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The Expeditionary Advanced Base Operation (EABO) concept provides a prominent role for the infantry rifle company in support of the MAGTF in the future high-end fight of great power competition, but risks its maneuver role diminishing unless lethality is enhanced through fused-fire support networks and modern antiarmor weapons. Wargaming the EABO concept has highlighted the need for a light and lethal antiarmor weapon more capable than the M4 Carl-Gustaf. Until this weapon is developed, in the interim, artificial intelligence opportunities should be pursued that speed up fire support approval and shorten the kill chain.

15. SUBJECT TERMS
Expeditionary Advanced Base Operation (EABO); Marine Operating Concept (MOC); wargame; lethality; Close Combat Lethality Task Force (CCLTF); infantry

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MASTER OF MILITARY STUDIES

TITLE:
THE EXPEDITIONARY ADVANCED BASE OPERATION CHALLENGE
WITH MARINE CORPS INFANTRY FIREPOWER

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

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Executive Summary

Title: The Expeditionary Advanced Base Operation Challenge with Marine Corps Infantry Firepower

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Thesis: The Expeditionary Advanced Base Operation (EABO) concept provides a prominent role for the infantry rifle company in support of the MAGTF in the future high-end fight of great power competition, but risks its maneuver role diminishing unless lethality is enhanced through fused-fire support networks and modern antiarmor weapons.

Discussion: Due to its distributed nature and lack of realistic ship-to-shore options, beyond aviation, Marine Corps infantry units envisioned to execute EABO will likely comprise of formations below the battalion level. Rifle companies operate legacy weapons designed to address threats during the last two World Wars. These weapons lack the range and firepower necessary to conduct EABO, against a near-peer, within the anti-access/area denial (A2/AD) bubble. Among these problems is the lack of a planned, programmed, and budgeted organic infantry antiarmor capability beyond the M4 Carl-Gustaf. Needed is a new antiarmor capability that not only considers the contested operating environment and armor threat the EABO force will confront but also addresses its challenges in supporting maritime sea control. Some considerations this weapon must address is enhanced portability, precision, range, and armor penetration.

Until a fielded antiarmor capability exists, in the interim, to enhance infantry maneuver within EABO, there is an opportunity to close the lethality gap with improvements to existing and developmental command and control (C2) technology to provide battlespace fire support managers a resilient real-time air-ground Common Tactical Picture (CTP). This technology should consider ways to leverage momentum towards digital interoperability to provide hardened communication architecture and intuitive user interfaces capable of fusing aviation and ground sensor data. Additional value added to this comprehensive package will be an intelligent system that can aid the fires approval authority with data management to shrink the kill chain by shortening the time required for deconfliction of fires geometries. This system would aggregate sensor, location, and weapons systems data to synthesize an optimal firing solution and provide a recommendation that can be approved, modified, or denied by appropriate authority.

Conclusion: The Marine Corps Operating Concept (MOC) challenges the service to innovate for lethality and resiliency to win the future fight. The current arsenal and fire support networks are unprepared to address 21st Century threats in support of the missions and roles of the Marine Corps infantry in supporting the MAGTF's execution of the MOC. A light and mobile infantry rifle company executing EABO requires a new antiarmor weapon to provide lethality and standoff and smarter fire support systems to speed up the application of fires. Enthusiasm and effort towards both these goals will ensure the infantry, and by extension the MAGTF, remains relevant in providing the joint force a unique capability to tackle future problems.

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Preface

At the start of this journey, I was determined to devise a future enabling concept for the infantry to facilitate the application of tactical and operational fire support over long-range air assaults. I hoped that by digging into the various digital communication networks, user interfaces, data management systems, and capabilities, I could link common themes that could be threaded through a future concept. After extensive research in existing communication architecture and concepts currently under development, I concluded this endeavor would be better served by someone within the communications field.

During Gray Scholars wargaming at MCWL, I began to reflect on my participation in MCTOG's 2030 Wargame Series and the problem similarities in advancing the Capstone Marine Corps' Operating Concept to conduct Expeditionary Advanced Base Operations. Among these problems was the lack of an organic infantry antiarmor capability beyond the M4 Carl-Gustaf and the need for a real-time air-ground Common Tactical Picture to facilitate fires. Since this was a recurring issue across the two wargames, I concluded I would pursue this effort.

My hope is this paper adds to the growing enthusiasm generated by the establishment of the Close Combat Lethality Task Force to focus the DoD enterprise on advancing the capabilities of the infantry. The Marine Corps typically does more with less, and the infantry tends to shoulder more than their share of the load. I would like to thank my wife Karen for allowing me to be an absentee father to complete research and writing while she shouldered more than her share of the load in raising our toddler Sienna. I would also like to thank Dr. Ben Jensen and Dr. Nathan Packard for the opportunity to participate in Gray Scholars and for the insightful and lively discussions their interaction with the group instigated.

Introduction

When we go into a near-peer fight, you would end up with a situation whereby the enemy has probably got very similar capability, very similar capacity and very similar lethality. So you have to ask yourself, where is your tactical edge? Where can you basically get ahead of the enemy?

--Lieutenant General Joseph Osterman, Commander, I MEF¹

The EABO concept provides a prominent role for the infantry rifle company in support of the MAGTF in the future high-end fight of great power competition, but risks its maneuver role diminishing unless lethality is enhanced through fused-fire support networks and modern antiarmor weapons. If executable, this concept would provide the Marine Corps with relevant strategic capability by offering policymakers options for projecting power within a contested environment. In wargaming EABO against a near-peer threat, lethality deficiencies were identified in rifle company capabilities that limited their ability to execute this concept in its entirety. Specifically, the range and environment EABO is executed in challenged C2 architecture lengthening the fires approval process. Furthermore, once ashore with limited fire support, the rifle company struggled using organic weapons to maneuver against armor threats and provide the time required to establish an advance base to receive the first aircraft. Through successful simulation of future fires C2 and weapons concepts, the solution was apparent that the infantry required hardened fused-fire support networks with real-time CTP and more lethal longer range antiarmor capability to maneuver within EABO.

