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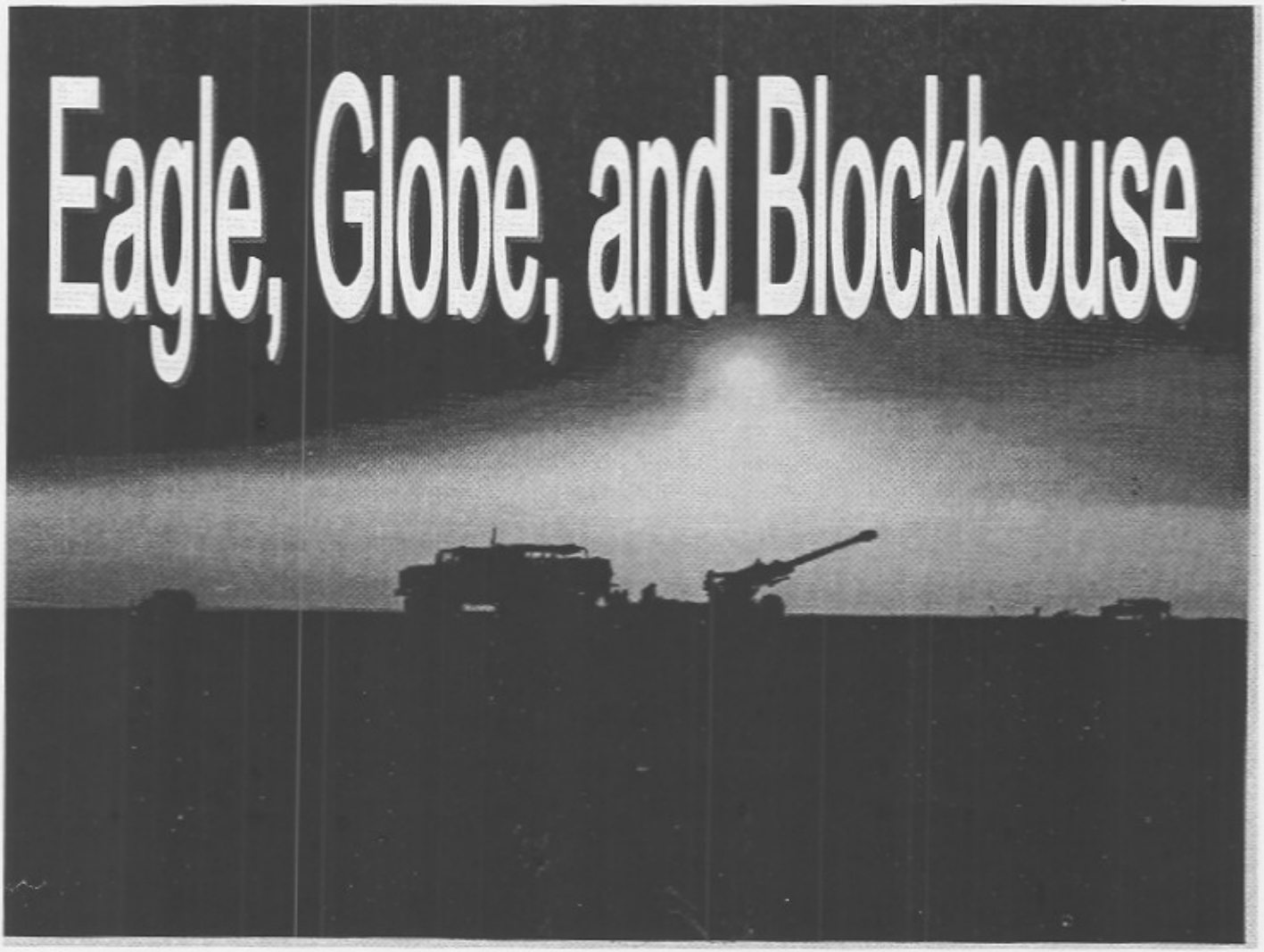

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USMC Artillery Detachment
USAFAS
Fort Sill, OK 73503-5600

Commanding Officer
Col J. M. Garner

Executive/Operations Officer
Maj B. J. Kramer

Sergeant Major
SgtMaj D. J. Huffmaster

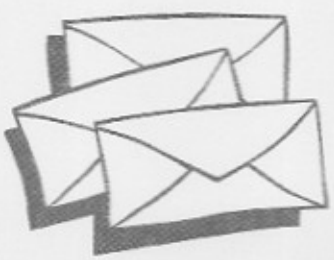
Personnel Officer
CWO2 G. A. Bassut

Training Management
MSgt G. T. Kollar
SSgt V. B. Parkhurst

Editor
Lcpl D. J. Paulson

Detachment Information:

DSN: 639-3979/6199
COML: (580) 442-3979/6199
FAX: 639-5127
EMAIL: atsf.ncr@sill.army.mil
WEB PAGE:
http://sill-www.army.mil/tngcmd/usmc/tcusmc.htm



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OAC 2-99 - Graduation	14 Jun 00
OBC 3-00 - Graduation	27 Jun 00

AFATDS Test Bed Update and Observations

By LtCol Gerald Smith

The AFATDS Test Bed entered its fourth year in December 1999. During this period, the combined efforts of MARCORSYSCOM, MCOTEA and I MEF Marines have greatly influenced the system that will begin the fielding process later this year. While the Test Bed has produced many successes, a number of significant challenges remain for the future of AFATDS and the integration of automated C4I systems.

The Test Bed successes include system size reduction, increased functionality and user friendliness. For most of the past four years, Test Bed units used a total of 40 Ultrasparc Computer Units (UCUs). The total weight of this system exceeded 360 pounds and required a four-man lift. Without exception, the Marines commented that it was too large. The fielded hardware will consist of Compact Computer Units (CCUs) and will weigh in at about 120 pounds (SL-3 complete mobile kit). The Limited Users Test & Evaluation (LUTE) conducted in late 1997, revealed numerous problems with the Tactical Air Support Module (TASM). In plain language, the fire support system did not process air (fixed or rotor-wing) missions very well. After detailed input from 3D MAW DASC Marines directly to the Raytheon engineers, the new A98 software is much improved. AFATDS provides a tremendous fire support mission processing capability. These capabilities, however, come with a price; the system has historically been difficult for users to master. Valuable input from 1st Marine Division FSCC and 11th Marines ensured that system use became easier with each software upgrade. This equates to less training for all users once the system is fielded.

Another Test Bed success has been the recent AFATDS name change. With the enhanced air functionality in the new A98 software, AFATDS is no longer just an artillery system; it is a complete fire support command and control system. Within the Marine Corps, the combination of the new hardware (CCUs) and the A98 AFATDS software the name has been changed to the Fire Support Tactical Data System (FSTDS). Although the change may not seem significant, the Test Bed experience proves otherwise. "AFATDS" denoted a system that was artillery specific and generated little interest from non-artillerymen. The name change has already helped to break the 'arty-only" mindset. Employment of FSTDS by non-artillerymen is essential to exploit the firepower of the MAGTF…and the name makes a difference!!

The Test Bed is currently in the "pre-fielding phase." The focus of this phase is training in preparation for the fielding of approximately 135 systems. The New Equipment Training Team (NETT) in conjunction with 11th Marine Artillery Training School (ATS) instructors recently concluded the largest Marine Corps FSTDS class to date. Over 130 students completed the Operator Course at Camp Pendleton. Marines from 1st Marine Division (to include artillery, tanks, LAR, and infantry MOSs), 3D MAW, FSSG, I MEF (G-2, G-3, and G-7), EWTGPAC, Marine Corps Communications & Electronics School (MCCES), Marine Corps Tactical System Support Activity (MCTSSA) and Reservists from 14th Marines provided a diverse cross section of MOSs in the class. Training across numerous MOSs is also essential integrating FSTDS with other C4I systems.

Initial I MEF fielding was scheduled to begin in December 1999. This date has been postponed due to production delays of several key SL-3 components. At this time, the initial I MEF fielding date is projected for June '00. III MEF units were initially scheduled for training and fielding this summer. The production delays, however, may push this back to late '00. These delays will slow the development of TTPs and the integration of FSTDS with other C4I systems.

As FSTDS gets into the hands of our Marines, several significant challenges remain. Training and C4I systems integration are the two most important issues. Initial training presents a "one-time" problem. It is extremely difficult to teach a complex system to a class with 130 students. The NETT and 11th Marines ATS instructors have done a tremendous job. The maximum class size should be no more than 50-65 students to ensure quality instruction. I MEF

had an advantage since many students in the oversized class received some previous AFATDS instruction. II and III MEF will not have the same luxury and should plan accordingly. The easy answer is to teach two separate (smaller) Operator Courses simultaneously followed by one Supervisor Course (typically only about 30% of the Operator Course students will receive the follow-on Supervisor Course instruction). The problem is the time and space factor. The Operator Course requires four weeks of instruction and the Supervisor Course requires two weeks. Thus, the "easy answer" requires dedicated classroom space and instructors for at least six to seven weeks and multiple large classrooms with sufficient power requirements. Initial training also requires a healthy TAD budget. Although not insurmountable, the initial training effort requires substantial planning.

As the I MEF Test Bed Director, my number one concern for the past 3 years has been training. The Test Bed revealed that this system required approximately 10-14 hours of sustainment training per week! Some of I MEF's sustainment training effort has been tied to frequently changing software versions. The number of hours may be slightly reduced in the future once we obtain a standard suite of hardware and software. Even with consistent hardware and software, the sustainment training effort will be significant. This is especially true for units that do not use the system on a routine basis (i.e., MEF, TACC, DASC). FSTDS operators and supervisors possess a very perishable skill set. Again, in plain language, if you don't use it -- you lose it! Training for Reserve Marines is also a concern. Reservists will have a difficult time with initial training due to the length of the classes and their proficiency will be difficult to maintain given the requirements and scheduling within the Reserve community. We must be very innovative in order to maintain FSTDS proficiency once the initial training has been completed.

I MEF is presently examining several options to meet the training challenge. MARCORSYSCOM has funded three billets for "on-site" contractors. One billet will be manned at each MEF as each is fielded. The on-site contractor is a billet filled by a Raytheon employee to assist with FSTDS training and employment. The on-site contractor should be tasked to implement an in-depth sustainment training program that is integrated with unit TEEPs. FSTDS training must merge with and complement other training requirements rather than becoming an additional training burden. Another training initiative is the LAN CPX. FSTDS will communicate over the SIPRNET or NIPRNET LAN. I MEF will conduct CPXs over the NIPRNET on a recurring basis. The advantage being that units can set up and exercise their skills from desks in their routine garrison office spaces (i.e., it's easier than big CPXs where everyone meets on the Regimental or Division grinder or ball field). Other potential training methods include Self-Paced Computer Based Training (CBT), detailed "how to" publications (i.e., FSTDS for Dummies), and a MCI Course. The CBT is under development, but more efforts should be focused on sustainment training aids.

Although training has been the number one concern for nearly three years, it is rapidly falling second to C4I systems integration. With the new A98 software, FSTDS now "talks" to TCO. The TCO link with FSTDS also ties in systems like IAS, C2PC and the IOW. In addition, TBMCS (the CTAPS replacement) will most likely make its debut this summer; FSTDS will also "talk" to this system. As far as I know, there is only one place in the Corps where all of these systems are set up in the same room on a semi-permanent basis -- the Battlestaff Training Lab in Quantico. There are only (literally) a hand full of Marines who have basic operator knowledge on more than one of these systems…again, they are mostly in Quantico. The Marines who will take this system to combat will not, for the most part, come from Quantico. The developers are meeting their requirements to make these systems interoperable. The problem, however, is that even if all of these systems have the ability to work seamlessly together, we may not have the resident expertise in the operating forces to make them "talk."

Our ability to integrate the systems will depend on how we train the users, employ our systems' contractors and manage systems development. In some regards, training and integration comprise a single interrelated challenge. The fielding of potentially powerful and integrated 21st century C4I systems has rendered our 20th century stove-piped training methods obsolete. This situation will severely limit the Corps' ability to use the full and intended functionality of these systems regardless of how much money we spend on hardware/software upgrades. Integrated systems will not be fully integrated until we learn how to provide integrated C4I systems training. In fact, the continuous stream of software/hardware upgrades magnifies the problem. As soon as new software versions become compatible (or work-arounds are created), one system receives a major upgrade that eliminates the previous interoperability. I call this the C4I train wreck…where the rapidly evolving integrated systems of the future have collided with the stove-piped, lock-step training methods of the past! The employment of our systems contractors also reflects our stove-piped mentality. Currently at I MEF, the FSTDS contractor works at 11th Marines, the CTAPS/TBMCS contractor works at Miramar with 3D MAW, and the TCO contractors work at the MEF HQ. Until recently, there has been no effort to get these technicians working together at all! We must push these contractors to become familiar with more than just their own system. As

artillerymen, we should not focus solely on FSTDS as the C4I fire support answer…we must take a wider view of the interrelated C4I situation to ensure that we provide realistic expectations for the integrated employment of these systems.

One potential solution to this problem is the creation of an integrated C4I schoolhouse/lab at each MEF (or one on each coast). Contractor and instructor support could be consolidated at this facility. Integrated C4I system TTPs could be developed and/or refined by the "experts" in the schoolhouse vice in the operating forces. The consolidated instruction would draw a diverse cross section of MOSs and enhance training. At the completion of their tour, the instructors would return to the operating forces and fill critical billets with a much broader understanding of C4I integration and how to leverage our systems against the enemy. Unfortunately, this integrated schoolhouse vision has a hefty manpower and equipment price tag. Modifying the mission of an existing facility such as MCTSSA or EWTGPAC/LANT may be a cheaper alternative. This would require a major overhaul of the existing facility and may presently be too far "outside the box" for any number of reasons. At this point, we do not have all the answers, but we do know that we have a long way to go in cleaning up the C4I train wreck.

One final observation concerns the future status of the Test Bed. It was always assumed that the I MEF FSTDS Test Bed would conclude with the initial I MEF fielding. We have come to realize, however, that…we now know what we don't know in terms of systems integration. As such, we anticipate the FSTDS Test Bed to continue beyond the initial fielding. The Test Bed must become less resource intensive than in the past, but at the same time assume more of a C4I systems integration mission with fire support requirements as the cornerstone. We will look to MCTSSA to take a more active role in the future.

The Bottom Line: The FSTDS Test Bed has been very beneficial, but the successes have been largely FSTDS-centric (stove-piped) and very expensive in terms of I MEF manpower and time. FSTDS by itself does not provide the single answer for all fire support challenges in the future. The integration of FSTDS with the other C4I systems presents tremendous potential. However, given the integration challenges of the future, we must carefully manage expectations. If we do not break the stove-piped mindsets and adjust our training to accommodate and integrate emerging technologies, we are inviting failure. Overly optimistic and unrealistic expectations will create false assumptions to ensure that these systems hinder - not help - our efforts on tomorrow's battlefield.

NOTE - The author reserves the right to submit all or part of this article for publication in other periodicals.

LtCol Smith has been the I MEF G-3 Force Fires Current Fires Officer since June 1997. Since Aug of 1997 he has also served as the I MEF AFATDS Test Bed Director.

RETHINKING THE AIR MOBILITY OF THE ARTILLERY

By Capt Robert Peterson
and
Maj G Scott Williams

In a recent II MEF Command Post Exercise (CPX) built around operations in Eastern Europe, the 10th Marine Regiment was forced to analyze terrain and movement issues within that theater of operations. Our intelligence preparation of the battlespace (IPB) revealed our movement forward would be restricted to a single main supply route (MSR), characterized by rugged mountainous terrain, numerous bridges, tunnels and switchbacks. With the unique terrain and mission challenges, trailing the maneuver element with our roadborne firing batteries would make supplying the maneuver element within the artillery fires umbrella difficult at best.

The idea of using the "Heliborne Artillery Raid" was considered in order to get howitzers forward into hilltop positions (almost entirely off the MSR) necessary to maintain fire support. The raid, as defined by the FM 6-50 is "a rapid movement of artillery assets by air, to attack a high priority target with artillery fires which could involve operations across the forward edge of the battle area (FEBA) and should not involve sustained operations." With this in mind, it became apparent that the raid was not the best option to provide maneuver elements with continued reliable artillery support. The following were considered:

1. The volume of ammunition needed to provide continued fires would be more than what is normally slung below the howitzer during a traditional raid.

2. Normal movement to contact is forward along the maneuver axis of advance. Shooting and advancing forward (when required) will help gain or maintain the offensive, vice shooting and immediately withdrawing.

3. Personnel requirements to sustain a battery would be greater than that of a raid.

4. Additional vehicles (forklifts and HMMWVs) would be required to move the guns and ammunition around the position area (PA). Increased communications assets would also be needed.

