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The 2019 Commandant's Planning Guidance predicts that future war will occur across widely dispersed maritime terrain, where adversaries actively contest every domain and hold Marine "contact layer" forces at risk. This work will examine how assault support doctrine must be reexamined for use in a contested, high intensity conflict. This work also seeks to analyze the utility of assault support operations in future Marine Concepts, including Distributed Maritime Operations, Expeditionary Advanced Basing Operations, and Littoral Operations in a Contested Environments. Finally, this work examines specific CH-53 Mission Essential Tasks in future war scenarios.

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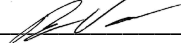
**FUTURE ASSAULT SUPPORT CONCEPTS: HEAVY VERTICAL LIFT IN A2AD
ENVIRONMENTS AND HIGH INTENSITY CONFLICT**

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

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Executive Summary

Title: Future Assault Support Concepts: Heavy Vertical Lift in A2AD Environments and High Intensity Conflict

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Thesis: Despite the limitations of assault support aircraft, the CH-53 brings a unique heavy vertical lift capability to the future battlefield and provides Marine and Naval commanders a vital degree of flexibility to conduct air mobility and assault support missions.

Discussion: The Commandant's Planning Guidance has initiated a radical redesign for the Marine Corps away from decades of low intensity counterinsurgency warfare in a desert environment. The current predictions for future war occur across widely dispersed maritime terrain, where adversaries actively contest every domain and hold Marine "contact layer" forces at risk with long range precision fires. Current assault support aircraft are the product of over 70 years of relatively uncontested American air superiority and conflicts against technologically inferior adversaries. Doctrinal relationships between assault support and air superiority aircraft are not designed or prepared for use inside a peer adversary's weapons engagement zone. This work will examine how assault support doctrine must be reexamined for use in a contested, high intensity conflict. This work will also seek to analyze the utility of assault support operations in future Marine Concepts, including Distributed Maritime Operations, Expeditionary Advanced Basing Operations, and Littoral Operations in a Contested Environments. Finally, this work will address specific CH-53 Mission Essential Tasks in future war scenarios.

Conclusion: Redesigning doctrine to enable integration with anti-air warfare assets, reexamining risk assessment and threat mitigation measures, and training aircrew to innovate, adapt, and think creatively in a contested environment will enable assault support operations in future war.

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Preface

As a CH-53E pilot, I felt the need to address concepts of assault support in a future war. Many future war discussions emphasize the advancement and proliferation of anti-access, area denial technologies and the increasing vulnerability of aviation, especially assault support platforms, in conflicts against peer or near-peer adversaries. Assault support platforms and doctrine cannot remain stagnant as the Marine Corps redesigns itself according to General Berger's planning guidance, and I wanted to explore ideas on the utility of the Marine Corps' heavy vertical lift capability as the force pivots to meet our "pacing threats."

I would like to thank Major Pedro Ortiz for getting the Gray Scholars going, and Professor Brandon Valeriano for picking us up and providing guidance down the home stretch. Additionally, I would like to thank Professor Jill Goldenziel and Lieutenant Colonel Ken Goedecke for leading an illuminating and intellectually stimulating class this year, and the rest of CG-15 for the thoughtful discussions, camaraderie, and side antics. To all who contributed thoughts, ideas, feedback, proofreads, pilot-to-grunt and Marine-to-civilian translations, and support in other innumerable ways, I could not have done it without you.

Introduction

The concepts of “air assault” and “air mobility” are rarely addressed in conversations of conflict against peer adversaries. As described by Marine Corps Tactical Publication (MCTP) 3-20E, “Assault support enhances the Marine Air Ground Task Force (MAGTF) commander’s ability to concentrate strength against the enemy’s selected weaknesses using speed and surprise, focus combat power at the decisive place and time, exploit opportunities created during combat, and sustain combat power.”¹ The Marine Expeditionary Unit (MEU), noted by General Charles Krulak in 1995 to be the “crown jewel” of the Marine Corps, exemplifies using speed and surprise to focus combat power.² The MEU’s composition, training cycles, deployment standards, and mission essential tasks (METs) are designed to create a highly mobile unit capable of responding quickly across a wide range of military operations (ROMO). Helicopter and tiltrotor assault support aircraft attached to the Aviation Combat Element (ACE) enhance the MEU commander’s ability to respond to crisis by maneuvering forces and providing logistics support through the air domain.

The CH-53E Super Stallion and the MV-22B Osprey are, according to the 2019 Marine Aviation Plan, the “backbones” of the Marine Aviation fleet.³ These aircraft have been key elements of Marine contingency and combat operations since achieving operational capability in 1981 and 2007 for the CH-53 and MV-22 respectively. While these aircraft have reliably served in assault support roles in “every clime and place”, neither platform has seen conflict against a peer adversary with aircraft and air defense capabilities that match those of the US.

In a modern age of Integrated Air Defense Systems (IADS) composed of diverse detection and targeting systems, advanced radar and infrared anti-air missiles, and increasingly lethal air defense artillery, a Marine Commander’s options for maneuver are extremely limited

by the tools and capabilities that can currently be fielded by a MEU. An argument may be made that of all the platforms employed aboard amphibious shipping, assault support aircraft are the most limited in modern anti-access (AA) and area denial (AD) environments. Large radar cross sections, complex logistical and maintenance requirements, and lack of anti-air defense systems all place the current inventory of Marine Corps assault support platforms at a severe disadvantage in conceptualized future high intensity conflicts.⁴ These limitations are alluded to in General Berger's 2019 Commandant's Planning Guidance (CPG) to the Marine Corps, which focuses on redesigning the force to persist and fight in modern A2AD environments.