After almost two decades of war in the Middle East, that arguably stagnated Marine expeditionary thought, the MOC strives to revitalize its services mindset to waging warfare in the 21st century. Among the MOC's many initiatives, it calls for the Marine Air Ground Task Force (MAGTF) to execute EABO with a force capable of seizing and defending terrain and able to conduct offensive action in support of sea control.² In essence, getting the Marine Corps back

to its Naval roots, if not in character, then in purpose. This expeditionary force must “reinforce and defend EABs with manned and unmanned long-range strike, anti-ship, anti-air, and C2-extending systems to transform a site into a sea-denial outpost.”³ Additionally, this “hub” is expected to provide an integrated logistical network for the Navy and serve as a staging area for follow-on forces. Although there are other approaches to how EABO could be accomplished, in the traditional sense, this task is expected to be performed by small and mobile infantry formations originating from an amphibious platform, typically as part of an Amphibious Ready Group/Marine Expeditionary Unit (ARG/MEU) team.

As the service reorients its forces and mindset from the desert to the Pacific to fight contested beachheads from the sea, it is refamiliarizing itself with MEU amphibious operations while leveraging new technologies to extend lethality. Recent MEU deployments, in moving towards validation of the MOC’s EABO vision, are experimenting with long-range fires and sensors from amphibious ships. These efforts are testing the utility of the High Mobility Artillery Rocket System (HIMARS), and the stealth and sensor capability provided by the F-35, to extend C2 and fires to support the overall security of the amphibious task force. Furthermore, each ARG/MEU deployment iteration continues to test the bounds of distributed operations over longer ranges, sometimes across multiple geographic combatant commands. This stretching of force capability not only provides the commander with flexibility but is seen as critical, specifically within 7th Fleet’s vast Indo-Pacific area, to deter China’s growing influence and military capability within the region. By extending the ARG/MEU geographically and augmenting it with advances in long-range fires and 5th generation aviation, “contact” is maintained to reduce China’s coercive influence, while providing an expeditionary force that can seize an EAB to allow for a transition to “blunt” its advances.⁴

This technologically enabled dynamic, flexible, light infantry flotilla attempts to be unpredictable to mitigate adversaries advances in technology and ship sinking capability. At risk to these advances to modernize the force is the purpose and role of the Marine Corps infantry in the future distributed fight. Under the former Secretary of Defense Jim Mattis, great strides are being made to modernize the infantry for more lethality. As an infantry officer having commanded at all levels, he experienced firsthand the erosion of infantry close combat capability as the Department of Defense's (DoD) focus has been on large, sophisticated platforms. Consequently, it was realized, to achieve overmatch with pacing threats the U.S. military must change the way it looks at training, equipping, and manpower to enhance infantry survivability and lethality. Therefore, the Close Combat Lethality Task Force (CCLTF) was established, in part, to identify and develop more lethal and lighter weapons, reliable communication systems, and integrated sensors that function beyond line-of-sight.⁵ Since the CCLTF's inception in February 2018, improvements are underway to enhance small arms, night vision, and infantry owned and operated unmanned aerial systems (UAS). Likewise, for Sea Dragon 2025, a MOC validation initiative, throughout a pre-deployment workup and subsequent deployment, 3rd Battalion, 5th Marines tested squad force structure aided with a variety of non-programmed experimental equipment. Although both of the initiatives above are moving the lethality ball forward, the current security environment of rising near-peer military capability parity demands greater momentum.

Purpose

If we are ignorant of the changing face of war, we will find ourselves unequal to its challenges.

--MCDP 1, Warfighting

The purpose of this paper is to explore and renew, within the conceptual space of the MOC, emphasis and debate on the necessity of developing enhanced Marine Corps infantry armament for survivability and lethality to fulfill its role in the “contact” layer of the EABO concept. As the AY18-19 Gray Scholars cadre experienced during wargaming elements of this mission set, gaps exist within the infantry arsenal to fulfill its role in completing this task. With the understanding that fire and maneuver are symbiotic, this discussion will visit opportunities to speed up the application of fires to enhance the utility of infantry and its role in EABO. Moreover, we will explore the historical stagnation of infantry firepower to emphasise it’s slow evolution to its current state of unreadiness to meet future requirements. As political and military leadership turnover churns the ebb and flow of strategic vision and operational concepts, the infantry lethality debate risk fading to the next shiny object. If this interest is allowed to recede, the EABO concept, as outlined in the MOC, will be difficult to validate in its current form and must be revisited.



Figure 1: U.S. Marines conduct an air assault to seize an airfield⁶

Erosion of asymmetric advantage

Long-term strategic competitions with China and Russia are the principal priorities for the Department, and require both increased and sustained investment, because of the magnitude of the threats they pose to U.S. security and prosperity today, and the potential for those threats to increase in the future.

– 2018 National Defense Strategy

The United States is in a strategic tug-of-war of great power competition with China and Russia. In part, this competition involves a technology race to create more capable military hardware, software, and systems.⁷ These rapid technological advances are shrinking space and time necessitating the need for better sensors and weapons to provide greater standoff for the fleet. As threat standoff is expanded, the U.S. Navy and Marine Corps team finds it increasingly difficult to project power ashore against a littoral threat while remaining outside the A2/AD bubble of a layered defense. Therefore, an option is to penetrate this A2/AD system with an expeditionary ground force capable of establishing an advanced base. Theoretically, the infantry unit with enablers at this location would provide rearmament and refueling to aircraft and assist the Navy with sea control. As the commander of I MEF states, “how are we doing naval integration in such a way that we can contribute to the sea control fight that the Navy would be prosecuting.”⁸ With the expansion of near-peer power projection capabilities, increasing the firepower of the infantry while making a more synchronous fire support apparatus to enable the execution of EABO should occur during the validation of the MOC. The window to develop and introduce these capabilities is narrowing. The EABO concept has been signed off by the Commandant of the Marine Corps, General Neller, and is in the early stages of experimentation.⁹ The DoD budget is at an all-time high. Soon the American taxpayer will demand a peace dividend and cuts to the DoD budget will quickly follow.