5. Logistical support: food, limited fuel and medical support would be needed to sustain an artillery battery in a forward PA.

6. Additional security in the form of air and ground defense would also be required to sustain the unit for the extended period of time required to provide adequate fires.

Keeping these factors in mind, it became obvious that the concept of the "Air Assault" would need to be revisited. The FM 6-50 defines the air assault as a technique in which "entire firing batteries are moved to quickly project FA (field artillery) fire support into a battle area, to attack special targets, to bypass enemy concentrations or untrafficable terrain, and to facilitate future operations." The raid is exercised and often advertised as a capability that Marine artillery is capable of executing if required to prosecute very specific and limited targets. However, little if any, attention is given to the idea of lifting a battery into firing position for extended periods of time to conduct sustained fire support needed by an advancing maneuver element over difficult terrain. Our training forces may be on the heliborne raid, but clearly the requirement in the above scenario was for an "assault".

Over the past year, the 10th Marine Regiment has spent considerable time planning and conducting raid and assault training. The fact that modern field artillery will need to keep pace with an increasingly faster maneuver element, has proven the assault to be a flexible and useful technique, thus the utility of the assault should be given increased attention. While the assault support package size will be based upon aircraft availability and lift requirements (number of Howitzers, vehicles, PAXs, ammo, etc), with a nominal assault support package of 3 CH-46s and 2-4 gunship escorts, a 5-6 gun battery assault can be conducted in minimal time with proper advance planning and training. Using an approximate range of 10-20 Km (dependant on threat and weather) the howitzers, personnel and support equipment could be in place and fire capable (FIRECAP) within 2 hours…with proper training!

Follow-on issues must also be considered: Prime movers (trucks) would then be required to link up with the battery to facilitate continued ground movement if required. Those vehicles could then be used as immediate ammo re-supply for the engaged battery. Follow-on security issues for the position and ground re-supply routes and would also need to be resolved during position improvement.

General differences between "raids" and "assaults" as related to planning, training and execution are listed below:

REQUIREMENTS	RAID	AIR ASSAULT
Duration	Very short duration	Long, even semi permanent occupation in the form of a firebase
Personnel	Minimum battery personnel required	Tailored personnel for the mission – most battery personnel would be required for continuous operations
Food and tentage	Little, if any	Water and fuel cans with MREs at a minimum.
Number of guns	2-3	All the guns that will fit in the PA.
Ammunition	Ammunition will be limited & target dependant	A large quantity of ammunition will be needed (a supply to last until prime movers arrive)
Vehicles	No vehicles are included	Communications, BCS vehicles and forklift
Communication	Limited communication requirement, perhaps sat-com.	Full up communications requirements to include digital communications and gun display units (GDU).
Re-supply	No re-supply is needed or planned for.	Re-supply as needed.
Camouflage netting	No camouflage netting	More than likely it will be needed.

In addition to normal helicopter lift planning and coordination issues, Artillery Commanders must:

- Develop requirements (personnel, equipment and ammo) for extended operations without prime movers.
- Develop security requirements.
- Practice hasty survey techniques and follow-on techniques to achieve five requirements for accurate predicted fire.
- Preparing, loading and lifting forklifts and HMMWVs.
- Develop method for lifting large quantities of 155mm ammunition. Battery XO's and Bn S-3 must plan ahead and ensure requisite amount of lift is requested in advance in accordance with ATO cycle.
- Plan and rehearse air assaults. Coordination must be flawless between landing support detachment, aircraft, and the battery.
- PZ/LZ operations.
- Communications requirements – This may include normal requirements for fire support nets, however additional radios will be necessary to communicate with aircraft. During advanced party operation or follow-on, is a C2 bird required?

While the artillery raid is another arrow in the fire support quiver, there exist a need for Marines to break out of the "raid" mindset and toward an additional capability that exists within the Marine Corps. Future areas of operation may not afford us the ease of trafficability, which we saw in the desert environment. A simple map study of any area east of the Adriatic Sea will show that for us to remain a viable fire support asset to the grunts, we need to think "out of the box" in terms of raids and assaults. Like any capability, we must plan for and rehearse it before we can truly say we are capable of achieving it. To quote an infantry battalion operations officer "if you haven't done it in the last 30 days don't tell me you can do it."

Captain Peterson currently serves as the 10th Marines Regimental Air Officer. Major Williams is the S-3A of 10th Marines. They can be contacted at DSN: 751-1640.

MARINE CORPS SYSTEMS COMMAND

2033 BARNETT AVENUE
QUANTICO VA 22134-5010

UPDATE FOR THE M795 HIGH EXPLOSIVE (HE) PROJECTILE

The overarching necessity for new and improved munitions is reflected in our artillery system for the next century and established in the Family of Artillery Munitions (FAM) Mission Need Statement (MNS). Artillery is a "System of Systems." The next generation system will consist of the XM777 Howitzer, Towed Artillery Digitization (TAD), the Medium Tactical Vehicle Replacement (MTVR), and a new suite of ammunition. Each piece of the system is critical to maximize the effects of fire support in the future. FAM is made up of six different U.S Army lead programs including; the M795 Extended Range HE Projectile, the XM898E1 Sense and Destroy Armor (SADARM) Projectile, the XM982 Extended Range Projectile (capable of carrying DPICM, SADARM, and a unitary warhead), the Modular Artillery Charge System (MACS), Multi-Option Fuse for Artillery (MOFA), and the Portable Inductive Artillery Fuse Setter (PIFAS). The M795 HE Projectile is a cornerstone of FAM.

What will the M795 Extended Range HE Projectile do for our operational forces? It will increase antipersonnel and anti-material effectiveness, accuracy, and range compared to the currently fielded M107 HE projectile. The 6km increase in range (out to 22km) will permit Marine Corps artillery units to mass fires while simultaneously reducing the need to mass units. This will minimize the enemies counter-fire threat and enhance survivability. The additional range will also reduce the need for units to displace in order to provide support to highly mobile ground combat forces. The increased explosive payload (23.8 lbs of TNT vice 15.0 lbs of CompB in the M107) and more effective fragmentation pattern will improve the lethal effects against enemy fire support systems, light armored vehicles, standing and prone personnel by 30% over the M107 HE round. The M795 HE is ballistically similar to the M483A1, DPICM. Using the less costly M795 HE to determine registration corrections for other members of the DPICM family of projectiles is economical, will increase accuracy, and reduce the number of rounds needed to affect a target.

The U.S. Army has developed, type classified, and is currently producing the M795. On 30 Aug 99, HQMC accepted the U.S. Army ORD requirements and signed an Operational & Organizational (O&O) concept document which states the M795 HE will replace the M107 HE as the primary artillery HE round. The long term intent is to replace the current M107 HE war reserve rounds with M795s over the Future Years Defense Program (FYDP). The existing M107s would then be used for training until depleted and completely replaced with M795 HE as the sole HE round for both training and war reserve stocks. A small allocation of M795s would be required for training each year. Recently, the Program Manager for Ammunition at Marine Corps Systems Command has included the M795 HE projectile in their FY01 Unfunded Priority List (UPL) and are requesting funding in the POM FY02 submit. If successful in receiving FY01 procurement funding the M795 HE will be introduced in the war reserve stocks and training allocations in FY03.

Marine Corps Systems Command Fire Support Programs Update

The purpose of this article is to update Marines who are interested in the on going developmental programs within Marine Corps Systems Command, Ground Weapons, Fire Support Division. The information below describes various programs, updates their status in the developmental cycle, and provides a point of contact for questions and comments.

M795 High Explosive (HE) Projectile. The M795 HE projectile will provide 6Km more range (out to 22.5 Km) and 30 percent greater lethality over the current M107 HE projectile. The additional range is possible by welding the rotating band on the M795 projectile body vice a swaged or fitted rotating band on the M107. This allows the M795 to be fired with the M119 and M203 propelling charges, thus achieving the greater range. The increase in lethality is provided by a greater amount of explosive fill (M795 has 23.8 lbs of TNT vice 15.0 lbs of CompB in the M107) and internal scoring which facilitates smaller fragmentation and increases the fragmentation pattern density. What will the M795 do for our operational forces? It will increase effectiveness, accuracy, and range. It will assist in reducing the counter-fire threat and enhance survivability. The M795 is ballistically similar to the M483A1, DPICM family of projectiles. Using the less costly M795 to determine registration corrections for other members of the DPICM family is economical, will increase accuracy, and reduce the number of rounds needed to affect a target. The U.S. Army has developed, type classified, and is currently producing the M795. On 30 Aug 99, HQMC accepted the U.S. Army ORD requirements and signed an Operational & Organizational (O&O) concept document which states the M795 will replace the M107 as the primary artillery HE round. The long term intent is to replace the current M107 war reserve rounds with M795s over the Future Years Defense Program (FYDP). The existing M107s would then be used for training until depleted and completely replaced with the M795 as the sole HE round for both training and war reserve stocks. Recently, the Program Manager for Ammunition at Marine Corps Systems Command has included the M795 projectile in their FY01 Unfunded Priority List and are requesting funding in their FY02 POM submit. If successful in receiving FY01 procurement funding the M795 will be introduced in the war reserve stocks and training allocations in FY03.

Point of contact is Major Kevin Rogers at (703) 784-2006 ext 5094, DSN 278. Email address is rogerskc@mcsc.usmc.mil

Trajectory Correctable Munitions (TCM). TCM is a 155mm projectile concept sponsored jointly by the United States and the Kingdom of Sweden. TCM will be designed to carry multiple payloads of either anti-armor submunitions (SADARM/BONUS), DPICM, or a unitary charge to provide 155mm howitzers an extended range capability. This is a technology oriented program of 25 months that will explore the feasibility and develop/demonstrate the required body of knowledge needed to evaluate trajectory correctable munitions for potential use by the U.S. Army and Marine Corps. The approach is to jointly focus on those technologies that have the most promise in leading to a demonstration of the principle of altering the original path of an artillery shell in flight to a specific coordinate. Both countries will evaluate the potential for a long-term relationship depending on technical progress demonstrated during the course of this program. The major deliverables will be a bench test demonstration displaying the ability to alter the course of the artillery shell in flight and a ballistic test of the projectile configuration. A final report on the results of this test is scheduled for 2d Qtr FY01

Point of contact is Major Bob McGovern at (703) 784-2006 ext 5093. Email address is Mcgovernb@mcsc.usmc.mil

Target Location Designation Hand-Off System (TLDHS). TLDHS will provide Forward Observers (FOs), Forward Air Controllers (FACs), Naval Gunfire Spot Teams and Reconnaissance Teams the ability to accurately acquire and locate targets; and designate targets for laser guided munitions and laser spot trackers. This is accomplished through a man portable, modular target location designation system whose major components are a Target Location Module, Target Designation Module and tripod. TLDHS's Target Hand-Off Sub-system (THS), residing on the Rugged Handheld Computer, will interface with the laser and provide the capability to digitally transmit requests for fire support THS software will transmit, store, create, modify, and display map overlays, operational messages and reports, as well as position location information via tactical radios, networks and wire lines. Fielding is scheduled to begin in FY 03 and be completed in FY 05.

Point of contact is Major Ed Lundstrom at (703) 784-2006 ext. 5091, DSN 278. Email address is lundstromed@mcsc.usmc.mil

AN/TPQ-46A FIREFINDER RADAR ELECTRONIC SUPGRADE.

The AN/TPQ-46A, the successor to the AN/TPQ-36(v)5 and AN/TPQ-46, is an electronics upgrade that improves survivability and effectiveness by replacing the hardware based control shelter with an LCU/software based system. Enhancements include 100 meter operator remoting, a climate controlled/NBC overpressure shelter, independent survey and siting, and a major communications package that provides full AFATDS interoperability. The AN/TPQ-46A is the Marine Corps' version of the U.S. Army's AN/TPQ-36(v)8 therefore, logistics and training support are optimized.

After fielding 11th Marines in October 1999, a performance review meeting was hosted by SYSCOM to evaluate performance and equipment concerns identified by the FMF. Concerns included operations in rain, comparative target detection to the predecessor system, friendly fire maximum range and several equipment deficiencies. Since December, SYSCOM has been aggressively gathering data to assess FMF concerns and funding the Army to make out of cycle software upgrades. SYSCOM representatives joined 12th Marines on a live fire exercise on Mainland Japan in February 2000 and intends to assist 11th and 10th Marines on their Spring FIREXs in March 2000 to provide training and equipment support and gather firing data. Another performance review will be hosted in Quantico in April 2000 with the FMF to review the status of performance concerns and update the fielding schedule.

Point of contact is Major Rob Terselic at (703) 784-2006 ext. 5087, DSN 278. Email address is terselicrj@mcsc.usmc.mil

Meteorological Measuring Set (MMS) Upgrades. The upgrades will replace the anemometer, barometer, and sling psychrometer and enhance the collection of surface data (temperature, pressure, humidity, wind speed and wind direction). The first upgrade includes the AN/TMQ–50 Semi–Automatic Meteorological Station (SMS), a Global Positioning System (GPS) antenna, a MWG 201 GPS Processor Circuit Card Assembly (CCA), supporting cables, and installation materials. The second upgrade provides a GPS radio sondes capability which will replace the LORAN system and streamline computation and dissemination of meteorological information. Fielding of these upgrades are scheduled to begin in the 4th Quarter FY00 and scheduled to be completed by the end of 1st Quarter FY01.

Point of contact is CWO-3 Ralph Lawrence at (703) 784-2006 ext 5007, DSN 278. Email address is lawrencer@mcsc.usmc.mil

Enhancement of the Electronic Meteorological Theodolite (EMT). The EMT that is currently part of the Meteorological Measuring Set (MMS) is being modified with mechanical scales. This will enable the theodolite to operate in a manual or electronic mode. The number of EMTs is also being increased by one EMT in each MMS. The quantity increase will provide a capability for independent MET team operations in tactical and training environments for which full up MMSs are not available. Two EMT prototypes have been selected and will undergo testing during the 4th Quarter FY 00. Initial fielding is scheduled to begin in 4th Quarter FY01 and completed by 2d Quarter FY02.

Point of contact is CWO-3 Ralph Lawrence at (703) 784-2006 ext 5007, DSN 278. Email address is lawrencer@mcsc.usmc.mil

Hydraulic Power Assist Kit (HYPAK). HYPAK consists of a hydraulic lift that when engaged raises or lowers the M198. The manual pump will remain as a backup. It is powered off of the prime mover and reduces howitzer emplacement and displacement times. The modification will be fielded to active units and MPF howitzers only. Fielding has begun and is scheduled to be completed during 3d Quarter FY01.

Point of contact is GySgt Scott Arnold at (703) 784-2006 ext 5083, DSN 278. Email address is arnoldsh@mcsc.usmc.mil

Elimination of Radioactive Light Sources (ERLS). The ERLS Collimator is designed to replace the tritium light source currently in place. It provides illumination through a low power consumption Light Emitting Diode (LED) and is powered by two non-hazardous "C" size lithium batteries. This fulfils the need for a non-radioactive alternative to the current light source with no loss in performance. The program includes a complete rebuild of all modified collimators. Fielding is scheduled to being 1 April 00 and be completed during the 4th Quarter FY00.

Point of contact is GySgt Scott Arnold at (703) 784-2006 ext 5083, DSN 278. Email address is arnoldsh@mcsc.usmc.mil

Environment Stabilization System (ESS). The ESS provides a preservation environment for electronic component intensive systems associated with the Meteorological and Counterfire Sections of our artillery regiments. The ESS is a uniquely tailored dehydration system whose primary objective is to reduce and stabilize the ambient relative humidity at between 30 and 40 percent. The system will reduce corrosion, parts failures, and maintenance labor hours. The system is scheduled to begin fielding in June 00 and complete by December 00.

Point of contact is GySgt Richard Frank at (703) 784-2006 ext 5085, DSN 278. Email address is Frankrw@mcsc.usmc.mil

Muzzle Velocity System Communications Adapter (MCA). This will become an integral part of the M-94 Muzzle Velocity System (MVS), allowing for the direct transfer of data from the MVS to the Battery Computer System over the existing communications architecture. Muzzle velocity variations will be instantaneously fed into the fire direction computer allowing for round by round muzzle velocity corrections. The MCA is scheduled to begin fielding in 2d Quarter FY01 and completing fielding in 4th Quarter FY01. Procurement is contingent on fielding of a version of fire direction software which is interoperable with the MCA.