The CPG states, "As the force-in-readiness, we are not an across-the-ROMO force; but rather, a force that ensures the prevention of major conflict and deters the escalation of conflict within the ROMO." The force General Berger envisions is one that is capable of surviving, enduring, and fighting in a contested environment against a peer or near peer adversary- which questions whether assault support aircraft such as the MV-22 or especially the aging CH-53 have role in that future force. General Berger continues, "Our future force... will require divesting of legacy capabilities that cannot be economically adapted to meet the demands of the future, while also taking calculated risks in some areas."⁵ Is the CH-53, and the vertical heavy lift capability it brings to the battlefield, a legacy capability that future Marines will have to do without?

There are several key drawbacks to the employment of CH-53s in the future. First, the radar cross section of both the CH-53E and its successor, the CH-53K are relatively large, especially when conducting external sling load operations. As with all rotary wing aircraft, the CH-53 is also vulnerable to Doppler radar systems.⁶ Modern adversary A2AD systems are more likely to detect and successfully engage the CH-53, and the helicopter is vulnerable to increasingly complex IADS. Secondly, the CH-53 carries a relatively large logistical footprint. A

standard four aircraft Helicopter, Marine, Heavy (HMH) detachment to a MEU requires approximately 50-60 aircrew, maintenance, and support personnel to operate, as well as an extensive maintenance logistics system. Finally, heavy lift helicopters are an expensive precision capability. The price tag on the CH-53K is currently estimated to be \$122-\$131 million per airframe, depending on how many aircraft the Marine Corps purchases or can sell to foreign militaries such as Germany.⁷ These three factors reveal the CH-53 as a platform that does not neatly fit into the Commandant's concept of a "stand in force," comprised of "low signature, affordable, and risk-worthy platforms."⁸

Despite the limitations of assault support aircraft, the CH-53 brings a unique heavy vertical lift capability to the future battlefield and provides Marine and Naval commanders a vital degree of flexibility to conduct air mobility and assault support missions. The Heavy Lift Helicopter Requirements Analysis conducted by Marine Corps Combat Development Command (MCCDC) in 2014 reinforces the concept that a heavy lift helicopter, capable of carrying all but the heaviest equipment in the Marine Corps inventory, provides an essential capability to the MAGTF to be able to operate from ship-to-shore and maneuver throughout the battlespace.⁹ This work will address three issues regarding the use of assault support in future conflicts: first, the history of assault support and air mobility doctrine will be analyzed against present day peer and near-peer A2AD capabilities and high intensity conflicts. For evidence, this section will examine the conclusions of several studies on future war trends, specifically regarding the lack of air supremacy, and examine how current assault support doctrine is suboptimal for operations in a contested environment. Second, it will examine the viability and applicability of executing assault support operations in an A2AD environment and high intensity conflict. This will compare assault support capabilities specifically regarding the characteristics of future A2AD

environments and the future war concepts developed by the Marine Corps Warfighting Lab (MCWL). Finally, this work will analyze the applicability of current CH-53 METs and Training and Readiness (T&R) events in support of Expeditionary Advanced Basing Operations (EABO), Distributed Maritime Operations (DMO), and Littoral Operations in a Contested Environment (LOCE). In conclusion, this work will examine some possibilities for the future development of assault support, and the importance of heavy vertical lift in future war.

Background: Doctrinal Concepts of Speed and Focus of Effort

The Marine Corps has been refining assault support doctrine for over 70 years. During World War II, utilizing combined arms and coordinating land, maritime, and air forces across all domains ultimately manifested in the concept of the MAGTF, an integrated air-ground task force capable of conducting assault operations from amphibious ships. Since the Vietnam War, Marine assault support aircraft have operated in environments where almost complete air supremacy exists, and assault support doctrine has been refined and optimized to conduct counterinsurgency and low-intensity operations. This has led to a fundamental disconnect between antiair warfare (AAW) and assault support operations in current doctrine, which must be resolved in the future to successfully operate in contested A2AD environments and high intensity conflicts. This section will examine the history of Marine Corps assault support doctrine and analyze current doctrinal shortcomings.

Current Marine Corps assault support doctrine is rooted in the detonation of the atomic weapons *Able* and *Baker* as part of Operations Crossroads above Bikini Atoll in 1946.¹⁰ The senior Marine present for the tests, Lieutenant General Roy Geiger, was concerned that sea-based forces were critically vulnerable to a devastating nuclear attack while massed for an amphibious assault.¹¹ The Marine Corps' answer to the atomic threat in 1948 was the

publication of *Amphibious Operations- Employment of Helicopters (Tentative)*, more commonly referred to as Phib-31. Phib-31 introduced a tentative doctrine regarding the employment of vertical lift capabilities in future Marine operations. Key characteristics in the use of helicopters were the “ability to circumvent powerful beach defenses” and accelerate and disperse the ship-to-shore movement in amphibious operations.¹² But the authors of Phib-31 were uncertain as to the direction and future of the Marine Corps in the atomic age. The ideas and concepts formulated in Phib-31 had no foundation in previous doctrine; then-Colonel Victor H. Krulak, one of the Phib-31 authors, recalled that “we had so little to go on, no data; just conviction” in the formulation of helicopter doctrine and tactics.¹³ Through rigorous experimentation, tests, and evaluation by Marine Helicopter Squadron 1 (HMX-1), helicopter concepts eventually worked their way into Marine Corps landing force techniques and procedures.¹⁴

The Korean War provided a combat environment for testing vertical lift concepts and accelerated the development of the helicopter program.¹⁵ Brigadier General Edward Craig, commander of the 1st Marine Provisional Brigade, was impressed by the versatility of helicopters during the conflict. In the mountainous terrain of the Korean peninsula, Marine helicopters performed missions such as “liaison, reconnaissance, evacuation of wounded, rescue of Marine flyers downed in enemy territory, observation, messenger service, guard mail at sea, posting and resupplying of outguards on dominating terrain features and the resupplying of small units by air” as well as serving as mobile command and control platforms.¹⁶ These missions proved the helicopter’s capability to deploy and conduct combat operations from the sea and solidified the role of helicopters in the Marine Corps.

