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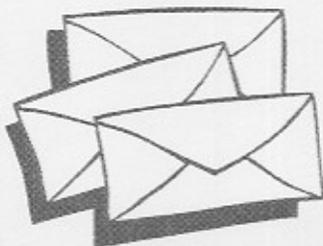
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MARINE CORPS SYSTEMS COMMAND

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GENERAL ARTILLERY SUPPORT - OUT OF A BOX?

The recently released final report from the Operational Maneuver From The Sea (OMFTS) working group stated the following in regards to General Support (GS) and General Support – Reinforcing (GSR) artillery missions:

“The Ground Combat Element (GCE) needs a GS/GSR capability that can range over a greater battlespace without requiring firing units to displace. Current mortar and cannon artillery systems are inadequate for meeting GS and GSR requirements. The larger maneuver area anticipated in OMFTS-style operations will be more suited to rocket artillery.”

Mention GS to any artilleryman, and visions of in-the-rear support, and shooting at maximum range with rocket-assisted projectiles (RAP) and Charge Super 8 Red Bag pop up. While this scenario is quite feasible, it is not always the norm. Artillery units assigned a GS mission could easily be located further forward than the Direct Support (DS) units. Instead of supporting a specific unit, they are supporting an operation. More often than not, though, GS and GSR artillery missions will be associated with longer ranges.

Currently, the Marine Corps has one artillery system, the M198 155mm howitzer, which is being used to fulfill all artillery missions. That system is reaching the end of its service life, and will be replaced with the M777 Lightweight 155mm (LW155) howitzer starting in FY2003. The LW155 surpasses the M198 in all areas except for maximum range, which is 30 kilometers. New ammunition being developed may give the LW155 a few more kilometers of range, but will fall short of what is needed.

On August 18, 1997, a Mission Need Statement (MNS) for an expeditionary indirect fire general support weapons system was published that identified a critical need for a long range, general support artillery system within the Marine Corps. The MNS states:

“To support our current and future concepts, Marine Air Ground Task Forces (MAGTFs) require organic, ground-based, indirect fire weapons that are responsive, maneuverable, and capable of accurately engaging targets at long range with high volumes of lethal fire under all weather conditions both day and night.”

In the event of a Major Regional Contingency (MRC), the Marine Corps currently relies on the US Army for Multiple Launch Rocket System (MLRS) support to fulfill the GS support role. However, this support is subject to availability, and may not be provided responsively or be consistent with Marine Corps requirements.

All of these requirements and needs begs the question, “What does the Marine Corps need?” Among the many US allies, there are numerous artillery and rocket systems being developed or fielded. I attended the Advanced Firepower 99 conference in London, UK in March 1999, and got to see first hand the progress our allies are making in long range artillery systems. The Germans are in the process of fielding the first advanced 155mm/52 caliber self-propelled (SP) howitzer system, the Panzer 2000, which is similar to the US Army’s Crusader system. The PzH 2000 will be the first in-service SP system to be designed from scratch to use a 52 caliber barrel. By having a 52 caliber barrel from the outset, the PzH 2000 will have a major range and firing rate advantage over other shorter-barreled SP systems. In 1998, Finland became the first country in Europe to field a 155mm/52 caliber towed artillery system, the 155 GH 52 APU. The Spanish company, Santa Barbara, is currently developing a new 155mm/52 caliber system called the 155/52 APU SBT-1, which is being evaluated by the Spanish Army. Giat Industries of France has recently completed the prototype of its private venture 155mm/52 caliber CAESAR that is mounted on a UNIMOG (6x6) cross-country truck chassis. This system has generated interest within the world artillery community due to its greater strategic mobility (C-130 transportable), and a

maximum road range of 600 kilometers. As you can see, our European allies are well ahead of us in the development and fielding of long range artillery systems. The 52 caliber barrel is rapidly becoming the standard due to the increased range advantage.

US efforts in developing long range artillery systems are currently limited to the US Army's Crusader program, and a feasibility study by the LW155 Program Office to develop a long range 52 caliber tube. In the past year, numerous artillery and fire support articles have been published in professional military journals that have addressed everything from doctrine changes, fighting with fires, organizational changes, and supporting Operational Maneuver From The Sea/Ship To Objective Maneuver (OMFTS/STOM). Three of five artillery articles published in the July 1998 Gazette all led to similar conclusions; that the Marine Corps needs some type of rocket or missile artillery system in order to meet the future requirements of OMFTS/STOM. The current cannon systems are too logistically burdened to keep pace with fast moving maneuver units, and lack the range to adequately support them. The indirect fire general support weapons MNS states a threshold (minimum) range requirement of 45 km is needed to meet future requirements. The only existing US system that could support that requirement is the MLRS firing the Army Tactical Missile System (ATACMS). The Marine Corps has elected not to purchase MLRS or the lighter High Mobility Artillery Rocket System (HIMARS) due to the high costs and the logistical burden which still exists with these systems in our fast moving scenarios. So we go back to the original question, "What does the Marine Corps need?"

Advanced Fire Support System (AFSS)

The Defense Advanced Research Projects Agency (DARPA) and the Naval Surface Warfare Center Dahlgren Division (NSWCDD) are working together to develop a fires platform to satisfy "US Army After Next" themes and the US Marine Corps' fires requirements for OMFTS. The Army and Marine Corps both have similar needs and requirements for fires in the future. We both need distributed, responsive, deployable, low-burden fires, beyond-the-horizon reconnaissance and targeting for small units, and force protection from hostile aircraft, UAVs, and missiles. The AFSS concept is a fires platform that provides a modular missile capability that would be vertically launched from a container unit, thus the term "out of a box". The "missiles in a box" concept is being designed to be affordable, containerized, platform-independent, and be capable of performing a variety of missions such as ground attack, air defense, and surveillance.

A closer look at the AFSS concept shows significant advantages over conventional cannon artillery systems. Designed for deployability, the AFSS concept demonstrates logistic efficiency through containerization that would eliminate the need for a firing platform or crew. A container/launcher unit (C/LU) would hold fifteen missiles and weigh approximately 2500 pounds. The missiles would be vertically launched, and all fifteen could be ripped off quickly, much like the current MRLS missiles. The C/LU could be easily transported and inserted by any existing Marine Corps helicopter or aircraft to include the V-22. It is a new military capability that can provide immediate firepower for early entry into a conflict, has a large zone of influence, and is a definite force multiplier. Commonality of components will keep the cost low, and life cycle costs (LCC) can be greatly reduced due to low personnel and vehicle requirements. The C/LU would be standardized and reloadable, thus greatly reducing costs and logistic burdens. A family of modular designed missiles will be available to perform multiple missions. The baseline missile would consist of a seeker, an updateable GPS/INS, a modular warhead, and a variable thrust motor. A wide range of enhanced capabilities such as autonomous seekers, multi-mode warheads or payloads (armor/frag/bunker), and in-flight GPS updates are possible. The modular vertical launch concept will lend itself to a self-locating/self-orienting capability, and manned or unmanned operation. A computer and communication system would provide positioning, power, communications, and fire control.

Currently, AFSS is an Army only program, and DARPA has been working with various users to establish utility and requirements. DARPA is specifically looking to satisfy Marine Corps requirements in order to gain joint service support. The AFSS program is defined as a "system of systems" designed to compliment (not replace) existing systems of ground forces to retain combat overmatch against any potential threat. This is just one part of an on-going effort to improve the mission capabilities of Army forces, as well as to make light forces more robust, mobile, lethal, and survivable in order to execute the variety of missions prescribed by the Defense Planning Guidance (DPG). For the Marine Corps, AFSS may provide a solution to the expeditionary indirect fire general support weapons systems MNS, but if pursued under the current MNS, our requirements would differ slightly from the Army. The Army was initially pursuing a short range system (20-30km), but has recently upgraded their requirements for a longer range system (40-90 km) which is similar to the Marine Corps' needs (45km+). The Army wants missiles capable of long range precision attack and the ability to loiter. The Marine Corps also require long-range attack missiles to take out or suppress high payoff targets (HPT) in support of an OMFTS scenario. Whatever system the Marine Corps pursues needs to be kept simple to avoid defining highly technical requirements that may slow the design and development of a system that meets the MNS requirements. Simpler equates to a more affordable system, and one that still meets our requirements. The Marine Corps has not

officially signed up to the AFSS program, however, high level interest has been shown from both the Marine Corps Warfighting Lab (MCWL) and the Marine Corps Combat Development Command (MCCDC).

ONGOING EFFORTS

The Office of Naval Research (ONR) and DARPA have recently recognized the similarity between ONR's ongoing Air and Surface Weapons Technologies (ASWT) and DARPA's AFSS concept. As a result, ONR is sponsoring the Joint Warfighting Counterfire System Advanced Concept Technology Demonstration (JWCS ACTD). The JWCS ACTD will demonstrate a joint, multi-mission system capable of high volume counterfire, fire support, and precision strike operations. Managers of the ASWT and AFSS programs plan to leverage off each other's technologies and other ACTDs where appropriate. Enabling technologies for JWCS ACTD include ONR's Concentric Canister Launch technology (the "box"), and missile advances (the "missile") from DARPA's AFSS program. The JWCS ACTD will be a major player in demonstrating the expeditionary nature of the AFSS concept and its responsiveness to the warfighter within the common USMC/US Army fire support command and control system, thus possibly streamlining the system acquisition process. The Commanding General, MCCDC was briefed on 24 June 1999 on the JWCS ACTD, and indicated that the Marine Corps would support the ACTD. The Marine Corps Warfighting Lab has also committed funding over the next five years in support of the ACTD. ONR and DARPA are in the process of outlining a Memorandum of Understanding (MoU) between them to address the common goals of achieving the USMC/US Army fire support needs. The ACTD is scheduled for FY03.

Whether AFSS concept will be part of the Marine Corps' next general support artillery system remains to be seen, but the possibility exists. The common interests and warfighting payoffs – expeditionary, survivable, mobile, lethal, low operating and support costs, self-locating/self-powering/remote control – are clearly demonstrated with the AFSS concept, and fall in line with OMFTS/STOM requirements. The LW155 will still have its place as the direct support weapon system for the Marine Corps, but another longer range general support system is definitely needed. The AFSS concept provides a unique solution to a critical requirement, and could be the answer to the Marine Corps GS dilemma.

POC: For questions or comments concerning GENERAL ARTILLERY SUPPORT - OUT OF A BOX, contact Major R. D. McGovern (MARCORSYSCOM (DS/GS Artillery Project Officer)) at Coml: (703) 784-2006 ext 2776; DSN 278-2006

FIREFINDER RADAR UPGRADES

The long awaited upgrade of the Firefinder Radar system are slated to be completed during the fielding of the AN/TPQ-46A from October 1999 to March 2000. The AN/TPQ-46A, like its Army equivalent AN/TPQ-36v8, consists of an electronics upgrade to the original AN/TPQ-36 that will provide it greater range, faster target processing and digital interface with AFATDS.

The Marine Corps began its upgrade of the AN/TPQ-36v5 in 1998 when 8 AN/TPQ-46 systems were fielded. The AN/TPQ-46, like its Army equivalent AN/TPQ-36v7, was a downsize from 5 ton to HMMWV of the original 1980's counter mortar radar technology. The Marine Corps renomenclatured its systems primarily because we have one additional vehicle and trailer than the Army. The Multi Commodity Maintenance Center, MCLB Barstow, was hired as the system integrator for the AN/TPQ-46/46A upgrades.

The AN/TPQ-46A Electronics Upgrade completes the Firefinder Upgrades. It converts the old hardware/firmware radar processor into a six card, software based processor. It provides digital communications for target processing with AFATDS, NBC proof shelter and operator remoting capabilities. The fielding scheduled for December 1998 was suspended when performance deficiencies were identified after 82nd Airborne DivArty Radar section were fielded. Deficiencies as compared to the AN/TPQ-46 were in the areas of rocket detection, false target locations, system lock ups and volley detection.

From December 1998 to May 1999 the Army's Product Manager Firefinder, MARCORSSYSCOM and the contractor aggressively pursued resolution of these deficiencies. In May and June 1999 the improved software underwent a test and assessment. It was tested with the firing of a complete, 1100 round Table 14 test at Yuma Proving where it achieved standard on volley detection. It was then assessed at Ft Bliss and White Sands Missile Range against rockets and Ft Bragg for a three week user assessment. The results of the test and assessment were satisfactory for the Army and Marine Corps to resume fielding.

MARCORSYSCOM, in conjunction with the Multi Commodity Maintenance Center, MCLB Barstow, will field and train the AN/TPQ-46A per the following schedule:

11 th Mar	5-19 Oct 99	10 th Mar	7-18 Feb 00
12 th Mar	28 Nov - 17 Dec 99	14 th Mar	3-21 Apr 00

A Operator Training course was conducted in May 99 and a Maintainer Training Course will be conducted in September 1999. 12th and 14th Marines will receive full New Equipment Training because they have had no exposure to the AN/TPQ-46A. Marines currently completing the 0842 and 2889 courses will be trained on the -46A system. The AN/TPQ-46A will be fielded with a Package 11 software version.

Additionally being delivered the FMF is the Firefinder Position Analysis System (FFPAS). FFPAS is a software modeling tool for positioning and siting radars and evaluating their performance. Each Regimental CBR officer will receive a CF-27 Panasonic Toughbook with the software. FFPAS will also run on the Maintenance Kit Toughbook and the LCU. Coupled with the Modular Azimuth Positioning System (MAPS), radar sections will have a self survey, autonomous operational capacity.

POC: For questions or comments concerning **FIREFINDER RADAR UPGRADES**, contact Major Rob Terselic (MARCORSYSCOM (CBG-FS)) at Com1: (703) 784-2006 ext 2706; DSN 278-2006; terselicrj@mcsc.usmc.mil

FIRE SUPPORT TACTICAL DATA SYSTEM



The Fire Support Tactical Data System (FSTDS) is coming soon to a theater near you. An operational theater, that is. The Commander, Marine Corps Systems Command has authorized the hardware purchase of the FSTDS. A Fielding Decision to give the "go ahead and field" is planned for Nov 99. With this decision, the Program Office will commence fielding the FSTDS. The projected fielding schedule is:

I MEF	Dec 99
III MEF (HI)	Apr 00
III MEF (Okinawa)	May 00
14 th Marines (-)	Sep/Oct 00
II MEF	Dec 00
14 th Marines (-)	Dec 00
10 th , 11 th , 12 th Mar FDCs	Jun 01
MarForRes	Sep 01
14 th Mar FDCs	Feb 02

The fielding of FSTDS will take approximately two weeks followed by a four week Operators Course and a two week Supervisors Course. The New Equipment Training Team (NETT) will provide the initial training for all FSTDS users.

The FSTDS will consist of a Compact Computer Unit (CCU), laser printer, 20" flat panel display, installation kit, cabling and the Advanced Field Artillery Tactical Data System (AFATDS) 98 software package. FSTDS will replace IFSAS for battalions and above and eventually will replace BCS. With the technical fire direction capabilities built into AFATDS 99 software, firing batteries can expect to receive their systems in the Jun 01 and Feb 02 timeframe.

AFATDS software the Marine Corps will receive is the same as the Army's, with additional Marine Corps specific functionality built in. Expect a new version of software to be fielded to the Marine Corps and Army about every 18-24 months. AFATDS software development will be accomplished in successive versions, each implementing additional functionality and interfaces.

AFATDS was originally developed to support the artillery community with an automated artillery fire support program. When the first versions of AFATDS were fielded it became apparent that the software had the potential to provide command and control for all operational fire support systems. The original USMC AFATDS program has since evolved into the FSTDS, the premier USMC fire support manager.

FSTDS will be a system of mobile, dispersed nodes. They will provide the force commander with automated planning and execution capabilities to rapidly integrate all supporting fire assets into maneuver plans. OPFACs will include Fire Support Coordination Centers (FSCCs) at the supported maneuver elements, Field Artillery Command Posts (FA CPs)/Fire Direction Centers (FDCs), Force Fires Control Center (FFCCs), Direct Air Support Centers (DASC), and Tactical Air Control Centers (TACCs).

FSTDS presently utilizes SINGARS radios as the main communications medium between units that employ FSTDS. Dedicated SINGARS radio nets provide quality, jam-resistant, encrypted communications that allow FSTDS Operational Facilities (OPFACS) to send and receive fire support data between each other. Testing is currently being conducted with the Enhanced Position Location Reporting System (EPLRS) to determine the ability of EPLRS to handle FSTDS communications. EPLRS, with its unique data communications capabilities, has the potential to integrate FSTDS into the Marine Corp's tactical data architecture.

In addition to radio communications, FSTDS has the ability to operate over multiple Local Area Networks (LAN) through two internal Network Interface Cards (NIC). The use of dual NIC cards allows FSTD to communicate with co-located FSTD computers on an internal LAN, while at the same time, being able to communicate with other command and control systems, such as the TCO, in a interconnected Combat Operations Center (COC). The use of the Secret Internet Protocol Routing Network (SIPRNET) and Tactical Packet Network (TPN) also become viable paths for communications between OPFACs.

FSTD does not operate as a stand-alone system by itself. It sends and receives inputs from other systems on the battlefield. FSTDS receives and sends automated friendly and enemy location update and overlays to the Tactical Combat Operations (TCO) system. This provides the ground commander with a common operational picture of the battlefield. The Air Tasking Order (ATO) is sent to FSTDS from the AIR Forces' Theater Battle Management Core System (TBMCS) based upon requests from FSTDS for air support. Interfaces between Fire Finder Radar systems and Meteorological Measuring Systems also are used to pass target and weather data to FSTDS.

Any questions about the FSTDS can be forwarded to Maj Scott Huelse, MarCorSysCom, PM 1S at (703) 784-2645 ext 2530; DSN 278-2645 ext 2530; E-mail: huelsesa@mcsc.usmc.mil

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AROUND THE SCHOOLHOUSE

NEW APPROACH TO TRAINING THE ANCIENT SCIENCE OF GUNNERY

Students attending the Officer Basic Course (OBC) are on the receiving end of new technology being utilized in the Gunnery Department. This technology, developed by the TELOS Corporation, is known as the Digital System Test and Training Simulator (DSTATS).

The DSTATS is designed to simulate the transmission of actual message traffic of all field tactical systems used in the field artillery. It is capable of receiving messages from the tactical data systems and returning the appropriate Acknowledgement (ACK) or Nonacknowledgement (NAK). The DSTATS performs these functions through one-on-one message exchange or by executing instructor-developed scenarios that contain actual system message traffic based upon the situation we have created. Digital devices are located at every echelon on the modern battlefield. The DSTATS is capable of simulating these tactical devices simultaneously while limiting equipment and personnel requirements, allowing us to train in a realistic manner with systems that are not routinely available in the classroom.

OBC students participate in 4 exercises in our Command Post Exercise (CPX) facility throughout the 19-week course. These exercises are based on tactical scenarios to reinforce class instruction and expose the students to realistic situations. The students first establish fully functional battery level automated FDC's. We then use the DSTATS to simulate forward observers, each equipped with a digital entry device and a battalion FDC equipped with IFSAS. The DSTATS enables us to transmit fire mission related messages, battlefield geometry, fire plans or any other message format that the device the DSTATS is simulating has the ability to transmit.

The tactical scenarios are developed with both time oriented and interactive responses from the simulator. A time oriented response means that transmissions from the DSTATS occur on an established time-line built within the scenario. An interactive response means that the DSTATS will not transmit a message format until it receives the appropriate message from the student FDC. An example of each response follows: In a time oriented response, 3 minutes after the scenario has been initiated a call for fire is transmitted from the observer (DSTATS) to the student FDC. In an interactive response, the observer (DSTATS) will not transmit any subsequent corrections until it receives a message to observer and shot from the student FDC. The DSTATS allows each FDC to execute the scenario independent from one another, allowing for a self-paced approach to training.

The DSTATS operates transparent to the real device operator, providing them with the impression that they are communicating with other real devices. It provides the students a view of the modern battlefield and an understanding of the important role digital communication has on that battlefield. The implementation of the DSTATS has increased the realism and efficiency of the training we provide to students attending the OBC.

POC: For questions or comments concerning NEW APPROACH TO TRAINING THE ANCIENT SCIENCE OF GUNNERY, contact Capt. S. S. Charney, at DSN: 639-6379/4973/2622; Comm: (580) 442-6379/4973/2622; E-mail: charneys@doimex2.sill.army.mil

FACCC STUDENT RESEARCH ESSAYS

The following section contains the results of two FACCC student research projects. Appendices and Enclosures for each of the below listed essays are not reprinted in the Eagle, Globe, & Blockhouse.

WHAT IS THE NAVY DOING TO BECOME INTEROPERABLE WITH THE MARINE CORPS AUTOMATED FIRE SUPPORT COMMAND AND CONTROL SYSTEM?

Captain Eduardo A. Abisellan
United States Marine Corps
Field Artillery Captains Career Course
Class 4-99
31 August 1999

Submitted To:

Colonel J.M. Garner
United States Marine Corps
Marine Detachment
Fort Sill, Oklahoma

EXECUTIVE SUMMARY

TITLE: What Is the Navy Doing to Become Interoperable with the Marine Corps Automated Fire Support Command and Control System?

AUTHOR: Captain Eduardo A. Abisellan, United States Marine Corps

THESIS: The U.S. Navy's answer for the automation of fires is to develop a system from scratch. The Navy lacks a fielded automated Fire Support Command and Control system capable of interfacing with the Advanced Field Artillery Tactical Data System (AFATDS). The Navy should utilize existing technologies to meet naval requirements, specifically a modified version of AFATDS.

BACKGROUND: In *Forward ...From the Sea*, the Navy and Marine Corps defined a combined vision for the 21st Century. That vision originated under the concepts proposed by the Marine Corps in OMFTS and STOM. A tenet of these concepts is sea based fire support. *The Concept of Employment for Naval Surface Fire Support (Circa 2005 Capability)* states that "future warfare will require lethal and protected forces to operate over a larger and deeper battlefield." Moreover, it states "maneuver forces must be supported by direct and indirect fires with extended range, greater accuracy, and greater lethality." The means, by which these fires are planned, delivered and coordinated for the Marine Corps will be through AFATDS. Naval Surface Fire Support will play a dominant role in both OMFTS and STOM. The ability to plan, coordinate and execute multi-faceted supporting arms will allow the MAGTF commander to fully integrate fires into the scheme of maneuver. Fielded systems must be "Joint Capable and Interoperable" if they are to succeed on the battlefields of tomorrow. The Marine Corps must explore options that will integrate AFATDS with NSFS C2 Systems. This becomes critical when operating in an OMFTS environment at extended ranges.

RECOMMENDATION: Fire Support Command and Control Systems must be standardized in order to maximize inter and intra service functionality and minimize cost in development, procurement and fielding. The Advanced Field Artillery Tactical Data System should be transitioned to the Joint Fires Automated Tactical Data System (JFATDS). Why not incorporate all service requirements into a single operating system? A re-engineered AFATDS would possess the additional functionality necessary to integrate all services under a common digital communications system, protocols, and common message standards. The creation of a separate system to meet the Navy's NFCS requirements is redundant and clearly against the precepts of Joint 2010 which state: "Simply to retain our effectiveness with less redundancy, we will need to wring every ounce of capability from every available source. That outcome can only be accomplished through a more seamless integration of service capabilities. To achieve this integration while conducting military operations we must be fully joint: institutionally, organizationally, and technically.