Although historical reference from the Marine Corps island-hopping campaign in the Pacific during World War II, and its establishment of advanced bases, could inform warfare analysis here, the application would loosely apply because there is little precedent for how small distributed infantry formations will execute the EABO concept as outlined in the MOC. Therefore, this concept will primarily advocate for the evolutionary need for more lethal organic infantry weapons, specifically antiarmor, and renew emphasis on fire support as an opportunity to fill the capability gap. Moving forward we will assume a ship-to-shore capability exists either surface, subsurface, or air that can insert an EABO force, at the ranges required, to seize terrain for lodgment within a contested environment. Depending on the method of insert, a level of local air superiority is implied. Here, we will also assume, that this disaggregated foot mobile EABO force will have the ability to digitally C2 its unit. Because this is a light force, force protection will be enhanced through mobility, surprise, and signature management.

Lastly, the definition of Artificial Intelligence (AI) evolves as rapidly as the next new shiny concept, therefore must be defined. The use of the term here will infer a system that can use components of human reasoning and machine learning (ML) to solve complex problems.¹⁰ There are many ideas for the use of AI and ML in the military to aid processes and decision making, although interesting to explore with further research, is beyond the scope of this paper.¹¹ Because the definition and applications of AI are predominantly in the eye of the user, to not limit the imagination of the reader, the discussion that follows will introduce AI as a decision aid to optimize staff processes to enhance fire support.

Fire Support Opportunity

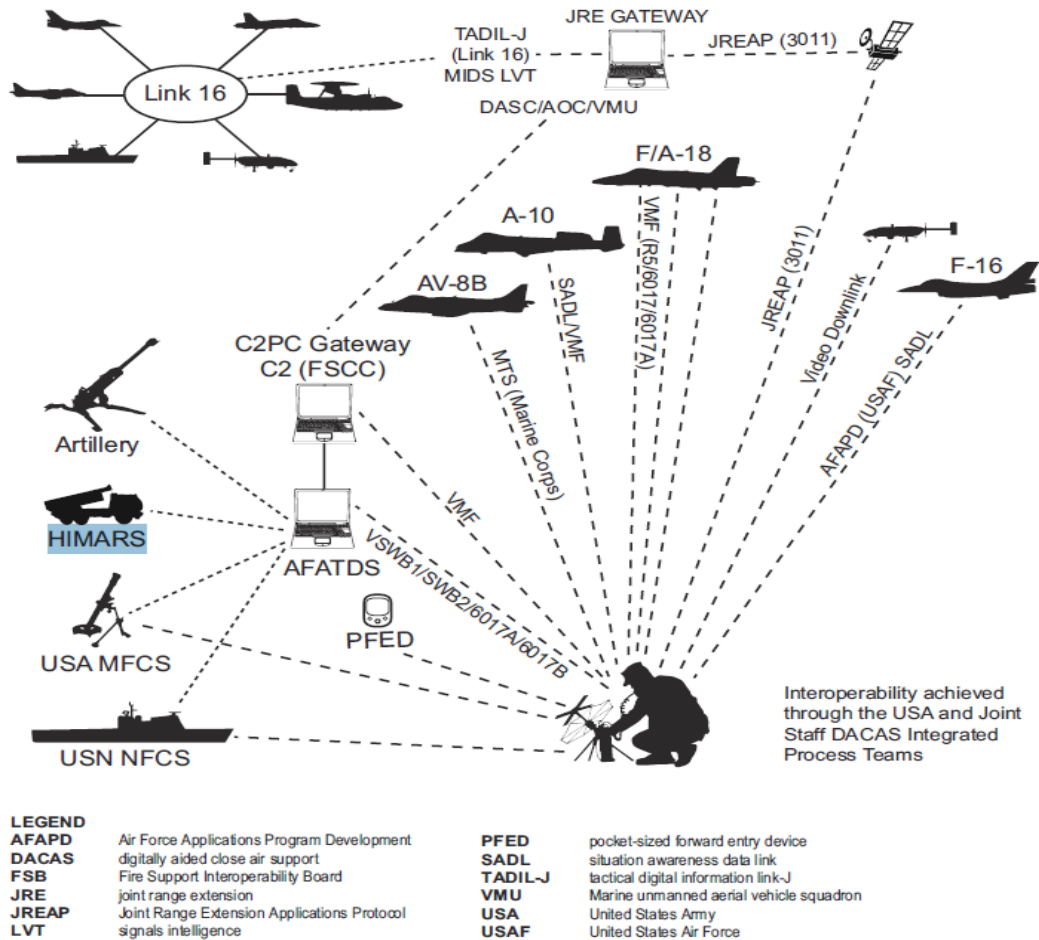


Figure 2: Target Handoff System Interface-Digitally Aided Close Air Support (MCRP 3-10F)¹²

During wargaming the EABO concept with jammed intermittent fire support, a significant problem the planners faced was the rifle company antiarmor capability was substantially overmatched against enemy armor. For Marine Corps infantry to execute EABO successfully, in the interim without a sufficient antiarmor weapon, there is an opportunity to pursue and advance a functional concept to shorten the fires kill chain. To do so, we must first focus on the fires agency that ties the support to the supported. The communication construct of the Fire Support Coordination Center (FSCC) relies on voice as its primary method to receive friendly position reports and target information from observers. This location data is typically plotted using charts and darts to deconflict air and surface fire support missions. Once fires

geometries have been deconflicted from friendly positions, the Fire Support Coordinator (FSC) either approves, modifies, or denies the fire mission. Depending on the level of proficiency of the FSCC and the reliability of the voice communications, this process can take anywhere from three to fifteen minutes, an eternity if you are the unit in contact and receiving casualties. As the Marine Corps progresses with digital interoperability, reliable mesh network architecture, and the proliferation of tablets like the Marine Air Ground Tablet/Target Handoff System (MAGTAB/THSV2) operating fires programs such as Kinetic Integrated Low-cost Software Integrated Tactical Combat Handheld (KILSWITCH), the opportunity exists to leverage AI to shorten the fires approval kill chain by providing timely and accurate fires effects that will enhance the lethality of the force.