Helicopter doctrine continued to be developed into the next large-scale Cold War conflict. But instead of the Soviet peer adversary envisioned in Phib-31, the Marine Corps found

itself in combat against the technologically inferior and highly mobile Viet Cong. In 1971, revised Fleet Marine Force Manuals underscored the helicopter's capability to "move infantry and provide direct support to artillery units" and "provide the commander greater flexibility and depth on the battlefield."¹⁷ These new principles of air assault were quickly adapted to the low-intensity conflict. The advent of the CH-53A in Vietnam enabled the Marine Corps to pursue a "checkerboard concept," where fire support bases and highly mobile heliborne infantry operated in mutual support of each other in dispersed and flexible formations. Helicopters also enabled an evolutionary air logistics grid that enabled Marines to pursue their distributed Combined Action Program in isolated Vietnamese villages.

The original tenets of vertical lift doctrine in the formulation of Phib-31 were not truly tested in the "helicopter war" in Vietnam.¹⁸ Commanders were able to employ mobile forces more flexibly, but Vietnam was a very different war than the high intensity conflict against a peer adversary envisioned by Lieutenant General Geiger in 1946. In a low-intensity conflict against a technologically inferior enemy force, helicopters were used to concentrate combat power rapidly at desired locations rather than enabling a dispersed ship-to-shore movement to protect against an atomic strike. Additionally, Vietnam pioneered the use of the CH-53 into expanded assault support roles, to include operating as a "flying crane" capable of lifting any other Marine helicopter at the time.¹⁹ These expanded roles were optimized for flexibility and mobility in an environment where US air forces could ensure air superiority for the conduct of assault support operations.

The refinement of assault support techniques against technologically inferior adversaries has carried through to the present, and helicopter tactics and doctrine have never been tested in a high intensity conflict against a peer adversary. Instead, helicopter doctrine has been adapted

through the Korean War, Vietnam, contingency operations, and most recently in Afghanistan and Iraq, to provide ground commanders flexibility and capability under an assumed umbrella of American air supremacy. Current Marine assault support aircraft and doctrine, especially for the CH-53, are challenged by modern A2AD capabilities. Specifically, weapons systems and technologies capable of detecting, denying access, and restricting assault support platforms the capability to maneuver within an area of operations are becoming less expensive and more widely proliferated around the world. Furthermore, potential adversary weapons systems can target the ships and airfields from which the CH-53 operates, limiting the ability of a naval force to approach a position to even launch assault support platforms. Every aspect of the CH-53's employment carries substantial risk in a modern A2AD environment.

In a high intensity conflict, where air superiority will be temporary and a secure "rear area" will be actively contested, utilizing assault support aircraft is even more risky. The 2009 Air Sea Battle Conceptⁱ (ASB) and future wargaming scenarios characterize future conflicts as initiated with little to no warning, rapidly escalated, costly, and highly attritive. Additionally, planners anticipate that every domain will be contested by adversary forces and capabilities.²⁰ If the Marine Corps is going to successfully serve as a "contact layer", then assault support aircraft must help the force survive as a conflict escalates from "contact" to "blunt," and doctrine must be prepared to operate in a contested A2AD environment.²¹

The Marine Corps current doctrinal publication, MCTP 3-20E Assault Support, discusses air superiority mainly in terms of escorts and suppression of enemy air defenses (SEAD). In traditional air assaults, these roles were primarily filled by attack helicopters or fixed wing

ⁱ The 2009 Air Sea Battle Concept was a Pentagon effort to counter A2AD threats. In 2015, the concept was folded into a new Joint Concept for Access and Maneuver in the Global Commons, which allowed further incorporation of land forces. Sam LaGrone, "Pentagon Drops Air Sea Battle Name, Concept Lives On," *USNI News*, January 20, 2015, <https://news.usni.org/2015/01/20/pentagon-drops-air-sea-battle-name-concept-lives>.

aircraft attached to a MEU.²² The primary method of escort in a high or medium threat environment is “attached”, in which the escorting aircraft “maintain close contact with the assault force” and provide “visual weapons coverage and responsive fires for threat engagement.”²³ MCTP 3-20E assumes that the escort aircraft will be part of a dedicated assault force; however, in a high intensity conflict, air superiority aircraft acting in these roles will not be tied directly to assault support aircraft, but rather be responsible for providing temporary local air superiority (TLAS) over a defined sector. This responsibility will almost certainly take the “escorting” aircraft out of visual weapons coverage as they act in offensive counter air and defensive counter air roles. Future assault support operations in contested environments and high intensity conflicts will require greater coordination with joint and combined force air superiority assets beyond the scope of current doctrine, which regulates them to narrowly defined escort and SEAD roles.