RESEARCH PAPER OUTLINE

Introduction

- A. Case Studies involving the use of Naval Surface Fires
- B. Degradation of Naval Surface Fire Support (NSFS)
- C. Purpose of Research Paper

Operational Maneuver From the Sea (OMFTS)

- A. OMFTS Has Given New Life to NSFS
- B. The Role of AFATDS and NSFS

Defining the Problem

- A. Statement of Problem
- B. What Does the Navy Require from a Naval Fires Control System
 - 1. Mission Need Statement
 - 2. Operational Concepts
- C. Naval Surface Fire Support Initiatives (NSFS)
 - 1. The Naval Fire Control System (NFCS)
 - 2. Three Part Plan
 - a. Near Term (Present to FY 2008)
 - b. Mid Term (FY 2009)
 - c. Long Term (FY 2021)
- D. Naval Gunfire Today
- E. Naval Gunfire Support in The Future

What Does AFATDS Do Now With Regards to NSFS?

- A. NSFS Requirements
- B. AFATDS Capabilities

Summary

- A. Recommendations
- B. Conclusions

Introduction

Case studies from World War II and Korea identify the important role naval guns played during major amphibious operations. Three celebrated case studies ranging from WWII operations in the Mediterranean (Sicily and Salerno), and Central Pacific (Iwo Jima), to Korea highlight the awesome effects of naval fires. "The amphibious landings at Sicily and Salerno demonstrate the decisive role of naval guns in blunting major infantry and armored counterattacks against the landing force."¹ The landings at Iwo Jima highlight the "destructive capability of the intermediate and major caliber weapons against hard point targets."² The Korean War demonstrated the diverse use of naval fires in such operations as "the Inchon landings, amphibious withdrawals of Korean forces at Pohang, and U.S. and Korean forces at Hungnam; support of troop units on the coastal flanks; counterbattery against numerous communist coastal defense guns, and interdiction campaign designed to deprive communist troops of essential supplies."³

The decommissioning of the Iowa Class battleships seriously degraded the naval surface fire support capabilities of the Navy to support amphibious operations, more specifically Marines ashore. Congressional concerns over the apparent lack of adequate naval surface fire support led to the Navy's current Naval Fire Support Initiatives. Later, concept papers such as "From the Sea", "Forward...From the Sea" and "Operational Maneuver from the Sea" proposed new operating concepts, based on new and emerging technological advancements, that helped to define the shared vision of the Navy and Marine Corps for the 21st Century.⁴

The purpose of this paper is to identify what the Navy is doing to become interoperable with the Army and Marine Corps automated fire support command and control system, the Advanced Field Artillery Tactical Data System (AFATDS). This paper will describe the operational concepts behind the Naval Fire Support Initiatives as they relate to the development of a Naval Fire Control System (NFCS). Moreover, specific recommendations are proposed for integrating Navy and Marine Corps fire support command and control systems.

Operational Maneuver From the Sea (OMFTS)

OMFTS has given new life to Naval Surface Fire Support and the role of the Navy in executing those fires. The basic tenets of OMFTS dictate the utilization of sea based fire support and Ship-To-Objective Maneuver (STOM) to close with and destroy the enemy. The objective simply stated is for the assaulting force to attack the enemy from a seaborne platform, eliminating the need for a phased buildup ashore. In essence, OMFTS is maneuver warfare at sea. Naval vessels will utilize the sea as maneuver space to best position the force for a direct assault onto the objective. Naval forces will conduct operations from over-the-horizon typically 25 nautical miles off shore initially; therefore, the great impetus behind the MV-22 Osprey, the Advanced Amphibious Assault vehicle (AAAV), and the Landing Craft Air Cushion (LCAC). These systems commonly known as the "Triad" will facilitate both STOM and extended range operations circa 2015 timeframe.

"OMFTS will project power from beyond the horizon to points 60 to 100 nautical miles inland."⁵ *The Concept of Employment for Naval Surface Fire Support (Circa 2005 Capability)* states that future warfare will require lethal and protected forces to operate over a larger and deeper battlefield. Moreover, it states maneuver forces must be supported by direct and indirect fires with extended range, greater accuracy, and greater lethality. The means by which these fires will be planned, delivered and coordinated for the Marine Corps is through the Advanced Field Artillery Tactical Data System (AFATDS). However, there has to be a system capable of receiving, understanding, displaying, and interacting with AFATDS messages at the other end.

Defining the Problem

The United States Navy currently lacks an automated fire support command and control system that can perform "force level Joint Fire Support planning, coordination and execution for all supporting arms."⁶

- Naval Surface Fires
- Air
- Artillery

The problem of automated fire support command and control is compounded by the lack of viable communication assets that can meet the extended operating requirements of OMFTS or Ship-to-Objective Maneuver (STOM), (Circa 2015 requirements).

"The management and execution of naval fires is currently performed manually utilizing voice, naval text formatted messages, status boards, paper maps and hand-drawn overlays. This manual process is labor intensive and has a limited capacity to respond to dynamic battlefield situations, to execute multiple fire missions, and to coordinate joint operations. The existing process does not and cannot meet the Marine Corps operational requirement for responsive, interoperability with automated fire support C2 systems. This process, coupled with an inefficient voice/manual command, control and coordination process, increases the risk of error and limits the ability for timely engagement of NSFS targets."⁷

The immediate solution to this problem has been to retrofit amphibious and Naval Surface Fire Support ships with SINCGARS radios. "For the near term, SINCGARS is sufficient for both voice and low-rate data communication both among units ashore and between the ground forces and the amphibious and supporting surface combatant ships. Once over-the-horizon operations are made possible in 2015 timeframe by the MV-22 Osprey, AAAV, LCAC "Triad", amphibious ships and surface combatants will probably be, at least, initially out of range of VHF communications."⁸

What does the Navy require from a Naval Fires Control System?

The Navy wants the following capabilities from a Naval Surface Fire Command and Control System: To be evolutionary in nature, constantly changing to the increasing demands levied by technological advancements, and the fielding of new or upgraded weapons or systems. The Operational Requirements Document for the Naval Fires Control System (NFCS) addresses this very question in detail. The following Mission Need Statement (MNS) and Operational Concept is taken verbatim to provide a general overview of what the Navy is actually looking for in a fire support command and control system. Additionally, two overarching theories are explored that may very possibly influence the development of a NFCS; they are the Ring of Fire and the Network Centric Warfare concepts.

(1) Mission Need Statement

"To address the need for firepower from the sea in joint littoral operations, a NSFS Mission Need Statement (MNS) was developed and approved in May 1992. The MNS described the need for a combination of NSFS weapon systems with sufficient range and lethality to meet the wide range of operational requirements to support amphibious assault operations. The requirements levied by the Navy require that an automated Naval Fires Control System (NFCS) be: 1) Compatible with the Global Command and Control System (GCCS). 2) Compliant with the Defense Information Infrastructure Common Operating Environment (DII COE). 3) Functionality interoperable with Marine Corps Command and Control systems including Tactical Combat Operations, the Intelligence Analysis System, the Advanced Field Artillery Tactical Data System (AFATDS), the Improved Direct Air Support Center, applicable segments of the Theater Ballistic Missile Control System (TBMCS), the Target Location Designation and Hand-off System (TLDHS), and other identified command and control systems."

It further states that it is essential that all enhanced Naval Surface Fire Support combatants and Amphibious Command and Control shipping have the capability to access, input, receive and instantaneously process information into and from the AFATDS.

(2) Operational Concept. "The proposed NFCS, when developed, will be fielded onboard DDG-51 ships, commencing with DDG-81, CG-47 (ICW Cruiser Modernization Program), and will be available to amphibious ships (LHA/LHD//LPD-17) and DD-21 ships to provide planning, coordination and execution of naval fires."¹⁰

The key tenets of this operational concept are that the NFCS must be able to "operate for extended periods either autonomously, as part of a fire support multiple ship group, or as part of an Amphibious Task Force (ATF) in a multi-mission environment."¹¹

- (a) **Ring of Fire.** The Ring of Fire Concept was first explored during Fleet Battle Experiment Alpha (FBE-A). FBE-A was conducted by the Maritime Battle Center (MBC) in conjunction with the Commandant's Warfighting Lab (CWL as it was then known) "Hunter Warrior" Experiment: A sea-based Special Purpose Marine Air-Ground Task Force (SPMAGTF) conducting dispersed operations on a distributed, non-contiguous battlefield in order to:
- Demonstrate sea-based C2 SPMAGTF engaged in Operational Maneuver from the Sea (OMFTS).
 - Examine C4ISR capabilities/requirements for a sea-based Joint Task Force Commander (JTFC).
 - Evaluate advanced Naval Surface Fire Support (NSFS).
 - Evaluate advanced munitions concepts including Theater Ballistic Missile Defense (TBMD).¹²

The Ring of Fire concept experimented with the tenets of the NFCS operational concept. Specifically, the ability of a fire support multiple ship group to: "control all fire missions using three defined threads involving the FOFAC Target Location Designation Hand-Off System (TLDHS) ashore in concert with fires coordination systems ashore and afloat."¹³

The primary naval fire support command and control system tested was the prototype Land Attack Warfare System (LAWS). LAWS is a "version of ADOCS, the Automated Deep Operations Coordination System, which is not an Army system but currently being used at the Corps' Deep Operations Coordination Centers (DOCC's), it does not automate fire mission processing. It is simply an information system used to exchange data between the various staff sections of the DOCC. The Navy intends to take this Corps level "e-mail" system and make it do fire mission processing aboard surface combatants."¹⁴ LAWS was used with the AFATDS utilizing the TLDHS. Three communication nets were evaluated: UHF, EHF satellite and VHF.

The experiment demonstrated:

- (1) Digital fires from FOFAC ashore directly to afloat fire support system (FOFAC to LAWS with surface fires).
- (2) Digital fires from AFATDS to afloat fire support systems (FOFAC through AFATDS ashore to LAWS with surface fires).
- (3) Digital fires from AFATDS to afloat fire support systems (FOFAC through AFATDS afloat to LAWS with surface fires).¹⁵

(b) **Network Centric Warfare.** Network Centric Warfare is a Navy Concept to leverage the revolution in information technology, which has tremendously increased the productivity of private industry. It involves common functionality between systems and shared knowledge in real time, or as close to real time as technology will permit.¹⁶ The belief is that "Network Centric Warfare enables a shift from attrition style warfare to a much faster and more effective war fighting style characterized by speed of command and self-synchronization."¹⁷

Naval Surface Fire Support Initiatives (NSFS)

NSFS initiatives resulted primarily from congressional concerns over the Navy's inability to provide adequate support to Marines with the decommissioning of the Iowa Class Battleships. Much has been written on the weapon systems initiatives resulting from Joint Vision 2010, and the U.S. Navy and Marine Corps vision for the 21st Century, in Forward...From the Sea, and Operational Maneuver from the Sea (OMFTS). The Draft Concept of Employment for Naval Surface Fire Support (Circa 2005 Capability) clearly delineates what the Navy intends to do with current weapon systems and with the advent of new technologies to support the operational requirements of OMFTS. Moreover, several articles published in both the Field Artillery Journal and U.S. Naval Institute Proceedings address the very same issue.

However, conspicuously missing from the vast majority of doctrinal literature, journals, and professional magazines, is the U.S. Navy's answer to command and control in support of Naval Surface Fire Support. The Army began fielding AFATDS in FY 96. The Marine Corps will commence fielding AFATDS in FY 99. However, there is no system currently in place to process AFATDS requests/messages (Fire Order Taskings) for Naval Surface Fires. Several systems/concepts have been proposed, but have not yet been fielded.

The Naval Fire Control System (NFCS)

The Naval Fire Control System proposed by the Navy is a system within a system and falls within the much broader Naval Surface Fire Support Initiatives. The Naval Surface Fire Support (NSFS) Initiative resulted from congressional action, as previously stated, and through continuing refinement such as: The Navy and Marine Corps Operational Concepts for the 21st Century; Forward...From the Sea and Operational Maneuver from the Sea.

Three Part Plan

The Navy has a three-part plan, incremental and evolutionary in design to fulfill the requirements of a Naval Fire Control System, which coincides directly with the much broader NSFS initiatives. In essence it is the Navy's plan for the 21st Century.¹⁸

(1) Near Term (Present to FY 2008): Modernization of Aegis Class Ships coinciding with the development of an automated NFCS.

- Development and Fielding of the Extended Range Guided Munition (ERGM).
- Modification of the Mk 45 Gun Weapon System and the Gun Computer System Mk 160.
- Development of an automated Naval Fire Control System (NFCS).

(2) Mid Term (FY 2009): NFCS functional improvements in order to support:

- The Land Attack Standard Missile (LASM).
- The Army Tactical Missile System Naval version (NTACMS)
- Tomahawk Baseline Improvement Program (TBIP)
- Tactical Tomahawk Weapon Control System (TTWCS)
- Area Air Defense Commander (AADC)
- Advanced Gun System
- DD-21 Land Attack Destroyer

(3) Long Term (FY 2021)

- 2nd Generation Arsenal Ship
- Combat System Interface
- Real-time Air Deconfliction
- Automated Supporting Arms Coordination Center (SACC)

Naval Gunfire Support Today

Naval Gunfire Support is done no differently today than during the Second World War. It takes 13 sailors to man and operate all required systems. Personnel requirements for mission processing is as follows:

- A. Bridge/Chart Table
 - (1) Navigation Supervisor
 - (2) Radio/Tele Phone Operator
 - (3) Bridge Plotter
- B. Combat Information Center (CIC)
 - (1) CIC Supervisor
 - (2) Gun Liaison Officer
 - (3) Assistant Gun Liaison Officer
 - (4) Navigator Recorder
 - (5) Navigator Plotter
 - (6) Target Plotter
 - (7) Radio/Telephone Recorder
 - (8) Radio/Telephone Operator
- C. Gun Control Center
 - (1) Gun Control Officer
 - (2) Safety Observer

As one can see Naval Gunfire Support today is personnel and time intensive, and lacks automation. "The Navy truly recognizes that for them to be relevant and able to support a "land force" it must modernize its NGF capability both in C2 and in fire power."¹⁹

Naval Gunfire Support In The Future

The Naval Gunfire Support System of the future will be designed to perform Naval Surface Fire Mission Planning and to employ Naval Surface Fire Support Weapons. It will not be a Fire Control System. "NFCS is a software application that will receive targeting data, conduct Naval Surface Fire Mission Planning and Coordination, and execute fire missions via interfaces to Weapon Control Systems."²⁰

The Navy as with the rest of the Armed Services is experiencing personnel/manning difficulties. A solution for the lack in available manpower is to automate systems, thus relieving personnel to perform other functions or allow ships to perform more tasks under reduced manning. The manning goal for the Naval Fire Control System will be 2 people vice 13, with the built in depth to conduct 24 hour/extended operations. The configuration of the CIC will accommodate not only the Gun Control Console, but also the Advanced Tomahawk Weapon Control System (ATWCS). NFCS functionality will include:

- Automated NSFS Functions
- Fully Digital Communications
- Automated Tactical Display
- Gun Control Console

What does AFATDS do now with regards to NSFS?

Naval Surface Fire Support will play an important role in both OMFTS and STOM. The ability to plan, coordinate and execute multi-faceted supporting arms will allow the MAGTF commander to fully integrate fires into the scheme of maneuver. Instead of reinventing the wheel, systems that are already operational should be thoroughly explored to see if:

- (1) They meet the operational requirements of new concepts, techniques, tactics or procedures, and or emerging technologies.

- (2) They can be modified to meet the operational requirements of new concepts, techniques, tactics or procedures and or emerging technologies.

The problem herein lies in the fact that a system currently exists that with modifications can meet the near, mid and long term requirements of a naval surface fire support command and control system. Fielded systems must be "Joint Capable and Interoperable" if they are to succeed on the battlefields of tomorrow. Moreover, command and control systems should be modular in design, allowing for inter and intra-service functionality.

The Advanced Field Artillery Tactical Data System (AFATDS) is the next generation Fire Support Command and Control System to replace the Initial Fire Support Automated System (IFSAS) currently in use throughout the Marine Corps. AFATDS is capable today of selecting either organic mortars, supporting artillery, naval gunfire support, or aviation support to attack targets, based on a number of criteria (target characteristics, commander's guidance, weapon system availability, etc.). It will generate and send Orders to Fire/Fire Orders to any of these assets, including Naval Gunfire Support ships. However, there has to be a system capable of receiving, understanding, displaying, and interacting with AFATDS messages at the other end.²¹ The "Field Artillery" in AFATDS is misleading in that AFATDS is truly a command and control system fully capable of selecting all forms of fires, not just field artillery.

AFATDS today performs the following key automated functions:

- Execution of Commander's Guidance
- Fire Mission Processing
- Coordination and Clearance of Fires
- Target Intelligence Processing

The next generation AFATDS will deliver technical fire direction as well as the Key Automated functions listed above. However, there are challenges associated with the system. These challenges are:

- Man-Machine Interface
- Digital Sustainment Training
- Education of AFATDS' Capabilities
- Field/Sustain Reserve Components

Recommendations

Fire Support Command and Control Systems must be standardized in order to maximize inter and intra service functionality and minimize cost in development, procurement and fielding.

A simple mathematical equation explains the logic behind this statement:

X = the standardized system (Army/Navy/Marine Corps/Air Force)

Y = the software (modular in design, to meet general, specific or joint applications)

Add the two together and you get a common system with modular/interchangeable hardware that meet specific service requirements but yet retains a joint foundation that allows for all services to communicate vertically (outside a service) and horizontally (within a service).

The Advanced Field Artillery Tactical Data System should be transitioned to the Joint Fires Automated Tactical Data System (JFATDS). This recommendation is based on the research performed during the drafting of this paper. The Marine Corps has been the driving force behind the integration and system functionality for naval and aviation fires. Why not incorporate all service requirements into a single operating system? A re-engineered AFATDS would possess the additional functionality necessary to integrate all services under a common digital communications system, protocols, and common message standards. The Operational Requirements Document for Naval Fire Control System (NFCS) has clearly listed the capability requirement for a Naval Fires Control System. The creation of a separate system to meet the Navy's NFCS requirements is redundant and clearly against the precepts of Joint 2010 which state: "Simply to retain our effectiveness with **less redundancy**, we will need to wring every ounce of capability from every available source. That outcome can only be accomplished through a more seamless integration of service capabilities. To achieve this integration while conducting military operations we must be fully joint: institutionally, organizationally, and technically."²²

A two-part solution is proposed to fulfill the Navy's requirement for a NFCS. This proposal mirrors the Navy's three-part Naval Surface Fires Initiatives of near, mid and long range requirements. The recommendations are based on the Navy and Marine Corps vision for the 21st Century, as defined by Forward... From the Sea and OMFTS, existing technologies, and the mission need statement for a NFCS, as identified by the NFCS Operational Requirements Document.

Near Term (Present to FY 2008)

The near term solution for a NFCS is to field AFATDS onboard Naval Gunfire Support Ships. AFATDS would perform the function required of a NFCS. Its job is to process the incoming missions and via interface with the Weapon Control System execute the fire order. This will complement the Navy's near term initiative for improving the Naval Surface Fire Support capabilities of its Aegis ships. Modernization includes retrofitting ships possessing the venerable 5"/54 MK 45 with the upgraded 5"/62 MK 45 Gun. This upgraded system is capable of firing the Extended Range Guided Munitions to a range of up to 63 nautical miles.²³

This near term solution will serve two purposes. First, it will allow for the immediate fielding and utilization of a proven fire support command and control system. Second, it will allow the services time to develop, test and field the *proposed* Joint Fires Automated Tactical Data System (JFATDS).

Mid-Long Term (FY 2009 to FY 2021)

The development of the Advanced Field Artillery Tactical Data System is in essence a revolutionary step towards a Universal Fire Support Command and Control System. As previously stated AFATDS is currently capable of integrating mortars, artillery, naval gunfire and aviation support.

AFATDS already possesses a common digital communications system, protocols, and common message standards. "It is DII COE level 6 compliant, uses the Joint Variable Message Format (JVMF), and Mil Std 188-220b protocol."²⁴ The mid-term proposal for a NFCS is the fielding of the *proposed* Joint Fires Automated Tactical Data System (JFATDS). JFATDS would possess software packages, or modules designed to meet the NFCS requirements of the Navy. Additionally, existing NFCS programs such as LAWS would be rolled into the proposed JFATDS program. Moreover, the initial fielding of JFATDS would coincide with the implementation of mid-to-long term NSFS initiatives. Mid-to-long term initiatives include the fielding of the DD-21 "Land Attack Destroyer," Land Attack Standard Missile (LASM), the Advanced Gun System, and the Tactical Tomahawk. By

this stage JFATDS has become a common automated fire support command and control system capable of providing both technical and tactical fire direction as well as fire support coordination for all arms of the services.

The long-term NSFS initiatives involve the construction of a second generation 21st Century Surface Combatant (SC-21), and utilization of advanced/emerging technologies to improve upon the proposed JFATDS.

Conclusion

"The nature of modern warfare demands that we fight as a joint team. This was important yesterday, it is essential today, and it will be even more imperative tomorrow."²⁵ The battlefields of tomorrow will require, more often than not, joint operations of some proportion. Somalia, Haiti, and most recently Kosovo have demonstrated the necessity for the services to conduct joint operations in order to achieve national interests.

The Advanced Field Artillery Tactical Data System possesses the potential to become a fully joint system capable of supporting intra and inter-service needs. The challenge lies in eliminating inter-service rivalries in order to achieve a common purpose. Transforming AFATDS into JFATDS is more than just achieving interoperability between services. It provides the foundation for a joint operating environment. Joint ventures will be the wave of the future. If the services continue with developing service specific weapons and command and control systems they are setting themselves up for failure. A case in point is the development of the Army and Navy's 155mm guided munitions programs. The Army has a guided munition program called Excaliber, the Navy's program is called the Competent Munition Advanced Technology Demonstration (CMATD). These programs are both contracted by Raytheon. Raytheon is not going to tell the Army or the Navy that they are working on two almost identical weapons program. Why should Raytheon say, wait a minute guys, did you know you are both working on the same idea! Why don't you guys get together and save some money?

The concept of JFATDS not only integrates and facilitates the command and control of universal fires, but also provides economy of force and most importantly unit of effort.

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**CLASS AND MARINE CORPS ARTILLERY:
REALISTIC ARTILLERY TRAINING?**

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United States Marine Corps
Field Artillery Officer Advanced Course
Class 4-99
31 August 1999

Submitted to:

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EXECUTIVE SUMMARY

TITLE: CLASS and Marine Corps Artillery: Realistic Artillery Training?

