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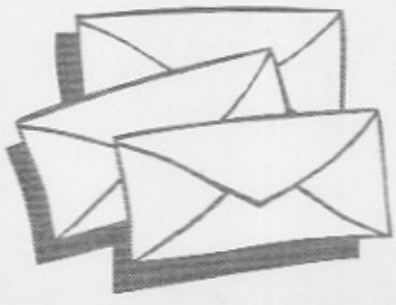

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LEADERSHIP

COMMAND PHILOSOPHY

By Capt T. E. Chandler

My command philosophy is my vision for leadership of Echo Battery. It tells you what I expect of the battery and what I expect of the Marines who serve in it. It tells you how I view my role as commander and what you can expect of me.

What is most important? The most important thing we do is to prepare for war. Should we be called, we must be prepared to deploy world-wide with all our Marines and sailors and – if necessary – all our equipment. We must possess the leadership, discipline, and technical and tactical proficiency required to undertake any mission across the spectrum of conflict, from providing humanitarian assistance to providing responsive, accurate artillery fires in an outright war. And, we must leave our families and personal affairs in a suitable posture, so that our loved ones can carry on in safety and security while we are gone.

Technical and tactical proficiency is our bread-and-butter. However, I believe leadership and discipline are most important. Throughout our history, Marine Corps units have made up in discipline, in NCO leadership and initiative, in individual ardor and in unit esprit what they may have lacked in combat readiness. This lesson is especially appropriate to Echo Battery as we approach the downside of the deployment cycle.

Where are we now? Marine Corps units undergo a recurring life cycle tied to the deployment schedule, and combat readiness ebbs and flows like the water of the ocean. For Echo Battery, high tide occurred during the last deployment when the battery was at the peak of its power and readiness. Since the battery returned from deployment, we have begun to experience the ebb, as turnover in key billets and the loss of good Marines to EAS, PCS orders and the FAP have had their effects. We will reach low water soon after we return from CAX, when we will lose more of our best Marines and the battery's numbers will bottom out. At that point, however, there will be a pause. Then, the tide will turn, and the water will begin to rise once more.

Where are we going? The power that makes the tide flow again comes from confident, competent new leaders, as they step up to fill the gaps and assume their rightful places at the forefront of a unit that is being reborn. The hard-charging PFCs, Lance Corporals, and junior NCOs of the last deployment, together with newly-joined Marines of all ranks and levels of experience, will form the cadre that leads the battery through its next deployment.

If you are moving onward, do not leave without passing on the benefits of your leadership, knowledge and experience. If you are staying, prepare yourself and be ready when the time comes for you to take charge!

What obstacles do we face? The greatest obstacles are "brain drain" and the high turnover that results. Losing trained and experienced Marines means that we stand to lose some of the experts and leaders we have come to rely on. High turnover makes it difficult for sections to remain proficient at collective skills, to preserve old SOPs or establish new ones, and to maintain the special advantages enjoyed by teams that have been welded together by tough training and shared experiences. At the same time, we face numerous distractions, including the FAP and taskers that the battalion traditionally assigns to the battery that has most recently returned from deployment.

How will we succeed? We will succeed by seizing opportunity from adversity. In the face of every challenge, how we succeed or fail is solely a matter of choice and of our collective will. It is a matter of attitude. Every time we say "fair winds" to one of our veterans, we must welcome the opportunity for a new leader to step up, take charge, and test his mettle. Every time we receive a tasker, we must bend it to our purpose and make it an opportunity to train our junior leaders in leadership—and in followership. No matter what we do, we must adopt the attitude that it can be an opportunity to train.

What are our training priorities? To train competent, confident and courageous leaders. To train intelligent, self-motivated and self-moderated followers. To train to a high standard of proficiency in individual and collective technical skills. To develop teamwork, camaraderie, and a shared sense of purpose.

We are all leaders. We are all followers. We each make a unique and specialized contribution to the unit. We are a team.