The MCTP 3-01B Air Assault, updated in 2018, does little to elaborate on the idea of assault support in contested environments. The publication’s sentiments can be summed up in the opening sentence of the Air Defense section: “Air Assault operations conducted in areas of the battlefield where the MAGTF does not enjoy air superiority will be difficult.”²⁴ The tactical publication makes no reference to MCTP 3-20C Anti-air Warfare, again assuming that air superiority aircraft will be part of a coordinated air assault “package” in the dedicated SEAD or escort roles. MCTP 3-20C mentions that “scheduling and coordination” with assault support functions should be made in preemptive offensive AAW strike operations, but fails to truly address the role of escort aircraft and air superiority measures that should be taken to enable assault support operations.²⁵ In a high intensity conflict against a peer adversary where air superiority is temporary and can be rapidly compromised, this is an unsatisfactory solution.

These omissions indicate that current Marine Corps doctrine is not formulated for operations against a peer adversary, or for situations where nearly total air superiority does not exist. Consideration must be given to how assault support operations will coordinate and integrate with Marine, joint, and combined air superiority assets providing TLAS.

The most affected portion of assault support operations in a high intensity conflict or a contested A2AD environment is the air movement plan. Doctrinally, the ground scheme of maneuver drives the landing plan, which in turn drives the air movement plan with input from the air mission commander and ground commanders.²⁶ However, while operating in a contested air domain, assault support planners must also coordinate with the agencies responsible for providing TLAS. Air superiority and assault support planners must both consider contingencies where TLAS is degraded or lost, and mission commanders must delegate authorities to the responsible air superiority agencies. How and when friendly forces can establish and maintain TLAS will dictate the air movement plan during assault support operations.

As already indicated, Marine Corps helicopter or assault support doctrine has never been applied in a high intensity conflict against a peer adversary, and doctrinal publications reflect the assumption that air supremacy will exist for the conduct of assault support operations. In some ways, current doctrine will have to return to the precepts of Phib-31 on how to successfully distribute forces and avoid being targeted by a peer adversary. Relationships and coordination between air superiority and assault support missions will have to be reevaluated to determine how to maximize survivability in a high intensity conflict against peer adversary threats.

The CH-53 and Assault Support in A2AD/High Intensity Conflict

While complex IADS, increasingly capable A2AD structures, and peer adversary AAW capabilities all increase the risk to assault support aircraft, the character of high-intensity

conflicts also increases the demand signal for assault support missions. CH-53s can still be operated at increased risk in an A2AD environment, and assault support operations will continue to provide an essential capability to MAGTF and Naval commanders. This section will analyze the characteristics of an A2AD environment and its effects on future assault support operations, as well as the increased capability assault support operations provide across the Force Protection, Maneuver, and Logistics warfighting functions.

International Security analysts Stephen Biddle and Ivan Oelrich contend that the common conception of adversary (specifically Chinese) capabilities and advancements in the realm of A2AD technologies are “highly effective” and spell the end of the United States’ ability to operate from the global commons.²⁷ However, their analysis shows that these increased capabilities do not mean that the Chinese will instantaneously be able to detect, target, and engage any US forces operating in the western Pacific at the onset of a hypothetical conflict. In examining the limits of A2AD technologies and capabilities, the study “Future War in the Western Pacific” finds that it is unlikely that China will be able to conduct sea denial beyond the Second Island Chain, and that “Far from becoming a Chinese lake, the air and ocean surface within the First Island Chain is more likely to become a wartime no-man’s-land (or no-man’s-sea), wherein neither side enjoys assured freedom of movement.”²⁸ While operations and maneuver conducted on the outside of the First Island Chain will occur within the China’s Weapon Engagement Zone (WEZ) and should expect to be contested, China’s ability to conduct area denial will not be as total as a simple examination of their weapons system capabilities and ranges would imply.

The Black Sheep Squadron Wargame conducted by MCWL reinforce this “no-man’s land” perception. During the wargame, neither US nor Chinese air forces were able to

consistently maintain air superiority during the high intensity conflict. Similarly, US forces were not able to entirely deny access to Chinese long-range missiles, stealth aircraft, and radar detection systems, but could threaten and impose a high cost on Chinese incursions into defensive areas.²⁹ This wargame is representative of the environment where the Marine Corps is choosing to employ its littoral amphibious forces, within the adversary's WEZ, with the mission to hold enemy forces at cost while "sinking ships and shooting down planes."³⁰ Assault support operations can be flown in these areas with an acceptable amount of risk with air superiority forces surged to provide TLAS.

The Naval and Marine Corps DMO,ⁱⁱ EABO,ⁱⁱⁱ and LOCE^{iv} concepts all reflect perceptions of what the Marine Corps' role in supporting a Joint Force Maritime Component Command (JFMCC) will be in future conflicts. Initially distributed in the 2019 CPG and more recently manifested in newly-appointed Chief of Naval Operations Admiral Gilday's Design for Maintaining Maritime Superiority, these concepts indicate a shift for the Marine Corps away from the last eighteen years of counterinsurgency warfare in the desert.³¹ The Marine Littoral Regiment (MLR) is the newest Marine Corps innovation, combining elements of a traditional MAGTF into a littorals-based unit capable of integrating with and supporting a naval task force. The MLR is designed to help commanders achieve sea control and sea denial in key maritime

ⁱⁱ DMO envisions a distributed force that exploits integration of capabilities and maneuver in all domains to mass effects at the time and place of its choosing. Naval Warfare Development Command (June 7, 2019), message card-unclassified received as an email attachment from Major Pedro Ortiz, Microsoft Word File.