Point of contact is GySgt Richard Frank at (703) 784-2006 ext 5085, DSN 278. Email address is Frankrw@mcsc.usmc.mil

Expeditionary Indirect Fire General Support Weapon System (EIFGSWS). While not yet funded for the Marine Corps, this system is a priority for funding efforts in FY01 and FY02. The U.S. Army High Mobility Artillery Rocket System (HIMARS) currently being tested by the U.S. Army has the potential to meet our EIFGSWS requirement. HIMARS is a loader-launcher and associated equipment mounted on a U.S. Army tactical truck. It can be loaded with a single pod of six MLRS rockets or one ATACMS missile. Dependent on the rocket type loaded, ranges in excess of 45 Km can be achieved.

Point of contact is Major Bob McGovern at (703) 784-2006 ext 5093. Email address is Mcgovernb@mcsc.usmc.mil

Helium Racks for MMS. MARCORSYSCOM has purchased helium racks for the meteorological section. The fielding of the helium racks to the artillery meteorological section is scheduled for March and April 2000. Each MMS will have two helium racks which is capable of carrying sixteen bottles of helium. The helium rack will be mounted in the M1097A2 HMMWV.

Handheld Survey Computers (HSC). MARCORSYSCOM is in the process of purchasing the handheld survey computer for the firing batteries. These HSC will be have the same capabilities that as the HSC that the battalion survey section. MARCORSYSCOM will be purchasing the next generation computer that is compatible with the HSC that survey section are presently using. The HSC for the firing batteries will have the same programs as the survey section. The plan is to have the HSC to the firing batteries by the end of 3rd quarter FY 00.

U. S. MARINE CORPS ARTILLERY DETACHMENT

759 MCNAIR AVENUE
USAFAS, FORT SILL, OK 73503-5600

AROUND THE SCHOOLHOUSE

AFATDS/Fire Support Tactical Data System Training

By 1stLt Garrett Benson

Fire Support Tactical Data System (FSTDS) training is a hot issue across the Marine Corps. As this system gets fielded across the fleet, the issue of who will train Marines is becoming larger and larger. Fort Sill now has courses available for the operator and is currently training Marines attending schools onboard Fort Sill. **The Operator's Course offered by Command, Control and Communication Division (CCCD) of the Fire Support and Combined Arms Division (FSCAOD) has seats available starting this summer for input from the Fleet Marine Force.** The dates and course numbers are listed below.

Course Number:	Start:	Finish:	Seats Available:
8-00	5 JUL 00	2 AUG 00	12
9-00	9 AUG 00	7 SEP 00	13
501	10 SEP 00	6 OCT 00	25

These seats are available through normal school nomination channels. The issue of the Fort Sill sponsored Command and Staff, or Supervisor's course, is generating some concern as well. There are no seats available for this course until FY 02 and the dates for these, and the Operator's course of the same year, are forthcoming. The Marine Corps has purchased 85 seats the Operator's Course and 15 in the Command and Staff Course for FY 02. Course dates and seat numbers for FY 01 are not available at the time of publishing, but will closely mirror those of FY 00.

The FSTDS Operator's Course is designed to give an understanding of the functionality of the system. It covers initialization, communications, commander's guidance, and fire mission processing, as well as other functional areas. The Command and Staff, or Supervisor's Course, is a compressed Operator's Course focused on giving Marine and Soldiers in supervisory positions a further understanding of the system's capabilities. The Command and Staff course is an excellent refresher for those who already have an understanding of the FSTDS system. The course's tempo makes it difficult to utilize it as a replacement for the Operator's Course.

During the Captain's Career Course, Marine Advanced Operations Chief's Course and the newly developed Fire Support Chief's Course, student will get between 80 and 110 hours of hands on training with FSTDS. These are the first iteration of FSTDS training being conducted by Marines for Marines. Other Fort Sill courses are planning on incorporating FSTDS training as well, culminating in the total replacement of legacy systems by FY 02.

The Point of Contact on course availability and dates is 1stLt Garrett Benson, OIC, Marine Corps Fire Support Systems, FT. Sill, OK, DSN 639-2592/2371, email: bensong@sill.army.mil.

FIELD ARTILLERY FIRE SUPPORT CHIEF COURSE

After many months of hard work by Marines of the Operational Forces, T&E Division, and representatives of the Marine Corps Artillery Detachment, Fort Sill, a new course for 0861s will be stood to at Fort Sill. This course will train 0861 Sergeants, and above, in the knowledge and skills necessary to function as the Fire Support Chief within a Fire Support Coordination Center. This six-week course will provide instruction in the planning, coordination, and execution of all fire support assets, however, it does not singularly focus on just "book knowledge" but will have extensive hands-on and practical applications to include 100 hrs of AFATDS training. This course is funded and the first convening of the course is expected in May. Further message traffic will announce the actual dates of the Field Artillery Fire Support Chiefs' Course.

The course descriptive data is enclosed below for further details.

The point of contact for the Fire Support Chief's Course is GySgt Lemke at DSN 639-3085 or lemkeb@sill.army.mil

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Course Descriptive Data

1. **COURSE TITLE**. FIELD ARTILLERY FIRE SUPPORT CHIEF

2. **LOCATION**. Marine Detachment
   United States Army Field Artillery School
   Fort Sill, Oklahoma 73503-5600

3. **COURSE ID**. A20ANY1

4. **OTHER SERVICE COURSE NUMBER**. TBD

5. **MILITARY ARTICLES AND SERVICE LIST NUMBER**. TBD

6. **PURPOSE**. To provide Marine Fire Support Men with the tactical and technical training necessary to perform the duties of a Fire Support Chief operating in a Battalion or Regimental level Fire Support Coordination Center.

7. **SCOPE**. Primary emphasis of the course is to qualify students in the Fire Support aspects for the MOS 0861. Subjects taught include communication equipment, procedures and doctrinal communications networks, fire support coordination, fire planning, MAGTF fire support, and fire Support Tactical Data System (FSTDS) operations and employment. Graduates of this course will be capable of performing the core plus tasks of planning, integrating, and executing the attack of enemy targets with lethal and non-lethal fires in support of MAGTF operations. In particular, the graduate will be combat capable of performing duties of the Liaison
Chief within an Infantry Battalion/Regimental Fire Support Coordination Center (FSCC) with particular emphasis on the employment of the FSTDS.

8. **LENGTH (PEACETIME)**. 30 Training Days

9. **CURRICULUM BREAKDOWN (PEACETIME)**.
   228.00 Academic Hours
   113.50 Lecture
   86.50 Practical Application
   8.00 War Game Exercise
   20.00 Written Exam
   12.00 Administrative Hours
   4.00 In processing
   4.00 Graduation
   4.00 Out processing

10. **LENGTH (MOBILIZATION).** 24 Training Days

11. **CURRICULUM BREAKDOWN (MOBILIZATION).** Same as Peacetime.

12. **MAXIMUM CLASS CAPACITY**. 20

13. **OPTIMUM CLASS CAPACITY**. 15

14. **MINIMUM CLASS CAPACITY**. 10

15. **CLASS FREQUENCY**. 2

16. **STUDENT PREREQUISITES**. Be in the rank of Sergeant through Gunnery Sergeant with the MOS 0861.

17. **MOS RECEIVED**. None.

18. **QUOTA CONTROL**. CG, MCCDC (C 463)

19. **FUNDING**. CG, MCCDC (C 463)

20. **REPORTING INSTRUCTIONS**. Students will report to the Commanding Officer, Marine Corps Artillery Detachment, Building 759, United States Army Field Artillery School, Fort Sill, Oklahoma 73503-5600, no later than 24 hours prior to course convening. Government quarters and messing are not available. Request for advances for per diem and partial liquidation must be submitted through the parent command's disbursing office during the entire period of TAD. The Marine Detachment disbursing office is located in Barstow, California. Therefore, the Marine Artillery Detachment, Fort Sill cannot pay per diem, lodging, transportation advances, or partial liquidation for Marines assigned TEMINS or TAD. Students should arrive with a military travel credit card to pay for lodging and meals. Additionally, all Marines are required to report in with Service Record Book (SRB), Health record (HR), and Dental Record (DR). Military transportation to and from the airport is not available. Commercial ground transportation is available to and from the Airport (DFW\OKC\Lawton) and fees are reimbursable upon liquidation for travel expenses. POV's for Sergeants and above are authorized.

Mailing Address for Students:
Students Name
(Class name and number)
Marine Corps Artillery Detachment (ATSF-MCR)
United States Army Field Artillery School
Fort Sill, OK 73503-5600

Directions to the Marine Corps Artillery Detachment, Fort Sill, OK

By Aircraft. Fly into the Lawton/Fort Sill regional airport. Check in with the Military Liaison Desk at the Fort Sill airport. The duty officer will be able to provide you further instructions and directions to Fort Sill. The Marine Corps Artillery Detachment does not provide transportation to and from the Lawton / Fort Sill regional airport.

By Ground Transportation. Depart Interstate 44 on exit 41, the Fort Sill Key Gate. Exit and head east into the "Artillery Training Center." The Marine Battery is located in Building 6007C.
Reporting Aboard. All students will report aboard to the Marine Corps Artillery Detachment, in the Service Alpha uniform.

Reporting Information

Report date. Students sign in prior to the report date for their course. During normal working hours (M-F, 0730-1630), Marines will report to the Marine Corps Artillery Detachment Headquarters, (Brown Hall - Building 759) on

McNair Avenue (near Snow Hall). The Mardet Commercial number is (580) 442-6187/6199. After normal duty hours Marines report into Building 6007C and report to the Marine Battery. The Marine Battery is located in the U.S. Army Field Artillery Training Center on the East side of the post. The commercial telephone number for the Marine Battery is Commercial (580) 442-5615/2467.

Students are required to bring the following uniforms with them:

1 set seasonal dress uniform.
1 set seasonal service uniform.
4 sets of utilities.

a. All Marines are required to wear the Service Bravo or Charlie Seasonal uniform on the second Friday of each month.
b. All Marines are required to wear the Dress Blue Seasonal
on the forth Friday of each month.
c. All course graduations will be conducted in the seasonal Dress Blue C or D uniform, or the Service B or C uniform, as directed.
d. Daily class uniform is utilities, unless otherwise specified.

21. **INSTRUCTOR STAFFING REQUIREMENTS**. See Appendix A for Instructor Computation Worksheet.

LN#	GRADE	MOS	BILLET DESCRIPTION	REQUIRED
289B	E7	0861	Instructor	2

22. **SCHOOL OVERHEAD REQUIREMENTS**. The current Table of Organization (T/O) is sufficient to support this course.

23. **TRAINING/EDUCATION SUPPORT REQUIREMENTS**. At a minimum, there is a requirement for 20 FSTDS Units at Fort Sill. MARCORSYSCOM will field FSTDS to Fort Sill, ICW the beginning of FSTDS fielding.

The following materiel requirements are identified for one iteration of this course:

NOMEMCLATURE	NSN	UNIT OF ISSUE	REQ'D	ON HAND	SHORT
AFATDS	TBD	SET	20	0	20

24. **TASK LIST**. See Appendix B.

CDD NOTES: None.

APPENDIX A - INSTRUCTOR COMPUTATION WORKSHEET (LOCKSTEP)

SECTION I COURSE DATA

COURSE: A20ANY1 FIELD ARTILLERY FIRE SUPPORT CHIEF

LOCATION: Marine Detachment
United States Army Field Artillery School
Fort Sill, Oklahoma 73503-5600

PROGRAMMED ANNUAL INPUT (FY 00): 40
PROGRAMMED NUMBER OF CLASSES/YEAR: 2

LENGTH (AVG CAL DAYS): 42
LENGTH (TRAINING DAYS): 30
SYLLABUS HOURS: 228.00

SECTION II CURRICULUM BREAKOUT

(A)	(B)		(C)		(D)		(E)		(F)
TRAINING SITUATION	MAX CLASS SIZE	÷	MAX RATIO (X:1)	=	INST REQ	x	SYLLABUS HOURS	=	INST MANHOURS
Lecture	20	÷	20.00	=	1.00	x	113.50	=	113.50
Practical Application	20	÷	10.00	=	2.00	x	64.50	=	129.00
Practical Application	20	÷	20.00	=	1.00	x	22.00	=	22.00
War Game Exercise	20	÷	20.00	=	1.00	x	8.00	=	8.00
Written Exam	20	÷	20.00	=	1.00	x	20.00	=	20.00

TOTAL INSTRUCTOR MANHOURS PER CLASS(G): 292.50

SECTION III INSTRUCTOR COMPUTATION

TOTAL INSTRUCTOR MANHOURS PER CLASS	x	PROGRAMMED # OF CLASSES	=	ANNUAL INSTRUCTOR CONTACT HOURS	585.00
ANNUAL INSTRUCTOR CONTACT HOURS	x	1.26	=	ANNUAL INSTRUCTOR HOURS	737.10
ANNUAL INSTRUCTOR HOURS	÷	MONTHLY INSTRUCTOR 12	=	HOURS	61.43
MONTHLY INSTRUCTOR HOURS	÷	145	=	**INSTRUCTORS REQUIRED**	0.424 = 1

ICW NOTES: Although the ICW states that 1 instructor is required, 2 instructors are the minimum amount needed to conduct this course. The student to instructor ratio is reflected as 20:1 for lecture periods, because only one instructor is conducting training. However, mastery of the subject matter being taught requires an extreme amount of practical application and hands on training. The student to instructor ratio for practical applications is 10:1, because of the level of difficulty for the tasks being covered. The class is divided into 2 groups of 10 for all practical exercises. Considering that the maximum/optimum class capacity is 30, 2 instructors are required, in order to properly staff instruction and practical application periods.

APPENDIX B – TASKLIST

DUTY: **0861.04** **FIRE SUPPORT PLANNING AND COORDINATION**

TASKS:

(S) 0861.04.07	Advise the supported unit of friendly and enemy fire support capabilities and limitations.
(S) 0861.04.08	Process a preplanned Close Air Support (CAS) request.
(S) 0861.04.09	Develop a quick fire support plan.
(S) 0861.04.13	Inform field artillery headquarters and Fire Support Coordination Centers (FSCC) of the supported unit's scheme of maneuver and fire support plan.
(S) 0861.04.14	Inform supported maneuver commander of the field artillery's tactical missions and corresponding artillery fire plan to support the scheme of maneuver.
(S) 0861.04.15	Coordinate fires across boundaries.
(S) 0861.04.16	Analyze targets to determine target precedence, types and quantities of fire to be used on opposing targets.
(S) 0861.04.17	Pass fire support information to lower, adjacent and higher field artillery elements.
(S) 0861.04.18	Monitor/coordinate request for Naval Surface Fire Support(NSFS).
(S) 0861.04.19	Coordinate a request for a preplanned Close Air Support(CAS) mission.

(S) 0861.04.20 Coordinate a request for immediate Close Air Support (CAS).
(S) 0861.04.21 Advise the maneuver commander on Fire Support Coordination Measures (FSCM).
(S) 0861.04.22 Plan/coordinate fire support to suppress enemy air defense.
(S) 0861.04.23 Advise the maneuver commander on employment of target acquisition assets available, their capabilities and limitations.
(S) 0861.04.24 Coordinate/prepare the fire support portion of Annex C Operations) and the Fire Support Appendix (Appendix 12) to the maneuver Operation Order (OPORD).
(S) 0861.04.25 Plan fire support for offensive operations
(S) 0861.04.26 Plan fire support for defensive operations.

(S) 0861.04.28 Brief the Commander of the Amphibious Task Force (CATF) and the Commander of the Landing Force (CLF) on the general mission and characteristics of Naval Surface Fire Support (NSFS) for the amphibious operation.

(S) 0861.04.29 Brief the Commander of the Amphibious Task Force (CATF) and the Commander of the Landing Force (CLF) on the capabilities and limitations of Naval Surface Fire Support (NSFS) for the amphibious operation.