How will we train? We will encourage individual efforts to achieve personal growth, provide opportunities for the development of leadership skills, and reward initiative. We will train to a high standard of technical proficiency in our individual and collective tasks. Technical proficiency is crucial to the accomplishment of our mission, and technical training is a way to develop the discipline, critical thinking, problem-solving ability, and self-confidence that are inseparable from mastery of a difficult skill. We will accept mistakes, but we will not tolerate a failure to learn.

We will apply these rules:

1. Every task is an opportunity to train.
2. Train as a team.
3. Train every Marine as a leader.
4. Decentralize in execution.
5. Execute. Execute. Execute.

What do I expect of you? I expect every member of this command to conduct himself in accordance with the core values of honor, courage, and commitment. I expect you to obey the law, to follow regulations, and to obey lawful orders. I expect you to take responsibility for your personal actions and choices. I expect you to remain true to your marital vows and to respect the sanctity of marriages of others. While marital conflict or separation is regrettable, it is a private affair; adultery is a breach of trust and a violation of Marine Corps values. I challenge you to live so that your personal integrity may never be in doubt, to guard your reputation, and to uphold the special trust and confidence with which the nation regards our Corps. I expect you to treat your fellow Marines and all others with respect and personal dignity regardless of race, creed, or gender, and to tolerate no abuse or hazing. I expect you to take risks when justified by the situation, but I charge you to never take a risk that could have consequences that you, your fellow Marines, or I could not accept. I expect you to make mistakes, but I challenge you to never make the same mistake twice.

Junior Marines: Be proud of the service you are doing your country. Remember that, by entering into a legal contract with the Marine Corps, you have voluntarily given up some of your individual freedoms for a period of time. Military service carries many obligations and restrictions, but, as a member of the military, you help to keep this Nation strong and ready to guard against any threat to the freedom of its citizens.

You should also expect to receive many benefits from military service: technical training, travel opportunities, unique and challenging experiences and the chance to develop leadership skills and to grow as an individual. The opportunities are there, but only if you go after them. Keep in mind that the surest way to get something out of any experience is to put a little bit of yourself into it. Don't be afraid to commit yourself—to your duties, your studies, and your fellow Marines. Be hard on yourself. Perform every task to the best of your ability. Seek out responsibility, and look for opportunities to lead. Remember: whenever two Marines are together, one is in charge. And, when in charge, be in charge. Four years may seem like a long time, but they are an investment that can pay great dividends over a lifetime. Don't waste your time!

Non-Commissioned Officers: You are the backbone of the unit. On any battlefield, expect your officers to lead from the front and to set the conditions for victory. Look to your SNCO's to lend you their courage and to show you how craft and cunning may defeat the enemy. But, in the last hundred yards as you close with the enemy, only you can keep your Marines together and moving forward. Only you can keep the aim true that withers the enemy line with fire. And, only you can strengthen the arm that wrestles victory from the foe. Those last hundred yards make all the difference, and they belong to you, the NCO.

Similarly, no unit can be truly disciplined without NCOs that enforce the rules. No unit can be fully trained without NCOs who know their business and who take every opportunity to train their junior Marines. No unit is well led without NCOs who see what needs to be done and who get it done without waiting to be told. Take responsibility for

yourself and for your team. Look out for your Marines and keep them informed. Take good care of your equipment. Set the example. Supervise.

Lead, teach, correct, care for, and motivate—every day!

Staff Non-Commissioned Officers: You run the battery. I decide where the battery is to go, but I rely on you to get me there. The battery officers are responsible for their platoons and functional areas, but I expect them to succeed through you. Teach your officers. Help them to learn their jobs and to know our Marines. Keep your officers informed. Tell us what we need to know, not what we want to hear.

Be technically and tactically proficient. Be sure to expand your knowledge beyond battery-level operations and administration. Look for better ways to do things.

Take care of your Marines, but first teach them to take care of themselves. You are role models for our junior Marines, and you must be mentors to our NCOs.

Officers: Our job is to take responsibility. That is what they pay us for. At the same time, we can rarely claim credit. Our Marines get the job done for us, but we must set the conditions for their success. Issue clear guidance. Ensure that your Marines have the resources they require, and ensure they are properly trained. Look to their motivation and their welfare. Look out for their safety.