ⁱⁱⁱ The EABO concept calls for employing expeditionary forces from temporary locations within a contested or potentially contested maritime area to conduct sea denial or support sea control. Sea denial involves preventing an adversary the use of the sea, while sea control is the condition in which friendly forces have freedom of action to use the sea for their own purposes. Marine Corps Concepts and Programs, "Expeditionary Advanced Basing Operations," accessed April 2, 2020, <https://www.candp.marines.mil/Concepts/Subordinate-Operating-Concepts/Expeditionary-Advanced-Base-Operations/>.

^{iv} LOCE describes naval operations in the littoral environment in light of emerging threats, with emphasis on contesting or gaining sea control. The concept includes employing sea-based and land-based Marine Corps capabilities to support the sea control fight. Marine Corps Concepts and Programs, "Littoral Operations in a Contested Environment," accessed April 2, 2020, <https://www.candp.marines.mil/Concepts/Subordinate-Operating-Concepts/Littoral-Operations-in-a-Contested-Environment/>.

terrain and will likely be the central Marine Corps “contact” force that deters enemy action prior to conflict and then persists as a “blunt” force if the conflict escalates. The key to success for General Berger’s force redesign is to enable the MLR to survive and persist through the opening stages of conflict and deny the adversary freedom of action.

However, the Marine Corps’ shift towards these concepts does not negate the fact that assault support assets can still be held at risk in these types of operations by increasingly long-range detection equipment and precision fire weapons. The proliferation of these weapons systems brings more militaries towards a “near-peer” status in terms of A2AD capabilities, but assault support aircraft are not entirely defenseless, even in risk-saturated future environments. Aircraft Survival Equipment (ASE) enables assault support aircraft to defend themselves to a small extent, and tactical flight methods such as terrain flight (TERF) can help prevent detection and targeting by long-range adversary radar systems. The CH-53E has a relatively large radar cross section and the CH-53K will be a similar size.³² Currently, Marine Aviation Weapons and Tactics Squadron 1 (MAWTS-1) is examining the dispersal and distribution of assault support platforms in the air movement plan and landing plan phases of air assaults, complicating adversary targeting and engagement criteria.³³ While these tactics, techniques, and procedures (TTPs) will reduce risk to assault support platforms, helicopters and tiltrotor assets will still be high priority and high payoff targets for adversary A2AD systems.³⁴ To further reduce risk, assault support missions must be closely coordinated with assets providing TLAS.

Ultimately, commanders operating in future A2AD environments and high intensity conflicts will have to carefully analyze the risks of using vulnerable assault support platforms. Over the past eighteen years of counterinsurgency warfare, tolerance for risk was extremely low as the loss of aircraft and personnel was viewed as a casualty spike in low intensity conflict. A

CH-53E that crashed in Al-Anbar, Iraq in 2005 with thirty-one personnel onboard represented the “single deadliest day” for American forces throughout the conflict.³⁵ In a high intensity conflict, commanders must be willing to take greater risks in order to gain the benefits of maneuver and flexibility offered by vertical assault support assets.³⁶ Commanders must analyze the threat adversary A2AD systems pose to assault support missions and be willing to surge air superiority capabilities in order to mitigate those risks to an acceptable level.

Assault support operations, while operating at increased risk, provide an essential element of the MLR’s Force Protection, Maneuver, and Logistics warfighting functions in a high intensity conflict. The future ground vehicle of the Marine Corps, the Joint Light Tactical Vehicle (JLTV) will undoubtedly be a key platform in the MLR’s ability to conduct surface maneuver in key littoral terrain and provide mobility and surface logistics support to the MLR.³⁷ However, when it comes to moving forces rapidly from ship-to-shore or across impassable terrain, analysis and simulations conducted by the MCCDC found that only the CH-53 has the capability to effectively transport the JLTV.³⁸ CH-53Es and CH-53Ks can transport up to eighteen tons externally, transporting heavy “useful” loads to and from places where other assault aircraft cannot. KC-130s require fixed runways, and MV-22s have a limited payload,^v especially at high altitudes or in hot, humid environments. Therefore, while the MV-22 is capable of accomplishing some of these functions for the MLR, only the CH-53E can lift all the assets the MLR requires.

Force protection is a vital warfighting function in high intensity conflicts, especially for Marine forces that will deploy and exist within the adversary’s WEZ. As a “contact” force, Marine forces need to be able to complicate and deny the adversary’s detection, targeting, and

^v Federal Aviation Administration definition: Payload is the weight of occupants, cargo, and baggage. (https://www.faa.gov/gslac/ALC/course_content.aspx?cID=103&sID=440&preview=true)

engagement cycle. Due to the lethality and precision of modern long-range fires, Marine forces must rely on deception and dispersion to increase their survivability rather than fortification. Surviving, and therefore maintaining combat credibility, means being able to disperse units across a wide geographic region to complicate or disrupt an adversary's ability to detect, target, and engage them.

Vertical assault support can enable friendly forces to disperse more flexibly than fixed wing assets. KC-130s and larger air mobility platforms are limited to operating from runways or conducting aerial deliveries. Runways, as fixed locations, can be monitored and targeted by adversary systems, while aerial delivery (unless accomplished in conjunction with parachute operations) requires previously established ground forces. Merely having the ability to disperse assets via vertical lift compels adversaries to disperse their detection systems, as the number of potential landing zones for vertical insert exceeds the number of KC-130 capable airstrips. The capability to disperse also inherently increases the ability of the Marine Corps to successfully conduct deception operations; if Marines are capable of dispersing assets across an area of operations, then adversaries must account for the possibility that Marines may have been able to disperse undetected, and dedicate additional intelligence resources to confirming the location of Marine forces.³⁹ If the Marine Corps loses the ability to disperse via vertical lift, then adversaries can concentrate their intelligence gathering efforts on fewer areas. If an adversary is less certain about the disposition of Marine forces, that force is more likely to be able to deceive the adversary. The ability to disperse and disperse a force via vertical lift will therefore inherently increase its survivability and force protection posture.