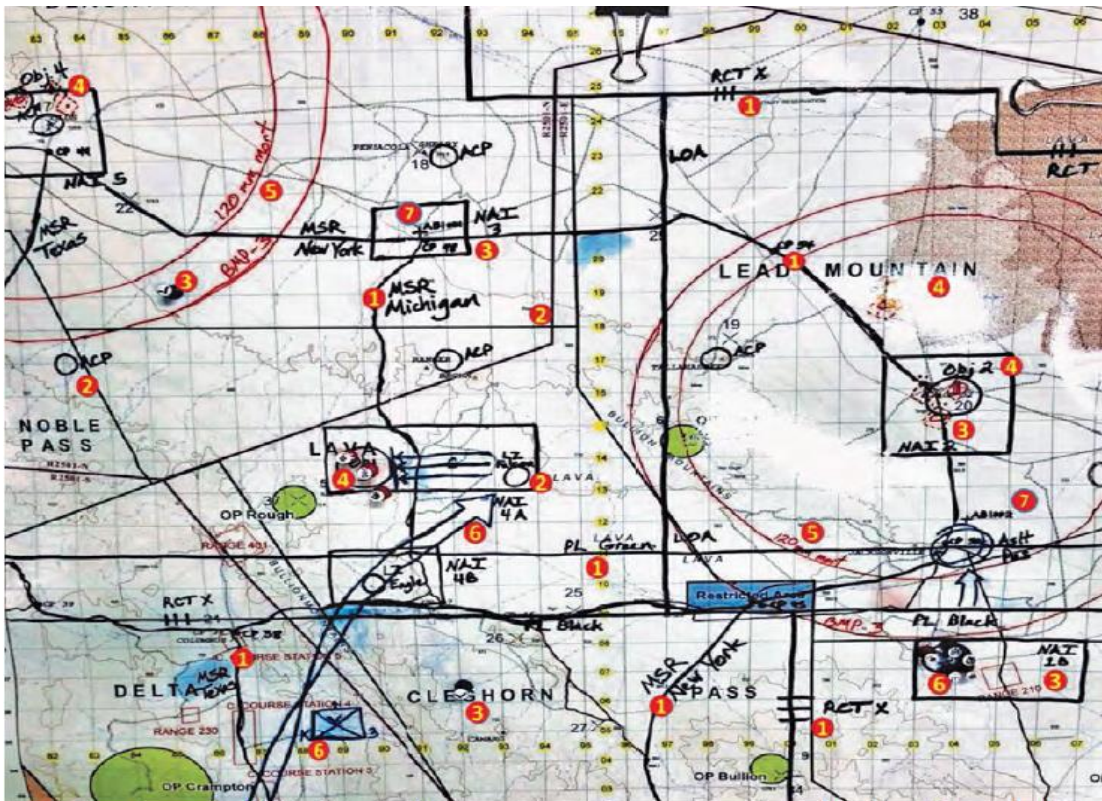


Figure 3: Map display of Common Tactical Picture with surface and air control measures¹³

Eventually, everything on the battlefield will be a sensor. The grunt on the ground will have a helmet-mounted camera and a visor displaying critical tactical information via augmented reality (AR).¹⁴ Manned and unmanned aviation and ground platforms with sensors will share a common language and network as the grunt. This sensor information will be fed to a brain that must optimize the utility of large data sets. Making sense of this data will initially require algorithms looking for patterns and anomalies in battlefield images and videos to verifying threats against both open source and secure databases. AI will support this effort as a decision aid by fusing the identified threat location with friendly aviation and ground control measures and weapons systems data, rapidly package it into a useful firing solution, and determine when, who, and over what medium to present the information to optimize its use to meet user objectives.

So, how exactly would this speed up the fires approval chain through the FSCC? What if the FSC had at his or her disposal the ability to immediately know all friendly locations, accurate target location, surface danger zones, weapons engagement zones, and geometries of every weapon system on the battlefield? Think real-time Common Tactical Picture (CTP) that fuses intelligence, with the air-ground picture. Furthermore, what if the FSC was provided the optimal weapon to target match and firing agency with the best geometries and ordnance to prosecute the target? That information would exponentially speed up the fires approval process and be a game changer. A user interface meshed with elements of KILSWITCH and Command and Control Personal Computer (C2PC) aided by AI can provide this opportunity.

Figure 4: KILSWITCH Graphic User Interface and C2PC 3D Graphic



The current state within a FSCC has the Air Officer, Fire Support Officer, mortar FO, and the FSC sucked into radios with intermittent yelling and plotting of fire mission information. Now imagine an FSCC with all the personnel mentioned above huddled around one screen. This screen provides a fusion of all sensors on station, displays full-motion video and images of the target, the location of everything known within the battlespace, and provides the optimal firing solution to engage an imminent threat or high payoff target. Concurrently, this information is sent to the firing agency and the maneuver force nearest the proposed effects. The FSC merely has to validate the information and approve the fire mission. Battle damage assessment is then recorded by sensors, cataloged, packaged, and provided to the FSCC and applicable commanders and intelligence personnel. AI would discriminate between what information is useful to whom based on billet, mission, and proximity to the target within the battlespace. A human would remain in the loop providing the ultimate approval to prosecute a target.

There is no maneuver without fires and fires only supports maneuver if timely and accurate. Fires accuracy is improved through better guidance and target location systems.

Responsive fires continue to rely on the proficiency of the FSCC, firing agencies, and reliable communications. AI integrated into the current, and future communication architecture would enhance reporting, reduce the kill chain and decision cycle, and improve situational awareness across the battlefield. This would greatly enhance the timeliness of fire support and ultimately improve the lethality of Marines executing EABO. For example, imagine a rifle company executing EABO, dispersed from its higher FSCC, with only organic weapons, but has aviation on station. This force comes into contact with an enemy armor unit, and due to lack of antiarmor capability, requires immediate fire support. The Fire Support Team Leader (FiST), with a couple of clicks on a tablet, is presented an optimal firing solution, also viewed by the company commander and FSCC, that is immediately approved and sent to the aviation platform for prosecution. This approval process should take less than a minute with additional time on the back end required, before effects on target, for the aviator to line the aircraft up within the approved final attack headings.