Know your Marines, and learn what they do. Develop a relationship of trust with your SNCO or NCO. Inspect now, so that you won't need to check later. Keep your SNCO or NCO informed. Seek their advice, but don't ask them to make your decisions for you.

Be an avid student of your profession. Master the technical skills required to do your job so that you may teach these to another. Study leadership. Seek responsibility. Expand your knowledge and experience as a way to grow in character and wisdom. Practice making timely decisions and issuing mission orders. You cannot always make the right choice, but you must make all choices for the right reasons.

What can you expect of me? You can expect me to make decisions. As the commander, this is the most important thing that I do. The most common decision I make is what the battery can and cannot accomplish in any given day, week, or month. I will not avoid my responsibility by making every task equally important or by simply directing that the battery will accomplish all tasks it has been assigned. Frequently, a lack of time, people, or resources makes it impossible for the battery to accomplish all tasks in the time available. When that happens, I establish priorities of work or simply decide what tasks the battery will and will not accomplish. I reserve the authority to make that decision myself, and I will live with the consequences.

When I make a decision, you can expect me to live with the results. Knowing when to make a decision is often as important as the decision itself, and I will not delay a decision unnecessarily. In general, once committed to a course of action, you can carry out your part without fear that I will change my mind in midcourse.

When you make a decision on my behalf, you can expect me to back you up. I do not want to do your job for you, and I know that you cannot do your job without authority commensurate to the task. In general, you can assume that you have the authority to

make all routine decisions necessary to carry out your duties and assigned tasks. If I disagree with a decision you make, I will let you know so that you will understand better what I expect of you next time. However, do not expect me to back you up if you knowingly or unknowingly make a decision that endangers the life or limb of any person, that risks the loss or destruction of government property without justification, that is dishonest, unethical, or inhumane; or that is inconsistent in any way with the standards and values of the Marine Corps.

You can expect me to enforce Marine Corps orders, policies, and directives on drugs, alcohol, and hazing.

Administrative Punishment: There are no set rules, circumstances and individuals matter. I see myself as exercising my authority to hold NJP on behalf of my officers and NCOs, and I expect platoon commanders and the Battery First Sergeant to make recommendations. In general, you can expect me to hold individuals accountable for their own actions or negligence and to consider the impact of punishment on the unit as well as on the individual.

Awards: Awards must be consistent, fair, and impartial. Awards must not be given cheaply, but it is never inappropriate to recognize a Marine for a job well done. There is an award appropriate for every circumstance. And, for the "mission accomplishers", we will do other things, as well: for example, special liberty, permissive TAD to hometown recruiting stations, and opportunities for specialized training.

Schools, PME, and Off-duty Education: Schools, NCO PME and evening college courses are opportunities to train leaders and professionals, not a distraction. NCOs will attend PME required for their grade. We will send qualified Marines to schools and licensing courses so that the battery has the right number of trained and licensed Marines to accomplish the mission. I will also send Marines who demonstrate aptitude and leadership qualities to specialized training—Small Arms Weapon Instructor Course, Close Combat Instructor Course, for example—whenever possible, so that they can return to the battery as instructors. I am committed to supporting Marines who want to improve themselves by attending off-duty college courses. If you have a plan and have shown the discipline required to complete off-duty education, I will work with you to ensure that you miss as few classes as possible.

Families: Our family lives are private, but we cannot go to war if we are not ready at home. Manage your personal affairs and ensure that your family is prepared in case of an unexpected deployment. Help family members understand your duties and responsibilities as a Marine. Keep your chain of command informed of personal issues that may affect your performance. In return, through the chain of command, I stand ready to support you with information, advice or assistance. And, I understand that often the best thing I can do for your family is to give them time with you.

Liberty: Being a Marine is a way of life, but our profession is not the only thing in our lives. We have a job to do, we will work hard to get it done, and we will go on liberty.

In conclusion, command is a matter of stewardship, not ownership. You are professionals, and you are good at what you do. I consider it a privilege to serve with you, and I am dedicated to helping you make Echo battery the best that it can be.