DUTY: 0861.11 AFATDS OPERATIONS

TASKS:

(S) 0861.11.01 Direct the establishment of a single workstation Operational Facility (OPFAC).
(S) 0861.11.02 Direct the establishment of a multi-workstation OPFAC.
(S) 0861.11.03 Direct exit procedures.
(S) 0861.11.04 Plan a communications configuration.
(S) 0861.11.05 Plan a data distribution scheme.
(S) 0861.11.06 Supervise the entry of a planned communications configuration.
(S) 0861.11.07 Supervise the implementation of a planned communications configuration.
(S) 0861.11.08 Supervise the entry of distribution data.
(S) 0861.11.09 Supervise FSTDS database input.
(S) 0861.11.10 Establish target guidances.
(S) 0861.11.11 Establish Fire Support (FS) attack guidances.
(S) 0861.11.12 Establish unit and sensor guidances.
(S) 0861.11.13 Establish Field Artillery (FA) attack guidances.
(S) 0861.11.14 Establish Command, Control, and Communications (C3) guidances.
(S) 0861.11.15 Establish miscellaneous guidances.
(S) 0861.11.16 Direct establishment of intervention point data.
(S) 0861.11.17 Supervise target report processing.
(S) 0861.11.18 Supervise fire request processing.
(S) 0861.11.19 Develop a fire support plan.
(S) 0861.11.20 Develop a schedule of fires.
(S) 0861.11.21 Supervise the implementation of a planned situation into current.
(S) 0861.11.22 Plan a unit movement.
(S) 0861.11.23 Plan Continuity of Operations (CONOPS).
(S) 0861.11.24 Supervise CONOPS execution.
(S) 0861.11.25 Supervise the development of an Air Support List (ASL).
(S) 0861.11.26 Supervise the processing of the ASL.
(S) 0861.11.27 Supervise actions upon receipt of an Air Tasking Order(ATO).
(S) 0861.11.28 Supervise actions upon receipt of an Airspace Coordination Order (ACO).
(S) 0861.11.29 Direct a request for immediate Close Air Support (CAS).
(S) 0861.11.30 Direct the creation of a trigger event.
(S) 0861.11.31 Direct actions taken on a trigger event being tripped.

TASK LIST NOTES: None.

DOCTRINE UPDATE

By Captain Rob Zyla

The development of doctrinal publications is a dynamic, evolutionary process rather than a revolutionary one....To be useful doctrine can not be written and refined in a vacuum. It must set forth the experience and thinking of its practitioners, the FMF, as well as theoretical and practical knowledge resident in the Marine Corps formal schools.

-MCO 5600.20M

In 1995, the Marine Corps initiated an aggressive schedule to revise and update its doctrinal publications. Since previous methods had failed to maintain timely, relevant, and compelling doctrine and TTPs, MCCDC instituted a program in which schools and commands were tasked as proponents for various manuals. Under this program the responsibility, for researching, authoring, and maintaining the manuals, rests with the proponent. Doctrine Division, WDID, MCCDC, serves as the coordinating authority and holds final editorial rights to ensure the manuscripts contain the TTPs and philosophy which represent the tenets of the Marine Corps.

Unfortunately, this process of rewriting our Warfighting (MCWP) and Reference (MCRP) publications is not quick. Besides the actual process of researching and writing the manuscript, several reviews and revisions take place. The proponent's manuscript is sent to MCCDC as an "author's draft." An internal review by the Doctrine Division is completed before the draft is sent to the FMF as a coordinating draft (and added to Doctrine Division's web site). The FMF will have a designated period of time (normally 90 days) to review and comment upon the coordinating draft. Comments received are reviewed, accepted or denied, and then incorporated into the draft. Depending on corrections required, a second coordinating draft may be sent out for comment. Once the final coordinating draft has all accepted comments incorporated, the draft is sent to civilian editors in Doctrine Division. This process usually takes a further 90 days to create the final editor's draft. The manual is then sent to the Commanding General, MCCDC, for signature, it receives a PCN, and is placed on the Doctrine Division's web site as a signed manual. Needless to say, this takes time!

In accordance with the proponency system, Marine Corps Artillery Detachment, Fort Sill is responsible for the preponderance of the ground fire support warfighting and reference publications. Following is a description of each of the ground fire support publications, its proponent, and its status.

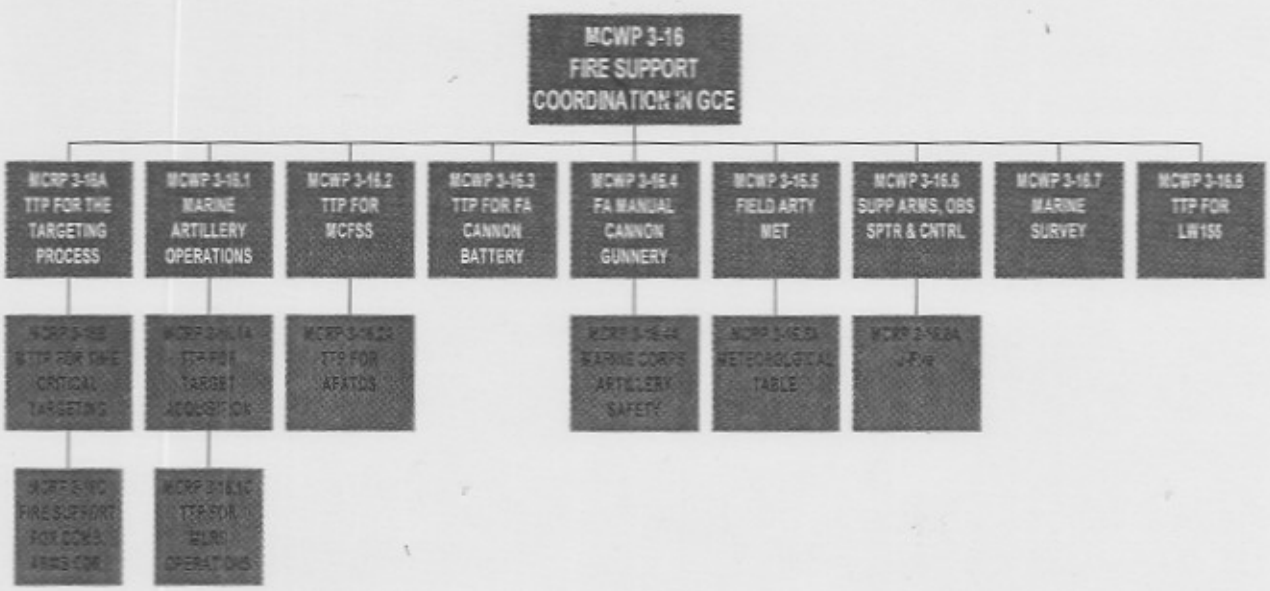


Figure 1: Fire Support Publications from Doctrinal Hierarchy

- **MCWP 3-16 TTP of Fire Support Coordination in the GCE. (Ft. Sill)**
  - Re-write of FM 6-18.
  - Contains up-dated TTP, incorporation of fire supporting planning into the MCPP, revised target numbering scheme, and example Appendix 19.
  - Incorporating final comments and awaiting approval to send to editors. Should be ready for CG's signature in June 00.
- **MCRP 3-16A TTP for Targeting Process (Ft. Sill)**
  - Dual designated FM 6-20-10.
  - Contains detailed discussion of targeting process (decide-detect-deliver-assess)
- **MCRP 3-16B MTTP for Time Critical Targeting (Joint Branch, Doctrine Division)**
  - ALSA publication.
  - Focused on process of adapting to time critical targets
- **MCRP 3-16C Fire Support for the Combined Arms Commander (Ft. Sill)**
  - Dual designated FM 6-71.
  - Being revised by Fire Support and Combined Arms Operations Directorate (FSCAOD).
  - Discusses the capabilities and limitations of supporting arms, fire support planning process (uses MDMP vice MCPP), and how to create commander's guidance for fire support.
- **MCWP 3-16.1 Marine Artillery Operations (Ft. Sill)**
  - Re-write of FM 6-9 Marine Artillery Support.
  - Currently in author's draft, waiting to incorporate Doctrine Division comments before sending to FMF for review and comments.
  - Updated TTPs, incorporates artillery regimental and battalion SOPs, and incorporates MCPP and creating the Artillery Fire Plan.
- **MCRP 3-16.1A Target Acquisition (Ft. Sill)**
  - Dual designated FM 6-121.
  - Focuses on use of weapons locating radar and sensor zones.
- **MCRP 3-16.1C TTP for MLRS (Ft. Sill)**
  - Dual designated FM 6-60.
  - Contains the TTP for MLRS Operations.
- **MCWP 3-16.2 MCFSS (Ft. Sill)**
  - Currently is FMFM 6-18.1 MCFSS. Discusses IFSAS operations.
  - Will be rewritten to include how commanders/supervisors create guidances and the use of all digital fire support equipment from company level higher.
- **MCRP 3-16.2A AFATDS Handbook (Ft. Sill)**
  - Operators' handbook for AFATDS operations.
  - Written by AFATDS NETT. Revised with software updates.
- **MCWP 3-16.3 TTP for Cannon Battery (Ft. Sill)**
  - Dual designated FM 6-50.
  - Contains duties and responsibilities of the battery staff, movement techniques, and other TTP for battery operations.
- **MCWP 3-16.4 Cannon Gunnery (Ft. Sill)**
  - Dual designated FM 6-40.
  - Contains TTP for manual cannon gunnery. This includes theory of ballistics, duties and responsibilities of FDC personnel, calculation of firing data for illumination, smoke, killing munitions, FASCAM, and etc.
  - Change 1 is in process of being signed by the US Army. This incorporates changes to safety calculations and addition of information on SADARM calculations.
  - Change 1 was sent as part of the Safety SOP disks that were sent to the S-3 shop of each active and reserve artillery battalion and regiment. The change can be downloaded from the WIDD, USAFAS web page (see below) along with the Table C.
- **MCRP 3-16.4A Artillery Safety (Ft. Sill)**
  - Reformat of Joint Regimental Safety SOP (JtRegtO 3570.1b).
- **MCWP 3-16.5 MET (Ft. Sill)**
  - Dual designated FM 6-15.
  - TTP for executing meteorological operations.

- **MCWP 3-16.6 Observer, Spotter, and Controller Handbook (Ft. Sill)**
  - Rewrite of FMFM 6-8.
  - Describes duties of FOs, NGF Spotter, and FACs.
  - Major focus on how to call for fire. This includes a discussion on opportune SEAD (SEAD CFF), Laser operation, adjustment of special munitions (smoke, illumination, DPICM, etc.).
- **MCRP 3-16.6A J-Fire (Joint Branch, Doctrine Division)**
  - ALSA publication.
  - Quick reference guide on weapon systems.
- **MCWP 3-16.7 Marine Survey (Ft. Sill)**
  - Waiting approval for final editing. Should be ready for CG signature in June 00.
  - TTP for Artillery Survey. This includes use of manual methods, PADs, GPSS, and hasty survey techniques (Astros). Discusses requirements for common survey, creation of survey control points, and control of survey parties.
- **MCWP 3-16.8 TTP for Lightweight Automated Howitzer**
  - Place holder for future publication that covers XM-777 (with towed artillery digitization).
  - Duties and responsibilities of battery staff.
  - Organization of the battery once TAD is fielded.

These doctrinal publications and others can be accessed via the Internet at the following sites:

Warfighting Integration and Development Directorate, USAFAS, Ft Sill.	http://155.219.39.98/doctrine/wddfrm.htm
Doctrine Division, WDID, MCCDC	http://www.doctrine.quantico.usmc.mil/
Marine Corps Artillery Detachment, Ft Sill:	http://192.132.84.3/tngcmd/usmc/tcusmc.htm

Publications are means provided on how the Marine Corps plans to fight. They provide a guide for action. While much of what is placed in these publications may seem second nature to some, they are of utmost importance to Marines that are returning to the Fleet Marine Force or to liaison officers of our sister services that may not comprehend intuitively how the Marine Corps fights.

The process and creation of Marine Corps Fire Support publications can be likened to the creation of a fire support plan – it must be a continuous and concurrent process. Much like a fire supporter continually checks with higher and supporting arms to ensure the plan makes sense and is supportable; the doctrine process ensures TTPs are evaluated for relevance and accuracy by both higher command (MCCDC) and those that will be executing (FMF). As was stated in the opening quote the "bottom refinement" by the FMF plays a crucial role in the process of refining and updating how the Marine Corps fights. So, next time a draft is posted to the Internet or sent for review (should see the MCWP 3-16.1 soon), please read and provide feedback. First, you are taking part in a process that impacts the entire Marine Corps, second, you can analyze if the TTPs are feasible, and finally you may learn something new.

Captain Zyla has been the Detachment's Doctrine Office since Feb 1999. He can be contacted at DSN: 639-5644 or zylar@sill.army.mil

TARGET HANDOFF SYSTEM (THS)
THE FORWARD OBSERVER'S NEW DIGITAL DEVICE

By Captain Andy Hamilton

PM, Fire Support, Ground Weapons Directorate, Marine Corps Systems Command is currently developing a new system which will provide digital fire support functionality, accurate target location and designation capability, and digital messaging to be used by artillery forward observers, forward air controllers, reconnaissance teams and naval gunfire spot teams. The Target Location Designation and Handoff System (TLDHS), will be the primary device used to introduce information into the AFATDS/FSTDS digital network and be a part of the at the company level. TLDHS is composed of the Lightweight Laser Designator Rangefinder (LLDR), the replacement for the MULE, and a computer that is running the Target Handoff System (THS) software, which is the fire support specific software of TLDH. The THS software will be used in conjunction with a C2PC based, situational awareness software suite, called the Digital Automated Communication Terminal (DACT), which is still under development. Both Program Officers are working together to ensure system integration that will merge the THS and DACT software applications.

Synetics Corporation, based in Virginia, has been awarded the contract to design the THS software (www.synetics.com). The Marine Detachment, Fort Sill, has provided recommendations to develop the Graphic User Interface (GUI) for the THS, which are the actual screens that the operator uses to manipulate the device. Software engineers convert the GUI, what the Forward Observer sees and understands, into Joint Variable Messages Format (JVMF) messages, which are required to transmit "useable" information to FSTDS. Synetics will have the first, artillery specific version of THS completed around the end of March 2000. Later versions of THS will incorporate communication with CAS and NSFS fire support assets. Testing dates for the artillery portion of THS are in FY 01.

The Ruggedized Handheld Computer (RHC) will be the computer utilized for motorized/mechanized operations and as an interim for dismounted observers until a lighter and smaller ruggedized computer becomes available. The RHC is a ruggedized miniature laptop with internal GPS and a touch screen capability. While the LLDR is the primary laser device to be used with the THS; however, certain other laser range finders could interface with THS (www.littonlaser.com).

The THS software is a windows based program that was formatted similar to the manual call for fire and developed with the intent to perform required fire support functions the minimum key strokes possible. THS is divided into three modes of operation: System Setup, Operations, and Historical Review. There is also a basic scenario that is built into the system used to train new operators.

1. The System Setup mode is utilized to configure the THS for a specific user, similar to the initialization concept in the Digital Message Device (DMS), the current digital device used by forward observers. Some of the functions of the system setup mode include:

- loading and saving data to a disk
- establishing subscriber address databases and network defaults
- entering digital map sheets and determining what information will be displayed on the map
- entering hardware interface information (i.e. what laser is being utilized and its required settings) other THS database default selections
- unit Standard Operating Procedure (SOP) defaults, including specific shell/fuze combinations, target blocks and PRF codes.