Although a significant proponent, the crux of the infantry lethality problem is not tied solely to fire support. The root cause of the problem is that a small force, distributed over great distances executing EABO, cannot defend themselves, at range, against enemy armor. Before we address this threat, we will first take a look at the evolution of the Marine Corps infantry arsenal, then explore its overmatch against China's armor through wargame observations of the EABO concept.

A Look at Infantry Lethality

Historically, when choosing its infantry arsenal, the Marine Corps had to negotiate a balancing act between the triad of cost, portability, and firepower. The past two decades of war have done little to improve infantry firepower, with development and procurement focused on

gadgets and gear to protect the warfighter conducting counterinsurgency operations. During this time, Marine aviation captured the limelight regarding cost and capability with the introduction of the MV-22, F-35B, CH-53K and performance upgrades to the H-1's. This stagnation within the infantry community is changing. The MOC has set the pace and azimuth of march towards innovation within the service and reaffirmed the primacy of combined arms and maneuver warfare.

Furthermore, the CCLTF is directed to analyze manpower, training, equipment, and doctrine to seek solutions that allow small combat formations to better exploit the operating environment by creating an overmatch against the enemy. These initiatives have shifted focus towards infantry lethality and its inherent capability gaps in the organization and firepower needed to win the future fight. Although there are ongoing weapons experimentations, due to the lack of maturation of a capable fieldable system, they will not be discussed here. Therefore, the central question is, do the current infantry weapons systems, used and battle-tested for decades, provide the maneuver company the needed firepower to fight and retain terrain against a peer competitor within the A2/AD bubble? If not, how does this lack of firepower factor into the Marine Corps strategic calculus for conducting EABO? A preliminary answer seems to exist in the available crew-served weapons (CSW) that reside within a rifle company.

Since World War I, with the introduction of the Browning automatic rifle, organic infantry firepower has centered around CSW's such as mortars, machine guns, and rockets.¹⁵ This lethal mix of direct and indirect fire capability is meant to put the enemy in a stay and die or move and die dilemma permitting friendlies space and time to maneuver. In the future fight, air superiority and the availability of supporting arms is not a given. Some proponents argue the next fight will involve the air insertion of small units within the enemy's A2/AD bubble to

secure an advanced base. This unit must come equipped with enough firepower to not only survive a mechanized force but also cripple the enemy's A2/AD system to allow follow-on forces access. Operating independently and divorced from the reliance of supporting fires in a multidomain denied environment, an air assault company is overmatched in firepower to seize an advanced base against a peer adversary with existing legacy weapons systems. Below we will illuminate the capabilities of the rifle company arsenal and argue that historically this firepower has evolved very little to meet the demands of 21st Century warfare.

The rifle has not been a dominant weapon on the battlefield since the machine gun was introduced during the Russo-Japanese War of 1904-05.¹⁶ At risk of discounting the capability of a well-trained rifleman, a company's firepower resides within its weapons platoon. Although additional firepower can be attained from weapons company attachments, we will focus on the rifle company as the maneuver formation likely to conduct an air assault to secure an advanced base. Due to the lack of existing surface connectors with the range and speed to negate the Long-Range Anti-Ship Missile (LRASM), an air assault by a light and mobile force appears to be a viable short-term solution to secure terrain within the A2/AD environment.

Small formation capability gaps within the EABO construct emerge when evaluating the existing infantry arsenal in the context of a future fight that involves an infantry company operating independently with available organic firepower. Of note, Marine Corps Force (MCF) 2025 eliminates the assault section and reduces the machinegun squad from nine to eight to create structure for 15-man rifle squads. This reduction naturally reduces firepower but creates capability with the squad system operator. The solution to the firepower reduction is the reintroduction of the M4 Carl-Gustaf recoilless rifle and will be discussed later.

Mortars

An air assault company capable of seizing an advanced base lacks the organic firepower needed to hold key terrain against a peer adversary. The first evidence for this claim resides in the indirect fire assets available, the 60mm mortar. The M224A1's ancestry can be traced back to the M2 60mm mortar used in World War II that had limited range and ammunition options. The M2 eventually evolved to the M224A1 to provide increased range at a lighter weight and serves as a rifle company's primary indirect firepower. This system can be fired in conventional mode with bipods and base plate or in a handheld mode that significantly reduces accuracy. The complete mortar system weighs 35.4 pounds, but when employed in the handheld it weighs in at a mere 16.6 pounds. The M224A1 can fire at a rapid rate of 30 rounds per minute and a sustained rate of 20 rounds per minute while providing a maximum effective range of 3,500 meters.¹⁷

A mortar squad consists of three Marines per mortar system with a total of three M224A1's in a rifle company. This smooth bore CSW provides the rifle company with its longest-range asset that is capable of delivering high explosive, illumination, and smoke. A variation of this system has been in use since Vietnam and has proved its reliability and effectiveness from the Gulf War through the most recent wars against terrorism. Although the M224A1 comes with a variety of rounds and fuzes, this system is not designed to address rolling enemy armor, but can be relied upon for final protective fires to aid withdrawal.¹⁸

Machineguns

Although the 5.56mm Infantry Automatic Rifle (IAR) is employed by fire teams, the primary direct fire capability in a rifle company is derived from the M240 medium machinegun. Manufactured by a different company, its lineage originates with the M60 that predates the Vietnam War. The M60 and the M240 were developed during the 1950-60s and continue to

serve as the general-purpose machine gun within the U.S. arsenal. The M240G, similar in function and employment as the M60, was an improvement with better reliability and a more extended max effective range. The M240G provided an adjustable rate of fire with a gas plug and a spare barrel that could be rotated to avoid overheating.