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THESIS: The Closed Loop Artillery Simulation System (CLASS) is the Marine Corps first attempt to provide a simulation system to the artillery to improve the quality of its live fire field training. However, the current vision of what CLASS will be falls short of the mark. By utilizing lessons learned from the use of the ISMT and the U.S. Army's development of the Fire Support Combined Arms Tactical Trainer (FSCATT), the Marine Corps could produce a high fidelity system that accurately replicates all aspects of battery level.

BACKGROUND: In the early 1990s the Marine Corps fielded the Indoor Simulated Marksmanship Trainer (ISMT). The ISMT was designed to provide all Marines marksmanship training on small arms and crew served weapons. Although the ISMT provides artillery men with a viable means of receiving familiarization training on battery and battalion organic weapon systems it has very little utility for MOS training. The U.S. Army has developed the Fire Support Combined Arms Tactical Trainer (FSCATT). The Marine Corps is planning on fielding a number of weapons simulators, to include the Closed Loop Artillery Simulation System (CLASS) in Fiscal Year 2002 but fulfillment of the current ORD will not provide realistic simulator training.

RECOMMENDATION: The Marine Corps artillery can benefit greatly with the fielding of the CLASS. However, it is imperative that the system be realistic as possible in simulating live fire training in order to provide a viable training tool to augment actual live fire exercises.

RESEARCH PAPER OUTLINE

- I. Introduction
- II. Background
 - A. Why Simulators? (Simulator Studies)
 1. Live Fire after utilizing simulators
 2. Benefits
 - B. USMC Indoor Simulated Marksmanship Trainer (ISMT)
 1. Description and uses
- III. Artillery Simulators
 - A. U.S. Army Fire Support Combined Arms Tactical Trainer (FSCATT)
 1. Components
 - a. FSCATT Target Acquisition Subsystem
 - b. FSCATT Weapon Delivery Subsystem
 - c. FSCATT Fire Direction Center Subsystem
 - B. USMC Closed Loop Artillery Simulation System (CLASS)
 1. Description of ORD requirements
- IV. Lessons Learned
 - A. FSCATT Software Problems
 - B. FSCATT Hardware Problems
 - C. HCT: FSCATT's Simulator Success
- V. Conceptual Short Comings of CLASS
 - A. General Discussion
 - B. CLASS Target Acquisition Subsystem (problems and solutions)
 - C. CLASS Weapon Delivery Subsystem (problems and solutions)
- VI. Conclusion
 - A. Recommendations

INTRODUCTION

Simulators, by definition, are devices that enable the operator to reproduce or represent under test conditions phenomena likely to occur in actual performance.¹ This definition should be the driving force behind the development and acquisition of the Closed Loop Artillery Simulation System (CLASS) for the Marine Corps' artillerymen. As a total system, CLASS should strive to achieve the same training benefits for the artillery community as the Indoor Simulated Marksmanship Trainer (ISMT) did for Marine Corps crew serve and small arms training: the integration of a high fidelity system which is able to provide quantifiable feedback to correct deficiencies and improve overall proficiency. Utilizing the U.S. Army's experiences in developing the Fire Support Combined Arms Tactical Trainer (FSCATT) and the lessons derived from ISMT utilization, the Marine Corps has the ability to develop a fully integrated, battery level training platform which augments live fire training and improve MOS proficiency.

Table 1 provides the reader a condensed comparison of FSCATT and CLASS subsystems and the author's proposed suggestions for CLASS improvements which will be discussed throughout this research paper.

Table 1: FSCATT and CLASS Component Comparisons and Suggested Improvements

	FSCATT	CLASS	IMPROVEMENTS TO CLASS
WEAPONS DELIVERY SUBSYSTEM	<ol style="list-style-type: none"> Howitzer Crew Trainer Strap-on Devices Ammunition (Table 3) <p>Status: currently in use as stand alone system</p>	<ol style="list-style-type: none"> Strap-on Devices Ammunition (Table 3 and SADARM) Deployable <p>Status: conceptual development; proposed fielding in FY-02</p>	<ol style="list-style-type: none"> Garrison Trainer Deployable Trainer
TARGET ACQUISITION SUBSYSTEM	<ol style="list-style-type: none"> GUARDFIST II with 1:1 or 1:30 instructor/student ratio <p>Status: currently in use as stand alone system</p>	<ol style="list-style-type: none"> System with 1:10 instructor/student ratio with at least four stations Deployable <p>Status: conceptual development; proposed fielding in FY-02</p>	<ol style="list-style-type: none"> Garrison Trainer Deployable Trainer
FIRE DIRECTION CENTER SUBSYSTEM	<ol style="list-style-type: none"> Interface with actual FDC equipment Act as Closed Loop Controller <p>Status: under development</p>	<ol style="list-style-type: none"> Same as FSCATT <p>Status: conceptual development; proposed fielding in FY-02</p>	

BACKGROUND

Up until the early 1990s, procurement of weapons simulators was a very low priority for the Marine Corps.² This can be, in part, attributed to the inability of systems to accurately reproduce the effects of live firing a weapon system. In recent years computer technology has grown exponentially. New systems using laser and videodisk technology offer a new level of realism that had previously not been available. Continuing research and advances in computer technology are leading to faster, more capable and realistic systems which will provide the military with easily accessible training aids that employ off the shelf technology with the ability for future, less expensive upgrades.

The Marine Corps' primary mission in peacetime is maintaining operational readiness. Until recently, the main technique to attain this has been the use of live fire training at all levels because it was the most effective means available. However, with reduced defense budgets and ammunition allocations, the Marine Corps has investigated options to augment live fire training in order to maintaining readiness. One of the tools available is the integration of high fidelity weapon simulators.³

WHY SIMULATORS?

Can simulators replace live fire training? No they can not. Field craft and employment can only be accomplished in a field environment. However, simulators provide the ability to identify deficiencies and better prepare Marines for the actual employment of weapon systems. Numerous studies have been conducted which indicate the use of simulators prior to live fire enhance individual and crew performance. One tank company improved its first round hit accuracy from 50-60 percent to 95 percent by utilizing simulators.⁴ A study evaluating gunner skills for the Dragon anti-tank missile indicated that the majority of live fire misses could be reduced by 25% through the use of simulators.⁵ An empirical study of marksmanship simulators showed an average increase of 27.25 points during live fire qualification.⁶ These examples highlight that the weapons proficiency from skills learned during simulations can be directly applied to live fire scenarios.

Factors such as range availability, range restrictions, shortages of safety qualified personnel, and logistical constraints all reduce a unit's ability to conduct live fire training.⁷ Simulators are not impeded by the same restrictions as live fire training and still can provide many of the same training benefits. As such, they are a viable option for meeting the Marine Corps training needs.

ISMT: THE MARINE CORPS FIRST STEPS TOWARD HIGH FIDELITY WEAPON SIMULATION

In 1995 the ISMT was first introduced at the School of Infantry, Marine Corps Base, Camp Lejeune, North Carolina.⁸ Utilizing modified common weapons and integrating them with a high fidelity computer system, the ISMT is able to replicate the actual firing of weapons. All Marine Corps small arm and crew served direct fire weapons found at the company level are available with the ISMT. In addition, weapons such as the AT-4, SMAW, 60mm and 81mm mortars can be utilized.

By simulating various environmental conditions, such as wind and low light visibility, and integrating numerous tactical scenarios, the ISMT provides Marines the unique ability to train to Individual Training Standards (ITS) relating to marksmanship before ever firing a single live round. The ISMT has

the potential to improve the quality of live fire training by correcting deficiencies and establishing proper procedures before executing a live fire range. The realistic, simulated firing of weapons utilized during live fire training translates to a higher standard of proficiency that can be established, and evaluated, before Marines ever expend live rounds.⁹ Subsequently, the ISMT has been fielded to Fleet Marine Force and Reserve units.

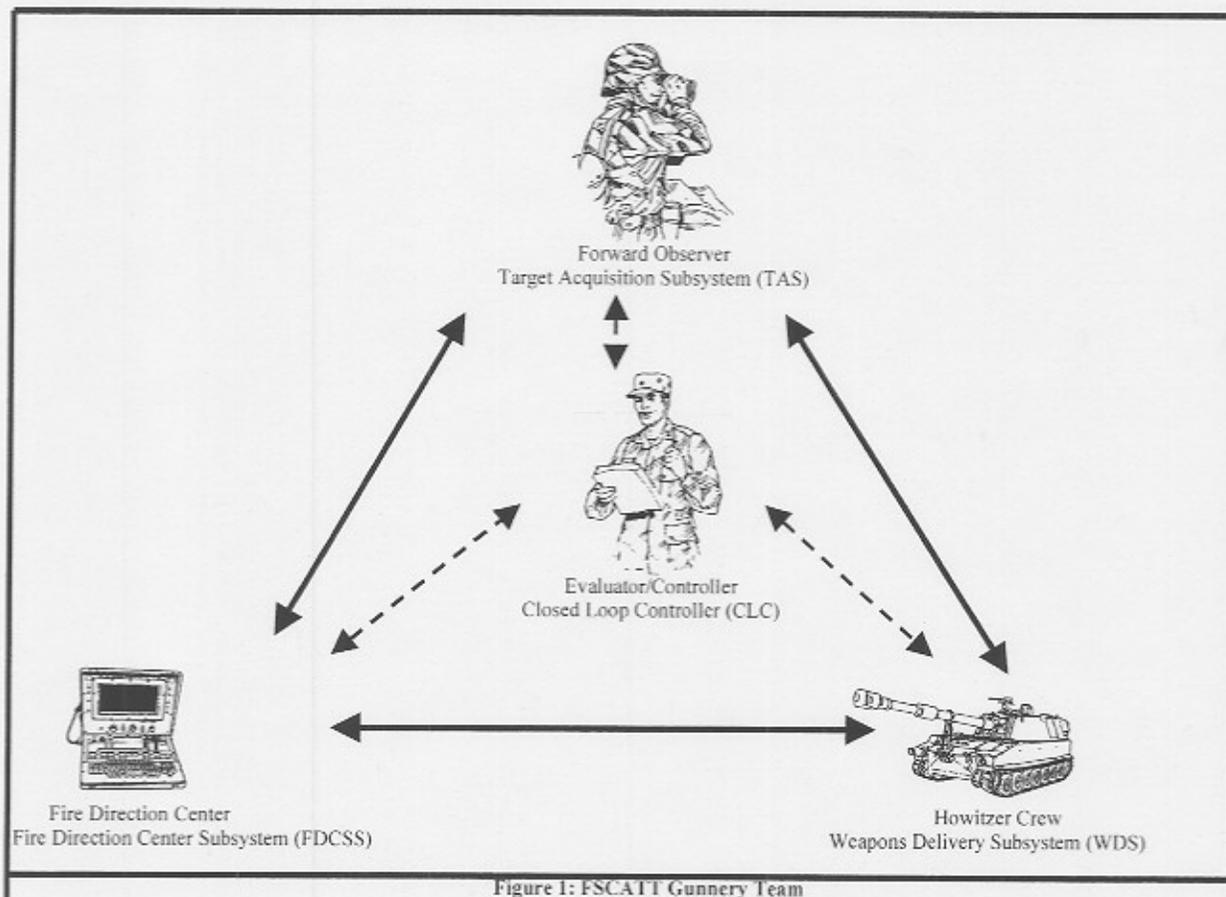


Figure 1: FSCATT Gunnery Team

ARTILLERY SIMULATORS

Although the ISMT provides individual commanders a unique training option for common weapons, it does not provide the Marine artillery community the ability to simulate the training for the entire gunnery team (See Figure 1). Command Post Exercises (CPXs) have been the main simulation tool available to Battery Commanders to integrate all portions of the gunnery team. While CPXs can adequately test digital communication conductivity, they have limitations that reduce overall usefulness and training value. Forward Observers do not get the benefit of adjusting rounds, Fire Direction Centers (FDCs) are not evaluated for computational accuracy, gun crews must be timed, and howitzer settings must be checked manually.¹⁰

U.S. ARMY FIRE SUPPORT COMBINED ARMS TACTICAL TRAINER

In 1993, the U.S. Army Training and Doctrine Command published an Operational Requirement Document (ORD) for the development of the Fire Support Combined Arms Tactical Trainer (FSCATT). Originally staffed under the title of the Closed Loop Artillery Simulation System (CLASS), the concept of FSCATT was to provide an integrated, battery level training system that would integrate and monitor all aspects of the gunnery team. The system was not structured as a tool for training above the battery level. As such, interaction with digital systems at the battalion level and above was not deemed a requirement. This was the first attempt at creating an integrated simulator for U.S. artillerymen.

The main components of FSCATT were identified as the Target Acquisition subsystem for forward observers, the Weapons Delivery subsystem for howitzer crews, the Fire Direction Center subsystem for FDC data computations, and the Closed Loop Controller subsystem which would control and evaluate all other subsystems. These components could be used together in a closed loop format or as stand-alone modules. Additionally, howitzer strap on trainers were identified as a primary requirement for towed artillery weapon systems. Strap on trainers were required to "measure, record and display actual firing data for deflection, quadrant, mission time, and FDC simulated fire mission data."¹¹

FSCATT Target Acquisition Subsystem

In FSCATT, the Target Acquisition subsystem is designed to integrate with the Guard Unit Armory Device for Full-Crew Interactive System Trainer (GUARDFIST II).¹² GUARDFIST II is a training system that has two separate versions: the one-to-one version which uses a high resolution monitor that allows an instructor to concentrate on one student, or a one-to-thirty version in which one instructor can train thirty observers utilizing a wide screen classroom. Both versions have an instructor control station and observer stations. Observers utilize the same items, such as binoculars and digital message devices, they are expected to employ in the field for target acquisition. The instructor station generates and controls the training scenario and records observer performance.¹³

FSCATT Weapons Delivery Subsystem

The Weapons Delivery subsystem utilized in FSCATT is the Howitzer Crew Trainer (HCT). The HCT replicates the M109A5 turret and its functions which provides visual and physical realism. The HCT will measure, record, and display actual firing data and will evaluate performance of individual and crew tasks.¹⁴ Actual components of the M109A5, specifically the M145 and M146 mounts and M117 and M118 telescopes, are integrated into the platform. All aspects of howitzer crew can be evaluated by the system (See Table 2).

Table 2: FSCATT evaluated tasks

Record/maintain fire mission data
Emplace/recover close-in aiming points
Load/secure ammunition in preparation for transporting
Prepare ammunition for firing
Lay and measure howitzer for quadrant with range quadrant
Disassemble/assemble breech block and firing mechanism
Load and fire a prepared round
Align close-in aiming points using M100 series pantel
Lay howitzer for initial direction without using aiming circle
Lay howitzer for initial direction using pantel
Check boresight
Lay howitzer for deflection
Refer the piece
Lay for quadrant with the gunner's quadrant
Mount/maintain GDU
Perform prefire checks

In addition to the platform, reusable training projectiles, fuzes, and powder charges are provided with each HCT (see Table 3). Recoil, weapon cant, displacement, and sustained rates of fire all provide a realistic, simulated environment for the cannoners.

Table 3: FSCATT Simulated Projectiles, Fuzes, and Powder Charges

Type	Description	Quantities Provided
M107	High Explosive	10
M107	HE(Deep Cavity)	2
M1101A1	White Phosphorous	1
M116A1	HC Smoke	2
M825	Felt Wedge WP	2
M483A1	DPICM	7
M864	DPICM Base Burn	7
M485	Illumination	2
M549A1	RAP	1
M692	ADAM-L	1
M712	Copperhead	1
M718	RAAMS-L	1
M731	ADAM-S	1
M741	RAAM-S	1
M557	PD	3
M564	MTSQ	6
M565	MT	1
M572	PD	3
M577	MTSQ	6
M582	MTSQ	6
M728	VT (deep cavity)	2
M732	VT	2
M732A2	VT	2
M739	PD	6
M762	Electronic Time	2
M767	Electronic Time	4
M3A1	Green Bag, Charges 1-5	8
M4A2	White Bag, Charges 3-7	12
M119A1	White Bag, Charge 8	8
M119A2	Red Bag, Charge 7	8
M203	Red Bag, Charge 8	4
M203A1	Charge 8	4
M82	Primers	40

Initially, strap on devices were envisioned to be portable systems that could be attached to the gunner's and assistant gunner's sites utilizing cameras to project images and computers to evaluate deflection and quadrant settings. Ideally these could be used to augment or in lieu of the HCT. However, hardware and software deficiencies and limited training value cause the devices, which were initially fielded as prototypes, to be deleted from the program. With the strap on devices, only the gunner and assistant gunner were receiving performance feedback from the system. When utilizing the

strap on devices, an instructor must manually verify ammunition settings. Overall the strap on devices were not able to thoroughly evaluate or train the entire gun section.

FSCATT Fire Direction Center Subsystem

The Fire Direction Center subsystem (FDCSS) is configured to work with the HCT and interface with actual battery/platoon FDC hardware. The FDCSS is required to record and display information such as call for fire, meteorological, ammunition, firing unit, message to observer data, and generate Initial Fire Support Automation System (IFSAS) and Advanced Field Artillery Tactical Data System (AFATDS) messages. Table 4 illustrates the types of fire mission the FDCSS is capable of producing. Additionally the FDCSS must be able to perform the duties of the Closed Loop Controller (CLC). After action reports and exercise control are the primary mission of the CLC.¹⁵

Table 4: FSCATT TRAINING MISSIONS

Precision Registration
High Burst/Mean Point of Impact
Low Angle Adjust Fire
High Angle Adjust Fire
Coordinated Illumination
Continuous Illumination
Immediate Suppression
Immediate Smoke
Quick Smoke
Simultaneous Missions
Adjust Final Protective Fire
Irregular Target
Fire For Effect
Priority Target
Time on Target
Prepare to Fire
Establish and Maintain Platoon FDC
Gunner's Qualification Test

At this time, the M109A5 HCT is being utilized at the U.S. Army Field Artillery School to augment the training of new cannoners and coincides with ongoing further development. The A6 model completed its customer test in spring 1999. GUARDFIST II is being funded and fielded under a separate ORD.¹⁶

MARINE CORPS CLOSED LOOP ARTILLERY SIMULATION SYSTEM

The Marine Corps has identified simulation deficiency of the artillery community and the need to acquire a simulation system that can train the entire gunnery team. In 1998, the Marine Corps approved an ORD for the Closed Loop Artillery Simulation System (CLASS) program. The mission of CLASS is stated as being able to "...provide deployable interactive mission training for the Forward Observer (FO), Fire Direction Center (FDC), and the firing battery crew that includes a full performance feedback and analysis capability."¹⁷

CLASS closely resembles the requirements the Army outlined when creating FSCATT. Like FSCATT, CLASS will have three major components and a controller subsystem. Many of the items and requirements the Marine Corps has specified can be almost directly applied from FSCATT. The requirements for the FDC subsystem, with the exception of certain types of fire missions, are almost identical to those identified by the Army's ORD.¹⁸

The major difference between FSCATT and CLASS occur with the Weapons Delivery subsystem (WDS) and the Target Acquisition subsystem (TAS). The WDS will be comprised of strap on devices and no simulated platform comparable to the HCT was identified as a requirement.¹⁹ The TAS will integrate many of the same capabilities as GUARDFIST II. However, TAS will have a smaller instructor to student ratio (1:10) and be shipboard deployable.²⁰

LESSONS LEARNED FROM FSCATT

With many inherent similarities between FSCATT and CLASS, the Marine Corps will be able to capitalize upon the Army's lessons learned during research and development. Although many shortcomings of FSCATT have been identified and corrected, the system still has problems that prevent it from meeting the Army's ORD requirements. The Marine Corps can expect, based off of FSCATT's trials and errors, that the integration of various hardware and software compatibility are the primary challenges CLASS will have to conquer.

FSCATT Software Problems

As an example, FSCATT's FDCSS, being primarily a software intensive system, has had difficulty interfacing with other systems and meeting outlined requirements. Due to software problems, the system can not conduct automatic scoring and evaluation of cannoners' performance without manual input from evaluators. Digital messages do not work properly which has reduced the FDCSS' ability to interface with digital message devices of the observers and battalion liaison officer. Additionally, the training value of the system is limited due to the fact that many tasks evaluated by the current system are for the senior members of the FDC.²¹

FSCATT Hardware Problems

Additionally, hardware deficiencies have been identified. Specifically the FSCATT's strap on trainers, which the Marine Corps has identified as its only component of WDS, met with numerous problems. The trainers proved to be difficult to attach and did not function well when exposed to sunlight. Only the gunner and assistant gunner were able to gain any training value from the system.²² Software interface problems have been numerous but the contractor claims that the strap on trainers can now complete 90% of the tasks of the HCT.²³

HCT: FSCATT's Simulator Success

To date, the most successful subsystem of FSCATT is the HCT. As a stand-alone trainer, it has the ability to accurately mimic the M109A5 howitzer in all aspects as a simulated firing platform. The HCT's internal dimensions and operations were developed from the characteristics of M109A5s. Realism and accurate portrayal of simulated fire missions provide all howitzer crew cannoners the opportunity to fire unlimited rounds while practicing proper MOS techniques.

CONCEPTUAL SHORT COMING OF CLASS: IS THE MARINE CORPS ON THE RIGHT TRACK?

The Marine Corps' goal with CLASS is to integrate all battery level artillery training into a system to sustain and improve MOS proficiency while maximizing the training value of limited quantities of ammunition.²⁴ CLASS must be able to provide viable training to the artillery community in the same way that ISMT has enhanced Marine Corps small arms training and the HCT has enhanced entry level cannoners training for the U.S. Army. The common thread of both systems is that they replicate the firing of the actual weapon systems currently in the inventory. Utilizing the same hardware found in the operating forces, both the ISMT and HCT are able to prepare Marines and soldiers for the challenges of live fire exercises. Conceptually CLASS is a solid project but in order to maximize its potential, the Marine Corps will need to build upon the Army's FSCATT development lessons learned and strive to incorporate the realism of ISMT and HCT into the system.

The FDCSS will need to train all FDC personnel in mission processing. Of the three areas of the battery gunnery team the Marine Corps' FDCSS development will probably be the easiest requirement to meet. Much of what the Army has learned through trial and error will be invaluable information while CLASS is developed. The challenge will be developing software that is capable of integrating WDS and TAS while still being able to function as a Closed Loop Controller (CLC). In the end, hardware limitations of off the shelf technology and current organic systems will be the greatest challenge in FDCSS integration.

CLASS Target Acquisition Subsystem: A possible solution

The TAS has the potential to provide observers with the ability to meet all Individual Training Standards (ITS). With a real world ammunition cost in excess of \$170,000 to train one observer in all ITS missions in one year, the TAS will be able to provide observers with the ability to train to standard with greater frequency.²⁵ It will also allow observers to train to standard with simulated munitions such as Copperhead and ICM, which are rarely fired during live fire training. Producing a high fidelity system that can meet ORD requirements and still be deployable will be a challenge. Once again, software and hardware capabilities will have to be maximized in order to produce such a system. The Marine Corps should explore the option of developing a garrison, static system and a smaller, less capable deployable system.