2. The Operations mode is used by the THS operator to perform all required functions throughout the conduct of a mission. It is organized into three main views: Observer Data, Current Missions, and Planned Missions. Switching from one view to the next is performed by a single button selection. In addition to the three views, there are a series of "hot buttons," which are continuously displayed from any view in the Operations mode, which facilitate critical functions while performing other work.

a. The Observer Data view allows the THS operator to:

- View GPS determined grid, altitude, and level of accuracy
- Select GPS default selections (i.e. datum, automatic position update interval)
- Perform self-location functions using known points or artillery impacts
- Manually enter observer location when GPS is not available
- Transmit observer location and information to higher headquarters

b. The Current view displays all active missions, both planned and targets of opportunity. Information for each mission is displayed like a tabbed index card, with the necessary data viewed on the front page as a "mission review." To switch from one target "card" to the next is simply done by selecting the tab. New missions are initiated using a specific mission template. A template is a saved call for fire with default selections established for a specific type of mission, thus reducing the amount of keystrokes required to perform that given mission (i.e. Adjust Fire, Fire For Effect, Illumination, Smoke, etc.). Once a template is selected, the observer can change any of the call for fire elements or just enter the target location and send the mission. The template merely provides the most common selections that a forward observer would make. Mission types and templates are organized into four categories:

- Standard Templates - established by doctrine, but users can select shell/fuze combinations according to the unit SOP for certain missions
- Customized Templates - established and saved by the observer if he anticipates using a specific CFF numerous times
- Planned Targets - a list of CFF's initiated and saved as planned targets for future use, as well as, all recorded targets and known points
- Recent Missions - a list of all ended missions in case the observer needs to re-initiate

Once a call for fire template is selected, the mission's "card" view is organized by the elements of the call for fire used in voice procedures. Some of the features that are available from within the call for fire format include:

- Instantaneous transfer of lazed target data directly into the target location field
- The ability to view the lazed target location on a digitized map for a "sanity check," prior to deciding to use that data for a mission
- An abbreviated list of target descriptions and degrees of protection available for the observer vice the lengthy list available in FSTDS
- A coordinate conversion function that can transfer data between two datum if multiple maps are being utilized, as well as, conversion between grid and lat/long coordinates
- A laser draw screen which allows lazing of up to eight points for irregularly shaped targets
- A moving target calculator that determines vehicle speed, a predicted intercept point, and time on target, as long as speed and direction remain constant.

c. The Planning view displays a database of targets that have been initiated and saved as planned targets, in addition to any recorded targets and known points. Planned and recorded targets are displayed on target "cards," as in the current view, and they are also listed on a digitized target list worksheet for organizational purposes. Currently, there is no JVMF format which allows for transmission of planned targets to be entered at the observers device and used in a fire plan by FSTDS, so fire planning in the THS is internal and will be strictly quick fire planning controlled by the observer. An observer can initiate numerous calls for fire and save them in the planned target database to be used for a specific company mission. He can use "Do not load, At my command, Time on target," and/or a duration to control the timing of the fires. Some coordination will have to occur with the battalion FSCC using voice communication or free text messages prior to sending a quick fire plan.

d. The series of "hot buttons" are continuously displayed from all views within the Operations Mode. Safety screens appear after a "hot button" is selected to ensure that action is desired and the button was not accidentally selected. The list of "hot buttons" include:

- New Mission - Initiates a new call for fire
- Mission Check Fire – "Check Fire" for a specific mission. This term is currently used by FSTDS.
- Check Fire All – "Check Fire" as used in voice procedures
- Fire PRI TGT or FPF – Request to fire that unit's assigned priority target or FPF (whichever is assigned)
- Immediate Suppression – Generates an Immediate Suppression mission. The IS screen displays the current observer location, whether manually entered or tracked by GPS, the target location, and a "danger close" toggle switch. Laser data can be automatically transferred to target location field. This screen can remain displayed while conducting a mission to ensure expeditious target engagement.
- View Map – Displays a digitized map with overlay information determined by the observer
- Target Locator – Allows the observer to use the laser functions prior to or independent of a call for fire
- Assign PRI TGT/FPF – Allows the observer to assign a target from the planned/recorded target list as his priority target or FPF and transmit it to the FSCC. This permits rapid shifting of priority targets in offensive or defensive situations.
- System Status – Displays an overview of the system configuration for troubleshooting and allows the observer to remotely control the LLDR from the THS.
- Free Text Message – E-mail to other subscribers on the network.
- Zeroize – Deletes all data off the hard drive

There is also a message bar (Inbox) located at the bottom of the Operations mode to view incoming messages.

3. The Historical Review mode is a database of all completed missions, the messages associated with each mission, and the time each message was sent or received. This mode provides the capability to accurately track of time standards for after action review.

Captain Hamilton serves as the MarDet's user rep to the THS program in addition to his primary duties as a Basic Fire Support Instructor. He can be contacted at DSN: 639-5801 or hamiltona@sill.army.mil

Survey Update
From the Nomads of the Battlefield
Defense News

USAF Fears Burn From Solar Flares / Heightened Activity After 2000 Could Zap Communications, Radar

WASHINGTON -- U.S. military officials are devising a battle plan to minimize the potentially crippling effects that extreme solar flares expected around the turn of the century could have on military communications and intelligence. Classified U.S. Air Force space command documents obtained by Defense News predict a wave of strong solar activity to begin in March 2000 with the force to disrupt, degrade and at times block the effectiveness of military radios, radar, communications and spy satellites. While solar flare activity is cyclical and typically mushrooms about every 11 years, never before has the U.S. military had so many assets vulnerable to the effects of solar activity. Nor has the military relied as heavily on the efficacy of those systems for communications, ballistic missile early warning, navigation, weather prediction and surveillance capabilities. Space environmental effects are caused by enhanced electromagnetic radiation, such as X-rays, extreme ultraviolet and radio waves. Also, they are caused by charged particle streams and other emissions from the sun, said the documents. These environmental effects are at the same wavelengths and frequencies used by U.S. military communications, radar and space systems, which means many systems could be rendered useless during periods of intense activity, called Solar Maximum. The sun, now in what is called the Solar Minimum cycle, is causing minimal interference. The effects of Solar Maximum can deny U.S. surveillance capabilities that serve military and intelligence agencies by increasing drag on low-Earth orbiting satellites, causing them to miss intended targets when scheduled to collect imagery or eavesdrop, said the documents. In the last cycle of Solar Maximum, communication and other satellites suffered degraded performance, Air Force Col. Jud Stailey, assistant coordinator of the Office of Federal Coordinator for Meteorological Services, Silver Spring, Md., said Dec. 13. Tactical and strategic radio and communication systems suffered lower performance and blackout periods, retired Vice Adm. Jerry Tuttle, president of ManTech Systems Engineering Corp., Fairfax, Va., said in a Dec. 9 interview. Tuttle was director of communications for the Joint Staff in the 1980s, and then for the Navy before retiring two years ago. A former high-ranking Pentagon official said Dec. 13 that the military's communications and intelligence satellites were robust enough to withstand the interference of the last cycle. By reducing the throughput of communication satellites, officials were able to pass critical data, but much more slowly than under normal conditions. Intelligence satellites are built to withstand very high levels of radiation, so the satellites were not crippled. However, the information they relayed to ground stations suffered the same dissemination constraints as the communication satellites, a retired government official said Dec. 13. Because of the military's vastly increased reliance on satellites, the implications of this Solar Maximum cycle are far more serious, Stailey said. For instance, in the last cycle, there were no navigation signals from the Global Positioning System constellation of satellites, he said. In the predicted upcoming Solar Maximum, satellite communications, including the transmission of voice, data and imagery, likely will be degraded and at times wiped out. The planned Global Broadcast Service, designed to pass intelligence and enable instant communication anywhere in the world, also is expected to be affected. Satellite navigation signals from the Global Positioning System at times will be inaccurate, and military planners may have to cope with errors from between 10 meters and 100 meters during the best of times, said the documents. Complete failure of the system is anticipated during the worst periods. Ground-based radar systems will experience unreliable periods where background noise will render them useless, or worse, cause bogus information to be provided, said the documents. For early warning radar systems, false target and unreliable launch detection information likely is to occur. The Air Force is attempting to measure and predict the times of the worst effects of Solar Maximum, so communications can be rerouted and military leaders will be prepared for times of total blackout, retired Air Force Gen. Charles Horner, former commander in chief of space, told Defense News Dec. 9. The Air Force is paying NASA about $17 million to develop and install a solar X-ray imager on a weather satellite being built for the U.S. National Oceanic and Atmospheric Administration. The prototype sensor, which will be flight-ready by 1999, will provide advance warning of approaching solar radiation bursts. NASA also is taking industry bids to build as many as four X-ray imagers for civil weather satellites. The National Oceanic and Atmospheric Administration intends to make the sensors a permanent fixture on all geostationary weather satellites. Separately, NASA is developing a spacecraft called the Advanced Composition Explorer, which will watch for solar storm activity beginning in 1997 from an orbital location 1.5 million kilometers from Earth. At that distance, the spacecraft can warn of solar storm activity an hour before its effects are felt. With warning, U.S. military operators can reorient satellites to protect them from particle bombardment, the documents said. They also can delay planned satellite launches and shut down systems to mitigate the Solar Maximum effects.

Sunspots Could Wreak Havoc With Satellites Next Year / Engineers May Not Be Able To Capture Radar, Radio Signals

WASHINGTON -- A cyclical solar phenomenon that can cause massive disruptions in satellite, radar and radio communications will return this year, much earlier than previously predicted, according to U.S. Air Force scientists. The Solar Maximum, an event that occurs approximately every 11 years, is a period of increased disturbances in the sun's atmosphere that lasts slightly more than two years. Knowing exactly when the event is going to occur is critical for satellite engineers, because the heightened activity can interfere with satellites and in some cases destroy them, Dick Altrock, an astrophysicist for the Air Force Research Laboratory, said June 30. Altrock is stationed at the National Solar Observatory in Sunspot, N.M.

For example, during the 1987 buildup to the previous Solar Maximum, which peaked in 1989, a National Oceanic and Atmospheric Administration (NOAA) satellite was irreparably damaged by a sunstorm, Altrock said. Another danger is to radar and radio signals, which normally bounce off the Earth's ionosphere as if it were a mirror reflecting a signal. When the Solar Maximum is in effect, the ionosphere "acts like a corrugated surface, making it difficult to predict where a communications signal will land," Altrock said. The ionosphere also can become opaque to certain frequencies, making communications with satellites difficult or even impossible, he said. Scientists have been aware of cyclic solar temper tantrums for centuries, but they still are not sure what triggers them. The leading explanation, Altrock said, involves a principle called the dynamo theory: The sun is composed of many gaseous materials, which produce a charge that in turn can affect the sun's magnetic fields. When the charges build up far enough, the magnetic fields actually migrate, causing enormous disruptions on the surface of the sun and in its atmosphere -- the Solar Maximum.

Patrick McIntosh, a former NOAA engineer, is considered the father of solar action research. For years, scientists have used a variety of techniques to predict the event, involving fields from physics to numerology, but none of the methods has proved to be particularly accurate. Altrock and a team of researchers at the Air Force Research Laboratory at Hanscom Air Force Base, Mass., believe they have found the key to dating the event. Using the Evans Solar Facility Coronagraph, a telescope at the National Solar Observatory at Sacramento Peak, N.M., the Air Force scientists created an artificial eclipse around the sun, giving them access to view the sun's corona at will. Based on their previous observations, the scientists now believe the Solar Maximum will occur between January and November of this year, Altrock said.

Both the U.S. Defense Department and NASA "take the Solar Maximum very seriously," Altrock said. "In addition to the disruption to Air Force radar, communications and satellite operations, solar activity can and has produced (electrical) blackouts that affect millions of people. "Most disruptions are of a relatively minor sort," he added. "But there are more and more satellites (in orbit)" that are vulnerable to solar disruptions, Altrock said. By knowing the date of the solar event in advance, satellite operators and communications experts can make plans to minimize the effects of a possible disruption to their systems. Space scientists also can use the information to help them decide when a particular satellite should be launched.

Russians Build Device That May Jam GPS

Washington -- A Russian device that can reportedly jam Global Positioning System (GPS) signals over a 200-kilometre radius could provide terrorists with a cheap and simple means to befuddle aircraft navigation systems. GPS and its Russian counterpart, Glonass, rely on a network of satellites to broadcast radio signals which a receiver uses to deduce its position. Since the satellites don't carry large power sources, the signals they broadcast are weak, which makes them vulnerable to jamming. The Russian device, from a company called Aviaconversia, first came to light at the Moscow Air Show in September. The company announced that it can offer a portable, 4-watt GPS/Glonass jammer for less than $4000. It claimed that this low-power device could prevent aircraft from locking on to a GPS signal Testing the device would be illegal in most Western countries. But as news of the device spreads, GPS experts are taking Aviaconversia's claim seriously. "I tend to believe them," says Lawrence Young, a physicist at the Jet Propulsion Laboratory in Pasadena, California. By broadcasting "noise" on the frequencies that GPS uses, a 4-watt jammer could prevent aircraft from using the satellites' signals. Young adds that a skilled engineer could probably build a similar device with components available from a typical electronics store. The vulnerability of satellite navigation systems to jamming is a growing concern, as the US Federal Aviation Administration (FAA) intends to start decommissioning ground-based navigation beacons in 2010. Les Dorr, a spokesman for the FAA in Washington DC, says the agency is aware of the problem, but has no plans to

reduce its future reliance on satellite navigation. "We are working with the Department of Defense to address unintentional and intentional jamming," he says Others are more worried. "The very fact that jamming the signal is so trivial means it can cause a disruption near a major airport, and a possible safety hazard," says Jim Sennott, an electrical engineer at Bradley University in Peoria, Illinois. "I'm concerned about it." The US military also acknowledges the vulnerability of GPS. "Jamming GPS might be a useful military technique for those who might oppose US and allied forces," says James Armor, director of the Department of Defense's GPS Joint Program Office in El Segundo, California. The encrypted GPS signals used by the military would be harder to jam than those used by commercial airliners. Among other things, they are spread over a wider part of the radio spectrum, making them more difficult to compete with. But a determined jammer could use a more powerful device than the 4-watt Russian model. For both military and civilian GPS users, the most obvious way to make jamming more difficult would be to increase the power of the signals. But this would require significant changes to the satellites' design.

NIMA Update

The GEODDUC CD
A One-Stop Shop for GI&S
GOTS Software and Training

By LT Gary Scoffield, USN, Instructor,
Defense Mapping School

Have you ever wanted or needed to view and manipulate a map, imagery, or elevation data on your computer? Do you want to figure out what is on those NIMA CDs that keep coming in the mail and how to get them to work? Have you ever had trouble obtaining the actual CD that you require for your AOI? Do the acronyms ADRG, CADRG, CIB, and DTED ever make you wonder what those NIMA guys are babbling about? Then the GEODDUC CD is what you have been searching for.

The GEODDUC CD is produced by Defense Mapping School's Imagery and Geospatial Information (IGI) Branch and is a compilation of various GOTS and freely available software packages, training materials, and information that helps the user exploit NIMA digital data. The CD was originally produced to support DMS's Geospatial Digital Data Users Course (GEODDUC), a week long course designed to expose the various digital data types and products that NIMA produces, and how to exploit them in a Windows 95/NT/98 environment with little to no cost to the user. IGI's Geospatial Information and Services Team (GIST) now distributes the CD as a training and operational tool for students of other resident courses and mobile training. The CD includes several GOTS and freely available software packages such as Falconview. With this CD, the user can exploit NIMA digital products (e.g. – CADRG, CIB, DTED, VMAP, DNC, AAFIF, ECHUM, etc.) to perform terrain visualization, produce briefing graphics, conduct mission planning, execute real time navigation, and calculate datum transformations and coordinate conversions. A tool that allows the user to easily add and edit military symbols and graphics in PowerPoint 97 has been recently added to the CD as well. This tool supports both rectangle and diamond military unit symbols and will save hours for your operation and planning cells.

All GEODDUC course materials and practical exercises are included to facilitate data and software training. Additionally included is information that expedites ordering NIMA CADRG, CIB, and other products and downloading data from the NIMA Gateways.

The GEODDUC CD is truly a one-stop shop for GI&S information and software, which allows anyone to quickly become a general user of NIMA's vast array of digital products and to expedite many operational tasks. For more information or to request a copy, contact LT Gary Scoffield, USN, at (703) 805-2644 or DSN 655-2644 or email scoffieg@nima.mil

SHIFTING THE PARADIGM

By GySgt Eugene W. Stahl Battlefield Visualization Chief for IMEF G-2

Marines have always set sail in their grand ships (actually the Navy owns 'em) with their beans, bullets, and Band-Aids, to make the world safe for democracy. Included in those supplies were maps that commander and staff deemed worthy of taking up precious cargo space. These maps provided us with a floating map room so the commander could race to the cargo hold, (try to find the Combat Cargo Officer) and pull out what he needed. This usually entailed sending LCpl Benottzz into the belly of the ship to sift through (or rifle through, depending on the importance of the mission) countless pallets of maps to locate one or two maps that were vital to the planning cycle. Of course, the specific products needed were always on the left side, against the wall, in the bottom pallet, in the bottom-right box.

Upon finding his treasure, LCpl Benottzz would race back to the JIC. The commander would send him back for adjoining maps, until he had all he needed to plan the mission. During this frenzy, LCpl Benottzz would pour through orders and instructions to identify the products that he had to dig through, some of it from information 15+ years old. When the MAU didn't have exactly the right maps, LCpl Benottzz would begin endless phone calls (e-mail hadn't been invented yet) to try and acquire the missing products. After arriving back at their post deployment home, LCpl Benottzz would conduct an extensive inventory of the entire MEU Pack, even though he'd only opened one box.

Then the size of the Amphib Readiness Group (ARG) shrunk and placed an even greater premium on cargo space. But the MAU Map Pack continued to be 30, 40, or more pallets of maps, shoved into the bowels of the ship. Then technology allowed the now-MEU staff to occasionally custom-build mapping products; and still the MEU Map Pack continued to be the monster we all know and love. Then NIMA transferred the responsibilities of handing the MEU Map Pack to the Defense Logistics Agency (DLA). But still the MEU Map Pack continued to be 20, 30, or more pallets of maps, shoved into black holes in the ship. This has continued for more than 15 years. But that's not the way we want to do it anymore. (or so you'd think)

Last April the Marine Corps realized "hey, this is kind of a stupid way to do things. Why don't we change this?" So the Marine Corps, began the arduous journey of trying to shift a major, "encased in granite" paradigm. The FMF held a MEU Map Supply Program Revision Conference, at the Defense Supply Center, Richmond, the week of 23 July 99. The purpose of this conference was to evaluate and select options to revise and improve Marine Corps and DSCR procedures for supporting the MEUs with mapping supplies; and implement change. The conference consisted of briefings outlining problems and proposing changes to the existing MEU Map Pack Program. Intelligence & logistics staff from MARFORLANT, MARFORPAC, MCIA, I - III MEFs, subordinate MEUs, DSCR, & NIMA attended, and outlined a complete, updated recommendation for supporting the MEUs with mapping supplies. Discussions centered on replacing the current MEU Map Pack with "core blocks" of mapping supplies that would be placed on automatic distribution to each MEU. Recommended changes will allow for increased readiness, reduced costs, and greater control of, and flexibility in, MEU responses to operational requirements.