The Marine Corps replaced the M240G with the M240B that allows only one gas setting, therefore, restricting the rate of fire from 550-650 rounds per minute. Classified as a medium machine gun, the M240B fires a 7.62mm round, weighs in at 25.6 pounds, and has a max effective range of 1,800 meters. The preceding nomenclature attempts to highlight the versatility and firepower of the M240B, but with an ammo can of 200 rounds weighing 16 pounds, the mobility needed by an air assault company can soon be strained. Moreover, much like the M224A1, the small caliber round provides some utility against light armored vehicles and firing final protective fires against troops in the open, but would be overmatched against a mechanized force counterattack from China's Type-59 Main Battle Tank.

Rockets

The rifle company has several rocket options available for antiarmor and bunker busting firepower. Individual riflemen can employ the M72 Light Anti-Armor Weapon (LAAW) and the AT-4. Developed in the 1950s to provide the infantry a cheap and disposable antiarmor capability, the 66mm LAAW is the predecessor to the 84mm AT-4. Although the AT-4 replaced the LAAW, it was reintroduced to service during Operations Enduring Freedom and Iraqi Freedom due to its versatile ammunition and the lack of an armored threat. With an effective range of 200 meters and the ability to fire-from-enclosure with anti-structure ammunition the LAAW has evolved to meet the needs of the warfighter on the current battlefield but was not designed to address a peer armor threat.¹⁹

The AT-4, much heavier than the LAAW at 15 pounds, provides more distance at 300 meters and a heftier punch with the 84mm warhead. It has more armor penetration than the LAAW, therefore, one would expect its utilization to rise with the increase in a motorized threat.

Within the rifle company, the CSW rocket option resides in the MK153 MOD 0 Shoulder-Launched Multipurpose Assault Weapon (SMAW) carried by the assaultmen. Fielded since 1984, it was designed as a bunker buster, for use against light armored vehicles out to 500 meters, and can penetrate 21-23 inches of cold rolled homogenous steel.²⁰ This system will soon be removed from inventory in favor of the M4 Carl-Gustaf.

The M1 Carl-Gustaf originated with the Swedish Army in 1948 evolving to the M3 version used by U.S. special operation in the late 1980s. The current M4 is an 84mm recoilless rifle that weighs 15 pounds, is 39 inches long, and proclaimed to be a game-changing weapons system due to its mobility, sights, and ammunition.²¹ This system can engage targets beyond 1000 meters and comes with an 84mm High Explosive Anti-Tank (HEAT) 751 round that can penetrate over 20 inches of armor.²² The future of infantry rocket firepower is a little less bleak with the introduction of the Carl-Gustaf but is still insufficient in providing the rifle company the autonomy needed to operate in a multi-domain denied setting cutoff from supporting fires.

Sure, tactics have evolved with the threat, but the arsenal available to Marine infantry to conduct strategic missions has evolved very little over the past 80-100 years. These superficial upgrades to weapons, optics, and ammunition have proven sufficient in the near term and are effective at fighting terrorism and insurgency in the Middle East. But these enhancements provide little utility against a peer belligerent with armor shrouded beneath an anti-access umbrella. Until recently, the MK 153 SMAW has been the primary CSW used against bunker busting and armor but is described as a costly, aging, and underpowered system that provides

very little to line companies for antiarmor capability.²³ The limitations of the legacy CSW systems discussed above and the evolution of firepower within the infantry resides in physics. A dismounted Marine can only carry so much destructive power burdened by the net explosive weight of energetic material. To enhance mobility requires lighter systems which force a tradeoff in lethality. To maneuver around this tradeoff, newer CSW's are designed to be more accurate to exploit weak points within an enemy system. Herein lies the crux of the problem. How will a foot mobile infantry company, with existing CSW systems, be able to bring enough firepower to the fight to seize and retain an advanced base when supporting arms are limited or denied?

In the short term, until a revolutionary weapon system is developed, infantry formations will need reliable access to a responsive fire support system that can reach back through the anti-access bubble to pull maritime and air component fires when needed. Until this is achieved, the air assault rifle company faced with the daunting mission of seizing an advanced base will be reliant on 20th Century firepower incapable of providing both mobility and lethality against peer armor formations consisting of ZTD-05 Light Amphibious Tanks and Type-59 Main Battle Tanks.

Enabling Concept

The GCE, at the edges of the Marine Air Ground Task Force's (MAGTF) operational range, is unable to generate the combat power necessary to execute its current (or future) tactical system and win against a hybrid, near peer threat. Such operational distances result in an infantry-only GCE, lacking mobility and lethality, divorced from the combined arms system within which it is designed to operate, entirely reliant upon air and naval fires and resources. This reliance creates significant risk to mission and to force when the air and maritime domains are contested and long distances (100NM +) negatively affect turnaround times, sortie rates, and the generation of ground combat power.

--MCTOG 2017 Wargame Series

MCTOG Wargame

To test components of the EABO concept, Marine Corps Tactics and Operations Group (MCTOG) planned and executed a wargame using a battalion-sized expeditionary force to seize an advanced base held by an enemy with the ability to reinforce with a mechanized infantry battalion. MCF 2025 force structure and capabilities were used to identify surfaces and gaps within this forces ability to execute EABO. The results of the wargame generated numerous findings, but relevant to this writing, the lack of an organic antiarmor capability for the rifle company inserted on the first wave via assault support aircraft posed a significant gap for the planning team to overcome. Due to the long-range nature of the air assault and the challenges this presented for agencies to delivery of fire support, further necessitated the need for the rifle company to own organic antiarmor and fire support capability that could provide a solution to enemy armor.

During the summer of 2017, MCTOG conducted the Future Wargaming Series (Air Assault). The purpose of the wargame was to test elements of current and future battalion level and below organizational structure and capabilities to seize an Expeditionary Advanced Base via vertical assault.²⁴ A key constraint placed on the wargaming group was the EABO force, with organic weapons and equipment, had to be internally transported in MV-22's and CH-53K's. One of the outcomes of the wargame was to identify shortfalls in the air assault forces weapons capability to execute this task.