The garrison TAS would be set up in a fixed facility, much like the out dated Training Support Fire Observer (TSFO) or the GUARDFIST II 1:30 option. With a large screen to project high resolution images and access to more computer memory, the garrison TAS would be more capable of meeting all CLASS ORD requirements. With prior planning, the facility could be established to include the FDCSS and WDS in a closed loop set up.

The deployable TAS would need to be a system that could be set up easily and require minimum space. A large screen could be utilized to project images. However, the deployable system may be less capable of producing the quality and quantity of high-resolution images than the garrison TAS. Utilizing advancing computer technology, deployable hardware with vast memory and enhanced capabilities is not out of the question.

A potential future use of the TAS that should be explored is the ability to download terrain images of actual areas of operation. The observer would be able to study the terrain and train in the area before ever stepping foot on the ground. This ability to conduct a "virtual reconnaissance" would provide the planners, as well as the operators, a unique tool in preparing for combat operations.

CLASS Weapon Delivery Subsystem: High Fidelity Dry Fire Missions

The WDS envisioned by the Marine Corps will provide quantifiable results, identifying deficiencies within a howitzer crew. However, what will ultimately be rendered is a high tech system of dry fire missions. Although simulating the proper setting of quadrant, elevation, and projectile/fuze selections, these are only portions of what the howitzer crew will be exposed to during field firing. Weapon recoil, high volume of fire, and quickly shifting from one target to another are integral portions that will be neglected with CLASS. A major driving force behind the WDS is that is be shipboard deployable and strap on trainers will meet that requirement provided there is adequate space while embarked on amphibious shipping. The Marine Corps needs to consider the development of a two part WDS - a garrison trainer and a deployable trainer.

The garrison trainer would simulate the howitzer much like the HCT. Based on the premise of the towed artillery system, it would simulate all aspects of the operational system. Capable of simulating weapon cant, recoil, and instructor controlled misfires, the garrison trainer would more readily simulate a field environment for 0811 cannoners. These garrison trainers would most likely be in a fixed facility and not deployable. The main benefit would be its ability to simulate and evaluate the actual howitzer sections procedures from "fire mission" to "rounds complete." Possible uses for the garrison trainer could include: 1) identifying and correcting gunline deficiencies prior to live fire, 2) integrating attached howitzer crews from other batteries prior to deployment for Combined Arms Exercises, and 3) training young Marines to be section chiefs who are not yet able to hold the position due to rank or inexperience. Ultimately our training should closely resemble what we will expect in a combat environment. The end result should be versatile, well trained Marines.

The deployable trainer would not be as capable of simulating actual firing due to space and size constraints onboard ship. Even the use of strap on trainers will require the howitzer crew have access to the guns and the ability for limited employment. However, all embarked vehicles and towed items are secured to the deck and placed in close proximity to each other in order to maximize deck usage. With this being said, the ability to employ strap on trainers and conduct viable training of howitzer crews will be limited. Simulated projectiles and fuzes could still be employed for training even without access to howitzers. Ultimately, either valuable deck space will have to be set aside and kept open for howitzer crew training or a smaller, mobile version of the garrison trainer will be required for shipboard utilization.

CONCLUSION

Marine artillery can benefit greatly with CLASS. It has the capability to enhance MOS training while optimizing reduced live fire ammunition. By utilizing the Army's lesson learned in developing FSCATT and ensuring that CLASS is able to accurately simulate fire missions at the observer, FDC, and gunline perspectives, the Marine Corps will be able to produce a system second to none. Currently, CLASS is insufficient to realistically train Marines at the battery level. The Marine Corps needs to consider the option of developing and appropriating robust, garrison based trainers for home

stationed artillery men and smaller, less capable trainers that can be utilized to sustain perishable skills while deployed. The driving factors behind CLASS must be its realism and ability to proficiently train Marines for the rigors of real world artillery employment. If the Marine Corps fails to use these two, basic principles and chooses to ignore the lessons learned from the ISMT and FSCATT, it will ultimately be young artillerymen at the batteries who will pay the price for the lack of vision.

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⁵ Stephen M. Gates. CNA Research Memorandum 87-116: *Appropriate Mix of Live Fire and Simulated Fire During Training* (Alexandria, Virginia: Center for Naval Analyses, July 1987), 10.

⁶ Robert M. Berg, Adebayo M. Adedeji, and Greg W. Steadman. CNA Research Memorandum 93-112: *Simulation Offset to Live-Fire Training, Phase II Results: Application of the "At Least Equal Effectiveness" Methodology to Simulator Use in Marine Corps Infantry Training Programs* (Alexandria, Virginia: Center for Naval Analyses, September 1993), 120-121.

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¹¹ Commander, U.S. Army Training and Doctrine Command and Commander, U.S. Army Material Command, Operational Requirement Document for the Fire Support Combined Arms Tactical Trainer (FSCATT) (March 1993), 2.

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¹⁵ Commander, U.S. Army Training and Doctrine Command and Commander, U.S. Army Material Command, 3-4.

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¹⁷ Marine Corps Systems Command, Program Review Brief: Closed Loop Artillery Simulation System (CLASS), (November 1998), 6.

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²⁰ *Ibid.*, 4-6.

²¹ Tieman, 4.

²² *Ibid.*, 4.

²³ Ray Vause, representative for Raytheon Systems Company (FSCATT Contractor), interview by author, 3 June 1999, Lawton, Oklahoma.

²⁴ [McConnell], 1.

²⁵ Berg, Adedeji, and Trenholm, 51.

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FIX ARTILLERY

The Commandant of the Marine Corps has directed Headquarters, U. S. Marine Corps to initiate a study of the challenges facing the Marine Corps artillery community. The Assistant Chief of Staff, Plans, Policy and Operations (Expeditionary Warfare) has collected recommendations from the operational and supporting establishments regarding the study. The CMC message as well as the input from the four artillery regiments and the Marine Corps Artillery Detachment, Fort Sill are presented:

ADMINISTRATIVE MESSAGE

ROUTINE

R 130926Z AUG 99 ZYB

FM CMC WASHINGTON DC//PP&O//

TO COMMARFORLANT//G3//

COMMARFORPAC//G3//

COMMARFORRES//G3//

INFO ZEN/CMC WASHINGTON DC//PL/SIG/DMCS/M&RA/I&L/AVN/P&R/

C4//

CG MCCDC QUANTICO VA//WDID/CWL/T&E//

CG I MEF//G3//

CG II MEF//G3//

CG III MEF//G3//

CG FIRST MARDIV//G3//

CG SECOND MARDIV//G3//

CG THIRD MARDIV//G3//

CG FOURTH MARDIV//G3//

COMMARCORMATCOM ALBANY GA

COMMARCORSYS/COM QUANTICO VA

MARCOREP FT SILL OK

UNCLAS //N03000//

PAGE 02 RUEACMC UNCLAS

MSGID/GENADMIN/CMC (POE)//

SUBJ/ARTILLERY AND CMC'S PLANNING GUIDANCE//

REF/A/ALMAR 023/99/CMC WASHINGTON DC/020001/JUL 99//

NARR/THIS IS A COORDINATED MESSAGE, RELEASED BY BOTH DC/S PP&O AND

CG, MCCDC. REF A IS CMC'S GUIDANCE//

POC/HM ROBBINS/LTCOL/TEL:COMM (703) 614-2505/TEL:DSN 224-2505//

RMKS/1. CMC HAS DIRECTED A COMPREHENSIVE REVIEW OF MARINE ARTILLERY IN ORDER TO CORRECT IDENTIFIED DEFICIENCIES BY 1 JUL 04.

2. OPERATIONAL MANEUVER FROM THE SEA, AND ITS SUPPORTING CONCEPTS OF SHIP-TO-OBJECTIVE MANEUVER AND FUTURE MILITARY OPERATIONS ON URBANIZED TERRAIN, REQUIRE FIRE SUPPORT CAPABILITIES ACROSS THE SPECTRUM OF CONFLICT FROM DEVASTATING, LETHAL FIRES IN SUSTAINED OPERATIONS ASHORE TO TAILORED NONLETHAL FIRES IN SUPPORT OF OTHER EXPEDITIONARY OPERATIONS. ALONG WITH MARINE AIR AND NAVAL FIRES, MARINE ARTILLERY MUST PROVIDE FLEXIBLE AND RESPONSIVE SUPPORT FOR MARITIME MANEUVER WARFARE.

3. MARINE ARTILLERY IS IN THE PROCESS OF SIGNIFICANTLY UPGRADING ITS EQUIPMENT; THEREFORE, A COMPLETE REVIEW OF THE ROLE, MISSION, ORGANIZATION, DOCTRINE, STRUCTURE, AND TRAINING OF THE ARTILLERY COMMUNITY IS REQUIRED. THE DEPUTY CHIEF OF STAFF, PLANS, POLICIES AND OPERATIONS WILL COORDINATE THIS PROCESS.

4. REQUEST, BY 8 SEP 99, INPUT REGARDING THE DESIGN OF A REVIEW PROCESS THAT THOROUGHLY EXAMINES MARINE ARTILLERY, ALONG WITH RECOMMENDED ISSUES AND TOPICS THAT REQUIRE INVESTIGATION. OUR INTENT IS TO FRAME THE PROCESS FOR ACCOMPLISHING THIS TASK AND THEN DISCUSSING IT AT THE GENERAL OFFICER SYMPOSIUM//

BT

NNNN



UNITED STATES MARINE CORPS
II MARINE EXPEDITIONARY FORCE
PSC BOX 20080
CAMP LEJEUNE, NORTH CAROLINA 28542-0080

IN REPLY REFER TO:
3000
G3
10 Sept 99

From: Commanding General, II Marine Expeditionary Force
To: Commander, U. S. Marine Forces Atlantic, 1468 Ingram Street Norfolk, Virginia, 23551-2596
Subj: COMPREHENSIVE REVIEW OF MARINE ARTILLERY
Ref: (a) CMC Washington 130926Z Aug 99
(b) COMMARFORLANT 201531Z AUG 99
Encl: (1) CO 10th Marines ltr dtd 7 Sept 99

1. My primary concerns are the responsiveness and adequacy of fires in the close and deep fight and the integration of fires with maneuver. I generally concur with the issues and topics presented by the 2d MARDIV resulting from the review conducted by the 10th Marine Regiment (Encl (1)).

2. We must develop complimentary systems that enhance the responsiveness and lethality to attack enemy maneuver and artillery throughout the battlefield framework. The current battlefield is too dynamic for us to restrict ourselves with just one weapons system for conventional surface to surface fires. In the regimental close fight we need a platform immediately responsive with minimal emplacement and displacement times. We moved away from the towed 105mm system and the M198 howitzer is unable to meet that task. A 120mm system for close maneuver would be ideally suited for expeditionary operations and the fire support in urban terrain task. In examining this avenue we can not limit ourselves to just the LAV mounted concept but also consider other maneuver platforms, possibly AAV.

Additionally, we need a rocket/missile capability to prosecute the GCE's deep fight, the MEF's deep fight and the counterfire battle. This capability is vital to our battlefield shaping efforts which promotes the success of the GCE. If the Army HIMARS system is proven to be compatible with our expeditionary and OMFTS principles, then we should either explore its acquisition for the Marine Corps or a rocket/missile system with similar capabilities. This system will provide deep fires with conventional MLRS munitions, out to 45 km, as well as the ATACMS, block IA, to 300km. Additionally, this system must be complimented with a sensor radar enabling us to execute proactive and reactive counterfire.

3. As we develop and field more digital communications systems for the artillery, to include AFATDS, the personnel structure and training must support its implementation. Fire support coordination and integration with maneuver is critical in the success of MAGTF operations. The Marine Corps has added IFSAS, and soon AFATDS, to the digital fire support capability but we have not developed the T/O for continuous operations of voice and digital nets. Furthermore, we have not upgraded the T/E necessary for independent operations of voice and digital nets. Fires communications, voice and digital, with maneuver is critical as the fluidity of the battlefield results in constant updates to fire support coordination measures and graphics that if not translated timely lend to incidents of friendly fire.

In the same light we must develop better doctrine that incorporates these new communications means, both voice and digital. We have the concept of OMFTS but have yet to establish the fire support doctrine that coincides. The spectrum of combat employment of a MAGTF is extremely broad and the integration of fire support results in a plethora of assets that a Fire Support Coordinator (FSC) could have at their disposal. Emphasis must be placed on training our FSCs internally on all aspects of Marine fire support as well as the systems, lethal and non-lethal, other services provide. Too often our young Artillerymen are called to fulfill billets outside the Fleet Marine Force. Upon return they are not capable of coordinating the multitude of

tasks required for fire support employment. We may need to develop tiered correspondence courses or develop a formal PME program to ensure these Marines are up to the task. Also, we can not put aside the requirement that is necessary to provide an ANGLICO like capability to the Army or more importantly to any coalition partner. Do not assume that the unique capability of the MAGTF ceases to operate in joint and combined warfare. ANGLICO was a powerful means to promote the superior fires capability of the Marine Corps/Navy team. My fear is that we have created a warfighting deficiency.

4. The 10th Marine Regiment recommends a board or committee process to develop and outline solutions for these issues out to FY 2015. In my review of the same issue for the restructure of Marine reconnaissance I suggested a MEF driven process. Nevertheless, as we review all the presented issues the process for mitigating our shortfalls must include bottom up input. Any entity external to the MEF and the Marines of the artillery regiments must be aware of the ground concerns and maintain an open line of communication before recommendations are made to doctrinal levels of command. This is the only means to which we will meet the tactical and operational requirements and preclude top driven resolutions that often are not zero mils. We should take time at the upcoming General Officers' Symposium to prioritize the issues across the Marine Corps and outline a direction as to how we will begin to resolve them.

5. Recommended Issues for examination:

a. *M198 as sole weapons platform.* Currently the only system for the artillery regiment is the M198 howitzer. This system does not possess the capability to meet the responsive demands of low-intensity, fast paced operations nor provide deep fires. The howitzer is made to fit into all missions given the artillery regiment because there is no alternative. This is a fine howitzer and very accurate but unable to fulfill all the myriad of tasks given.

b. *Doctrine, Tactics, Techniques, and Procedures (TTPs) for the Counterfire fight.* Currently the doctrine and TTPs as well as the equipment to prosecute a counterfire fight are inadequate. FMFM 6-9 lists counterfire as one of the three critical tasks for Marine artillery. However, FMFM 6-9 provides no real, definitive guidance on the planning, coordination, and execution of this mission. Furthermore, we lack the target acquisition and weapons assets to effectively conduct this mission. The complete reliance is upon the ACE to enact this mission. Either we take the mission from the artillery or provide them the assets to execute.

c. *T/Os and T/Es do not support the establishment and proliferation of digital equipment and net structure.* Currently, the Marine Division structure has neither designated nets for Artillery digital operations nor sufficient personnel to operate and monitor the growing number of digital systems. Attempting to conduct voice and digital traffic over a single net exacerbates the problem. We must re-look the planned fielding of AFATDS and make the adjustments to ensure personnel and communications equipment are embedded in the T/Os and T/Es to allow the systems to work as designed. Additionally, we must also look at how we are staffing our artillery regiment.

Too often our regiment is faced with not being able to man all its howitzers. T/Os support wartime requirements and are looked at carefully; however, how we actually staffed the regiment requires consideration. Currently, the 10th Marine Regiment is authorized (54) howitzer crews, it only has (43) crews formed and of that number only (40) are trained. This means we can not staff (14) howitzers within our only organic element providing artillery fires.

d. *The current Artillery structure does not provide the flexibility required to support current or future Marine Corps missions.* Currently, the Marine Corps Artillery weapons system can not support MEU operations, heliborne operations, and rapid operations with LAR, Tank, or Mechanized Infantry. Further, it does not support mid-range or deep operations to include counterfire. A mixture of light, highly mobile systems (like a SP or wheeled 120mm mortar system) and a deep strike capability with rocket/missile systems (like HIMARS) task organized with cannon systems allows for close, mid-range, and deep operations artillery support. The following is an example organization for an artillery regiment: one battalion of LAV mounted 120mm mortars, a GS battalion with a HIMARS capability, and the remaining units with the traditional organization of DS support 155mm cannons. Such equipment would allow for more efficient task organization, as well as flexibility to provide mobile, lethal, and responsive fire support throughout the

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possible set of Division or MEF missions. We must reorganize the Marine Artillery with multiple complimentary systems.

e. Marine Target Acquisition (TA) capability is inadequate. The need for a better, more capable suite of complimentary TA systems rather than a single Q46A is necessary to find and destroy enemy indirect fire systems. Winning the counterfire fight is critical to overall success of any combat operation. In order to accomplish this, we must have a robust capability to acquire indirect fire systems before they fire and while they are firing. A combination of ground sensors with extended ranges like the Army Q37, naval assets like the initial testing of the Aegis SPY-1 CBR Radar, and the development of an airborne CBR system are critical to the ability to conduct and win the counterfire battle. We must investigate options that will provide greater range and versatility than that currently resident in the Q46A radar. Ideally, we should have an asset that provides coverage at least 30km. Furthermore, we should give consideration to an airborne CBR platform that would be resident to the Marine Wings and able to provide immediate target data on enemy indirect weapon systems for attack.

f. Multiple reductions in Artillery training resources has systematically eroded training and resources. Four major events have negatively impacted artillery training:

(1) The decision by the Ground Training Ammunition Review Group (GTARG) to reduce the artillery practice ammunition by over 30%. *We must review artillery training ammunition levels ensuring we are not relying upon unproven simulation systems for crew proficiency.*

(2) The lack of a Unit Conduct of Fire Trainer (UCOFT) similar to that used by tank and LAR crews to maintain crew proficiency. There is a CLASS simulation trainer planned to offset the loss of training ammunition but indications are that it will not be fielded prior to the ammunition cuts. *We must develop an adequate crew simulator/trainer for artillery crews.*

(3) The near obsolete condition of the Target Set Forward Observer (TSFO) facilities that allow for simulation training of forward observers (FOs) and the lack of a portable system for MEUs, UDPs, and other artillery units for proficiency training during deployments. *We must modernize the existing TSFOs and purchase a portable/deployable FO trainer for deploying units.*

(4) The decreasing availability of live fire ranges and the restriction to firing points making live fire training predictable. *Protect and improve existing live fire ranges and work to remove firing point restrictions. Should develop a firing column type safety system to be employed for artillery live fire. This will make any area capable of howitzer element emplacement a firing area.*

6. In summary, my focus is on complimentary and supplementary fires from the regimental close to the MEF deep fight, to include the counterfire battle, and the training of the personnel to coordinate the fight. However, there are several ancillary points I want to emphasize. The first is we must not forget Naval Surface Fire Support and continue to work towards the development of a capability, now and for the future, that supports OMFTS and our expeditionary mission. Secondly, the Marine Corps has always considered the ACE an integral part of our fire support system. Therefore, an examination of ACE fire support capability must not be excluded from this review. Third, as part of that theory of complimentary systems we need to re-examine whether or not the LW 155mm howitzer meets our emerging requirements. Fourth, the lethality of artillery is critical and we must ensure we are doing the right things to procure the appropriate munitions. The artillery operates on the principle of Shoot, Move, and Communicate. Our review of Marine Corps artillery should be based upon that simple principle.

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1000
3/4645/91
7 Sep 99

From: Commanding Officer
To: Commanding General, 1st Marine Division (Attn: COS)

SUBJ: COMPREHENSIVE REVIEW OF MARINE ARTILLERY

1. The lack of Artillery is not the issue. The issue is the lack of an integrated plan to acquire, equip, and train a force with sufficient fires to ensure overwhelming combat power.

The current lack of fires within and in support of ground forces is partially the unintended result of the Marine Corps shift to the doctrine of maneuver warfare. It is also the result of our experience of Southwest Asia that appeared to codify the power of maneuver and direct fires unsupported by a meaningful indirect fire effort. Finally, the effort to trim budgets and end strength in the wake of the cold war made indirect fire systems a bill payer because they are costly in manpower and acquisition costs. The Marine Corps made several decisions, which desynchronized maneuver and fires. First, the Marine Corps migrated to one system, M198, to provide fires for the rear, close and deep fight. At the same time, we also made a major investment in the mobility of the force (LAV, M1A1, R&D V-22 and R&D AAV). The M198 lacks mobility and sufficient range with the bulk of its ammunition to support the force we are designing. Second, the Marine Corps reduced the number of artillery systems in each artillery battalion, which complicated the ability to provide continuous fires. The lack of an integrated plan has created a situation that may be as dangerous to change as the current situation is to the force. There are no quick solutions and in fact quick solutions should be avoided.

If the Marine Corps chooses to get into the conventional fires race following the US Army model, we will not regain synchronization of the force. We are an expeditionary force that must be able to fight the three block war with our fires and maneuver. The Army model is designed to develop forces for sustained operations ashore, and the Marine Corps needs to leverage their efforts, but not at the expense of our expeditionary character. We must also factor in the developments within NSFS and CAS to ensure that our forces can fully exploit the lethality they bring to the battlefield. Our integrated plan should be developed through the lens of a DOTES analysis:

a. Doctrine. This is the single largest deficiency we have. We have chosen to produce capstone doctrine and concepts without developing the detailed implications to the force. Consequently our doctrine without tactics, techniques, and procedures is like a ship without a rudder. We have not even addressed the impact of advanced digital systems on every aspect of the delivery of fires. We must develop a TLOM for the OMFTS force that addresses both our expeditionary requirements and our contribution to sustained operations ashore. From the TLOM we should develop the concepts of force employment to ensure our fire support platforms and structure meet the maneuver requirement.

b. Organization. We are improperly organized to support today's force or facilitate our transition to the requirements for the future. The artillery was reduced to provide for structure for the MLRS rocket system. The MLRS was probably the wrong system for the Marine Corps, but the HIMARS system has some promise for the requirement to provide expeditionary support of sustained operations ashore. The problem is that we cannot support HIMARS without additional structure or a reduction in our cannon structure, which is already at dangerous levels. The HIMARS is a counterfire system not a close support system (danger close 2000M). The cannon and the rocket are ideal for the 3d block of the three block war; however, neither as well suited to the 2d block of that war. Consequently, we need a 120mm mortar to meet the full spectrum of

conflict. This system needs to be fully integrated into fire support system and must have the accuracy, responsiveness, and mobility to support the maneuver force with suppressive fires. The optimum organization for such a force is possibly as follows; Artillery Regiment, (four cannon battalions 4x6 and one rocket battery), Infantry Regiment (one 120mm mortar battery 1x12) and LAR Battalion (one battery 1x8). This proposal represents a major shift in structure and can only be achieved through a long-term integrated plan. 2012-15 is the optimistic time frame that we can expect an FOC for fires that are resynchronized with the maneuver.

c. Training. Training is not meeting the current requirement. 0861s have no training beyond entry level, yet current fielding of AFATDS and other digital equipment make follow on training at the SNCO level essential. The Universal Spot Team training has to be developed. 0811s have no training beyond entry level, while current fielding plans of the LW155 will require more aggressive training of our SNCOs. In general the level of professional training must be enhanced to ensure we are able to maintain unit proficiency of the force. The fire support coordinators at the infantry battalion are untrained and a solution must be developed. These issues and many more must be integrated into a timeline that ensures that we are ready when various equipment is fielded.

d. Equipment. The digital systems (IOW/TCO/AFATDS/DCT/DACT/ etc./ etc.) have been fielded in an almost mindless pattern. The potential of these systems is real time targeting and fires, but these systems require integration and TTP development. These systems also have to be inter-operable with the fire support systems being developed in the joint battlefield. Operational forces need to be resourced with the appropriate facilities to conduct team training. The difficulty with equipment's being fielded, in general, is that they do not have the funding for the support tails associated.

e. Supporting Establishment. This lag time between fielding and the facilities to actually support the equipment and training is too long. The proposed changes in organization to provide the fires has to be timed to ensure that the bases and stations are ready to support the forces.