Recommendations identified by the Conference were:

1. Identify "Core Block" items. NLT 1 Jan 00, define by AOR and Country Code, Planning and Contingency (MEU SOC missions) items to be permanently held and maintained by each MEU. Each MEU will identify requirements, MEFs will coordinate all subordinate MEUs requirements, and MARFORs will validate the "core blocks". The larger War Reserve portion of the MEU Pack is already included in MC&G instructions, and should be pre- staged with other War Reserve Stock (WRS)located around the world.

2. Integrate Map Supplies into Automatic Distribution. Once the core blocks have been identified, place "core block" items into the DSCR automatic distribution. The WRS can be placed into the automatic updates that NIMA and DLA already provide.

3. Revise the configuration and labeling of MEU map supplies. DSCR will provide packing lists to streamline the inventory control process at the MEU level beginning with the next deployment.

4. Handle classified map supplies. Ensure MEUs are authorized to receive double-wrapped, classified map supplies. Ensure labeling identifies map supply account to receive items, and address security of classified map supplies as a separate issue in applicable doctrine.

5. TPFDD/Movement of Map Supplies. Map supplies will be handled like other NSN items.

6. Establish standardized GI&S/MC&G Policy. Rewrite MEU Map Pack doctrine to reflect changes identified at the conference. Revise/update ALMAR 39-98 regarding map supplies, and conduct liaison with HQMC to draft MC&G policy.

7. Conduct program cost analysis. DSCR will conduct a cost analysis of each MEU maintaining it's own MEUpack

8. Introduce map supply training package. Intelligence and supply or logistics schools should publish a video, manual, or other educational vehicle to familiarize map and supply users with mapping supplies.
Hold a "Status of Program Revision" follow-on meeting. Recommend follow-on meeting for program status the week of 31 Jan 00 to allow for adjustments of actions as the transition to the new Core Block concept takes affect.

9. Submit recommendations to CMC/LP/I&L and MCIA/05 for program oversight. These ideas will be elevated to the Marine Corps level to ensure identified actions will be taken. This forum cannot, dictate actions to National Agencies.

There is a serious shift in the we way do business. If emerging technology continues to allow for more digital custom map building, and realistic requirements are levied by the MEUs (for instance, no MEU needs 475 copies of a 1:2,000,000 map of Bhutan), then the MEU Map Pack Program as we know it, can dissolve, and the MEU can focus on mission accomplishment rather than counting maps.

GET MAPS FOR BRIEFING SLIDES

Get maps for briefing slides! Preview data before you download or order. A new interface allowing customers to browse Geospatial data real-time through a web browser was implemented on JWICS, SIPRnet, and OSIS. The Raster Roam allows customers to access online geospatial data through a point and click world map, coordinate input (geographic, UTM, MGRS) and to perform a Geonames search, with Geonames searches providing content links to the CIA Factbook and Intel country information (this feature is only on JWICS and SIPRnet). Users can select different image viewing sizes, zoom factors, elevation readout units, and different map scales (GNC, JNC, ONC, TPC, JOG,TLM, CIB 5 or 10 and DTED 0-2), depending on data coverage. Users can then download the data to a number of generic raster (jpeg,bmp,tiff) and GIS data formats (Mapinfo, Arcview, Imagine) for ingesting as a briefing graphic or map background. To navigate the online maps users can use directional arrows or point and click within the Raster Roam window to change the viewing area.

A Raster Roam bulletin board has been established on JWICS and SIPRnet to address customer feedback. Raster Roam can be accessed through Products and Services link on the JWICS and SIPRnet homepage. From here click on Digital Data then Raster Roam icon.
OSIS:http://gis.nima.mil/geospatial/SW_TOOLS/NIMAMUSE/webinter/rast_roam.html
http://delphi.dia.ic.gov/proj/jmitc/gits.html
A VPF roam is in development. It is located at these URLs
OSIS: http://gis.nima.mil/geospatial/SW_TOOLS/NIMAMUSE/webinter/vpf_roam.html
SIPRnet :
http://sps.stl.nima.smil.mil/sw-tools/NIMAMUSE/webinter/vpf_roam.html
JWICS:
http://jws.stl.nima.ic.gov/sw tools/NIMAMUSE/webinter/vpf_roam.html
This application will allow for the real-time viewing,
symbolization and querying of VPF data. Feedback is appreciated.

Professional Artillery Refresher Training (PART)

PART is a course designed for Captains and Majors (0802) returning to the operating forces. It focuses on refreshing the students on equipment, logistics functions, and maintenance procedures and teaches revised artillery and fire support TTPs. The course is scheduled for 11-30 June 2000 and there are seats available. The course is funded. Outlined below is the course schedule. **Those interested should contact Major Bill Baker at DSN 639-4809, Commercial (580) 442-4809, or bakerw1@sill.army.mil.**

DAY	DATE	TIME	FILE #	SUBJECT MATTER AND REFERENCES	LOC	INSTRUCTOR	REMARKS
1	11-Jun	MARDET		REPORT			
2	12-Jun	0700-0800		INPROCESSING	MARDET		
		0800-1000		TEXT AND INSTRUMENT P/U			
		1000-1200		DIAGNOSTIC EXAM			
		1200-1300		LUNCH			
		1300-1500	TVO1KQ	TRAINING MANAGEMENT			
		1500-1700	LDRS	BATTERY COMMANDERS SYM		FIELD GRADE	
		1830-TBD		SOCIAL			
3	13-Jun	0800-1000	GD03AC	ADVANCED AIMING CIRCLE PROCEDURES, (SIMOS,ETC)	AC HILL	CWO2 BARNES	
		1010-1700	AS03BA	SURVEY(TO INCLUDE HASTY,GPS,MEU (S0C) SURVEY ISSUES)		CWO2 BARNES	
		2000-2400	GD03BA	HASTY SURVEY(ASTRO & PK)		CWO2 BARNES	
4	14-Jun	0800-1000		PROGRAMS UPDATE (XM777, TLDHS, AMMO,ETC)		MAJ MULLINS	
		1000-1130	GM01PS	M900 SERIES/HMMWV OPERATOR AND ORGANIZATION LEVEL INSPECTIONS		CWO4 CORDES	
		1130-1230		LUNCH			
		1230-1400		M900 SERIES/HMMWV OPERATOR AND ORGANIZATION LEVEL INSPECTIONS			
		1400-1600	GM01PH	HOWITZER INSPECTIONS			
5	15-Jun	0800-1050	GM01NH	MAINT PROGRAMS		CAPT SIDES	
		1100-1150	GMO1NO	UMMIPS		CAPT SIDES	
		1310-1400	GMO1NO	MIMMS INPUT TRANSACTIONS		CAPT SIDES	
		1410-1700	GMO1NC	TECHNICAL PUBLICATIONS		CAPT SIDES	

6	16-Jun	0800-1150	GM01NS	MIMMS OUTPUT REPORTS		CAPT SIDES	
		1310-1700	GM01NT	SUPPLY & FISCAL RESPONSIBILITY		CAPT SIDES	
7	19-Jun	0800-1000	PCC	PRE COMMAND COURSE(EFFECTS VIDEO)			
		1000-1150	GD03FT	GRAPHIC & FIRING TABLE REVIEW			
		1150-1310		LUNCH			
		1310-1700	GD03AC	CALIBRATION (THEORY & M94)			
8	20-Jun	0800-1150	GD03RM	REGISTRATION & MET THEORY (TO INCLUDE VALIDATION OF MET)			
		1310-1700	GD03TS	BCS TROUBLESHOOTING			
9	21-Jun	0800-1700	GD03MS	SAFETY (NEW SAFETY PROCEDURES, XO'S MIN QE, & INTERVENING CREST)			MANUAL SAFETY TEST
10	22-Jun	0700-0800	GD03MS	REVIEW SAFETY TEST			
		0800-1150	GDO3BS	BUCS SAFETY			BUC SAFETY TEST
		1310-1500	GDO3SA	SOP REVIEW, SURFACE DGR ZONES			
		1500-1700	GD03CC	HOWITZER SAFETY PRAC AP (HANDS ON, MICROMETER END FOR END, SIGHT ALIGNEMENT, ETC)		MSGT WADE	
11	23-Jun	0700-0800		REVIEW BUCS SAFETY TEST			
		0800-1700		IFSAS/AFATDS OVERVIEW			
12	26-Jun	0800-1200	TV01 CF	FIRES PARAGRAPH			
		1300-1700	TV01CG	OPORD SPARTAN			

13	27-Jun	0700-0900	TV01KD	RSOP CLASS			
		0900-1700		RSOP AND M198 CREW DRILL (BTRY DEFENSE,BTRY LOG SITE, WEAPONS FAMILIARIZATION,ETC)	FIELD EX		
14	28-Jun	0800-1200	TVO1GK	ARTILLERY FIRE PLAN CLASS			
		1300-TBD	PE	ARTILLERY FIRE PLAN PRAC AP (MCPP)			
15	29-Jun	0800-1000	PE	FIRE PLAN PRAC AP(ARTILLERY OP ORDER BRIEF AND PRODUCTION W/TABS)			
		1000-1200	TVO1TA	TARGETING METHODOLOGY			
		1300-1500		RADAR EMPLOYMENT		CWO AVENETTI	
		1500-1700		MET OVERVIEW		CWO AVENETTI	
16	30-Jun	0800-1000		FINAL EXAM			
		1000-1100		COURSE WRITTEN CRITIQUE			
		1100-1200		OUT CALL W/ THE COMMANDING OFFICER & FINAL COMMENTS			
		1300-1500		TEXT AND INSTRUMENT TURN-IN			
		1500-1700		OUTPROCESSING	MARDET	ADMIN	

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.

HIMARS AND THE OMFTS FORCE OF THE 21st CENTURY

Captain Christian T. Ellinger

The 1999 Marine Corps Force Structure Planning Group (FSPG) Report focuses on the development of "…recommendations consistent with current MAGTF employment and organizational realities that facilitate the evolution toward a ready, relevant, and OMFTS capable 21st Century force." In the area of fires and mobility, the future of the MAGTF's ability to provide new levels of lethal fires will greatly depend on the procurement of a mobile rocket system. This system, combined with the new lightweight 155mm howitzer, will provide the MEFs' command and control systems quicker and more accurate fire support[1]. The U.S. Army realized years ago that there was a need for a rocket artillery system that could provide fires for the counter-fire requirement and those that would be adequate for the deep battle. As the Marine Corps moves into the 21st Century and starts to develop its tactics and techniques concurrent with Operational Maneuver from the Sea (OMFTS), it too is realizing that traditional cannon artillery, although adequate for the close battle, may not be enough in the way of fire support. Traditional tube artillery must be combined with the capabilities of a mobile rocket system in order to provide the MAGTF commander with the enhanced fire support needed for the 21st century fight.

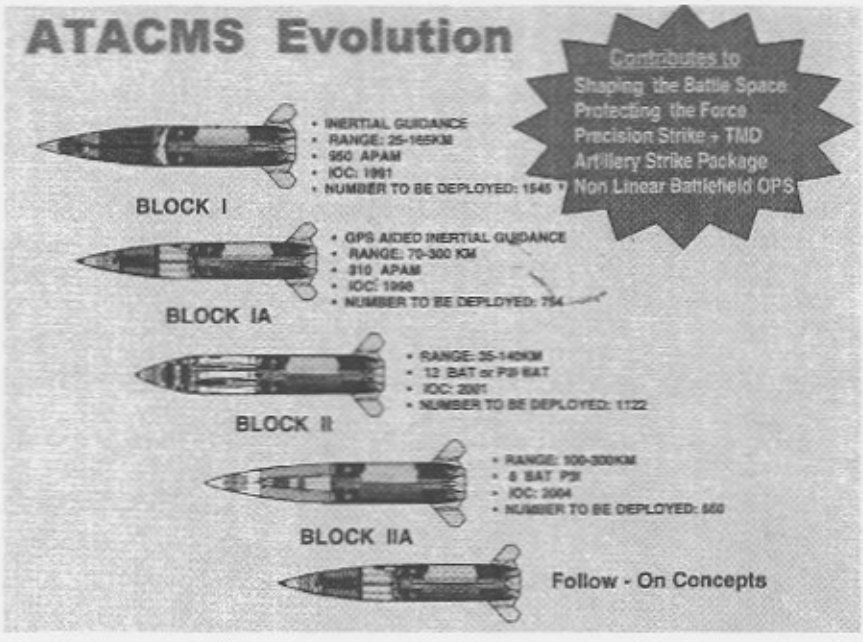
General Support Artillery. The recognition of the need for General Support rocket artillery and the procurement of such a system are not a new concept for the Marine Corps. Former Commandant, Gen A.M. Gray, signed a required operational capability (ROC) for the Multiple Launch Rocket System (MLRS) as far back as February 1990 [2]. However, it was determined at higher levels that the U.S. Army could provide that capability to the Marine Corps. Five years later, the Marine Corps and U.S. Army signed a memorandum of agreement (MOA) stating that the Army would provide MLRS support based on "commander's guidance, contingency requirements, and units available" [3]. On paper, the MOA sounds straightforward enough, but it lacks certain details. The Army has not designated specific units to fulfill the mission. In addition, there has been no provision made to place MLRS launchers and associated support equipment on maritime pre-positioned ships. Certain concerns naturally arose: How will the logistic demands, such as maintenance and munitions, of a non-Marine organic system be addressed? Will MLRS only be available during Major Theater War? What about quickly planned and executed contingency operations? The logical solution becomes clear: the Marine Corps cannot rely on another branch to provide the general support artillery that should be organic to the MAGTF. The High Mobility Artillery Rocket System (HIMARS) offers the solution.

As the Marine Corps moves into the next century, its focus of effort concerning the artillery has centered on the development and procurement of the new lightweight 155mm howitzer. This new system, designated the M777, has many improvements over the current M198 howitzer and, weighing only 9000 pounds, it is more well suited for our Marine Expeditionary Units that move quickly inland from the sea. But the M777 has a drawback. Although a capable system for the close fight, it's maximum range with the rocket-assisted projectile is projected at only at 30 kilometers. It does not make good sense that the Marine Corps can accomplished the wide range of fire support missions with a single artillery system. "In the end, one artillery system, no matter how good, will not give Marines the variety of artillery capabilities it

needs" [4]. In addition to accomplishing the direct support, close battle with the M777, the Marine Corps must be able to accomplish all four of the tactical missions that it may be assigned.

Without true general support artillery, the commander's ability to influence and shape the battlefield by the introduction of overwhelming firepower is greatly diminished. The tactical missions of the artillery have not changed. However, the assets needed to accomplish these missions have. "Since the 1980's the U.S. Marine Corps has gone down the path toward an artillery force consisting of a single 155mm towed weapon system for every battalion, Active and Reserve" [5]. During the Gulf War, 5th Battalion, 11th Marines served as the general support battalion. The extended range of the M110A2 gave it the "punch" critical to the GS mission. With 8 inch howitzers a thing of the past, what will the battalion designated with the GS mission do in the next major theater war? The HIMARS system is a true GS system that can deliver devastating fires over large distances in a short amount of time. The use of HIMARS for early entry contingency forces, such as the MEU, Special MAGTF, or MEF Forward would also provide a significant combat multiplier.

The High Mobility Artillery Rocket System. HIMARS is the newest member of the Multiple Launch Rocket System family. It is a high mobility wheeled variant that incorporates a six-rocket or one-missile pod on the back of a five-ton chassis. It fires the entire family of MLRS munitions and retains the same self-loading features installed on MLRS. In addition, HIMARS is equipped with an onboard land navigation and survey system and the Improved Fire Control System (IFCS). HIMARS is operated by a crew of three: driver, gunner, and section chief, but the computer based fire control system enables a crew of two or even one to load, unload, or aim at a target [6]. The types and range of HIMARS' munitions are what makes it so well suited for GS support. HIMARS can fire the M26A1 Extended-Range Rocket that ranges out to 45 kilometers. Its inventory also includes the Army Tactical Missile System (ATACMS) Block 1 and 1A. Block II and IIA are in development and are scheduled to be operational by 2001 and 2004 respectively. The Block 1 missile delivers 950 anti-personnel/ anti-materiel M74 submunitions and achieves ranges to 165 kilometers.