OPERATIONAL FORCES

DOING MORE WITH LESS

By Capt J. B. Chartier

In our Marine Corps today, live fire training occurs less often than any commander would like. Because of this, innovative training is required to maintain our skills as Fire Supporters and to train our maneuver counterparts. Of course we have the TSFO, which allows us to hone our target location and call for fire skills, but what about when we are not near these training tools? What do we do while aboard ship? We have to become more creative in devising training.

Captain Dov Kawamoto used some ingenuity to devise creative training while deployed with the 31st MEU (SOC) as a Forward Observer for Alpha Co., Battalion Landing Team 1/5. He was tasked with evaluating the fire support section of the BLT's Super Squad competition and in preparation for the competition, Capt Kawamoto constructed an interactive class given to all the squad leaders on basic call for fire and adjustment procedures. He designed practical exercises using Power Point to test the squad leaders' basic fire planning skills as well as their call for fire capabilities. This allowed him flexibility as to where he could give his classes and made it easy to use by others Training like this is what we need in the artillery community. It is incumbent upon us to devise creative ways to train our observers and the maneuver units we support. The more we interact with our maneuver counterparts, the more trust, confidence and latitude we will be given to devise training.

Instead of sitting around idly, leaders should be asking themselves, "What training have I conducted with the FiST lately?" The onus is on us to ensure FiST leaders are fire support literate. Unless he is a senior Lieutenant, the only fire support training he has had is at The Basic School and the Infantry Officers Course. Therefore, it is our job to ensure fire support training, grounded in doctrine, occurs.

Training is only limited by our imaginations. In our increasingly high tech world, anyone can access most of the Officer Basic Course fire support classes on our website http://sill-www.army.mil/FACCC. Take advantage of the resources available on the web. Between the EWTGPAC, EWTGLANT and TTECG web site, one can find a number or classes, trends and training tips to get them started. There are years of fire support experience in each of those web sites, but do we have to be so "high tech" with our training?

What about fire support specific Tactical Decision Games (TDGs)? Officers remember the hours at The Basic School spent around the sand tables, in essence, working out TDGs. There is no reason not to design TDGs to practice our fire support tactics, techniques and procedures. In fact, that is probably one of the best tools we have

to get the creative juices flowing and begin to look at situations from many different angles. Is there only one way, one answer, probably not. If this sounds all too daunting, remember that in the back of every Marine Corps Gazette there is a TDG. Granted, it is designed to stimulate thought about maneuver tactics, but who says we cannot practice developing fire support plans to support the tactical scenario. This is a simple, yet effective, way to train us, our subordinates and most importantly, our infantry brethren. Do not underestimate the learning potential of TDGs.

If this is not enough, an MCI aimed at company and battalion level fire support requirements is in development and will add more flexibility to your training possibilities. Remember, just because we cannot always observe live fire, does not mean we have to stop training.

Everyone knows and understands the importance reading our own doctrine. Why not sit down with the MCWP 3-16 Tactics, Techniques and Procedures for Fire Support Coordination in the Ground Combat Element, MCWP 3-16.6 Observer, Spotter, Controller Handbook or one of our many other publications and learn it. Before we can teach our subordinates, we must understand it first. How can we accurately advise our maneuver commanders if we have not read the publications ourselves?

There are numerous training methods available to us, but are we using them? TDGs, creative instruction and reviewing doctrine are just a starting point. Remember training, like chow, is continuous.

SUGGESTED TRAINING WEBSITES

www.tecom.usmc.mil www.ewtgpac.navy.mil www.ewtglant.navy.mil
www.29palms.usmc.mil/base/ttecg/homepage/arty.htm