The application of a DOTES analysis is essential. The force structure solution is a three year process. The facilities solution is a five year process. Training solutions require time to develop the POIs and schoolhouse structure. Equipment is designed to meet an operational requirement. The key is a through review of our doctrine, concepts of employment and development of TTPs. This review will not be the 100% solution, but a 50% solution is better starting point than we have now. We can make some improvement by 2004, but these will be on the edges. The long-term view allows us to marry technology with resourcing.

3. Topic. Development of Fire Support Coordinators.

a. Discussion. Rapid technological changes and manpower policies have coupled to create amateur fire support coordinators at every level. The expertise of Infantry Bn Fire Support Coordinators is adequate at best and inadequate in most cases. Regimental FSCs are typically post battery command majors who are usually allowed a year to learn the complexity of their duties. Higher level fire support billets are not immune, and this problem may be seen in the Division FSCC and MEF's Force Fires Section.

The advent of increasingly complex Fire Support C2 systems to support STOM and maneuver warfare requires consistency and stability in FSCoord billets and extensive training. Digital and automated systems have increased the complexity of information management and decision making. An FSC must assume his duties with the ability to plan and orchestrate fires using digital systems.

Typically two year FMF tours for officers, earlier promotions to major, and assignment policies that ignore MOS progression preclude the development of experienced fire support coordinators. Additionally, the paradigm of battery command as a prerequisite for promotion militates against assigning the best captains to Bn FSC duties. Majors on a third FMF tour are rare, as most field grade artillerymen don't return to the FMF until they are Lieutenants Colonel.

b. Recommendation

(1) Make infantry Bn fire support coordinators Marine Artillery Captains on the T/O of the infantry battalion. Supporting batteries would still provide an artillery liaison officer.

(2) Btry LnOs remain as lieutenants but are manned with our most experienced and best. This paradigm change needs to be conveyed to promotion boards.

(3) Develop a career progression that reinforces fire support expertise; 0802 captains who have served as Btry LnOs return to the FMF for duty as Inf Bn FSCs for 18 mo's then assume battery commands as available; Regimental FSC billets are manned as Priority billets by senior majors who have served as LnOs or Bn FSCs prior; Assign officers to Division FSC and MEF Force Fires billets who have served as Bn or Regt FSCs.

4. Topic. MEF Fires Doctrine.

a. Discussion. Doctrinal fire support issues surrounding MEF fires continue to be problematic and detract from the single battle concept. Generally, the Marine Corps uses the fire support doctrine developed by the Army and attempts to mold it to fit our unique requirements. The Army Corps structure, however, is very different from the MEF.

The MEF employment of air to shape the battle is key to shaping the division battle but the handoff of the MEF fight to the division close battle is disjointed and uncoordinated. The Army relies heavily on large quantities of rocket and cannon artillery in the division battle while the Marine Division relies heavily on air to accomplish the long-range fires. Application of fire support coordination measures, the reporting of BDA and the linkage of air fires to the appropriate fires cell/FSCC are inefficient. The use of AFATDS and other C2 systems may make some doctrinal measures irrelevant.

The BCL, although termed a coordination line, is neither permissive nor facilitating coordination. The BCL as currently employed, is a forward boundary separating MEF and Division. This can be better defined by a boundary between the Division and the Wing, reducing the MEF Fires Cell as middlemen in coordination. We can go farther and refine the coordinated fire line for attack beyond by air in a counterfire role.

14th Marines' role as force field artillery headquarters is overstated and they are not structured to fulfill this role. Their role is more appropriately as an Artillery Brigade HQ with counterfire HQ responsibilities.

b. Recommendation

(1) Intense scrutiny needs to be given to the employment of air, the battlespace coordination line, the role of 14th Marines and the MEF Fires section from the standpoint of doctrinal fire support coordination for the MEF.

(2) All of our doctrinal fire support measures should be evaluated for relevancy in light of new and emerging digital fire support C2 systems.

5. Topic. Enlisted Fire Support Structure.

a. Discussion. Current structure and manning does not support the efficient employment of current and future fire support C2. The AFATDS is a very complex system requiring formal school training and an investment of 20 hours per week of sustainment training. To complicate the issue, the introduction of other C2 systems requires integration at the battalion FSCC to facilitate responsive fire support. The current and projected C2 and fire support systems require a higher level of technical fire support system expertise while reducing the reliance on basic communication skills.

The AFATDS and future digital sensor to shooter systems will centralize tactical fire direction at the regimental FSCC reducing the need for technical fire direction specialists at the artillery battalion. Fire support coordinators will coordinate and implement the delivery of fires.

c. Recommendations

(1) Develop and institute a formal school for fire support chiefs, staff sergeants, emphasizing fire support using current digital C2 and fire support systems. Designate these staff sergeants MOS 0869.

(2) Immediately upgrade the Battery Liaison Chief billet to a staff sergeant 0869.

(3) Explore the universal spot team concept, eliminating the preponderance of communicators, eliminating naval gunfire spot teams and increasing the number of 0861 scout observers. Modify current MOS progression and structure for 0848s and 0861s. Merge the new 0869 and 0848 at the rank of GySgt into one MOS 0899, Fire Support Chief.

6. Topic. Fires Systems Roadmap.

a. Discussion. The current plan for fires is neither adequate nor integrated. There is a need for additional capabilities to meet the full spectrum of lethality, to enhance mobility and responsiveness.

Tactical mobility of fires is a function of range and appropriate effects on target. Operationally mobile fire support systems are capable of employment in a theater without extraordinary logistical effort while supporting the concept of the supported maneuver forces. Strategic mobility matches fire support systems with available lift and C2 systems. Our current and planned cannon systems and C2 systems do not satisfy our mobility requirements.

Our fire support systems must be able to deliver fires along the entire spectrum of lethality, meeting the required effects of the maneuver commander for suppressive fires in close battle, massed fires in the mid battle and precision fires in the deep battle. Our current and projected systems are too few to allow mass, too short range to fight deep and too heavy for the close fight.

Responsive fires are more a function of command and control systems than fire support platforms. Our C2 systems are not integrated. AFATDS does not communicate with TCO, C2PC or IAS. We will have no sensor to shooter capability in FY01 with the fielding of AFATDS because it communicates with the DCT that is four generations old. The DACT, which should be the highest priority for fires, is not even projected to have a fire support application. These two problems alone counter all the advantages of a networked fire support C2 system like AFATDS.

b. Recommendations

(1) Pursue a 120mm rifled mortar that will provide accurate direct support suppressive fires. Employed as a battery in direct support to a maneuver regiment.

(2) Forego the fielding of the LW 155 and pursue a quantum leap cannon system that has a higher rate of fire, greater range and eliminates separate loading ammunition, perhaps a rail gun. The M198 can continue to fight the battle outside of the direct fire fan, we just need more of them for throw weight and to ensure we can provide continuous fires.

(3) Pursue a rocket system that is expeditionary, lethal enough to address hardened targets and capable of providing fires in close proximity to maneuver. This is not MLRS or HIMARS, this is an Expeditionary Indirect General Support Weapon System (EIGSWS).

(4) Integrate our C2 systems and jettison the least capable. A web browser that integrates C2PC and AFATDS is the right direction. In the future, develop all C2 systems to run on common hardware and develop the system from the bottom up to facilitate the flow of tactical information.

(5) Develop a fire support program for the DACT now!

(6) Pursue command and control systems that are voice activated and interactive. Until we have systems that require minimal training, we lack operational flexibility.

7. Point of contact for this Headquarters (S-3) is Maj Connally at Comm. (760)725-3836/4638 or DSN 365-3836/4638.

E. J. LESNOWICZ, JR.

From: Commanding Officer, 12th Marines
To: Commanding General, 3d Marine Division
Subj: ARTILLERY AND CMC'S PLANNING GUIDANCE
Ref (a) MSG CMC WASHINGTON DC/130926ZAUG99

1. Per the reference, the following is provided. The reference requested input regarding the thorough review of the role, mission, organization, doctrine, structure, and training of the Marine artillery community.

2. INTRODUCTION

a. Excepting force structure decisions arising from FSPG recommendations, ideas and recommendations resulting from artillery-related reviews and conferences have seemingly more often than not "died on the vine" and seldom advanced beyond the discussion stage. This is often the case, for instance, with suggestions/recommendations developed by senior Marine Corps fire support specialists at the annual Marine Corps Fire Support Conference. And, too frequently, those suggestions/recommendations that were accepted and implemented were not part of a coherent whole -- not part of a larger artillery or fire support "roadmap."

b. In Third Division we see the forthcoming CMC-directed review as the best opportunity to repair serious existing across the board deficiencies in how Marine Corps artillery is structured, equipped, employed, etc. The thoughts below are offered to assist review organizers and participants and represent the combined efforts of Marines at many different levels of experience and rank. In some instances points appear contradictory or in conflict with other points. This is the case. We have intentionally not stifled or limited thinking on the topic, so as to give review organizers more ideas to work with. What emerged from our internal review was broad consensus regarding the need to increase our responsiveness and to have sufficient weapons systems and ammunition types to support ground commanders throughout the "three block war," from the platoon level to the Division CG.

3. THOUGHTS ON REVIEW DESIGN

a. Starting Assumptions

(1) Group should seek ways to get USMC artillery role, mission, organization, doctrine, structure, and training on track NOW with the intent of fixing near-term deficiencies NLT FY04, but also working on a roadmap to see us into the OMFTS-era.

(2) Massive changes required in organization, training, doctrine and equipment to provide artillery support on the OMFTS battlefield comprised of widely-dispersed maneuver and support units. Cannon artillery (LW155) will be the artillery workhorse. Some sort of readily available General Support artillery will be required for the Division Commander to 'weight the effort.'

(3) All Marine air is not all weather, and much of it is subject to JFACC tasking; all Marine artillery is all weather and is not subject to outside tasking. Increased ranges and specialized munitions open the battlefield in depth.

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(4) USMC artillery must be expeditionary and some of it must be able to move with the fastest maneuver elements; it must offer us greater range and be more responsive than is currently the case; and it must afford precision as well as flexible munitions choices to fight the "three-block war."

b. Charter/Mandate

(1) Examine near-term and long-term role of USMC artillery and design a "roadmap" for USMC artillery for the next 35 years.

(2) Look for specific near-term "fixes" (NLT FY04) to current or emergent issues (3) Broad, unconstrained in scope, but bounded by realism in final recommendations

c. Composition. A General Officer with a strong artillery background chairs a review group whose core membership includes a broad cross-section of "out of the box" thinkers from our Active, Reserve and even retired fire support (heavy emphasis on artillery) community. At a minimum, representation should include:

(1) Capt - Col 0802s, an 0803, at least one 0602 with recent experience as a regimental/battalion S-6, and senior SNCOs within the 08 community;

(2) Current and former battalion and regimental commanders, as well as officers with current/recent regimental/battalion S-3, S-4, FSC experience;

(3) Relevant MCCDC/HQMC offices (T&E, warfighting lab, PP&O, Manpower, etc.) as well as the acquisition community;

(4) Ft. Sill

(5) 0302, 1802, 75XX, 0402, and other relevant MOS

d. What do we expect of USMC artillery?

(1) Prior to the start of the review, we should consider asking the operating forces what is expected of Marine artillery. What do we want our artillery to do? What capabilities do we expect from it? What kind of response times? Specific questions should be asked of the operating forces - the consumer - to determine if, from the maneuver perspective, current/planned doctrine equipment, and/or force structure will support these desires. The artillery should not play a lead role in answering these questions; maneuver should.

(2) General Officers should bring these responses to the GO Symposium where the issues can be discussed and senior-level consensus built. This will aid in focusing the review group's efforts.

e. Role of Outside Experts. While not a comprehensive listing, the group should consider heavy use of individuals/organizations with relevant expertise on topics such as:

(1) OMFTS

(2) Simulation

(3) Ammunition developments

(4) Foreign artillery equipment/organization

(5) Current and planned (even conceptual) equipment/systems

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(6) C2 systems

(7) Geo-location

(8) Anticipated fiscal constraints (though this should not limit the group's thinking)

(9) Evolution of USMC artillery organization and equipment. We frequently end up going "back to the future," and a look at organization/equipment from the 1940s-90s – included four major wars and extended inter-war periods – may have relevance ("Want a new idea? Read an old book.")

(10) U.S. Army doctrinal thinking (Force XXI, digitization of the battlefield, etc.)

(11) MCLS and after-action comments from CAX and other relevant exercises/deployments of various sizes

(12) Tactical communications (may even consider someone from the telecommunications community to talk emerging technologies/concepts)

3. TOPICS FOR REVIEW

Topic: Organization of firing battery

Discussion: Planned developments and howitzer upgrades, to include the LW155 Preplanned Product Improvement (P3I) with its on-board navigation and self-positioning capability, will permit batteries to operate over great distances and permit semi-autonomy for the gun sections. At the same time, the extended range 120mm mortar (towed as well as LAV variant) offers the potential for increased responsiveness and flexibility in the indirect fires realm. A key question regarding the latter, however, is whether a mortar with a 14+ kilometer range should be an infantry or an artillery weapon.

Recommendation:

(1) Examine various employment concepts for the firing battery, to include forming three or four two-howitzer platoons/battery designed to conduct semi-independent platoon operations (similar to Paladin units).

(2) Consider changing the battery T/O to reflect the requirement for greater experience in battery leadership for semi-autonomous operations (i.e., battery commander – Major; platoon commander – Captain; battery gunny – MSgt, etc.) as well as increasing and redistributing 0844s in the battery, etc.

(3) Examine the idea of creating 120mm mortar batteries.

(4) Maintain the current acquisition objective for the MTRV in order to increase tactical mobility.

Topic: Organization of cannon battalions

Discussion: In the past the Marine Corps had four firing batteries per close-support battalion. This organization provided greater flexibility and firepower to the artillery and maneuver commanders. We have lost some of that flexibility – as well as firepower – by going to 3x6.

Recommendation: Study the feasibility of adding a fourth firing battery to close support battalions.

Topic: Organization of artillery within the active divisions

Discussion: Force structure decisions over the past 15 years resulted in a loss of 1-3 artillery

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battalions/regiment. The Division Commander has little to no artillery to weight the effort, and his available fire support has significantly decreased. What is desperately needed is additional artillery to support up to four maneuver units simultaneously, as well as provide a general support capability to the division as a whole. On a related note, in recent years we have increasingly turned to calling Marine Corps aviation our "flying artillery." The danger in this approach is that we may lose our "flying artillery" to JFACC tasking.

Recommendation: Explore the idea of creating one or more cannon battalions per active division, as well as assigning one rocket artillery unit per division.

Topic: Mission, Organization and Equipping of USMCR Artillery

Discussion: Questions exist regarding the employment and structure of USMCR artillery battalions. Does 14th Marines primarily fight as an artillery regiment? Or does it attach several battalions to regular artillery regiments? Is employment as the Marine Corps counterfire headquarters an appropriate mission for 14th Marines, and if so, is it appropriately structured to perform the mission? Should the Marine Corps maintain tactical rockets (HIMARS, MLRS) in the Reserves and keep the active artillery as solely tube artillery? Should we outfit 14th Marines with Q-37 radar in addition to/instead of the Q-46 for long-range counterfire acquisition? Should one reserve battalion be outfitted with each active artillery regiment for exercise and OPLAN purposes (a habitual relationship of sorts)? Should USMCR cannon battalions be retubed so their howitzers can fire at extended ranges?

Recommendation: Examine the mission of 14th Marines and review its current/planned structure, roles and equipment.

Topic: Mission and Organization of the Artillery Regiment

Discussion: An argument can be made that the artillery regimental headquarters battery (though not necessarily some of the functions the regiment performs) has little relevancy on the future OMFTS battlefield. That instead, the artillery regiment should be dissolved and some of its functions performed at the division level, others performed at the battalion level, and still others can migrate elsewhere. At the same time, certain training and artillery-specific functions (including 'advocating' artillery issues) are best performed by an artillery commander – not by the division staff.

Recommendation: Examine the role of the artillery regiment in an OMFTS environment, looking at where the functions currently performed by the regiment can best be performed in the future.

Topic: Greater Flexibility in Artillery Weapons

Discussion: In previous decades Marine Corps artillery offered more flexible response options than is currently the case. The pack howitzer and 4.2" mortars provided mobile, responsive support in nearly any terrain; the 105mm provided a bit more punch at slightly longer ranges with greater variety of munitions, and was still mobile enough to be pushed or pulled by a handful of Marines; the towed 155mm fired at much greater ranges with an array of highly lethal munitions, but it was also heavy and relatively immobile in many kinds of terrain; and the 155mm and 8" SPs provided a powerful punch and were ideal for keeping up with mechanized forces. Today we have one system with associated advantages and disadvantages. The central question is, however, whether a sole system – the 155 towed system – provides maneuver commanders the required fire support? Or are additional systems required in order to answer the needs of commanders at all levels, from platoon to MEF?

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Recommendation:

(a) Establish whether a requirement exists for tactical rockets in Marine artillery (MLRS, HIMARS, etc.).

(b) Establish whether a requirement exists for heavy mortars in Marine artillery.

(c) Review prior USMC/USA Memorandum of Agreement regarding Army MLRS for suitability, completeness, etc. (does it answer 'the mail').

(d) Establish whether a requirement exists for a weapon with greater mobility and crew protection, such as an LAV-mounted 155 howitzer.

Topic: MEU Battery Organization and T/E

Discussion: Debates have long existed as to whether artillery should deploy with standard MEUs. Over time we have seen the mix change from 3x6 (105), to 3x6 (155), to 3x8 (155), to 3x8 (4-105 and 4-155), to 3x6. Commanders have resisted removing artillery tubes from the MEU because it does provide hip-pocket artillery support for the BLT Commander. At the same time, concerns exist because of the disproportionate amount of embarkation space required for an artillery battery. Do we need artillery on MEUs? Should the MEU take out heavy mortars rather than tube artillery? With the LW155, can we consider sending MEU batteries out with armored HMMWVs as prime movers? Can we send MEU batteries out with four as opposed to six tubes?

Recommendation: Reevaluate the structure and equipment of batteries deploying with MEUs.

Topic: Artillery/Supported Unit Relationship

Discussion: Artillery frequently neglects its primary customer by not standardizing habitual relationships with maneuver units, especially in some of our UDP/MEU deployments. Further, we generally send our junior Marines to be Forward Observers (FOs), which sends a signal to maneuver commanders that they are not getting the very best (or at least the more experienced) the artillery community has to offer. This has led to the current situation where fire support coordination has migrated from the artillery community to the maneuver units (FIST is typically an 03 Lieutenant; BN FSC an 03 Captain).

Recommendation:

(a) Examine the merits associated with habitual artillery/maneuver relationships,

(b) Examine the feasibility of realigning the typical 0802 lieutenant billet assignments to increase the overall FO experience level.

(c) Extend the tour length for 0802 lieutenants to 36 months to ensure well-rounded development within the firing battery and as an FO/liaison to maneuver.

Topic: ANGLICO

Discussion: As a result of a prior FSPG decision, we have disbanded the Air/Naval Gunfire Liaison Companies and lost the capability to provide trained and dedicated fire support coordinators/liaison with our friends and allies. This is a real loss – one felt not only by our friends/allies, but also by other FMF units who must provide fire support liaison personnel to fill the holes left with the disbanding of ANGLICO. This is a critical void that must be filled.

Recommendation: Reestablish the dedicated liaison/FSC capability formerly held within ANGLICO.

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Topic: Complexity of Current/Emerging C2 Systems

Discussion: The chief complaint against artillery is that it is too slow. What results is a rightfully skeptical infantry customer, and a loss of credibility for digital systems. Even in units most proficient with digital systems, unrealistic workarounds, such as putting retransmission sites in front of the FLOT are common. Current and emerging C2 systems (IFSAS/AFATDS, as well as the family of SINCGARS equipment) are training intensive and operator "unfriendly." In addition, they have not noticeably increased our capability, largely because of their complexity. When everything is "clicking," these systems are amazing to watch. But over 90% of the time things don't "click," and response times drag. How often do maneuver commanders hear comments such as "I'm waiting on the box." Or, "Digital is down." Or, "Digital is slower." We are raising a generation of warfighters who tolerate decreased response times; who accept the need to wait on digital communications; who accept the need to wait longer than we formerly did in the voice realm for fire mission processing (to send a digital CFF to the maneuver FSC, which clears it and forwards it to the artillery battalion FDC, which then forwards it to a battery FDC, which then forwards it to the gunline); who tolerate the "inevitable" delays resulting from complex C2 equipment we now possess. Artillery's critical vulnerability is the complexity and predictable delays associated with our current and emerging fire support C2 systems.

Recommendations:

- (a) Undertake a thorough analysis of where we want to go with artillery C2 systems. Look at purchasing off-the-shelf comm/C2 systems that will enhance our capability.
- (b) Develop a "sensor to shooter" capability to significantly increase artillery response time.
- (c) As part of a "sensor to shooter" capability, examine wireless communications means between the FDC and the gunline.
- (d) Evaluate whether AFATDS is the best system for Marine Corps fire support, or are emerging windows-based technologies are simpler to use and more appropriate for the early 21st century than AFATDS.
- (e) Expand entry-level training for C2 system operators. The current level of training for C2 system operators in the artillery regiment is not sufficient to effectively utilize the systems that are fielded and OJT for these operators is not the answer, particularly in forward-deployed, high tempo units. The operating forces require Marines to be familiar with these systems and able to use them on arrival.

Topic: Non-Lethal/Precision Artillery Ammunition

Discussion: Artillery is limited in many current real world operations because ROEs preclude the use of this highly lethal arm. At the same time, there is a clear void in our ability to place highly accurate non-lethal or focused/limited lethality fires from extended ranges, particularly in built-up areas with heavy civilian concentrations. We require a round that is easier to use than the Copperhead round and can go through a window if need be, similar to air-dropped "smart" munitions. Until we develop artillery munitions with greater flexibility in employment, artillery will be limited in its "three block war" contributions.

Recommendation: Examine the feasibility of developing non-lethal as well as lethal precision ammunition for use in MOUT situations.