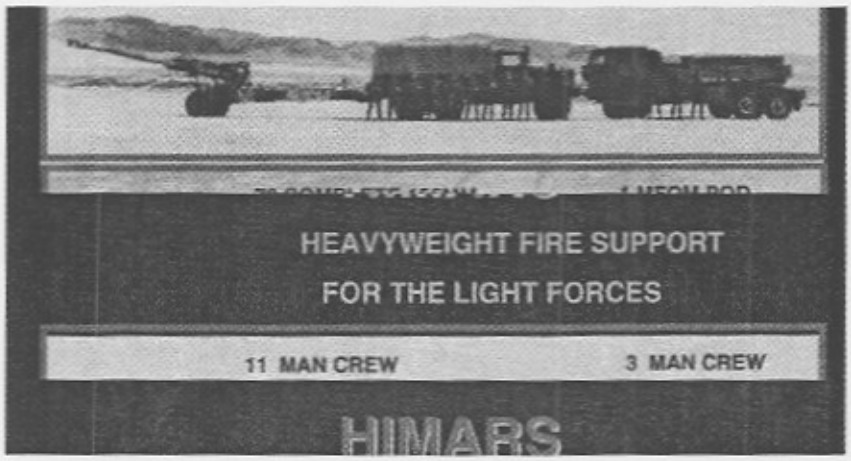
The Block 1A missile doubles the range to 300 kilometers by reducing the payload to 310 submunitions and is augmented by a global positioning system (GPS) The ATACMS Block II has a predicted range of up to 140 kilometers and delivers 13 Brilliant Anti-Tank munitions (BATs). The Block IIA has a predicted range of 300 kilometers due to the reducing the number of BAT sub-munitions to 6. These improved BAT munitions will utilize millimeter waves to acquire stationary targets [7].

Weighing just 24,000 pounds, the HIMARS is a little more than half the weight of the MLRS and can be transported by C-130 or LCAC. In addition to the extended ranges and firepower needed to influence the battlefield, the HIMARS system also offers solutions in the areas of crew issues, maintenance, and agility.

HIMARS munitions provide lethal, long-range fires in a high volume. Compared to one extended range dual-purpose improved conventional munition (DPICM) 155mm round, a single HIMARS rocket provides an increase of 794 percent in payload. Consider the following: One HIMARS launcher, consisting of six rockets equals forty-eight 155mm rounds or a battery 8. One HIMARS battery of nine launchers equals 483 DPICM rounds or eighteen howitzers firing 27 volleys. That type of fire mission would take a 155mm Battalion over ten minutes to fire, while the HIMARS battery would take thirty seconds. Additionally, if we examine both weapon systems' crews, we see that a M198 155mm howitzer needs a crew of eleven Marines to emplace and operate. The HIMARS launcher needs a crew of three and can be operated by one if necessary. Also, in the way of re-supply, one HIMARS munitions pod equals 78 complete 155mm rounds. In short, the rocket delivered submunitions provides the commander with ability to rapidly attack targets with devastating results [8].

The smaller sized crew of the HIMARS system offers many advantages to a Marine Corps that is feeling the effects of downsizing and lowered retention. The crew of three takes up less space when berthing and transporting and presents less of a burden to re-supply and sustain in the field than the M198's crew of eleven. With HIMARS being mounted on a five-ton truck chassis, the associated maintenance efforts present far less of a challenge to the Corps. Motor Transport Mechanics and Operators are trained to repair and upkeep the five-ton truck and repair parts are already in the system. The logistical and mechanic's challenges associated with a rocket system on a tracked vehicle are not even a consideration with the HIMARS and its five-ton chassis. In the area of agility, HIMARS offers a system that can keep up with the maneuver element, can emplace quickly, has 6400 mils capability, and can displace quickly. How many artillerymen have been frustrated by not being able to keep up with maneuver, being bogged down and stuck in a gun position, or having to shift trails to respond to a mission out of traverse? "A rocket system employed in the Marine Corps will provide solutions to other inherent challenges we currently encounter as a force with specific regard to personnel shortages, training and maintenance readiness" [9].

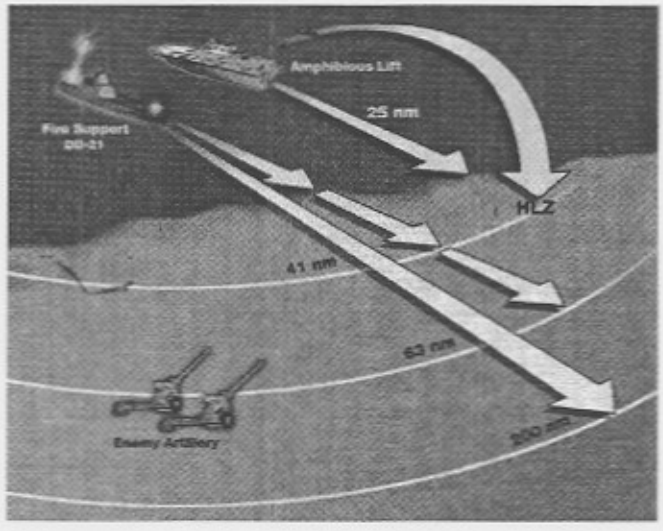
Even with all HIMARS' advantages, there are certain challenges that the Marine Corps will be faced with if it decides to procure the system. First, the Corps will be responsible for the addition of another artillery military occupational specialty course at The Field Artillery School at Ft Sill. With the MLRS schoolhouse for U.S. Army personnel already established at Ft Sill, the addition of Marine enlisted and officer instruction should not present too many difficulties. When the system finally arrives in the fleet, the Marine Corps logistics systems will face the challenges of the introduction of totally new munitions associated with HIMARS. With these munitions already part of the Army's MLRS inventory, the Marine Corps can draw from an already established rocket logistics system as they build their own. Lastly, as HIMARS operates in combat, there will be the need for an increased-range radar system, such as the Q-37, that



will be able to set up zones out to HIMARS' increased ranges. Marines have always prided themselves on be innovative. Working through the problems associated with the introduction of a new lightweight rocket system will be challenging, but successful.

HIMARS and OMFTS. How then can the HIMARS system be incorporated into the 21st Century fight and Operational Maneuver From The Sea? With the face of conflicts changing rapidly, the Marine Corps must be able to organize itself with tactics and weapons systems that will allow it to fight in "every clime and place" as well as in numerous different capacities. Similar to the "three block war" concept of urban conflict, the Marine Corps of the next century must be able to shift just as smoothly as it focuses on warfighting. Rapid transition from a small special mission force to larger contingency operations and even major theater war will be essential. The HIMARS system will give the Corps the advantage in any scenario. It will be as equally effective as it comes ashore quickly with the MEU as it is would be providing a general support capability to the MEF Commander.

The basic theory behind OMFTS and Ship to Objective Maneuver (STOM) "…calls for the majority of the amphibious force to remain sea-based with the rest maximizing speed, shock, and firepower far inland while minimizing the force's footprint and vulnerability" [10]. The amphibious landing of the past where all combat power and support elements come across the beachhead will soon be a thing of the past. Naval forces will remain well beyond the horizon and launch ground combat elements past the beach straight to the objective. "STOM operations seek to have the landing force overwhelm the enemy by exploiting the force's power and rapidity of execution against the enemy's weakness" [11]. With Naval forces 25 miles out to sea and ground forces pushing as far as 200 nautical miles inland to secure its objective, OMFTS present a new and tremendous capability. OMFTS fire support philosophy is based on a three pronged approach. It will incorporate naval surface fires, air, and ground-based fire- support. However, with OMFTS redefining the horizon, beachhead, and battlefield, traditional Marine and Naval fire support must adapt to remain effective.



These increased distances create two major problems: Ground and Naval fire support ranges and logistics. With the ground combat element moving extended distances inland to the objective, the current 155mm rocket assisted projectile range of 30 kilometers is not enough. Likewise, current Naval surface fires delivered by the five inch 54 and MK 45 gun mount come up short. The Navy is attacking the problem with the development of the DD-21 class ship with extended range weapons. The HIMARS system presents the already developed answer to the need for longer range and greater precision. HIMARS firing ATACMS Block II and IIA coupled with the new lightweight 155mm howitzer will provide the deep and close fires needed. The system will allow the maneuver commander a variety of fire support options that will better support the advances created from the OMFTS concept. Logistically, the HIMARS system of pre-loaded rocket and missile pods takes great stress off the combat trains of the past. These pods can be flown in by CH-53E and V-22 or brought ashore by LCAC or LCU. They are a self-contained complete munition containers that do not create the logistical problems of coordinating compatible projectile, powder, fuzes and primers. This coupled with the fact that a HIMARS crew of three (or one if need be) can easily load the pod into the launcher makes HIMARS a relatively simply system to re-supply. In the area of lift, the LCAC can bring two complete HIMARS vehicles or a HIMARS vehicle and a LVT with extra rocket-pods ashore on one load. HIMARS' extended ranges will allow fire support even if the objective is up to 300 kilometers further inland. Once HIMARS is ashore it can either operate from a secured beach-head or move with the maneuver element of LAVs or M1A1s. The fact that the HIMARS system is mounted on a five-ton chassis allows it to keep up with and navigate with maneuver. Re-supply can be accomplished either by sea or air. If HIMARS is set up close to the beach, extra rocket-pods can be brought ashore quickly on LCAC or flown farther inland by CH-53E or V-22 Osprey.

The introduction of a mobile rocket system like HIMARS will present a unique capability to the maneuver commander as OMFTS and STOM becomes reality. But how, right now, can HIMARS benefit the Marine Corps' "bread and butter", the Marine Expeditionary Unit (MEU)? What missions might arise and how might HIMARS be used? One of the Marine Corps' strengths as a service is its ability to react quickly to crisis anywhere in the world. With the constant presence of three Marine Expeditionary Units always at sea and ready, the Marine Corps is uniquely equipped to respond. "Forward deployed naval expeditionary forces can respond immediately to a crisis, execute forcible entry or reinforce other forward deployed elements, and through prompt action help halt an enemy offensive and enable the flow of follow-on ground and land-based air contingents" [12].

The recent history of Marine forces in action can be grouped into three overall missions. The first mission is that of the MEU. The "tip of the spear" as it is called. Fast contingency forces that rescue, evacuate, or provide assistance and then pull out or are relieved by follow on forces. Examples include the assault on Grenada, peacekeeping in Beirut, Somalia, and Kosovo, the TRAP mission in Bosnia, and the evacuations of noncombatants from Liberia, Sierra Leone, and Albania. Traditionally, deep fires have been provided by Naval Surface Fires and the ACE. The artillery battery assigned to the BLT is brought ashore and provides continuous close fire support. But what if Naval Gunfire is not conducive to the topography? What if, like in Yugoslavia, weather does not permit air assets to fly for days on end? With a platoon of HIMARS ashore, the MEU commander has a powerful option.

The next mission is that of "kicking in the door". This mission is most commonly associated with a larger Marine force, most likely the Regimental Landing Team. In this mission, there is often the requirement to secure an airfield or port for the introduction of follow-on forces. "For artillery forces, the longer range and higher lethality for defensive fires becomes more important" [13]. The introduction of a HIMARS battery will give the MAGTF commander a general support or defensive fires capability that can augment air and naval surface fires.

The last mission is the "major theater war". Because the Marine Corps will most likely not be the theater commander's main effort, the Marine Commander must create "…the organic ability to shape our portion of the battlefield and provide counterfire. Range and lethality now become critical to offset the potential low priority of air and naval surface fires" [14]. A General Support HIMARS Battalion as part of each MEF will provide deep missile fires with ATACMS or support closer maneuver forces with rocket fires.

Recommendations and Conclusions: the 1999 Marine Corps Force Structure Planning Group Report recommended "…the addition of an artillery battery to both II MEF and III MEF". It goes on to state "This addresses a longstanding deficiency associated with the loss of tube artillery and the unrealized acquisition of MLRS. These two batteries help restore depth and flexibility, while increasing all-weather fire support" [15]. This recommendation is warranted and will provide relief to over committed battalions as they fill the LF6F, UPD, and WESTPAC requirements. It addition, the FSPG's blueprint for the ground combat element of the 21st Century contains a general support rocket Battalion in each Marine Expeditionary Force. This recommendation moves in the right direction. The Marine Corps should pursue the need for a true general support system. The HIMARS system can achieve greater effects at farther ranges with fewer personnel. One Battalion of HIMARS could be added at 10th and 11th Marine Regiments. Each Battalion would contain four firing batteries with six launchers each. The HIMARS Battalions would function and train in the GS role as well as provide a platoon of two launchers for each LF6F and WESTPAC work-up and deployment.

Introduction of these HIMARS units will supply the much needed enhanced fire support capabilities for the contingency operations and Major Theater Wars of the future. As the Marine Corps develops the ground combat element of the 21st Century, the HIMARS system will provide a true GS capability. Coupled with the traditional cannon artillery and ACE fires, HIMARS units will provide that greatly increased firepower and flexibility to the maneuver commander.

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Captain Ellinger graduated from Officer Advanced Course 5-99, on 28 Oct 1999. He is currently serving with the 13th MEU.

LAR FIRES

By Captain Andrew J. Tate

The Marine Corps recognized, in 1996, that the LAV-M (81mm-mortar variant) lacks the range and lethality required for the LAR commander to significantly shape his battlespace. A mission of need statement (MNS) for a light armored vehicle with enhanced fire support capabilities was developed to address this specific issue. The MNS indicated that the now available, non-developmental Delco/Royal ordnance 120mm AMS, adapted to the General Motors LAV, has the potential to fill this existing void for the LAR commander.[1] The purpose of this paper is to provide information pertaining to the LAV 120mm AMS enhanced fire support capabilities and how its integration will impact LAR, the current T/O, and the Marine Corps.

The LAV 120mm AMS (see Figure 1) contains a mortar tube with a semi-automatic tapered screwed breach mechanism with concentric fume extractor and recoil system. It can fire all standard 120mm smoothbore ammunition and can currently achieve an unassisted range of 9,200 meters, which is 3,500 meters further than the LAV-M. The mortar tube is mounted in a cradle supported by trunnion bearings for full elevation movement. The turret mount allows 6400 mils traverse, with an elevation range from –89 mils to +1422 mils. The LAV 120mm AMS automated fire control system and increased high rate of fire will enable the commander to mass a larger volume of fire more rapidly, and with more lethality than is currently available with the LAV-M. The LAR commander can now achieve a more favorable force ratio by attriting the enemy deep within his battlespace.

Figure 1
The LAV 120mm AMS

Historical Background:

The mission of LAR is to conduct reconnaissance, security, and limited offensive and defensive operations as directed by the Division or supported commander. LAR has five unique tactical operations that fulfill its mission. These five operations are reconnaissance, security, limited offensive, limited defensive and amphibious operations.[2] The current organization of LAR, with the LAV-M, limits the ability of LAR to accomplish these five tactical operations and its overall mission.

Each LAR battalion is currently organized with one Headquarters and Service (H&S) company and four line companies. Each line company has three line platoons and one weapons platoon. The line platoons are equipped with

four LAV-25s, 12 total for the company. The weapons platoon consists of two LAV-Ms and four LAV-ATs (TOW II antitank missile launcher variant). Under this current organization, LAR has only eight LAV-Ms for organic fire support for the battalion, two for each line company. As determined by the MNS, the LAV-M lacks the required range and lethality for indirect fire support to enable LAR to conduct its overall mission.

The three tactical operations of limited offense, limited defense and amphibious are part of Marine Corps doctrine. Every Marine is familiar with these operations based upon their respective entry-level school. Reconnaissance and Security operations, as they pertain to LAR, present the biggest obstacles when trying to integrate fire support. This is due to the lack of training, doctrine, and equipment limitations. Also, the entry-level education does not fully address these two complex operations. Moreover, these two operations illustrate the lack of range and lethality of the LAV-M. Incorporating the LAV 120mm AMS into LAR can solve the existing fire support concerns facing the LAR commander.

The purpose of the zone, route, and area reconnaissance is to obtain information concerning routes or all routes, terrain, obstacles, or enemy within a zone or sector. The information obtained during this type of operation will help the MAGTF commander develop an educated scheme of maneuver that should produce the desired level of success for the offense.