Vertical lift is essential to enabling friendly forces to maneuver in contested A2AD environments, even after the start of a high intensity conflict. If a conflict escalates with little or

no warning as predicted by the ASB Concept, friendly forces will need to disperse rapidly to achieve two purposes.⁴⁰ First, and most importantly, rapid maneuver is required to protect key assets from a “Pearl Harbor” scenario where friendly forces are caught unprepared or massed at an air or sea port of entry. Once a conflict is initiated, it will be much more difficult for the United States to flow forces into the theater until adversary A2 systems can be defeated. Secondly, contact layer forces must maneuver to seize key terrain and contest adversary actions. Vertical assault support, while less cost-efficient and riskier than surface transport, creates options for Marine and Naval commanders. One example is displacing fire support units to locations where they can effectively engage adversary shipping moving through key maritime terrain, such as a strait or a similar chokepoint. If a weapon system cannot maneuver effectively, adversaries will be able to identify, isolate, and bypass these forces, rendering them operationally irrelevant. Vertical lift can open vital options for a commander to maneuver his forces in the prelude to and opening stages of a high intensity conflict.

Once past the opening moves of a high intensity conflict, future war models expect the situation in the area of operations to evolve rapidly, requiring blunt layer forces to react quickly to retain the initiative. Rapid maneuver of forces across wide distances will likely be required in order to keep pressure on enemy forces and prevent key friendly assets and capabilities from being isolated, bypassed, or destroyed. Fixed wing assault support and surface transport may be sufficient for some or even most maneuver, but there will be situations in high intensity conflicts where the necessity of transporting key assets and capabilities quickly justifies the additional risk incurred by relying on vertical assault support. While US air supremacy is unlikely in the opening stages a high intensity conflict, TLAS may be surged to enable these critical assault

support operations. Assault support aircraft enable key maneuver options for Marine and Naval commanders during escalation and in rapidly evolving high intensity conflicts.

The importance of heavy vertical lift in support of the logistics warfighting function is largely self-explanatory. Contact layer forces, while forward deployed, will need to be kept at high levels of readiness and resupplied regularly. Vertical assault support may not be the most effective means of sustaining these forces for extended periods of time, as surface logistics links and unit foraging are less risky than relying on aerial resupply. Studies conducted by the Naval Postgraduate School reveal that 3D printing and “military foraging” help extend unit capabilities and mitigate the effect of an inconsistent supply chain, but “not to the extent of replacing the existing resupply system.”⁴¹ Therefore, when the demand for resupply, evacuation, or other logistics requirements are urgent enough, the additional effort required and risks incurred by assault support operations will be justified. An example of this would be if key units conducting sea control or sea denial missions rapidly expend large quantities of munitions and need an urgent resupply when surface logistics or foraging are not adequate solutions. Vertical assault support offers flexibility to commanders when a link needs to be forged between logistics nodes, without relying on slow surface transports or easily targeted airfields.

One key concept the assault support community is developing in depth is the provision of Forward Arming and Refueling Points (FARPs) in a contested battlespace. In air war simulations conducted by MCWL, enabling air superiority aircraft to remain on station fueled and armed at critical points proved to be a key factor in conducting sea denial operations.⁴² To accomplish this, friendly air superiority aircraft relied on FARPs for rearming ordnance and air-to-air refueling to extend their time on station. The EABO concept envisions utilizing mobile, dispersed, and rapidly established FARPs to support air superiority fighters such as the F-35, and

HMH squadrons have been exercising their capability to transport fuel and ordnance to forward locations.⁴³ However, studies indicate that F-35 operations in a high intensity conflict could consume up to 336 tons of fuel and 280 tons of ordnance per day, a rate that could easily exceed the capability of vertical heavy lift assets to sustain depending on the distance between the point of origin and the FARP.⁴⁴ Assault Support FARPS will likely not be able to sustain combat operations at that projected rate across a widely dispersed area of operations unless massed to meet logistics requirements. Wargaming by MCWL revealed that assault support aircraft can fill a critical shortage in a high intensity conflict by providing forward-based munitions to air superiority aircraft, rather than fuel.⁴⁵

However, F-35s and other aviation assets will not be the only platforms in a high intensity conflict that require fuel. The EABO and DMO concepts envision forces that are highly mobile and widely dispersed throughout the AO, and while the Marine Corps is actively seeking to employ more renewable energy sources on the battlefield, the complete replacement of traditional fuels is not currently on the horizon.⁴⁶ Just as with all other logistical needs, there will be a time and place on the future battlefields where the MLR's need for mobility generates a demand signal for fuel in an austere location. CH-53s and other assault support aircraft may be better suited to fulfill these critical shortfalls by providing an air delivered ground refueling capability, rather than massing air assets in a single location (even temporarily) in order to refuel air superiority aircraft.

The CH-53 provides a vital degree of flexibility to Marine Commanders in the way the platform and the concept of heavy vertical lift enables options for MLR and maritime force commanders. While fixed wing and surface logistics platforms may be able to carry heavier payloads and the MV-22 may possess greater range and speed, the CH-53's unique ability to

vertically deploy and redeploy all the expeditionary elements of the Marine Corps will enable the MLR to maneuver, sustain, and conduct command and control functions in a dispersed and contested environment. These capabilities will carry risk, especially in environments where Marine, joint or combined forces are unable to provide air superiority, and commanders will have to carefully assess the increased risks of employing assault support aircraft against the demand signal created by Marine forces operating inside the adversary's WEZ.