Topic: Target Acquisition

Discussion: Marine Corps artillery target acquisition is currently limited to the Q-46 radar, a system with approximately a 12 kilometer range against artillery and mortar. Other systems and technologies exist that can complement and expand this capability. Additional systems offer increased redundancy as well as survivability. For example, "sound ranging" is passive and can be used to cue radar, enhancing radar

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survivability in an EW threat environment; the longer ranges and expanded spread of bistatic radar offer greater battlefield coverage; and sound ranging systems, with their smaller footprint than radar, offer earlier introduction in amphibious or vertical-insert operations.

Recommendation:

(1) Examine the feasibility of increasing our target acquisition capabilities to incorporate different types of systems such as bi-static radar, Q-37 and sound location systems.

(1) Postpone/stop the imminent reduction in T/E radar assets and examine whether a requirement exists to increase the T/O from four to five radar sections per regiment. (In the coming months the regiments are slated to lose one radar from their T/E to align with a 1999 FSPG recommendation to maintain four radar teams on the T/O. One can question whether we should reduce the T/E to match the current T/O, or raise the T/O to match the existing T/E.)

Topic: Radar Simulation Software (RSS)

Discussion: It is difficult for radar operators to train effectively in the hostile mode (the primary mission of radar) without some type of manipulation or special arrangements. Software exists to assist in this type of training.

Recommendation: Purchase RSS software for the artillery regiments and CAX controllers.

Topic: Role of Artillery Chief Warrant Officers (0803)

Discussion: In recent years various proposals have been developed expand the role of 0803s in the artillery community. These proposals have ranged from making battery Fire Direction Officers 0803s, as well as filling the Target Information Officer (TIO) slots with 0803s. At the same time, we must examine the longer-term requirement for dedicated survey officers at battalions/regiments. With the increased accuracy of geo-position locating systems, there may not be a requirement for full-time survey officers – particularly at the regimental level.

Recommendation: Validate current requirements for 0803 Chief Warrant Officers and examine the feasibility of expanding their role to include other related duties, particularly in billets that are customarily left unfilled, such as TIOs.

Topic: Artillery T/O Review

Discussion: T/O reviews in recent years have downgraded select billets, thereby leaving vast holes with regards to MOS progression (such as the lack of a GySgt 0848 in battalion and regimental operations shops), and ignored obvious deficiencies in some MOSs (such as NBC, for instance).

Recommendation: Perform a thorough T/O review to reflect recent changes in promotion flows as well deficiencies in the current T/O and anticipated changes resulting from force structure/equipment/doctrinal recommendations made by the artillery review group.

Topic: Universal Observer

Discussion: The current program of instruction at Ft. Sill for an 0861 is four weeks long. Marines learn less than half of required ITs there, and the receiving unit is expected to train the scout/observer to MCCRE standards. The POI for a NGF spotter is two weeks and the POI for CAS is one week. Scout/observers do not learn targeting, threat identification, fire support principles, and fire support/targeting software (i.e., LCU).

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Recommendation: Examine the feasibility of expanding the training time for an 0861 scout/observer to incorporate into one POI information on artillery, NSFS, CAS and other relevant subjects, so they receive this background prior to assignment to the FMF.

Topic: MOS Consolidation

Discussion: In recent years we have consolidated certain artillery and artillery-related MOSs in order to assist in career development. The jury is out, however, as to whether this "de-specialization" has helped or hurt the operating forces.

Recommendation:

(a) Examine the impact of past MOS consolidations on the artillery community (i.e., 0842/0844, radar repair MOSs into 2889, etc.).

(b) Examine the feasibility of increasing the number of T/O GySgt 2889 (SNCO Ground Radar Repair) and assigning one to each artillery regiment and MARCORSYSCOM.

Topic: 0861 Experience Levels

Discussion: The current T/O does not provide the experience needed for regimental and battalion liaison sections. Past T/O decisions have substantially decreased the T/O experience levels, which has also impacted the actual manning experience level. This situation is exacerbated when one factors in the increased complexity of our automated fire support C2 equipment (as opposed to manual/voice methods) and the fact that there are fewer billets for SNCOs 0861s in the liaison sections.

Recommendation: Examine current 0861 T/O rank structure with an eye toward increasing the experience level at the battalion and regimental liaison level.

Topic: Quad Regimental Combat SOP

Discussion: The four Marine artillery regiments – and the battalions underneath them – each develop separate Combat SOPs. While there are certain similarities across the board in SOPs, there are also noteworthy differences on even the smallest things, such as convoy signals. With UDP batteries operating under multiple battalion SOPs, and battalions chopping to different regiments in some OPLANS, there is great problem potential in situations where we may not have long training lead times prior to an operation. While certain elements must remain flexible to accommodate division SOPs, the majority of artillery combat procedures can be standardized and should be practiced across the four regiments, as is the case with artillery safety procedures contained within the Quad Division Safety SOP

Recommendation: As a review group recommendation, Ft. Sill and MCCDC should be tasked to develop a draft Quad Regiment Artillery Combat SOP.

Topic: Training Ammunition/Artillery Simulation

Discussion: As a result of the 1999 Ground Training Ammunition Review Group (GTARG) recommendations, the annual artillery training ammunition allocation decreased over 30% from FY99 to FY00 (CMC had directed a cut of 5% per year for an aggregate reduction of 30% by FY05). The GTARG sought the majority of reductions in FY00 so the Marine Corps could leverage savings to expedite delivery of the Closed Loop Artillery Simulation System (CLASS), which was not slated to receive procurement money until FY03. The GTARG's intent was to dedicate some of the FY00 cost savings to begin major CLASS R&D funding and accelerate its procurement in FY01. But, CLASS did not make the FY00 POM cut; thus, we are still years out from receiving the CLASS...and Marine Corps artillery training ammunition has been drastically cut.

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Recommendation: Accelerate procurement of the CLASS and reexamine the current artillery training ammunition allocation to see if it meets training and evaluation requirements. [NOTE: Commanders must now use their training ammunition for MCCRE, at the same time that their training allocation has been severely cut.]

Topic: AEM Repair of LCU/AFATDS

Discussion: There is no training plan to train MOS 2887 in LCU/AFATDS repair.

Recommendation: Implement initiatives to add 2889 instructors at Ft. Sill in order to stand up a course for MOS 2887.

Topic: Ammunition Handling Equipment

Discussion: Firing batteries now employ a forklift to aid in offloading ammunition in the position. Some foreign armies employ a prime mover-equipped crane for ammo handling. Such a device could shrink a battery's 'footprint.'

Recommendation: Review ammunition handling equipment used by other militaries for suitability of use on Marine prime movers.

Topic: Headquarters Battery T/E (BN and Regt)

Discussion: The current headquarters battery T/Os reflect unrealistic allowances across the board. In some cases they maintain excess (i.e., 100KW generators); in other cases they are deficient (i.e., M240s/SAWs for survey and radar teams).

Recommendation: Review the T/E for battalion and regimental headquarters batteries.

Topic: MET Profiler

Discussion: A FONS has already been issued regarding the need for updated MET systems, particularly the MET Profiler.

Recommendation: Continue to pursue the early acquisition of the MET Profiler.

Topic: 12th Marines JCS Battery Sets

Discussion: Following the disbanding of 2/12 in 1994, 12th Marines was directed to maintain two complete sets of firing battery equipment. Most of this equipment remains unused and is in the warehouse or armory, while some of it is used for training at Camp Fuji.

Recommendation: Obtain relief from the JCS requirement to maintain two complete firing battery equipment sets.

Topic: Night Observation Equipment

Discussion: We do not currently have easy and accurate means to adjust artillery during night operations. Though NVGs are effective at close ranges, we lack equipment that permits us to accurately adjust at longer ranges.

Recommendation: Establish a requirement for a night vision device with a reticle pattern that is effective at longer ranges.

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Topic: Laser Designator

Discussion: The MULE is effective as a range finder and target designator, but is cumbersome and unreliable.

Recommendation: Establish a requirement for a hand-held laser designator.

4. We in Third Division appreciate the opportunity to offer the above contributions and hope they are helpful in framing the artillery review. We look forward to future opportunities to contribute to the process and urge that any draft "roadmap" resulting from the review be staffed throughout our Corps with time for Marines to comment on it prior to its forwarding to CMC.

D. C. O'BRIEN



United States Marine Corps

14th Marines
4th Marine Division
NAS Fort Worth, Texas 76137

August 24, 1999

Memorandum

From: Colonel Rudder
To: Major General Punaro
Subj: ARTILLERY AND CMC'S GUIDANCE
Ref: (a) Col Stewart's e-mail dated 18 Aug 99
(b) CMC (PP&O) MSG 130926Z Aug 99 [attached to ref (a)]

Sir,

1. Col Stewart asked me to develop a Division position on artillery issues per CMC's guidance outlined in reference (b). We asked for comments from regimental and separate battalion commanders and from officers within 14th Marines to gather issues from the widest possible audience.
2. The collective opinion is that artillery is out of balance. Years of changes on the margin and duty as the "bill payer" for manpower reductions during the Defense draw downs in the early 1990s has brought Marine artillery to its current state. Operational Maneuver From The Sea (OMFTS) requirements for fire support as well as competing requirements for sustained operations ashore make "fixing" artillery an interesting and difficult issue. The topics below are forwarded for your consideration.

(a) Topic: *Artillery Structure*

- (1) Discussion: There are not enough battalions and cannons to provide adequate fire support to a Marine Division. Marine artillery [both Active and Reserve] was reduced 45 per cent from FY88 to FY94 – from 440 cannons to 270 cannons and from 19 battalions to 15 battalions. In FY88 10th Marines had five battalions and 120 cannons. In FY99 10th Marines has four battalions and 72 cannons. In FY88 14th Marines had five battalions and 108 cannon. In FY99 14th Marines has five battalions and 90 cannons. Moreover, there are not enough forward observer teams to provide to all the maneuver battalions in a modern Marine division.
- (2) Recommendation: Restructure Active component artillery to improve its ability to support a Marine division. This can be done many ways, but a flexible Active component regimental artillery organization for would be four cannon battalions organized with four batteries of six cannons each (4x6). This allows the battalion commander to maneuver and mass his batteries and provides additional forward observer teams. This would increase cannon strength from 72 cannons to 96 cannons per Active division. It also saves manpower and equipment by not creating another battalion headquarters. Reserve component battalions would not be mirror imaged. Reserve component battalion structure would remain as it is now (3X6). A Reserve battalion's primary mission is augmentation in a General Support role. However, their structure could be modified during mobilization or to support other artillery initiatives. [See discussion below on rockets.]

(b) Topic: *No Long-Range Artillery*

- (1) Discussion: Neither the M198 or the new XM777 howitzer can effectively perform the GS mission to provide depth to combat and deliver counter-fire. The M-198 and the incoming M-777 are both range limited at about the 30km (with rocket assisted projectiles [RAP]).

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OMFTS and its supporting concepts extend the area over which the maneuvering forces will operate as well as blur the distinction between the close and deep (shaping) battle. These operational concepts are also more dependent on responsive application of firepower employed by physically scattered, but commonly commanded fire support assets than are more conventionally organized and employed forces (Regiments fighting on a linear battlefield supported by conventional cannon artillery). Thirty kilometer (km) weapon systems, with relatively slower ground movement speeds than mechanized units operating deep, are inadequate to service targets deep operating forces will encounter. While both rotary and fixed wing aircraft can support the engagement of targets for these forces; they are not a panacea. The MEF commander will focus the F-18s on shaping operations, thereby leaving Harriers and Cobras alone to support these maneuver units. Responsive surface to surface, all weather fire support, organic to the MEF, is needed to provide deep fire support under all conditions.

- (2) Recommendation: Mobile, rocket artillery in the near term appears the way to go relative to the capabilities we will require. Not only because the rocket itself will improve fire support, but it is likely the foundation and evolutionary precursor to future technologies that will allow a true sea based, OTH, STOM capability along with AAV, MV-22 and LCAC. The USMC should procure a General Support surface to surface rocket weapon system capable of ranges beyond 60km that is expeditionary and strategically and operationally deployable by C-141, C-130 and by ship. The HIMARS under development by the Army is a viable candidate. This system can be mounted on the Medium Tactical Replacement Vehicle (MTVR), the replacement to our current 5-ton. The HIMARS system also requires fewer personnel to operate. In addition, a platform such as HIMARS fires all munitions currently in the system and comes with a smaller Class IX requirement than MLRS.

(c) Topic: *Marine Rocket Artillery Organization*

- (1) Discussion: If the Marine Corps pursues acquisition of an expeditionary rocket system, the artillery structure to support this weapon system should be one that allows planners to build a MAGTF tailored for designated war plans.
- (2) Recommendation: The most flexible structure for Marine rocket artillery is one rocket battery of six launchers for each Active component regiment and two battalions of 3x6 batteries in 14th Marines. Third Division's rocket battery could be stationed at 29 Palms with the LAR battalion. This structure gives the division commander long range fires, allows planners to build a powerful RLT within a "brigade" size MAGTF, and gives the MEF commander long range surface to surface, all weather fires in a major theater of war. It leaves three cannon battalions in 14th Marines to provide conventional reinforcing and general support missions to the Active component.

(d) Topic: *14th Marine Organization*

- (1) Discussion: Fourteenth Marines provides the USMC an efficient method of maintaining artillery structure and capabilities without the Active manpower overhead. Fourteenth Marines must focus its capabilities on augmenting and re-enforcing MEFs for MTWs. We need to deploy as battalions and not allow piecemealing of batteries to support war plans. Furthermore, rockets fit well in the Reserve component. Rocket batteries require significantly less manning, lend themselves to simulation training with significant reduction in live firing requirements, and are a unique capability largely required only in the event of a MTW. Reserve cannon battalions should have the same capabilities as Active component battalions, but in a 3x6 configuration. A 4x6 Reserve cannon battalion organization could be done, but would require major reorganization within MarForRes. If

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the USMC acquires rockets, we should pursue the structure recommendation above. Finally, the 14th Marine regimental headquarters needs to reorganize to support its war plan Force Artillery Headquarters mission. It would not be a mirror image of an Active component regimental headquarters.

- (2) Recommendation: Hold the line on Reserve artillery employment and structure, and actively support reorganization of 14th Marine headquarters to support its FAHQ mission.

(e) Topic: *Caliber Mismatch for the Close Fight*

- (1) Discussion: The USMC acquired the 155mm caliber weapon system and associated family of munitions for several reasons: 1) the Army stopped maintaining the M101A1 cannon; 2) the Army stopped producing 105mm ammunition; 3) the Army invested its special munitions capabilities in the 155mm caliber shell; 4) the M198 was the weapon system the USMC needed to get into the fight during a Cold War MTW in Europe; and 5) the USMC could not go it alone on maintaining the M101A1 system nor would it acquire the Army's M102 or M119 105mm systems. In acquiring the M198, we gave up the capability for foot mobile infantry to close on the enemy under the cover of close artillery fires. Infantrymen must shift 155mm fires earlier than 105mm fires because the bursting radius of the 155mm round is greater and more lethal than the 105mm round. This means the infantry must close on the enemy with a gap in fires from artillery to mortar coverage. Yet, it would be a mistake to purchase another 105mm cannon or place the 120mm mortar system in a Direct Support role. We would not be leveraging new technology. Instead the USMC should pursue replacing the XM-777 cannon at the end of its service life with a small caliber rocket system in the 100mm to 110mm range. Smaller caliber rocket systems could deliver the accurate, high volume fires required by infantrymen in the close fight and increase the mobility of DS artillery by reducing the size of its equipment.
- (2) Recommendation: Begin now to research and develop a small caliber DS rocket system and a family of munitions to support it.

(f) Topic: *Liaison Team Reorganization*

- (1) Discussion: Despite the restructuring efforts of the Marine Corps over the 20 years, the method of integrating and coordinating fires has remained relatively unchanged since World War II. The only real change has been the introduction of the weapons company commander in the infantry battalion's Fire Support Coordination Center in the late 1970s. There are two issues here. First, for many years the Marine artillery community has not put its best foot forward in sending its best artillerymen to the infantry as liaison officers. In artillery culture, the place to shine was in the firing battery or as the battalion S-3 and S-4. Yet the job of a liaison officer is infinitely more demanding and requires more in skills and talent. Furthermore, the liaison and forward observer teams are spread throughout the battalion. This results in a diffused and uneven training of fire support personnel. The infantry is not served well by these practices. Second, Most field grade artillery officers spend the majority of their careers either in artillery billets within artillery regiments or in supporting establishment billets unrelated to fire support. This leaves our senior artillerymen ill prepared to recommend employment of air, or naval guns and almost totally ignorant as to electronic warfare or non-lethal weapons. While a small number of infantry officers spend a tour of duty with Marine Air Groups the same doesn't happen for artillerymen; who in future billets will advise commanders on the employment of aviation as a component of fires. When naval surface fire support (NSFS) becomes relevant again the same logic would apply. Outside of the VMAQ community, whose knowledge and experience is single dimensional, few Marines understand electronic warfare and almost no one in the fire support community understands the more inclusive C2W/IW.

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- (2) Recommendation: We should pursue several initiatives to correct this situation. First, reorganize artillery liaison team structure. Consolidate all liaison, forward observer, and naval shore control parties in the artillery battalion under the battalion liaison section. On the battlefield, the field grade officer leading this section will have the most influence over their activities and training. Second, assign more artillerymen to the Air/Ground Exchange program. There is a natural fit for artillerymen in their fire support training with the aviation community to benefit greatly from this program. Third, when promoted to major, assign artillery officers as Fire Support Coordinator/MOS XXXX. Then require officers with this MOS fill exchange billets with the ACE, as well as similar billets on Navy or Army Staffs. It will involve development of a PME POI, which could be self study, but should definitely involve sponsorship training from the Air Wings, Naval Surface Forces, and Joint C2 Warfare Center. Fourth, change the grade of the liaison officer to the infantry battalion from lieutenant to captain. A captain will bring more experience to the billet. Finally, restore the grade of infantry battalion liaison chief to staff sergeant. He, too, will bring more experience to the infantry battalion.

(g) Topic: 0861 Fire Support Marines Training

- (1) Discussion: Training for the 0861 Marine is broken. These Marines receive no formal MOS training beyond their basic forward observer training. Yet, the required skills set for this MOS are changing the most rapidly with the introduction of digital gunnery and fire support technology. This is most evident when a Marine transitions from a forward observer to a liaison section Marine at the infantry battalion and regiment. Institution of career progression training is needed for this MOS to ensure these Marines have the necessary skills in a dynamic and increasingly technical aspect of fire support. If we don't fix this problem soon, Marine units will execute fire support poorly on future battlefields.
- (2) Recommendation: Establish a formal training curriculum for this MOS beyond basic training. Additionally, an MOS change should be assigned, MOS 0869 is suggested, to reflect a significant change in duties and required skills. This MOS change should occur as a Marine reaches the grade of sergeant to continue to master gunnery sergeant.

(h) Topic: Air Officer at Artillery Regiment

- (1) Discussion: The increased requirement for artillery to establish quick fire channels to the ACE, use UAVs in target acquisition, and move artillery cannons and ammunition by air require the addition of an air officer to the regimental staff. Making this assignment will ease coordination with the ACE on fire support and logistical issues. Currently artillery units must go to the division air officer to make these arrangements. This method slows down planning and fire support responsiveness.
- (2) Recommendation: Assign an Air Officer to the regimental staff.

(i) Topic: Ammunition Requirements for Artillery

- (1) Discussion: The U.S. Military is seeing a shift away from a "platform-based" force to a "munitions-based" force. However, advanced munitions such as the XM982 (\$5,500 for Unitary round, \$5,400 for the DPICM variant, and \$50,000 for the SADARM variant) are costly. While these variants promise increased range, precision, and lethality their high cost will limit the amount the Marine Corps will purchase. Limited amounts of these munitions will make them a division level asset. There is still a need for large amounts of inexpensive High Explosive munitions. The Marine Corps currently possesses M549 HERA (range 30KM) and M864 Base Burn DPICM (range 28.3KM) munitions. The U.S. Army has just purchased the M795HE (range 22KM), which the Marine Corps will acquire

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in FY06. Talley Defense Systems has demonstrated that it can add the same Base Burn Assembly from an M864 to the M795 (making these two rounds ballistically similar). This new round would be designated the M795E1 (range 28.3km).

- (2) Recommendation: Increase the stock of inexpensive, longer range artillery munitions such as the M864 Base Burn DPICM, M549 HERA (currently in the inventory), and program the M795E1 Base Burn HE to bridge the gap until a family of inexpensive rocket munitions are developed.

(j) Topic: *Operating Force Tour Length for Lieutenants*

- (1) Discussion: Artillery lieutenants do not spend enough time in their MOS before assignment to supporting establishment billets. These Marines are usually transferred with barely two years in their MOS. Learning your trade as a young officer is the most important confidence builder there is. With the increasing complexity of digital fire support requirements, these officers are becoming ill prepared to assume duties as battery commanders and liaison officers upon their return to the operating forces. This is a combat issue.
- (2) Recommendation: Retain artillery lieutenants in their first operating force assignment for a full three years. Doing so will improve their MOS skills and give them more field time which will better prepare them for increasingly more difficult fire support assignments.

(k) Topic: *0811 MOS Skills Progression Training*

- (1) Discussion: Currently, MOS 0811 has no designated MOS progression. Individual Training Standards (ITS) for SNCOs are beyond the basic entry level, yet there is no formal USMC training to support the development of these skills. Introduction of the new lightweight howitzer into the Marine Corps arsenal will present new doctrine and training issues that further serve to validate progression training for MOS 0811.
- (2) Recommendation: Request standards branch at T/E Division, MCCDC lead artillery regiments in identifying mid and advance SNCO core ITS for standardization and implement these standards via local regimental Artillery Training Schools or at the Artillery Training Detachment at Ft. Sill, OK.

(l) Topic: *Artillery Battalion FDC, Liaison Section, and Maneuver Regiment COC Relationship*

- (1) Discussion: Current doctrine attaches an artillery battalion liaison section to an infantry regiment to assist in fire support planning, coordination, and execution during combat operations. The artillery liaison section is required to provide information to both the infantry regiment and the artillery battalion in order for both units to maintain situational awareness on the battlefield. This current organization is cumbersome and often detracts from the ability to provide timely fires by artillery.
- (2) Recommendation: The artillery battalion FDC should be collocated with the infantry regimental COC in order to facilitate rapid coordination. This will ensure that both maneuver and artillery are aware of unit locations, current enemy situation, and plans for future operations. Bottomline, they both have situational awareness and the artillery can provide timely fires as well as position units to support future operations. Fire mission clearance and processing is streamlined. The infantry S-3 and the artillery S-3 can work hand-in-hand to develop fire support plans that best support the Regiment. There is no lapse between fire planning and execution. Collocation will also significantly reduce

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communications requirements. The artillery combat trains would assume the admin and logistical tasks currently performed in the battalion headquarters.