To conduct this tactical operation, A LAR battalion would normally use three companies with a 24KM frontage beyond the forward edge of the battlefield (FEBA) with each company responsible for a zone or sector of 8KM. During Desert Storm Task Force Sherman (1st and 3rd LAR) maintained a 40KM frontage.[3]

Security operations are broken into two major areas, the screen and the guard. The stationary screen, like reconnaissance operations, is conducted beyond the FEBA. The flank screen is conducted to mask the movement of the main effort to an objective. An entire LAR battalion, reinforced by a tank company, is needed to conduct a guard. Companies within the battalion conducting the guard operation would perform zone reconnaissance, movement to contact, screen, delay, or hasty attack.[4]

The LAV-M is employed in the same manner for both the reconnaissance and security operation. They are employed to suppress the enemy while breaking contact, mark for air, and provide illumination. Range limitations force the LAR commander to decide either to co-locate the LAV-Ms in order to mass, or decentralize in order to cover the entire sector.[5] For example, when employed together the LAV-M does have the ability to mass fires but lacks the desired lethality and the range to cover a 24KM front. When employed in sections of two in support of the line companies, they do not have the required range or lethality needed for an 8KM front. In both cases the LAV-M does not have the ability to combine its high rate of fire with an automated fire control system which hinders its ability to provide responsive fires. Replacing the eight LAV-Ms with sixteen LAV 120mm AMSs will significantly improve the organic fire support capability of LAR.

Integration:

Combining its high rate of fire and fire control system with its ability to shoot and move faster than the LAV-M, the LAV 120mm AMS can be employed either as a battery in support of the battalion or attached to each company in sections of four. With sixteen LAV 120mm AMS in the battalion, the LAR battalion commander even has the option to split the battery into two sections of eight to support a 24KM front. With this employment option, the LAV 120mm AMS can achieve the desired range. The 120mm smoothbore mortar round will provide more lethality over the 81mm mortar round, especially when all eight, or sixteen, systems are massed on one target. With artillery support, the LAV 120mm AMS can be employed further from the forward line of troops (FLOT) and still achieve the desired results, while allowing the LAR commander to expand his battlespace.

Under the current organization, a Marine artillery regiment is organized to support the division with four cannon battalions. There are several options for the tactical mission assignment of artillery to support the offense. The most likely option is to have three cannon battalions in DS of each infantry regiment with the fourth providing GS for the division. The second is to have two cannon battalions in DS, with one cannon battalion reinforcing the DS battalion of the main effort, and one cannon battalion in GS for the division. The options for tactical mission assignment for the defense present the same options. The bottom line is that artillery support is limited due to its primary mission to support

the three maneuver regiments leaving LAR, more often than not, without adequate artillery fire support. This means that the MAGTF commander, based on the mission and threat, has to conduct a thorough risk assessment before assigning a cannon battalion to provide any support to LAR.

The artillery support relationship with LAR will be based upon METT-T. The MAGTF commander must identify the risk assessment with deploying an artillery battalion beyond the FEBA in order to support LAR. Generally, the MAGTF commander will assign LAR priority of fires from the general support (GS) artillery battalion. He also has the option of assigning an artillery battery in direct support (DS) to LAR.[6] This means that the GS or DS artillery unit must be positioned beyond the FEBA and force protection and logistical re-supply now become an issue. The current doctrine does not address these issues.

For example, an artillery battalion with the GS role for the division will normally give priority of fire to LAR when they are conducting reconnaissance operations.[7] The MAGTF commander also has the option of placing an artillery battery in DS of LAR and position the GS battalion where it can support the division. Either way, the supporting artillery unit will have to move beyond the FEBA to support LAR with responsive timely fires. Once beyond the FEBA force protection and logistics become an issue, not only for the LAR commander but also the artillery commander. During MEFEX 95 conducted by I MEF, LAR had the mission to conduct reconnaissance 120KM beyond the FEBA.[8] Artillery was not assigned a tactical mission for this operation primarily due to difficulties implementing force protection and logistical re-supply.

To overcome the force protection issue the LAR commander will have to assign a portion of his force to provide security for artillery. This means he will have to reduce his combat power forward and may not be able to conduct a thorough reconnaissance. To reduce the logistical problem the artillery unit can move forward with the prime movers combat configured with enough ammunition to provide smoke and immediate suppression to enable LAR to break contact. The considerations for assigning tactical missions to artillery are the same with security operations.

An artillery battery would normally be assigned DS to LAR during the conduct of security operations.[9] Much like reconnaissance operations, the force protection and logistic issues are the same when LAR is conducting a stationary screen. These issues can be reduced in the same manner discussed above. Flank screen operations present different issues since LAR would be conducting this operating to screen the movement of the main effort to an objective.

Moreover, the issue of force protection and logistics are compounded during flank screen operations. This is because LAR is not the only maneuver force moving forward. The DS artillery battery would either have to move with LAR on the unsecured flank or in front of the other maneuver elements to maintain pace with LAR and provide fires. Regardless of the option of employment, force protection is a must to provide survivability to the DS artillery battery.

When moving within the LAR zone the LAR commander must provide some type of force protection element to the battery. When moving in front of the other maneuver forces, least desirable option, LAR or that maneuver unit will have to provide force protection. The force protection element will have to be larger than what would be provided during reconnaissance operations. This is because the DS artillery battery will have a longer logistical train and force protection will be needed to ensure survivability of the logistical trains. Combat configuring the prime movers will not provide enough ammunition to support LAR from the line of departure to the objective. If force protection is not provided for the logistical trains and their routes, the DS artillery battery may not be able to provide continuous fire support throughout the operation. This is due to the logistical trains and routes vulnerability to enemy ground and air attack. Combining artillery with the LAV 120mm AMS will provide greater lethality than is currently available with the LAV-M, while at the same time reducing the force protection requirement to the LAR commander. Artillery can now be positioned short of the FEBA and still provide indirect fire support.

While conducting reconnaissance operations the GS or DS artillery unit can be positioned on the FEBA, combat configured with rocket assisted projectiles, to provide lethal fires for LAR. During DESFIREX 1-94 and DESFIREX 1-95 the GS battalion was positioned short of the FEBA with priority of fires to LAR.[10] The artillery unit will take over the mission of providing fires for LAR once they come in range. The mission of the LAV 120mm AMS will be to bring about rapid lethal fires on the enemy to allow LAR to break contact and cover the withdraw. If integrated into LAR, the LAV 120mm AMS can remain further from the FLOT than the LAV-M because of its range, and still provide lethal fires, while at the same time remaining within range of the DS artillery unit. The ability of the LAV 120mm AMS to occupy, engage and displace rapidly will allow for the safe withdraw of LAR while still providing organic fire support. The advantage of this employment option will negate the need for LAR to provide an element for force protection to the

artillery unit, which will enable LAR to maintain combat power forward for the operation. It also enables the DS artillery unit the ability to conduct normal logistic operations since they are positioned on the FEBA and the logistical trains will be moving through a secure zone.

The DS artillery battery supporting LAR during a stationary screen can be employed in the same manner as discussed above. When employing the DS artillery battery for flank screen missions the option of moving with LAR is more desirable. The battery would move at a rate to keep a majority of LAR in range at the same time remaining within range of the GS artillery battalion. The LAV 120mm AMS should be employed in platoons of four and cover the lead elements or those units beyond the range of the DS artillery battery. The LAV 120mm AMS will be able to provide greater lethality than is currently available with the LAV-M. Again, its ability to rapidly occupy, engage, and displace increase the survivability of the supported unit. With this solution, LAR will have to provide a platoon of LAV-25s, at the minimum, to provide force protection for the battery to increase survivability of the battery and the logistic trains. Solution:

The introduction of the LAV 120mm AMS provides a more lethal system with greater range than is currently available but will also affect personnel and training within LAR. More specifically, the LAR battalion T/O will be affected by introducing artillery Marines that are school trained at entry and career level schools in fire support.

The creation of a LAV 120mm AMS unit in LAR with 0802 leadership, without increasing the total number of officers in the Marine Corps, raises the issue of where will these officers come from? The billet of battalion fire direction officer, which is currently filled by a captain (Line 19, T/O 1142G), can be reduced to lieutenant. This will free 15 0802 captains. Of these 15 captains, only four of them will be needed to support LAR battalions as LAV 120mm AMS battery commanders. These battery commanders would also have the responsibility of filling the requirement as the battalion fire support coordinator. This will allow LAR to reduce line 30A of both T/O, 4861D and 4861G, which is currently a 0802 major's billet. The assistant executive officer (A/XO) billet in an artillery battery (Line 60, T/O 1113G) can be deleted and this will free 45 0802 lieutenants. Of these 45 lieutenants, only 16 of them would be needed to support the LAR battalions as platoon commanders for the LAV 120mm AMS. Moving these Marines to LAR will create the following responsibilities.

The responsibilities of the battery commander will be the same as those of a weapons company commander in an infantry battalion. He must ensure the four platoons plan and train for continuous operations in an intense combat environment. As the battalion fire support coordinator, he must ensure that fire support is thoroughly integrated and can support the battalion commander's scheme of maneuver. This recommendation is not far from the mark since 1st LAR is currently operating in this manner with the difference of an infantry officer filling the billet instead of an artillery officer.[11]

Currently, there are only four lieutenants resident on the LAR company T/O. Since three lieutenants are line platoon commanders the responsibility for training and employing the LAV-Ms falls on the company executive officer (XO). This is different from a traditional line company since there is a fifth lieutenant resident on the T/O to command the weapons platoon. A 0802 lieutenant as the LAV 120mm AMS platoon commander would allow the company XO more freedom to supervise the overall administrative, logistical, and maintenance requirements. It will also enable the company XO to coordinate more effectively with adjacent and higher units for forward/rearward passage of lines or relief in place to ensure these types of operations are conducted in a smooth and efficient manner[12]. The 0802 lieutenants would have to attend the LAV Leaders Course before moving from the artillery battalion to LAR. These platoon commanders will be responsible for the training of their platoons so that they can work with the other three platoons to mass fires, or independently to support a LAR company. The company XO will maintain the responsibility as the company fire support coordinator and the DS artillery battalion will still be required to provide forward observer teams.

The introduction of sixteen LAV 120mm AMSs into a LAR battalion will raise maintenance issues that have to be resolved. The introduction will increase the total number of LAVs in the battalion from 114 to 122. The numbers show that with the increase of vehicles the ratio of vehicle to mechanic will be 2 to 1. Based on that ratio, there should be no need to increase the number of 2147s (LAV mechanic) or 2171s (electro-optical ordnance repairer) with the increase of LAVs. This does not alleviate the requirement for these military occupational specialties (MOS) to receive training in proper maintenance procedures that are unique to the LAV 120mm AMS. This can be accomplished in two ways. First, by utilizing mobile training teams for those mechanics already resident in LAR. Secondly, introducing LAV 120mm AMS specific classes to the period of instruction at the basic MOS school for both the 2147s and 2171s.

As indicated previously, the MOSs that the increase of vehicles will effect are 2147 and 2171. The current T/Os allocate nine 2147s, sergeant and below, for organizational maintenance support to each line company. Third LAR battalion, by T/O, has 33 2147s and nine 2171s, sergeant and below, in H&S company for organizational maintenance support of the battalion. The remaining LAR battalions, by T/O, have 27 2147s and seven 2171s, sergeant and below, for organizational maintenance support of the battalion.

Tactical Implications:

The tactical implications are many with the introduction of the LAV 120mm AMS. The LAV 120mm AMS meets all transportation requirements of the basic LAV. Landing Force Sixth Fleet (LF6F) deployments are currently deploying with a company minus of LAR. The task organization for this company includes two LAV-Ms organic to the company. With the introduction of the LAV 120mm AMS, companies can deploy with a platoon of four LAV 120mm AMSs for organic fire support. This will not only increase the maneuverability of LAR on deployment but also increases indirect firepower for the Marine Expeditionary Unit (MEU). The task organization options available to the MEU Commander increase with the introduction of the LAV 120mm AMS. For example, the LAV 120mm AMS can be used as the primary, all weather, indirect fire support asset for the battalion landing team (BLT) until artillery comes ashore. Once artillery comes ashore the platoon returns to the LAR company to provide DS indirect fire support to the LAR company for any follow on missions.

Fire support coordination measures will not change with the introduction of the LAV 120mm AMS. The task organization used to support the mission will drive the fire support coordination issues and planning. Commanders will have to consider the capabilities and limitations of the LAV 120mm AMS when planning amphibious operations. When the LAV 120mm AMS is used to support the landing force in the initial phase of the operation, command and control procedures will have to be clearly defined and understood. The mission of LAR during the initial phase of the operation will also have to be considered before the decision is made to use the company's organic fire support in support of the landing force. When the LAV 120mm AMS is used to support the landing force a tactical trigger point will have to be established when to return the platoon to the company. Normally the decision point will be when the artillery battery comes ashore and can provide fire support for the landing force.

Summary:

Currently, LAR is limited in conducting operations because of the limited range and lethality of the LAV-M. The Marine Corps must incorporate the LAV 120mm AMS into LAR as discussed in this paper. The LAV 120mm AMS gives the Marine Corps an improved indirect fire support asset with greater range, lethality, and responsiveness enhancing the LAR commanders ability to shape his battle space. Even without artillery support, the LAR commander can utilize the greater range and lethality of the LAV 120mm AMS to move deeper into the battlefield and exploit several principles of war such as surprise, mass, lethality, and speed.

The introduction of artillerymen into LAR will enable the LAR commander to better use this asset. It will enhance LARs ability to conduct operations due to the fact that the Marines employing the system are school trained in fire support and the employment of fire support systems. They have a better understanding of fire support capabilities and limitations necessary to synchronize fire support with the LAR commander's scheme of maneuver.

Although there will be an increase of personnel in the LAR battalion, there will not be a need for an increase of personnel for the entire Marine Corps. With the reduction of the artillery battalion fire direction officer from captain to lieutenant and the deletion of the artillery battery A/XO, officers will become available to support LAR.

The introduction of the LAV 120mm AMS also increases the indirect fire combat power for MEU deployments. The lack of a capable, decisive indirect fire support asset during the initial phases of a landing can be resolved with the integration of this system. The range and mobility of the LAV 120mm AMS creates more options for success for the MEU commander. It will enable him to maximize his battlespace by utilizing his organic fire support assets to create a synergistic massing effect on the enemy, denying the enemy the ability to organize any effective resistance.

Recommendation #1:

Integrating the LAV 120mm AMS into LAR as a battery. The total number of LAVs would be sixteen to better support the entire battalion. The battery commander will be a 0802 captain who will also have the responsibility as the battalion fire support coordinator. The sixteen LAVs will be broken down into four platoons, which will be commanded by 0802 lieutenants. The battery could also be task organized, one platoon per line company, depending on the mission of LAR. There will be no need for an increase of mechanics since the battalion currently has enough mechanics to support the increase of vehicles.

Recommendation #2:

Incorporating the LAV 120mm AMS into LAR as four platoons organic to the four line companies. The platoons still maintain the capability to mass on a single target if required. The only limitation is the ability to rapidly clear fires when the entire battalion is conducting a mission since the platoons will be independently supporting the companies. 0802 lieutenants will still command the platoons and the company XO will remain as the company fire support coordinator. The battalion fire support coordinator should still be a 0802 captain to ensure that fire support is thoroughly integrated and can support the battalion commander's scheme of maneuver. He can also assist the company commanders in providing guidance to the LAV 120mm AMS platoon commanders on training and employment. Again there will be no need to increase the number of mechanics due to the increase of LAVs.

NOTES

[1] Colonel James C. Flynn, USMC(Ret), "LAV-120mm Armored Mortar System", Marine Corps Gazette, Volume 82, Number 2, February 1998, 34-35.

[2] United States Marine Corps, Employment of the Light Armored Reconnaissance Battalion (MCWP 3-14)(Draft).

[3] Captain Kurt Koch, USMC, <KOCHK@Pendleton.USMC.mil> "Re: Thesis Questions from Captain Tate". 13 August 1999. Personal communication.

[4] Major Brian Colebaugh, USMC, <Colebaub@TACOM.ARMY.mil> "Re: Thesis Questions from Captain Tate". 13 August 1999. Personal communication.

[5] Koch, "Re: Thesis Questions from Captain Tate".

[6] Major Gus Dearolph, USMC, <Dearolph@onslowonline.net> "Re: Thesis Questions from Captain Tate". 13 August 1999. Personal Communication.

[7] Colebaugh, "Re: Thesis Questions from Captain Tate".

[8] Major Anthony Johnson, USMC, Former Fire Support Coordinator, 3rd LAR, Telephone conversation with author, 27 September 1999.

[9] Colebaugh, "Re: Thesis Questions from Captain Tate".

[10] Johnson, Telephone conversation with author.

[11] Koch, "Re: Thesis Questions from Captain Tate".

[12] Dearolph, "Re: Thesis Questions from Captain Tate".

Captain Tate graduated from Officer Advanced Course 5-99, on 28 Dec 1999. He is currently serving with 5th Battalion 10th Marines.