to the CVECs for crew relief or maintenance. In such a scenario, TG 36.5 could also act as a lily pad for MV-22s operating from an advanced base.

If and when the ACE flows ashore, the CVECs might remain on station to facilitate continued logistical support to operations ashore and augment Aviation Logistics Support Ships (T-AVB) for intermediate level aircraft maintenance. The CVECs could also return to other bases to ferry more aircraft into the objective area to include Army and Air Force assets. During Phase IV operations, the ships could serve as mobile bases for special operations, much in line with the original AFSB concept. Finally, as seen in the redeployments from Iraq and Afghanistan, retrograde of vast stocks of equipment from combat zones is not a simple or cheap task. S-Class conversion ships could
bring immense capacity in terms of return of aircraft and equipment for repair and reintegration to the operational forces.

Figure 4: Operating Concept depicts the employment of CVECs in an amphibious operation with a shore-based threat to shipping. The red line indicates the shore-based threat to the ATF, which decreases with range. The yellow indicates the ships of the ATF have increased survivability due to their design features yet are still at risk. Notice the LPD 'Lily Pads' and the Ospreys operating from and advanced base using the CVEC in a similar manner.

Conclusion: A Solution Exists

Despite a decade of relatively secure defense funding, the U.S. Navy fleet continues to shrink due to spiraling acquisition costs. At the same time, significant maintenance demands increase challenges to a strained fleet with no evidence to suggest these trends will improve in the near future. An unstable fiscal environment and unwillingness to make major compromises in
warship designs on the part of both the Navy and Marine Corps compound the problem to make further reduction to the amphibious fleet highly likely in the near future.

Meanwhile, the Marine Corps has invested billions of dollars, decades of research and development, and lives in the new generation of VTOL aircraft, yet risks leaving these aircraft sidelined in the next crisis for lack of aviation-capable shipping. Marine aircraft that cannot fight from the sea are redundant to aviation assets from the other services and potentially irrelevant. Since the majority of the Marine Corps' new aircraft have been purchased, naval leaders should ensure that taxpayers get a return on their investment by maximizing relevancy of these aircraft in a crisis. While the solution may incur some risk and departure from service paradigms, both history and contemporary designs provide an answer in the form of converted merchant ships. As shown, modern designs allow for a flexible and efficient combat multiplier that serves both the military and civilian industry. The nation can ill-afford another drain on the budget and the naval services need more aircraft capacity for amphibious operations. The solution exists, and the time is right to build a Jeep Carrier for the 21st Century.
Citation and Endnotes


2 Note: Considering the Marine Corps currently has 8 active duty Infantry Regiments.


6 Note: Colloquially known as “Big Deck Amphibs.”

7 “Assault Echelon Shipping,” Slide 2.


9 Note: F-35B squadrons left behind are not included in this calculation due to uncertainty of their basing and deployment means. Furthermore, F-35Bs have better capability for self-deployment, although at the cost of a strained tanker fleet and potential lack of basing in the objective area.


13 Morison, pp 40-41.


16 Mulquin, “Arapaho Update”, 104.


Maersk presentation to OSD, Slide 4.


Maersk presentation to OSD, Slide 4.

Department of the Navy (DoN), “LPD-17 Selected Acquisition Report,” 31 Dec 11, 9.


Unattributed meeting with Maersk representative, November, 2012. Note: The source wishes to remain anonymous due to a potential for perceived conflicts of interest.


“Maersk Advances its At-Sea Staging Base Concept.”


Email correspondence with 3dMAW G-3 staff section, 14 December 2012.


MCCDC SID, “Baseline MAGTFs,” Information Brief, 1 September 2012, Slide 4. Note: Only one HMLA of 15 aircraft supports the current MEB, two in a MEF ATF.

Note: These designations are notional and provided for the sake of clarity through the scenario. While Task Force 36 would likely be the designation of 3d Fleet’s Amphibious Task Force, Task Groups are designated as required.
Bibliography


Marine Corps Combat Development Command, Baseline MAGTFS. Information Brief, September 1, 2012.


Marine Corps Combat Development Command Seabasing Integration Division, Assault Echelon Shipping, Report, September 2012.