(m) Topic: *Use of UAVs and Robots for Observed Fires*

- (1) Discussion: UAVs, like Aerial Observers, are a superior means for observing and controlling deep artillery fires. The problem is that UAVs are often grounded, much like manned aircraft, during inclement weather. [A condition frequently encountered in many regions of the world where we plan for MTWs.] Additionally, the connectivity and coordination between the UAV Detachment to the artillery fire direction center is planned or functioning poorly. The result is the failure in execution of a UAV assigned as the primary or alternate executor of a fire support event important to the success of a MAGTF's plan. This failure is normally pursuant to poor deconfliction procedures between friendly fires and aerial and ground maneuver.
- (2) Recommendation: Improve training and co-locate UAV Dets with supported higher headquarters or firing units to improve connectivity, coordination of missions, and procedures.

(n) Topic: *Target Intelligence and Information Processing*

- (1) Discussion: In a modern combat environment, to include low intensity conflicts, target information processing is important to winning the fight. Properly analyzed, coordinated, and disseminated information helps Marines attack a commander's high payoff targets in a timely manner. Given the capabilities of today's target acquisitions systems (CBR, UAVs JSTARS, etc.) the artillery regiment can easily become overwhelmed with target information.
- (2) Recommendation: Fully examine the intelligence and targeting requirements within the artillery regiment to better support target acquisition and target processing, to include those means of exchanging information with adjacent and higher headquarters. This must include understanding the manpower realities that bear on getting well-trained Marines to support this vital warfighting effort.

P. C. RUDDER



UNITED STATES MARINE CORPS

MARINE CORPS ARTILLERY DETACHMENT
U. S. ARMY FIELD ARTILLERY SCHOOL
759 MCNAIR AVENUE
FORT SILL, OKLAHOMA 73503-5600

IN REPLY REFER TO

1500
CO
8 Sep 99

From: Commanding Officer, Marine Corps Artillery Detachment
To: Commandant of the Marine Corps (Code PP&O)

Subj: MARINE CORPS ARTILLERY DETACHMENT FORT SILL INPUT; ARTILLERY AND THE
CMC'S PLANNING GUIDANCE

Ref: (a) PP&O 130926z AUG 99

Encl: (1) Future Artillery Battery/Battalion Organization
(2) Artillery Movement Ashore in OMFTS
(3) Artillery Mobility
(4) GS Artillery
(5) Ammunition Transport/Handling
(6) Targeting
(7) Counterfire
(8) Minimum Three Year Tour for 0802 Lieutenants
(9) Forward Observer Support
(10) 0861 Billet Grade Reduction

1. Per ref (a), the Marine Corps Artillery Detachment, Fort Sill, Oklahoma submits enclosures (1) through (10) as topical items for framing discussion on artillery and fire support at the 1999 General Officer's Symposium.

2. Paragraph four of the reference requested recommendations for the design of the review process. Marine Corps Artillery Detachment Fort Sill believes that a Mission Area Analysis (MAA) should be conducted in the 2000-01 timeframe, with the results carried forward to a 2001 MAGTF Fire Support Conference. Objectives for this conference will be to dissect the fire support discrepancies identified by the MAA, build consensus among the entire MAGTF fire support community, and prioritize the MAA's findings. Action can then be forwarded to MCCDC for inclusion into the Combat Development Process.

3. Until such time as there is one central figure responsible for the direction and focus of effort of Marine Corps fire support, this community will require additional means to make judgments based upon current tasks and concepts. The MAA would investigate and determine deficiencies based on current tasks and concepts, but would not necessarily drive fire support needs for the future. Therefore, a survey of selected billets, such as regimental commanders and assistant fire support coordinators, division, wing, and MEF commanding generals, and force fires coordinators should be conducted prior to the Mission Area Analysis to determine the core competencies the Marine Corps wants its fire support system to have in the future. The results of this survey should then be compiled, prioritized, and used in conjunction with the MAA to determine the focus of effort for Marine Corps fire support. This in turn will be used as a roadmap to change or create doctrine, determine future requirements and, most importantly, keep all interested parties focused on the same endstate.

4. POC at this command: Maj B.J. Kramer, (dsn) 639-6498, email: kramerb@doimex2.sill.army.mil.

J. M. GARNER

Topic: FUTURE ARTILLERY BATTERY/BATTALION ORGANIZATION (enclosure (1))

Deficiency- The fielding of the AFATDS, XM-777, MTRV, and, in particular, Towed Artillery Digitization will give Marine fire supporters capabilities not previously seen with regard to increases in responsiveness, mobility, and survivability resulting in significant increases in the ability of artillerymen to support the maneuver commander. However, the impact of these programs combined into a system that can support operational concepts, such as OMFTS, is not fully understood and, therefore, not tested. This is an instance where technology is driving doctrinal development. Marine artillery cannot maintain its current organizational structure and expect to optimize the advances these programs offer. Several questions need to be adequately addressed prior to the fielding/implementation of these systems:

- How should a battery fielded with XM-777 (w/TAD) be organized?
- What are the tasks and responsibilities of the leadership (CO, XO, FDO/OpsO)?
- Can a single battery FDC/Ops center sufficiently control six relatively dispersed/semi-autonomous howitzers?
- Will two operations centers focused on terrain management, ammunition management, communications relay, and tactical fire control more efficiently control the howitzers?
- Does the current battalion organization optimize the use of current and future technologies?
- Does the battalion still require an FDC when AFATDS(with a properly constructed database) can aid in determining what/who/how many for a particular mission?
- Can a "control cell" be added to the infantry regimental FSCC to aid in facilitating tactical fire direction by AFATDS, while an operations cell in the battalion HQ performs terrain and ammunition management?

Systems available to address the deficiency- The same questions addressed in the above paragraph are being asked by the US Army with regard to the M109A6 Paladin (155(SP)). FM 6-70 *Paladin Operations* and tests done by 4th ID are trying to solve these issues. C/1-377 (155,(T)), 18th Airborne Corps Artillery is currently fielded with a second generation technology demonstrator for TAD under the guise of 155mm automated howitzer concept (155 AH), which is their go-to-war equipment.

Current options- Follow the progress and development of TTPs for Paladin, the 155AH, and the Army's digital division (4th ID). Apply lessons learned as a basis for XM-777 (w/TAD) TTPs.

Request that C/1-377 exercise and validate some Marine Corps requirements for the TAD System.

Recommendation- Have an artillery battalion serve as a prototype unit to test the possibilities and difficulties associated with these systems. Although the majority of these programs are still under development, some battalions of 11th Marines are fielded with AFATDS. Here the M198 (155AH) can serve as a surrogate for the XM-777 (TAD). The Marine Corps should request from the Army some amount (perhaps 12-18) technology demonstrators for TAD. Allow the test battalion staff and Marines to determine the changes in knowledge, skills, and ability required to operate the system, identify techniques for terrain, ammunition, and logistics management, and "how to" best employ the howitzers (individual, pairs, platoons, or battery). Evaluate these TTP at CAX to provide a measure of reliability to maneuver elements that this system works. The endstate should be that the concepts are validated prior to fielding of the TAD System.

Topic: ARTILLERY MOVEMENT ASHORE IN OMFTS (enclosure (2))

Deficiency- As stated by the OMFTS working groups (AWS 1996, 1998, 1999) and the MAA-24 analysis of 1995, Marine Artillery is not capable of supporting OMFTS due to lack of mobility, logistical burden, and the large amount of lift (assault or LCAC) required for an artillery unit to get ashore. Most of these studies used conventional thinking and, as such, reconnaissance and assault elements will cross the littoral penetration point followed by combat support and combat service support elements. While it is important to use these studies to determine deficiencies and establish requirements for future systems, the Marine Corps has yet to determine how the current and, soon to be acquired systems, CAN be made to support OMFTS and other operational concepts.

Recommendations- The artillery community must take a more active role in defining Marine artillery's ability to support OMFTS. Exercises must be conducted that challenge artillery units to get ashore and then provide continuous support to maneuver elements. A paradigm shift must occur in amphibious planning. If all things were perfect, the Marine Corps would be able to execute OMFTS as described by the concept. However, since the average acquisition life cycle is 14 years, we will have a towed artillery system (a very capable one with TAD) for the next 20 years. This will demand a change in the thought processes associated with phasing units ashore.

Topic: ARTILLERY MOBILITY (enclosure (3))

Deficiency- Marine Artillery in support of Marine Expeditionary Forces afloat has not been optimally used as a result of the high weight and large embarkation footprint of a 155 towed system using a 5-ton truck as prime mover. The M198 system has always been advertised as "helicopter-transportable" but the truth is the size and weight of this weapon has given it very limited use in helicopter operations. Even when moved ashore by helicopter, the challenge was how to move the gun and to service it since the 5-ton prime mover has never been capable of also being moved by helicopter. The plan in this case was always, "remain in place until your prime movers are brought ashore," which is an obvious high-risk venture. Additionally, with the current shortage of deck space available for the MEUs, a decision is usually required to not take the complete compliment of vehicles, either ammo or prime mover, due to lack of embarkation space. The Marine Corps' plan to purchase the Lightweight Towed Howitzer (LTH) does not solve these problems. This new howitzer has a similar embarkation footprint aboard ship and the plan is to still use a full sized 5-ton or even larger 8-ton truck as its prime mover. Ship-to-shore movement via air will be much easier for the howitzer due to its reduced weight, but the dilemma will still exist in that we will have a non-mobile vital asset not capable of making survivability moves until prime movers can be brought ashore. Helicopter assets for these forces are so vital that they cannot be relied upon as a dedicated prime mover. When the only option presented to the MEU commander is to place his valuable guns ashore without a dedicated means to move them, he will usually pick another option. If we do not provide this option, our ability to support these forces afloat and our reputation will continue to suffer.

Systems available to address the deficiency- The General Motors/British Vickers families of medium tactical trucks are only a few of the medium weight tactical utility vehicles capable of acting as the prime mover for the LTH designed to be air-transportable by different families of tactical helicopters. Another option is the French 120mm towed mortar system--one type of lightweight medium mortar system that could be used as the principle surface weapons system for the MEUs only. The prime mover for this system would be a standard utility HMMWV.

Current options- Purchase a medium weight air-transportable prime mover for the LTH in numbers to support only the MEUs and units working up for the MEUs. This will give artillery battery commanders the ability to provide fires and prime moving capability ashore in support of MEU operations. A battery will require eight CH-53 lifts to move its weapons, crews, and prime movers ashore. Additional lifts will be needed for ammunition. Another option is purchase enough 120mm mortars to be used only to support the MEUs and the units working up to the MEUs. These mortars will be manned by the artillery battery deploying with the MEU and will replace the 155 weapons. One CH-53E can carry two systems, the crews, ammunition, and the two prime movers in one lift, meaning that a 6-gun battery can go ashore in three lifts or an 8-gun battery in four. The embarkation footprint is drastically less than that placed by either an M198 or LTH equipped unit. The weapons are much smaller and can actually fit into the back of a 5-ton truck or tucked away into unused space. For every 5-ton prime mover you would be replacing with a utility HUMMV. Ammunition trucks will still be needed, but in lesser numbers. The trade-off will be a loss of range and munitions for expeditionary use.

Recommendation- Conduct a cost estimate into the purchase of a medium weight air-transportable prime mover to support the LTH on the MEU. Additionally, conduct a tactical comparison looking at likely fire support roles for the MEU and the trade-off between using a heavy mortar that is easy to get ashore vice a 155 howitzer that is heavier but more capable.

Topic: GS ARTILLERY (enclosure (4))

Deficiency- There is currently a significant lack of general support surface fires within the Marine Corps. In the division or MEF planning of fires, it is essential that the commander have the ability to weight his main effort with all-weather, long-range fires in addition to the direct support fires normally associated with existing organizations. Current structure provides one active component general support artillery battalion to each division, armed with the 155mm towed howitzer. This is not enough in terms of range or numbers.

The use of the 14th Marine Regiment as the GS capability for the Marine Corps has great merit, but does not completely "fill the bill" either. 14th Marines is armed with the same weapon as all other artillery units in the Marine Corps, and the towed 155mm howitzer lacks sufficient range to provide GS fires in support of the Division/MEF for counterfire, deep SEAD, engaging deep high-payoff targets, and allowing the MEF Commander to provide moved fires to shape or weight the battle.

The Marine Corps needs an organic, long range, all weather, highly deployable, general support artillery system.

Systems available to address the deficiency- The High Mobility Army Rocket System (HIMARS) is a wheeled, 8-ton vehicle which carries a single-pod missile/rocket pack. The missile/rocket pack is the same one used on the Army's MLRS system firing either six unguided rockets out to ranges of 30-45 KM or a single ATACMS guided missile out to an unclassified range of 135 km. This system has had good success in its initial field tests and the Army plans on purchasing them to use as deep GS fires for their light divisions and the 18th Airborne Corps. It uses ammunition currently in inventory for the MLRS system, as well as many of the MLRS system components.

Current Options- Replace two or three of the 14th Marine battalions with a 3 X 6 structure of HIMARS launchers or a similar system. Also, look at providing a Battalion or Battery of rockets to each active artillery Regiment. This will greatly increase the strategic and tactical deployability of Marine general support artillery and significantly increase the organic fires support available to the MEF Commander.

Recommendation- Consistent with previous studies (95 MAA), study and pursue the options of procuring/fielding a true organic general support artillery system with capabilities similar to those of HIMARS. A COA should be finalized prior to full fielding of LW155 and FMTV.

Topic: AMMUNITION TRANSPORT/HANDLING (enclosure (5))

Deficiency- In reviewing the after action comments from Operation Desert Storm, it should be noted that both 10th and 11th Marines identified difficulties in transporting ammunition. In order to get rounds to the batteries they were forced to use outside transport, Logistic Vehicle Systems (LVS), and dump pallets of ammunition on the deck. This shortage of organic ammo transport capability still exists today. With the arrival of the XM777, this shortfall will only be exacerbated by the increased rates of fire of the new system. Army "heavy" units have six mechanized ammo carriers per battery and a total of 18 HEMTTs with the palletized loading system (PLS) per battalion. By comparison, the six 5-ton trucks with trailers per battery and the three LVSs per battalion available to Marine artillery battalions appear to be inadequate. Additionally, when transferring ammunition from one vehicle to another or from a vehicle to a gun it is done manually by the Marines. This is okay for small numbers of rounds, but in a lengthy high intensity conflict this may place great physical duress on the ammunition handlers.

Systems available to address the deficiency- There are several ammunition transport variants available. Currently, the Marine Corps uses a combination of 5-ton trucks and LVSs. Another system that has recently been fielded in US Army artillery units is the PLS, which is essentially a HEMTT with a crane on it. The PLS is capable of loading/off loading palletized ammunition with its crane and a hydraulic pump. As for ammo handling devices, there are systems that have already been developed. The Projectile Transfer Mechanism (PTRAM) was developed with the lightweight howitzer in mind. It is gravity operated mechanism capable of transferring ammo from one vehicle to another. The projected cost of this system is \$3000-4000.

Recommendation- Determine the feasibility of increasing the ammo transport capability of the artillery battalions by purchasing additional LVSs or PLSs. Additionally, the Marine Corps should investigate improving its ammo handling capability by purchasing a PTRAM System or other ammunition handling system for each battery.

Topic: TARGETING (enclosure (6))

Deficiency- Intelligence collection management requires the FSCC to have direct and real-time access to intelligence, and the expertise to filter this information for potential targeting value. Sensor-to-shooter links are virtually non-existent due to a lack of resident technical expertise in both the targeting process and the automated C4I systems in use. This void has allowed C4I network plans to break sensor-to-shooter links with unnecessary action stops at each command level. Fire support personnel are not allocated the proper equipment at the maneuver regiment to manage information needed to develop targets, which causes a void in the commander's situational awareness of his battlespace with respect to available target intelligence.

System available to address the deficiency- The addition of a Target Information Center (TIC) to the artillery battalion FSCC and one C4I platform will segregate fire support coordination tasks during the execution of the plan from targeting information tasks. The additional C4I workstation will give the FSCC ample equipment to run two stations in the forward CP and two stations in the main with one station allocated to future plans. WO1 0803s currently attend the U. S. Army Target Information Officer Basic Course at Ft. Sill and CWO3s attend the Warrant Officer Advanced Targeting Course. Personnel structure for the TIC does not exist.

Current option(s)- Option 1 includes replacing line #75 (Captain 0802) on the Artillery Regiment T/O with a CWO4 0803 and establishing a TIC at each artillery battalion FSCC led by a Target Information Officer line #44(CWO2/0803), four Marines, and add one C4I workstation to the existing FSCC T/E. Option 2 includes staffing the Assistant Liaison Officer billet at the artillery battalion FSCCs with a senior 1stLt/0802 who attends a Marine-oriented targeting package during the Officer Basic Course at Ft. Sill. The TIC is also included in this option.

Recommendation- Implement Option 1 as it offers the most complete solution to the problems associated with the targeting process. It addresses the most vulnerable limitation of our fires in the areas of responsiveness and information processing. In essence, it institutionalizes targeting and provides technical competence and continuity within the section.

Topic: COUNTERFIRE (enclosure (7))

Deficiency- Marine artillery counter battery radar capabilities are completely inadequate. The current system AN/TPQ-46A has an average detection range of 14.5 km for artillery, 24 km for rocket and covers a fan of 1600 mils while emitting a significant electronic signature. Enemy artillery and rocket capabilities out range our radar by 3X. The AN/TPQ-46A is the only ground-based counterfire radar platform in the MAGTF leaving Marine artillery, as well as maneuver elements, extremely susceptible to enemy fires without the capability of detection.

System avail to address the deficiency- N/A

Current options- Due to the cost and time required to procure a counterfire radar system, a two-phase option is recommended. Acquisition of a ground-based suite of acoustic sensors (utilized successfully by the U.K. in Bosnia) to be deployed based on IPB and function as a cueing agent for the AN/TPQ-46A. This "sound ranging" system is passive and provides 360 degree continuous coverage beyond 40 km. Information gathered by this system will be used to assign and/or cue the radar to a zone of likely activity. Acquisition of long-range radar should be initiated immediately. This radar should be more survivable (transmitter and receiver separated up to 10 km) and have a detection range of beyond 40 km. The sound ranging system will continue to be employed with the AN/TPQ-46A.

Recommendation- Based upon the immediate need for accurate, reliable hostile weapon location beyond current capabilities on a non-linear battlefield, it is recommended that the above two-phase option be initiated.

Topic: MINIMUM THREE YEAR TOUR FOR 0802 LIEUTENANTS (enclosure (8))

Deficiency- Marine 0802 lieutenants are not getting sufficient artillery-related experience during their first FMF tours. Lieutenants are commonly removed from the FMF and sent to "B" billets after completing only two years of their initial three year tours. The problem manifests itself when inexperienced officers are required to perform key billets such as Liaison Officer or Battery XO. The typical officer billet progression in an artillery battery is Forward Observer, Fire Direction Officer or Assistant XO, then LNO or XO. Two years is simply not enough time to gain the requisite knowledge and experience needed to effectively perform in the positions of LNO and Battery XO. All too often, lieutenants are sent out to infantry battalions unprepared and inexperienced, which damages the relationship with our infantry counterparts and limits our combined arms effectiveness. LNOs and XOs should have a firm experience and knowledge base in forward observation, fire direction and battery operations prior to being assigned to these positions, which unfortunately is not happening due to the shortened initial FMF tour lengths.

Systems available to address the deficiency- N/A

Current options- Maintain the status quo or keep 0802 lieutenants in their initial FMF tour longer than what is currently being practiced.

Recommendation- Allow 0802 lieutenants to complete their entire three year tours prior to sending them to "B" billets.

Topic: FORWARD OBSERVER SUPPORT (enclosure (9))

Deficiency- The ability of artillery to provide the maneuver commander with adequate forward observer support to his main effort has been hampered by a lack of adequate FO teams. This shortage results in teams having to cover more than one area/unit or reposition themselves frequently in order to provide the right coverage during the various phases of an operation.

Systems available to address the deficiency- N/A

Current Options- Maintain the status quo or restructure the liaison elements within the artillery battalion by centralizing all FOs, scout observers and infantry battalion artillery liaison officers within the artillery battalion headquarters. This option does not (and should not) involve a decrease in forward observer/liaison structure. This option achieves the following:

- Allows the fire support coordinator to "weight the main effort" by positioning the best target acquisition on the battlefield where he may best be utilized.
- Supports the re-emerging "Universal Spotter" concept by providing for centralized control of key positions, which will be operating with more complex communication and target acquisition equipment.
- Enforces the integration of the forward observers with maneuver. Removing artillery officers from the garrison related activities of a firing battery not in the field will assist in breaking a long-standing artillery paradigm: placing junior artillery officers in motor pools, supply warehouses and communication offices, when they should be with their supported maneuver commander.

Recommendation- Conduct an analysis involving Total Force Structure, T&E, Fort Sill and the FMF to determine the feasibility of a consolidated liaison platoon at the artillery battalion headquarters.

Topic: 0861 BILLET GRADE REDUCTION (enclosure (10))

Deficiency- Due to the deactivation of the ANGLICOs over 1/3 of the 0861 structure was cut causing a severe shift in the MOS pyramid. As a result of reshaping the MOS, the grade of the 0861 billets in the

artillery battalions was lowered one grade, which included the battery liaison chief (SSgt to Sgt). While technology does aid in reducing or replacing individuals, it does not replace experience. Particularly in OMFTS, the liaison sections are required to work in diverse operations that demand knowledge, experience, and continuity to establish procedures and systems to ensure fire support and maneuver are integrated. Some points to consider include:

- artillery fire plans and tactical fire direction completed at the artillery battalion are supervised by a 0848 master sergeant. The liaison section at the infantry regiment, which is responsible for the planning, coordinating, and executing the fire support plan, including the artillery fire plan, is supervised by a 0861 gunnery sergeant;

- digital communications, in particular AFATDS, is very technical. It takes time and experience to use, integrate, and troubleshoot. While sergeants are capable of operating the systems, they generally don't have the operational experience at the battalion or higher level to see the big picture and aid in determining the very important commander's guidance in the AFATDS database.

Systems available to address the deficiency- N/A

Current options- Maintain the status quo or commission a study to revisit the decision to lower the 0861 billets' grade structure.

Recommendation- Increase the 0861 billets' grade and return staff sergeant 0861s to the maneuver battalion FSCC.

1999 MAGTF

FIRE SUPPORT CONFERENCE

EXECUTIVE STEERING COMMITTEE DOCUMENTS

The 1999 MAGTF Fire Support Conference was conducted from 4-8 October 1999 at Marine Corps Base, Camp Pendleton, CA. Results from the conference will be forwarded to the Commanding General, Marine Corps Combat Development Command for final adjudication. Briefs, Working Group Reports and Attendance Rosters are posted on the Marine Corps Artillery Detachment website at:
<http://sill-www.army.mil/TRNGCMD/usmc/tcusmc.htm>

Three critical documents from the conference are presented. The Executive Steering Committee, consisting of Marine Artillerymen, Aviators and a NSFS Representative prepared these papers in part to provide feedback to the CMC's guidance to "Fix Artillery". The concept of an Artillery Operational Advisory Group (OAG) is presented, as well as recommendations on MAGTF Fires Proponency.