Analysis of CH-53 T&R METs in Future Conflict

The intent in this section is to discuss current CH-53 METs and Training and Readiness (T&R) codes as they pertain to operations in an A2AD environment or high intensity conflict. While some T&R codes will remain relevant in future conflicts, CH-53 squadron commanders and pilot training officers should reevaluate how they train and execute their METs to prepare their squadrons to “operate inside actively contested maritime spaces” in accordance with General Berger’s guidance.⁴⁷ Overall, the “radical redesign” of the Marine Corps for future conflicts is reminiscent of the original conception of Phib-31.⁴⁸ The Commandant has laid out his convictions for the future force with a gamble that echoes the tentative helicopter doctrine formulated by the authors of Phib-31. While CH-53 METs remain applicable in their traditional roles, squadrons must train in ways that will enable creative and innovative thinking in high intensity conflicts.

3240: Combat Assault Transport (CAT). Conducting CAT is an essential task in DMO, as the US cannot preposition its forces everywhere of significance.. The US will need to maneuver significant forces quickly as conflicts escalate in order to counter enemy maneuvers and preserve forces in the face of overwhelming enemy attacks. The challenge is that “operationally relevant” Marine forces are not generally “mobile,” especially across the key

maritime terrain envisioned by the CPG.⁴⁹ Current concepts for EABO require forces that can only be transported by KC-130 aircraft and require relatively high-signature airstrips for insert and extraction. Future Naval and Marine commanders will be extremely limited if they rely on a critical sea denial platform that can only be moved via an airstrip as opposed to a vertical-lift asset such as the CH-53. Successfully denying the use of airstrips will enable the enemy to fix, isolate, or bypass these forces. CH-53s will enable the MLR commander to displace his forces and maneuver them to effectively support the JFMCC, rather than being constrained by access routes or constricting terrain. The challenge for CAT in escalation is that the opening phases of a high intensity conflict are also the most dangerous times to conduct assault support missions.⁵⁰ Prior to establishing local air superiority or reducing hostile IADS, large-radar signature aircraft such as the CH-53E will be at the greatest risk to enemy radar and anti-air threats. To mitigate the increased risk, squadron commanders and instructors should emphasize radar avoidance techniques such as terrain flight (TERF) and TERF external operations, while also familiarizing aircrew with long distance low-level flights over water. CAT is the core mission that enables the DMO and EABO concepts.

3340: Aerial Delivery (AD). While cargo transported during AD missions can be transported internally, cargo that cannot easily be secured or hand-loaded is most efficiently transported externally by “sling loading.”⁵¹ The CH-53, as a dedicated heavy lift helicopter, has specialized in external transport ever since the Vietnam War. However, external loads increase the CH-53’s radar cross section and restrict dynamic maneuvering against threats, further increasing the risk of operations in a contested A2AD environment. The A2AD and high intensity conflict characteristics that apply to CAT also apply to AD, although the increased threat and desire to minimize time in a landing zone (LZ) may also drive a tactical shift to

external operations. Squadrons and aircrews should consider training to configure and de-configure aircraft for external operations in flight to reduce the time spent in a targetable LZ.

3440: Tactical Recovery of Aircraft and Personnel (TRAP). While TRAP has been one of the most high-profile missions performed by the CH-53 in low intensity conflicts, the execution of the mission will be drastically different in high intensity conflicts and high-threat A2AD environments. The current TRAP template in the Assault Support Tactical Standard Operating Procedures defines the relative threat for a TRAP mission in terms of enemy surface capabilities; however, peer adversary AAW capabilities will be a significant factor for friendly forces attempting to execute a recovery.⁵² Additionally, in a naval campaign where surface vessel casualties could create a personnel recovery mission beyond the capabilities of current Search-and-Rescue (SAR) platforms, the CH-53E could have a role as a heavy rescue aircraft. While helocast^{vi} has been an under-utilized mission in years of desert warfare, the ability to transport inflatable boats and medical personnel by air and helocast them into a rescue operation may be critical to recovering the crew of a sunken surface combatant. As in current scenarios, executing TRAP in future high intensity conflicts will be highly dependent on the situation, and assault support aircraft will have to plan for peer adversary surface and air threats.

3540: Air Evacuation. The nature of DMO reveals that tactical withdrawals and evacuations will have to occur over long distance and more quickly than an adversary force can exploit a critical gap. In a geographically constrained environment, a rapidly escalating and dynamic conflict will reduce the effectiveness of surface evacuations. Forces operating inside contested areas will require rapid, airborne relocation and evacuation when opposed by a peer adversary capable of long-range precision targeting and compromising air superiority. While the

^{vi} Helocast: CH-53E T&R code 4110: Inserting forces from a forward hover into the water. Marine Aviation Weapons and Tactics Squadron 1, CH-53 Combat Aircraft Fundamentals, ANTTTP 3-22.3 (Fallon, NV: Naval Strike and Air Warfare Center, 2018), 5.7.

“golden hour” standard upheld in low intensity conflicts may no longer be realistic, surging TLAS and assault support platforms to maneuver units on a contested battlefield will be a necessity in future high intensity conflicts.