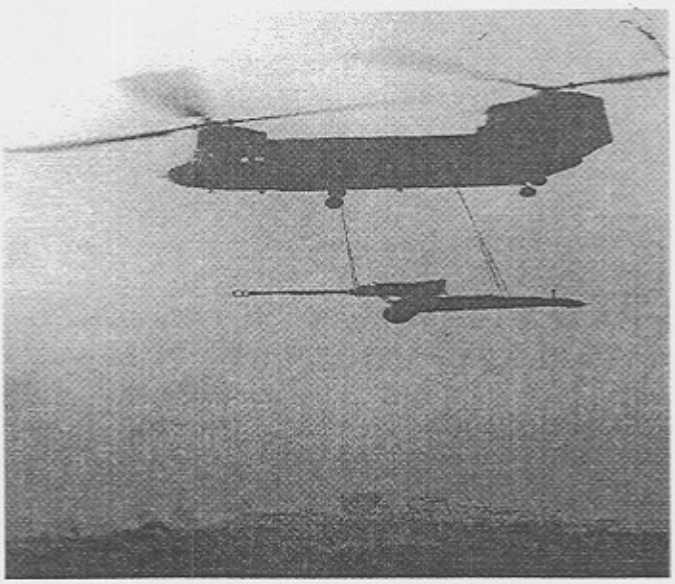
POC: For questions or comments contact 1stLt Josh Chartier, Basic Fire Support Branch, at DSN 639-5801; E-mail: chartierj2@sill.army.mil

JOINT COMES TO 10TH MARINES

By LtCol G. T. Starnes

Military operations in today's world are often conducted with a "Joint" flavor. Marine Corps units need to be prepared to integrate with units from other services seamlessly to be effective in this joint world. During the 10th Marines Rolling Thunder 1-01 exercise at Fort Bragg, NC, C Battery of 1/10 got a taste of joint operations during a live-fire artillery air assault. Because of a temporary lack in availability of heavy lift assets within the Marine Corps, the 10th Marines coordinated support from U.S. Army CH-47 Chinook helicopters from elements of the 18th Airborne Corps from Fort Stewart GA. Although the mission was a resounding success in the end, there were definitely some valuable lessons learned.

The CH-47 Chinook is a very capable platform. Although similar in appearance to the Marine Corps's venerable CH-46, it is a much larger, more powerful helicopter. Its primary missions are to conduct aerial movement of fire support systems, combat troops, equipment, and supplies in maneuver, combat support, and combat service support roles. It is equipped to accomplish these missions day or night, and under most weather conditions. The Chinook uses 30 troop-carrying seats as a maximum (28 when configured for parachute operations). Unless the helicopter is carrying external loads, this troop-carrying restriction is due to space within the aircraft, and not the weight of personnel aboard. The maximum take-off gross weight is limited to 50,000 pounds which gives a theoretical lifting capability of just over 26,000 lbs. Externally the Chinook can lift up to 26,000 lbs, but loads over 19,000 lbs require mission adjustments and prior coordination.



U.S. Army doctrine focuses heavily on helicopter lift to provide mobility on the battlefield. Because these types of operations are so common for Army units, their organization is slightly different from the Marine Corps. The Marine Corps' FSSG elements contain Helicopter Support Teams (HST) whose Marines are specially trained to prepare loads to be lifted, to rig slings for external lifts, and to actually hook-up loads to helicopters before they are lifted. In the Army, there are no such specially trained units, only specially trained individuals within combat units. The first coordination problem arose because of this difference in doctrine. Because the soldiers who rig howitzers and ammunition are not specifically school trained, they require a specially trained load-master to certify the loads as safe for flight.

The HST that were working for C Battery was not qualified by the Army school, and therefore not authorized to sign the Army's inspection form. After several phone calls and emails, we found that because the Army was lifting a Marine Corps load, the Marine Corps is responsible for our own rigging and therefore not required to sign the Army load certification. After notifying the helicopter squadron and directing them to their own publications on the subject, the issue was cleared up.

Another significant issue to overcome was the use of the Army's specialized slings and travel-locks. The CH-47 has three hooks for external lifting. The forward and aft hooks are used for dual-point lifting, (the preferred method for lifting the M198). Unlike the Marine Corps, the Army typically does not use long extensions from these hooks to attach the slings to. This caused several problems for the HST. The biggest problem was that the helicopter had to fly much lower so that the men on the ground could reach up and attach the slings directly to the aircraft, instead of to a hook dangling below the aircraft. This limited clearance between the howitzer and the aircraft makes the HST's job much more difficult to accomplish. The HST Marines have to stand up on top of the howitzer, and actually reach up to the aircraft. An additional problem arose due to the significant amount of static electricity a helicopter creates as when hovering above the howitzer. Because the Army's slings ground themselves on contact, there is little danger involved in the hook-up process. The Marine Corps slings are not self-grounding, which means the HST Marines must ground the helicopter's hooks before attempting to attach the sling, or risk a potentially dangerous electric shock. While the HST Marines are trained and equipped to do this, it may surprise the CH-47 crew-chief to see a Marine attacking his helicopter with a long grounding rod- a point worth briefing beforehand!