Note: Enclosure (2) to the Executive Steering Committee's Initial Report is omitted.

United States Marine Corps
10th Marine Regiment
11th Marine Regiment
12th Marine Regiment
14th Marine Regiment
Marine Corps Artillery Detachment, Fort Sill, Oklahoma

5000
ESC
7 Oct 99

From: Commanding Officer, 10th Marines
Commanding Officer, 11th Marines
Commanding Officer, 12th Marines
Commanding Officer, 14th Marines
Commanding Officer, Marine Corps Artillery Detachment
To: Commandant of the Marine Corps (PP& O)
Via: (1) Commanding General, 1st Marine Division
Commanding General, 2nd Marine Division
Commanding General, 3rd Marine Division
Commanding General, 4th Marine Division
(2) Commanding General, I Marine Expeditionary Force
Commanding General, II Marine Expeditionary Force
Commanding General, III Marine Expeditionary Force
(3) Commander, Marine Forces Pacific
Commander, Marine Forces Atlantic
Commander, Marine Forces Reserve

Subject: ARTILLERY OPERATIONAL ADVISORY GROUP (OAG)

Enclosure: (1) Proposed Artillery Operational Advisory Group Charter

1. The enclosure is forwarded for approval.
2. During the 1999 Fire Support Coordination Conference, the Artillery Commanders determined that a requirement exists for a sponsored forum to address and resolve artillery related issues within the Operating Forces. The Artillery OAG as proposed in the enclosed charter would function as an action body sponsored by the division commanders to provide input and recommendations to the annual Ground Board via the Quad-Division Conference.
3. We believe that creation of this OAG would unify the currently fragmented efforts of the artillery community to develop artillery issues and recommend solutions. Our combined opinion is that this forum is the most effective means to forward artillery issues from the Operating Forces to the Combat Development Process via the Ground Combat Element Proponent. The ultimate goal is to improve ground-based fire support to the GCE and MAGTF Commanders.

Colonel H. T. GOBAR
CO 10th Marines

Colonel D. C. O'BRIEN
CO 12th Marines

Colonel J. M. GARNER
CO Marine Artillery Detachment

Colonel E. J. LESNOWICZ, JR
CO 11th Marines

Colonel P. C. RUDDER
CO 14th Marines

ARTILLERY OPERATIONAL ADVISORY GROUP

1. **Purpose.** The Artillery Operational Advisory Group (OAG) is chartered as a forum for direct Operating Force interaction with requirements officers, program managers, headquarters advocates, and technical advisors.
2. **Intent.** The intent of the Artillery OAG is to serve as a vehicle for identifying and prioritizing artillery issues that directly impact the operational capabilities, standardization, training, readiness, structure, and safety of Marine artillery. The Artillery OAG will allow for open discussion of issues affecting the artillery community and its ability to provide artillery command, control, and communication; personnel and structure; facilities; training; and doctrine throughout the Five-Year Defense Plan (FYDP). The Artillery OAG will be the forum for providing a long-term plan (beyond FYDP) for the Artillery community to the Ground Proponent and the Commanding General, MCCDC.
3. **Background.** For many years the Marine Artillery community has attempted to coordinate its efforts on topics of structure, doctrine, safety, and manning to agencies within the Marine Corps' bureaucracy. It has largely failed to make headway on many of these issues except within the area of artillery safety. Here, the four regiments have produced and maintained a common safety regimen with the help of the Marine Corps Artillery Detachment at Fort Sill, OK. The result of its inability to make its point heard within the Marines Corps' bureaucracy is a combat arm out of balance with the needs of the division and MAGTFs it supports and with numerous internal training and structure issues. An organized and sponsored OAG, supported by general officer leadership, will better articulate artillery issues and provide recommended solutions to the Ground Proponent.
4. **Organization.** The Artillery OAG is divided into two separate entities; The Executive Steering Committee (ESC) and Working Groups (WG).
 - a. **The Executive Steering Committee.** The ESC will be sponsored by the four Commanding Generals of the Marine Divisions. The ESC will include all artillery regimental commanders and the Commanding Officer, Marine Artillery Detachment, United States Field Artillery School, Fort Sill, OK and will review the priority issues submitted to them from the Working Groups. The ESC will submit their top ten priority issues to COMMARFORPAC, COMMARFORLANT, and COMMARFORRES via the chain of command for endorsement and forwarding to the Commandant of the Marine Corps [D/CS PP&O]; Commanding General, MCCDC or Commanding General, MARCORSYSCOM.
 - b. **Working Groups.** The WGs are comprised of officers and Staff Noncommissioned Officers from each artillery regiment. Chairmanship of WGs will be as assigned by the ESC. Working Groups focus attention on specific issues pertaining to operations and employment, personnel, equipment, facilities, training, safety, readiness, and standardization. Working Groups work and staff OAG action items and present them to the ESC with recommended solutions. Action items will be presented in a Topic/Discussion/Recommendation format with a recommended priority for ESC consideration. Working Groups will be established as required.
5. **Procedures.** The Artillery OAG is an Operating Force forum. Each regiment and the Marine Artillery Detachment will have one vote in the ESC and WGs. Differences will be resolved through a simple majority vote. Members of the supporting establishment who are participating in the WGs are advisors to the WG leader.
6. **Action.** The OAG will meet semi-annually, or as required, to meet timely input for the POM/Program review process. Regiments will take turns hosting this meeting. The host will provide the necessary conference logistical and administrative support in coordination with the OAG Chairman. The hosting organization will announce OAG meetings via Naval Message and identify an action officer to coordinate the OAG conference. This action officer will coordinate all pre and post conference activities and facilitate the conduct of the conference in session. The OAG chairman will turn in all

documentation, notes, and action items to the OAG conference action officer at the conclusion of the conference. Electronic copies of all proposed action items and briefs will be forwarded to the OAG conference action officer not later than 15 working days prior to the first day of the conference for inclusion into an OAG briefing book.

7. Changes to this charter require four of five votes of the ESC membership. Concurrence with this charter is indicated by the ESC signatures below.

Colonel H. T. GOBAR
CO 10th Marines

Colonel E. J. LESNOWISC
CO 11th Marines

Colonel D. C. O'BRIEN
CO 12th Marines

Colonel P. C. RUDDER
CO 14th Marines

Colonel J. M. GARNER
CO MARINE ADMIN DETACHMENT



UNITED STATES MARINE CORPS
MARINE CORPS ARTILLERY DETACHMENT
FORT SILL

IN REPLY REFER TO

5000
ESC
8 Oct 99

From: Fire Support Conference Executive Steering Committee
To: Commanding General, Marine Corps Combat Development Command
Via: Commanding General, I Marine Expeditionary Force

Subj: MAGTF FIRES PROPONENCY

Encl: (1) MAGTF FIRES PROPONENCY

1. Request concurrence and forwarding of the enclosure to the Commandant of the Marine Corps for the purpose of establishing a single high level decision-making body focused on the integration of MAGTF fires systems and processes to ensure MAGTF fires initiatives are coordinated and mutually support MEF single battle operations. This MAGTF Fires proponent would give coherent, coordinated direction to create or modify doctrine, give true overall direction to the Commanding General, MCCDC, the Commanding Officer, MARCORSYSCOM, and D/CS P&R in developing an integrated MAGTF system of fires that are truly integrated through a process which involves Marines from the Operating Forces. It is time to act on this initiative to ensure the rapid changes occurring in today's Marine Corps are focused on the Commandants end-state for MAGTF operations and to ensure MEF commanders have the ability to fight the single battle in joint warfare.

COL L. K. BROWN, MCCDC

COL J. M. GARNER, Ft. Sill

COL H. T. GOBAR, 2d MARDIV

COL T. P. MINIHAN, 3d MAW

COL D. C. O'BRIEN, 3d MARDIV

CAPT (USN) K. QUINN, N86

COL P. C. RUDDER, 4th MARDIV

COL B. W. SAYLOR, 1st MARDIV

Subj: MAGTF FIRES PROPONENCY

COL H. C. SPIES, 3d MAW

LTCOL D.W. SHUPE, JR 1ST MARDIV

COL P. C. CHRISTIAN, I MEF

LTCOL M. P. PERRY, II MEF

Copy to:

Dep C/S, PP&O

Dep C/S, C4I

Dep C/S, M&RA

Dep C/S, Aviation

Dep C/S, P&R

N85

N86

CG, MARFORPAC

CG, MARFORLANT

CG, MARFORRES

CG, 1ST MARDIV

CG, 2D MARDIV

CG, 3D MARDIV

CG, 4TH MARDIV

CG, 1 MAW

CG, 2 MAW

CG, 3 MAW

CG, 4 MAW

Subject: MAGTF FIRES PROPONENCY

Problem. No venue exists within the Marine Corps to vet MAGTF fires issues across all communities that can obtain a decision that contributes to the coordinated improvement of MAGTF fires operations.

Discussion. The Commanding General, MCCDC, through the Commanding Officer, Marine Artillery Detachment at Fort Sill, OK acting as his executive agent, has sponsored Fire Support Conferences periodically in the 1990s. Although commanders and general officers throughout the Marine Corps and MEFs are invited and encouraged to attend, attendance is poor from communities outside of Marine artillery. For example, for the conference just held at Camp Pendleton from 4-8 Oct 99, there were no infantry regimental commanders, air group commanders, or separate maneuver battalion commanders in attendance beyond the first day. As is generally the case, operational commitments kept many commanders from attending. Only the G-3 of 3d MAW and Commanding Officer, MACG-38 remained in attendance beyond the first day.

General officer participation was limited to generals in I MEF. LtGen Knutson and Major Generals DeLong, Newbold and Stanley set the tone for the conference to ensure that attendees maintained a focus on MAGTF fires.

However, the general lack of participation by commanders outside of Marine artillery ensures discussions within conference working groups become single dimensional because communities outside of air and artillery, with a vested interest in fires issues, are not there to raise their voices. Consequently, this lack of participation by others continues to give the perception to the officer corps that the conference is an artillery conference focused on artillery issues, not a true fires conference. Although much work is done, the recommendations forthcoming from these conferences tend to die a bureaucratic death once forwarded to MCCDC or MARCORSSYSCOM. Not one recommendation from past conferences can be identified as an action complete.

Again and again, the majority of the issues discussed in the conference working groups needed coordination among several communities. It is painfully apparent that many of the problems in MAGTF fire support exist because of the stovepipe nature of many aspects of the fire support providers, including ground, air, and maritime and the C4 systems that should connect them.

Recommendation. The Marine Corps needs to establish a single, high level decision-making body focused on the integration of MAGTF fires systems and processes to ensure MAGTF fires initiatives are coordinated and mutually support MEF single battle operations. This MAGTF Fires proponent would give coherent, coordinated direction to create or modify doctrine, give true overall direction to the Commanding General, MCCDC, the Commanding Officer, MARCORSSYSCOM, and D/CS P&R in developing a integrated MAGTF system of fires that are truly integrated through a process which involves Marines from the Operating Forces. It is time to act on this initiative to ensure the rapid changes occurring in today's Marine Corps are focused on the Commandants end-state for MAGTF operations and to ensure MEF commanders have the ability to fight the single battle in joint warfare.

Below is a proposal of a body organized to achieve this goal.

Create an Executive Steering Committee (ESC) co-chaired by DC/S PP&O and DC/S Air. Other members would include the Commanding General, MCCDC and DC/S C4I. Adjunct members could include DC/S P&R, N85, N86, and N88 as issues/discussions require. The ESC would meet annually in the spring to affect POM processes and decisions or further prepare issues for the Commandant's Marine Requirements Oversight Council [MROC] or the General Officer Symposium in the fall.

To support the ESC, create a Working Group Coordination Team (WGCT) from Branch Heads who work for general officers in the ESC. We recommend POE, APP, MSTP, WDID, etc. to form this team. The WGCT would meet as required to carryout their responsibilities. The WGCT would:

- recommend the agenda for the ESC's annual meeting
- coordinate the administration and execution of the ESC's meeting
- nominate issues to the ESC for Working Groups to work
- monitor progress of Working Groups by receiving periodic in-progress reports

- supervise the activities of a Contractor hired to administer the proponent's activities and maintain historical files.

The WGCT would recommend issues to the ESC co-chairs from issues raised by combat arm communities and Operational Advisory Groups (OAGs) currently within their staff cognizance as proponents for Air, Ground Combat Element and Command Element.

Create Working Groups to do the work to further define the issues, analyze issues, and make recommendations to resolve each issue. Working Groups would concentrate on issues of immediate importance to MAGTF operations regarding MAGTF Fires. They would work only one or two issues each year. Working Groups would meet as required to complete their work. Their membership would be composed of those officers from the Operating Forces who can lend the expertise and prestige to resolving the issue, i.e. commanding officers of regiments and air groups; MEF Force Fires Coordinators; Division Fire Support Coordinators; Operations, Intelligence and Data Communication officers from each MSC; subject matter experts [i.e. MAWTS-1 or Expeditionary Warfare Training Groups]; etc.

We recommend beginning with the following working groups:

- C4I
- Targeting/Target Acquisition [include radars, UAVs & EW]
- Doctrine [MAGTF & Joint]
- Training
- Fires Systems [from mortars to artillery to aviation]

Hire a contractor to act as the administrative agent for the proponent. This allows officers within the working groups to think rather than act as action officers. Marines are renowned for not maintaining complete turnover files and papers to support past decisions. Furthermore, HQMC and other Marine commands and agencies are not staffed to provide the administrative support required to support the ESC without degrading their own work. The contractor would provide the appropriate administrative support to the ESC, WGCT, and WGs, keep minutes and other papers from proponent activities, and perform the administrative support to execute the annual ESC meeting. The contractor would also create and maintain a password protected WEB site to facilitate communication between the WGCT and WGs as these bodies will be widely separated geographically in execution.



UNITED STATES MARINE CORPS
MARINE CORPS ARTILLERY DETACHMENT
FORT SILL

IN REPLY REFER TO
5000
ESC
8 Oct 99

From: Fire Support Conference Executive Steering Committee
To: Commander, Marine Forces Pacific
Commander, Marine Forces Atlantic
Commanding General, I Marine Expeditionary Force
Commanding General, II Marine Expeditionary Force
Commanding General, III Marine Expeditionary Force
Commanding General, Marine Corps Combat Development Command
Commander, Marine Forces Reserve

Subj: INITIAL REPORT

Encl: (1) Executive Summary
(2) Slide Presentation

1. The Fire Support Conference was conducted at Camp Pendleton from 4-8 October 1999. A concerted attempt was made to broaden the scope of the conference to ensure that MAGTF fires were addressed as opposed to a narrow focus on artillery. CG, I MEF and his Force Fires Section assisted greatly in this effort and we had good representation from 3d MAW. We also had Naval Surface Fires representation from OPNAV N86.
2. The conference focused in two main areas. First, we analyzed MAGTF fires in total. Second, in response to the Commandant's guidance to "fix artillery", we focused on specific near, interim and long term goals to achieve that end. The enclosures summarize our recommendations in both areas.
3. MAGTF fires include naval surface fires, ground based fires, aviation fires and the C4I architecture to support them. The conference made the following determinations:
 - Naval Surface Fires - Inadequate but funded plan in place to fix. Needs Marine Corps support.
 - Aviation Fires - Under the proponency of DC/S for Aviation, Marine Aviation continues to move forward with equipment, tactics, techniques, procedures, doctrine and a new family of munitions to meet the Commander's plan for fires.
 - Ground Based Fires - Broken. No real plan.
 - Fire Support C4I - Broken in short term. Plans exist but unclear if they will solve real fire support problems.
4. Many challenges face the Marine Corps in developing an overall MAGTF fire support capability that will support Operational Maneuver From The Sea by the target date of 2015. The greatest challenges are:
 - a. Ensure fire support capability across the spectrum (MEU (SOC) to MEF operations).
 - b. Ensure expeditionary capability and maximize strategic and tactical mobility.
 - c. Ensure a fully interoperable C4I system which will effectively support our ability to plan and execute fire support and allow for rapid and certain coordination.

- d. Accomplish all of the above within the budget and end strength constraints we face.
5. Enclosure (1) summarizes our specific initial recommendations. Enclosure (2) is a briefing presentation of the Executive Steering Committee recommendations to LtGen Knutson. A more detailed report is being prepared by the Marine Corps Detachment at Fort Sill which will include a discussion paper addressing each of the principal recommendations. Additionally, extensive work was completed by working groups which addressed a host of other issues. Their recommendations will be forwarded to appropriate agencies for further action.
6. The Executive Steering Committee included 3 of the 4 Artillery Regimental Commanders, a senior 11th Marines representative and the incoming 11th Marines Commander, the Commanding Officer of the Fort Sill Marine Detachment, the Head of the Doctrine Division at MCCDC, the Force Fires Officer from I and II MEF, the G-3 of 3d MAW, the Commanding Officer of Marine Air Control Group-38, and the Head, Land Attack Warfare Branch from N-86. All of us are in agreement with the thrust and recommendations in this interim report.

COL L. K. BROWN, MCCDC

COL J. M. GARNER, Ft. Sill

COL H. T. GOBAR, 2d MARDIV

COL T. P. MINIHAN, 3d MAW

COL D. C. O'BRIEN, 3d MARDIV

CAPT (USN) K. QUINN, N86

COL P. C. RUDDER, 4th MARDIV

COL B. W. SAYLOR, 1st MARDIV

COL H. C. SPIES, 3d MAW

LTCOL D.W. SHUPE, JR 1ST MARDIV

COL P. C. CHRISTIAN, I MEF

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Copy to:
 Dep C/S, PP&O
 Dep C/S, C4I
 Dep C/S, M&RA
 Dep C/S, Aviation
 Dep C/S, P&R

EXECUTIVE SUMMARY (enclosure 1)

MAGTF FIRE SUPPORT ISSUES

1. **DEVELOP MAGTF FIRES PROPONENCY SYSTEM:** Within the Marine Corps, there is no overall proponency system for the Fire Support community. The result has been a lack of coherence in approaching or resolving fire support issues. Develop a Proponent/OAG system for MAGTF Fires within the Marine Corps. This Fires Proponent should have the charter and authority to direct the combat development process for a Fires Command and Control System that will, in turn, guide the concurrent development and acquisition of systems within the triad of MAGTF Fires: Aviation, Artillery and NSFS.
2. **DEVELOP A ROAD MAP FOR C4I FIELDING/INTEGRATING:** Currently, the Marine Corps is in the process of fielding a variety of C4I systems that affect fire support. These systems, although interoperable to a limited degree, have not provided the integration necessary to achieve a common tactical operation picture or seamless operation. It is recommended the MCCDC develop a roadmap for the next generation C4I system to enable full integration between the battlefield operating systems. The roadmap should include a leading technology C4ISR capability for big deck amphibious ships.
3. **DEVELOP TRAINING/ASSIGNMENT PLAN FOR FIRE SUPPORT OFFICERS:** As new fire support technologies have come on line and the operations have increasingly become complex, joint and coalition in nature, the demands on our Fire Support Officers have significantly increased. Current manning/training/assignment policies of Fire Support Officers do not adequately prepare them.
4. **FIX FORCE ARTILLERY HEADQUARTERS (FAHQ) ORGANIZATION:** Request MCCDC conduct an immediate "quick-look" study to define FAHQ's tasks and required capabilities to recommend structure (T/O) and equipment (T/E) changes necessary to enable Fourteenth Marines to accomplish the FAHQ mission. Since this reorganization affects an MSC of a critical warfighting command, request completion of this study NLT 30 April 2000 to allow inclusion of new/improved capabilities in the FY 00 MEFEX/UFL Exercises.
5. **DEFINE CONCEPT AND REQUIREMENTS FOR UNIVERSAL OBSERVER:** The Universal Observer concept has been discussed throughout the Marine Corps fire support community. This concept needs to be defined and the requirements articulated.
6. **FUND MORTAR BALLISTIC COMPUTER:** There is an ORD identifying the requirements for a Mortar Ballistic Computer that will integrate mortars into the Marine Corps fire support C4I system. This program should be funded.
7. **FUND AN-GVS-5 REPLACEMENT:** A signed Mission Need Statement (MNS) exists to replace the AN/GVS-5. This requirement should be funded to enable Marines to accurately locate targets, ever more critical now that precision fires has taken on a greater role in supporting the maneuver commander.

FIX ARTILLERY - IMMEDIATE

1. **ESTABLISH ARTILLERY OPERATIONAL ADVISORY GROUP (OAG)/MAGTF PROPONENCY LINKAGE:** The Marine Corps Artillery has no mechanism that provides for community focus or provides linkage to the other MAGTF Fire Support providers. The establishment of an OAG for artillery reporting through the ground proponency chain would correct this deficiency.
2. **RAISE PRIORITY/FUND R&D FOR GROUND WEAPONS LOCATING RADAR:** Current radar capability within the Marine Corps is completely out stripped by the stand off distance of potential threat indirect fire support systems. A significant range increase in ground locating radar capability must be procured to make up for this short fall. The MNS exists but is currently unfunded.

3. **RAISE PRIORITY/FUND R&D FOR EXPEDITIONARY INDIRECT FIRE G/S WEAPON SYSTEM:** A MNS has been submitted identifying a short fall in an expeditionary G/S fire support capability. "Fixing Artillery" requires that this capability be procured. The first step should be to fund the R&D effort identified in the MNS.

4. **DEVELOP MNS FOR VERY LIGHTWEIGHT EXPEDITIONARY SYSTEM:** In order to provide fire support throughout the continuum of operational missions, a very lightweight expeditionary system is needed. Recommend that a MNS be generated and studies be conducted that explore alternatives in filling this fire support gap.

5. **CONDUCT CMC DIRECTED STUDY/STRUCTURE REVIEW (T/O AND T/E) FOR ARTILLERY REGIMENTS – INCLUDE 14TH MARINES FAHQ MISSION:** The current T/Os and T/Es for the artillery regiments do not adequately reflect the missions or needs of those regiments. A structure review would enable each regiment to be organized in a manner that reflects its mission.

6. **PROCEED WITH LW155, BUT CLOSELY MONITOR ALTERNATIVES:** The LW155 adequately addresses our need for a cannon artillery system and is well on the way to being ready for procurement. However, we should not ignore emerging technologies and should evaluate their potential prior to purchasing the LW155.

FIX ARTILLERY – 2004

By the FY 2004, the issues raised previously should be well on their way to resolution. The following milestones should be accomplished:

- Select and achieve IOC of Ground Weapons Locating Radar
- Select and achieve IOC of expeditionary indirect fire GS weapon system
- Select and program light/expeditionary system
- Finalize and begin artillery restructuring of the artillery regiments
- Achieve interoperability of principle C4I fire support systems currently being fielded

FIX ARTILLERY – 2015

By FY 2015, artillery should be fixed with the following:

- A complete artillery restructuring
- Complete fielding of
 - General Support Weapon
 - Light Expeditionary Weapon
 - C4I Interoperable Fire Support System
 - Long Range Acquisition Radar