During execution, the air assault force was required to rapidly seize and retain terrain, establish a FARP, and posture forces to defend against enemy mechanized reinforcements three hours away. The objective was an enemy controlled airfield on a small island. Due to the lift constraints, a wave of assault support aircraft could only support the insertion of one reinforced

rifle company. Therefore, this company would need enough firepower to defend itself for three and a half hours before a subsequent wave could land and support. This second wave arrival time falls outside of the enemy’s three-hour window to reinforce and created a significant problem for the friendly force. The enemy reinforcements consisted of a battalion-sized mechanized infantry force equipped with artillery, mortars, BMP3’s and T-72B3’s. Once on the ground, the friendly force used MCF 2025 and “future” capabilities that included light mobility assets such as unmanned ground vehicles (UGV’s), new organization for hunter-killer platoons, semi-autonomous antiarmor systems, and exo-skeletons.²⁵

Table 1: Blue Team Comparative Analysis²⁶

| Round 1 (FY19) | Round 2 (FY25) | Round 3 (FY30 Choice) |
|---------------------------|----------------------------|-----------------------------------|
| (7) Infantry Plt | (1) Infantry Co | (1) Inf Co w/platoon with EXOSUIT |
| (3) 81mm, (3) 60mm Mortar | (6) 81mm, (3) 60mm Mortars | (6) 81mm, (3) 60mm Mortar |
| (1) HMG Plt | (8) Javelin Missile | (6) UGVs HMG (6) UGVs SPIKE |
| (6) Javelin Missile | (2) Engineer Squad | (2) Missiles in a box |
| (1) LAAD Tm | (2) UGV HMG | (12) MRZR |
| (1) Bn Jump | (6) MRZR | (1) Hunter Killer Plt |
| | (1) Bn Jump | (1) SWARM Kit Large |
| | (1) MUX Resupply | (1) SWARM Kit Small |
| | (1) C-130 C2 Configured | (1) Bn Jump |
| | | (2) MUX 1x logistics, 1x armed |

Legend
 Bn – battalion
 C2 – command and control
 Co – company
 EXOSUIT – exo-skeleton suit

HMG – heavy machinegun
 Inf – infantry
 LAAD – low altitude air defense
 MRZR - vehicle brand name

MUX – MAGTF unmanned expeditionary
 Plt – platoon
 UGV – unmanned ground vehicle

Initially, the friendly force was able to seize the airfield but was subsequently challenged in repelling the enemy armor counterattack. It became apparent that the friendly force lacked mobility, firepower, and resiliency with organic combat support to survive and win against a mobile armor force. The inability to create a tactical advantage, even with experimental concepts, resulted in high casualties for the friendly force directly correlated to their inability to

generate external fire support to cover the internal firepower gap. The wargame determined “if proposed operating concepts require greater operational reach, then the problems specifically highlighted in this wargame, and other problems indicated or implied, require solutions before the GCE and MAGTF can execute Littoral Operations in Contested Environments (LOCE) and EABO in support of a naval campaign.”²⁷ Numerous solutions were recommended, but relevant here, a more lethal antiarmor weapon and reliable fused-fire support architecture could have significantly increased the survivability of the EABO force.

Gray Scholars Wargame

The Marine Corps Warfighting Lab (MCWL) provided the venue for students from the Command and Staff College (CSC) to test various concepts for EABO within the “contact” layer of a contested environment. Using innovative methods of force structure and capabilities to arm and insert ground units, the Blue Team was able to rapidly establish bases to receive aviation elements. The challenge for the Blue Team, without a real-time CTP among all players, was the integration and clearance of aviation and HIMARS fires to support sea control.

During the fall of 2018, the AY18-19 Gray Scholars met weekly at the MCWL and worked with the Ellis Group to test emerging technologies within the EABO construct. In part, these enabling concepts, some derived from the imagination of the students, were used to enable the EABO force to establish a FARP within the A2/AD bubble to extend the operational distance and resiliency of the MEU. This wargame differed from the MCTOG wargame in that the method of insert was not limited to an existing aviation platform and could leverage other ship-to-shore connectors such as the Maritime Water Craft (MWC). These MWC’s were outfitted with capabilities such as Weapon Platform (RiWP) turret, a Long-Range Precision Fires (LRPF) missile, 30mm Bushmaster Canon, and Coyote launchers. In addition, the MWC had sensors

and optics managed by a C2 system that could speed up fires approval.²⁸ Furthermore, this wargame did not isolate the EABO force with only organic fires capability. The Blue Team had a HIMARS platoon attached and was allowed to reach back to maritime and aviation components to pull fires.

The MOC hypothesizes that the EABO force should be able to establish a FARP and assist with sea control. In the Ellis Group wargame the EABO was successful in utilizing ACE and LCE enablers to establish revolving FARP's within two hours. Creating FARP's, up to eleven in some instances, was not difficult for the students, but determining how to sustain them proved challenging. During the scenario, a Maritime Platoon construct was created that essentially put squads and platoons on maritime footing. The Maritime Platoon utilizing MWC's could employ an asymmetric strategy to assist the Navy with sea control. This strategy involved the use of surprise, hit-and-run tactics, and ambushes to impose costs on littoral threats.²⁹ To address Maritime Platoon sea control gaps around the straits, the HIMARS platoon was used. Due to the lack of a CTP among all players and the long-range and max ordinate of the HIMARS, integrating clearance of fires with the aviation and maritime components was difficult. In summation, this table-top wargame highlighted how tactical level cost imposition could be achieved, and whole of government levers pulled to maximize the lethality of the MEU executing EABO. Although not a focus, the group struggled to validate key components of EABO; specifically, how to sustain the FARP and integration of long-range missiles to facilitate the Navy with sea control.³⁰

The MCTOG and Gray Scholars wargames produced many useful points requiring additional analysis and further highlighted that to conduct EABO the infantry needs 1) a more lethal antiarmor capability and 2) better fire support integration across the land, air, and maritime

components. Until a digitally interoperable fire support system enhanced with AI is developed, like the opportunity mentioned above, an antiarmor weapon that can provide the infantry with lethality, range, and mobility should be pursued. As a starting point to envision a more lethal antiarmor weapon, we must first look at the current threat. Adversaries the EABO force could potentially confront have an assortment of amphibious fighting vehicles, main battle tanks, and infantry fighting vehicles. Those platforms have weapons that range from the 25mm autocannons to the 105mm rifled gun. China's Marine Corps uses the Type-86 Infantry Fighting Vehicle with an autocannon that has an effective range of 2,500 meters. They also have the ZTD-05 Light Amphibious tank with a 105mm rifled gun with a range of 2,000 meters and the Type-59 Main Battle Tank with a 100mm rifled main gun that can fire out to 1,500 meters.³¹ This small threat sample further underscores the overmatch with the legacy antiarmor systems the Marine Corps infantry uses.