4982 Sea Based Tactics, 4942 Long Range Tactics, and 4981 ADGR. The nature of DMO and the envisioned role of the CH-53 as a FARP asset requires emphasis on the current 4982, 4942, and 4981 T&R codes. Being able to close the logistics gap between sea-based sites and EABs ashore is a critical requirement that will only increase in future conflicts; similarly, distributed operations are inherently going to require the use of long-range tactics. The 4981 T&R code will play an essential role in the future of the EABO concept, although as previously indicated in MCWL wargaming, an emphasis should be placed on conducting forward ordnance resupply, instead of just fuel provided by the CH-53 Tactical Bulk Fuel Delivery System.

As MCWL and MAWTS-1 continue to refine logistics for the MLR and mission requirements for the EAB, LOCE, and DMO concepts, they will need to develop and refine T&R requirements for the CH-53E and other Marine Corps assault support aircraft. Despite the removal of T&R code 3140, Expeditionary Shore Based Operations, squadron aircrew and maintenance personnel should continue to practice operating for extended durations in austere, non-traditional environments. Most importantly, aircrew and squadrons should train to employ creative thinking and adaptive solutions using known TTPs to overcome the complexities of A2AD environments and high intensity conflict. Air superiority should not be assumed or wished away when conducting tactical planning and execution of core METs.

Recommendations and Conclusions

Heavy vertical lift provides Marine and Naval commanders a critical degree of flexibility in future high intensity conflicts in contested airspace against peer adversaries. The status quo

tactics that have been utilized in low-intensity conflicts against technologically inferior and less capable adversaries need to be reexamined for applicability in the future. Marine Corps assault support and joint air mobility doctrine needs to more fully address how operations should be conducted in environments where air superiority is either temporary or non-existent.

Employment of vertical assault support in modern A2AD environments and high intensity conflicts demands a higher level of coordination between commanders on the ground, ACE assets flying in support of JFMCC, and area air superiority agencies operating as part of Joint Force Air Component Command.

Additionally, commanders must reexamine the concept of risk management in future conflicts. Assault support and air mobility missions will inherently carry more risk when conducted in contested A2AD environments, but the flexibility and maneuverability that will enable the EABO and DMO concepts will justify accepting higher levels of risk. Risks incurred by conducting assault support operations in contested environments can be mitigated by merging the assault support and AAW doctrines and conducting further research and wargaming to determine how to optimize employing aviation assets in a contested air domain. Once mitigated, these risks will be justified by the increased Force Protection, Maneuver, and Logistics, and capabilities the Marine and Naval Commanders gain by conducting assault support operations. The extreme risk-adverse mentalities that have shaped aviation operations in low intensity conflicts must be reevaluated.

This reassessment of risk mitigation for assault support operations in high intensity conflicts and contested environments should be tested at MAWTS-1 and at the squadron level. Pilot training officers and Weapons and Tactics Instructors should strive to enable creative thinking and innovative tactical adaptation as they train the next generation of heavy lift pilots.

While the intent behind current missions and METs for CH-53 squadrons will not change, mission planning and execution will be vastly different in a contested environment against a peer adversary. The adage “brilliance in the basics” and status quo will not serve the CH-53 community in the future; aircrew and squadrons will need to adapt, innovate, and employ creative solutions to provide optimal support for the MLR and littoral forces in the future.

The risk in this work’s analysis is that the Marine Corps is pursuing a suboptimal strategy regarding the concepts of future war. The Commandant’s focus in his planning guidance is to prepare to fight against the “pacing threats” (i.e., Russia and China), and wargaming by MCWL reinforces the perception that the Marine Corps must change to prepare for a high intensity conflict against a peer adversary.⁵³ However, historians will note that while assault support doctrine was originally created for a high intensity conflict, it ended up being adapted for use against technologically inferior forces in low intensity conflicts, contingencies, and counter insurgencies across the globe. Throughout the history of helicopter warfare, the anticipated clash with the Soviet Union never materialized. The risk, therefore, is that the Marine Corps is investing in a perception of future war that will also never occur.

While some analyses suggest that even great power conflicts will manifest as insurgencies and proxy wars instead of high intensity conflict, the Marine Corps must remain prepared and postured to respond to either extreme.⁵⁴ Concepts of vertical lift and assault support enable Marine and Naval commanders a wide variety of options and maneuver capabilities that can be adapted to any clime, place, or future war scenario. Even if the Marine Corps visions of future war are wrong, there will always be missions that can be accomplished with vertical lift capabilities. Modernizing assault support doctrine and retaining platforms such as the CH-53K will enable the Marine Corps to pursue new concepts for fighting within an

A2AD environment and still maintain capabilities that ensure the Marine Corps' ability to maneuver in lower intensity conflicts.⁵⁵

In future assault support operations, the CH-53K will continue to be a force multiplier, with a larger cargo capacity and smaller logistics footprint than its predecessor.⁵⁶ Beyond the CH-53K, the necessity to conduct heavy vertical lift operations will remain; Marine forces will always need the ability to maneuver through the air domain in order to respond to crises or deter and confront peer adversaries. In the future, unmanned platforms may provide heavy lift capabilities on the battlefield, enabling commanders to accept even higher levels of risk when attempting to provide logistics in an A2AD environment. However, the Marine Corps has always counted on manned aircraft to transport and maneuver combat troops around the battlefield, and the MAGTF Unmanned Expeditionary Capabilities do not include CAT as a currently projected mission set.⁵⁷ Combat necessity and dynamic escalation to a high intensity conflict will demand that the future Marine Corps, based around developing concepts such as the MLR and modern platforms such as the JLTV, can operate in a distributed, flexible, and mutually supporting manner and survive as a credible force in future wars.

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