Solution

As the reader will note, the most lethal organic antiarmor capability an EABO force has is the M4 Carl-Gustaf. With a direct fire range of 1000 meters, no top-down attack profile option, and the ability to penetrate 20 inches of armor, this system will quickly become overwhelmed against mechanized forces and does very little to aid with sea control. To execute EABO as the MOC envisioned, an isolated infantry force, divorced of external fire support, requires longer range and more lethal antiarmor weapons beyond the Carl-Gustaf's capabilities. At a minimum, a new antiarmor weapon system should have a max effective range of 4,000 meters and capable of rendering an armor mobility kill with various attack profiles. The weapon should be developed with reconfigurable warheads to address troops in the open, penetrate Type-59 armor, and able to penetrate a ship's hull, such as the Type 071 LPD, just below the waterline.

This system should be man-portable but scalable to CSW employment to expand capabilities based on threat. As the Sea Dragon 2025 Marines recommended, the infantry needs a precision-guided antiarmor weapon. It should be fire and forget, with seeker head lock-on as a backup for GPS denied environment. The specifications mentioned here are not all-encompassing and should stress low cost, but offers a starting point to address some of the requirements the infantry expects of this new capability.

The introduction of this weapon to the infantry community would have impacts, possibly more than explored here, across the Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities, and Policy (DOTMLPF-P) spectrum. Much like the recent introduction of the IAR and the Carl-Gustaf, training materials would need to be developed and curriculum updated at Infantry Training Battalion (ITB). Since ITB will soon no longer train anti-tank assaultmen to employ the SMAW, the 0351 combat instructor structure would transition to teach students this new weapons system. There would be no implications for additional personnel within an infantry squad because the 0311 rifleman that employs the AT-4 would be trained to employ this antiarmor weapon. Parallel efforts should be pursued to source an all-weather optic that is lightweight and capable of supporting the weapon at max effective range. The largest impact of this weapon is its implication for doctrine, if any, in assisting the Navy with sea control. It would be premature here to address those concerns without a fieldable system with clearly defined, tested, and validated specifications to evaluate its impacts within the maritime domain.

Conclusion

The MOC laid out a vision to focus the Marine Corps on the future fight while emphasizing its role as an expeditionary force in readiness capable of contributing to the Navy's

mission. The EABO concept within the MOC is a large check the infantry is challenged with cashing for the MAGTF and is the origin of much wargaming and MEU testing over the last several years. What we have learned is distributed operations within a contested environment strains the reliability of existing C2 architecture and its ability to provide fires to support maneuver units. In the absence of fire support, infantry formations are severely overmatched against an enemy EABO force with armor. The root cause of this overmatch is a large portion of the current Marine Corps infantry arsenal has its genesis from needs derived from the two World Wars. These needs were to combat German tactical infantry and armor formations. The CSW's of today do not provide the necessary penetration at the company level leaving the unit unequipped in firepower to combat future high-intensity combat.³² With minor improvements to functional reliability, weight, and ammunition these systems have been unadulterated since inception. Unless a portable high energy antiarmor weapon is created, or a fire support system is developed that can deliver responsive fires within a multi-domain denied environment, expecting to secure advanced bases via air assault against a peer threat will be difficult at best. MCDP-1 states that to execute maneuver warfare, we must use rapid, unpredictable, and focused actions to create a turbulent situation that robs the enemy of cohesion forcing a dilemma in which it cannot cope. Within EABO we hope to achieve this as a MAGTF using small distributed formations capable of power projection through the positioning of lethal capabilities. Given the current state of the infantry arsenal, devoid of a lethal antiarmor weapon, a maneuver warfare philosophy reliant on supporting fires is the only way the EABO concept can achieve validation.

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- ³ Headquarters US Marine Corps, *Marine Corps Operating Concept (MOC). How an Expeditionary Force Operates in the 21st Century*, Washington, DC: Headquarters United States Marine Corps, September 2016. 13.
- ⁴ US Department of Defense, *Summary of the 2018 National Defense of the United States of America: Sharpening the American Military's Competitive Edge* (Washington: DC: Office of the Secretary of Defense, 2018), 7.
- ⁵ US Department of Defense, *Establishment of the Close Combat Lethality Task Force*, Directive-type Memorandum 18-001, March 16, 2018, 8-11.
- ⁶ Shawn Snow, "Marines seize an airfield and small island while testing tactics for fight against China," last modified 21 March 2019, <https://www.marinecorpstimes.com/news/your-marine-corps/2019/03/21/marines-seize-an-airfield-and-small-island-alongside-special-operations-airmen-and-soldiers-while-testing-tactics-for-fight-against-china/>
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- ⁸ Cox, 1.
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- ¹¹ <https://warontherocks.com/2016/09/waze-for-war-how-the-army-can-integrate-artificial-intelligence/>
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- ¹⁹ Sea Power, 103.
- ²⁰ Nicholas Miner, "The 0351 Infantry Assaultman," *Marine Corps Gazette*, October 2015, 57.
- ²¹ Scott R. Gourley, "M3 Multi-Role Anti-Armor Anti-Personnel Weapon System," *Army Magazine*, February 2015, 64.
- ²² Miner, 57.
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- ²⁴ Marine Corps Tactics and Operations Group, *Future Ground Combat Element Wargame (Air Assault) Final Report*, (Prepared by MCTOG Emerging Concepts, Innovation, and Doctrine Division, 8 September 2017), i.
- ²⁵ MCTOG, Air Assault, 4.
- ²⁶ MCTOG, Air Assault, B-3.
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- ³² Sprincin, 62.

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