The other problem with a lack of hook extensions is that because the aircraft is flying much lower, the barrel of the howitzer is much closer to the bottom of the aircraft. To overcome this problem, the Army uses specially made travel locks that are much smaller. With the special travel lock in place, the barrel is depressed making it parallel with the ground, providing more clearance. To do the mission, Battery C had to borrow travel locks from an Army artillery unit. The only other alternative would have been to use the normal travel locks with extended Marine lifting hooks and convince the Army helicopter unit to use them.

After overcoming many challenges, the mission came off without a hitch. The helicopter pilots were very impressed with the knowledge and detailed planning displayed by the HST Marines of the 2nd Transportation Support Battalion. They were also very flexible and easy to work with once all the issues were presented. The Marines of Battery C 1/10 performed flawlessly, moving four howitzers, an FDC HMMWV, a Forklift, and ammunition into a position, getting FIRECAP and sending projectiles downrange safely and expeditiously.

In the future, artillery units may find themselves in a combat situation relying on lift assets from outside the Marine Corps, or even from outside the U.S. Military when conducting missions. Training for artillery air assaults with U.S. Army Chinooks is an outstanding opportunity to train your Marines to be prepared for these types of operations.

Notes on Universal Cannon Safety

By Capt M. Grice

With the adoption of change1 to the FM 6-40 (MCWP 3-16.6) Field Artillery Cannon Safety has undergone a change from multiple computational procedures to a single, comprehensive matrix for production of safety data. The change has been out for about a year now, and two questions regarding the procedures need to be addressed.

Question #1: Why are there so many table "C"s when they seem to contain the same data?

Answer: The answer is that table "C" (Ballistic Data for Safety Computations) is a new table that has been added to all base ejecting firing table addenda in order to provide basic ballistic data that may in turn be used for safety computations. There are multiple firing table addenda for each projectile; each based on the ballistic solution required. M825 Improved Smoke, for example, may be fired using either the FT 155-ADD-T-0/FT 155-AM-2 combination or the FT 155-ADD-Q-0/FT 155-AN-2 combination. Both sets of tables will produce accurate target attack data, but they are produced using different entry arguments: one using HE (AM-2) and one using DPICM (AN-2). Since there are two firing table addenda, there are two table "C"s, each with the same information. All new firing tables will be printed with the table "C" data included, which will alleviate confusion.

Question #2: Why is there no Fuze K in the safety computation matrix?

Answer: The decision not to include Fuze K was made as a compromise between accuracy, timeliness, and convenience. The universal safety computations compensate for range factors by applying "Range K" to the information listed on the range safety card for firing point safety or produced when creating the Surface Danger Zone (SDZ) for non-firing point safety. Range K is, in effect, a GFT setting for the firing table. The difference between Range K and a GFT setting, however, is that Range K does not contain a separate fuze correction.

The reason that a separate Fuze K was not applied to the safety computations is based on how fuze settings are computed. Fuze settings are derived as a function of range, meaning that the bulk of nonstandard conditions that can be quantified are

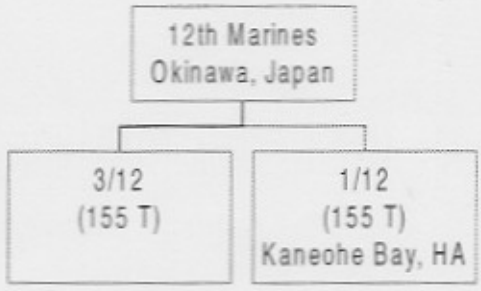
compensated for with the application of Range K. The Firing Tables and Aeroballistics Branch (FTAB) of the Army Research, Development, and Engineering Command (ARDEC) confirmed that performing computations in this manner produces safe data as the majority of difference between standard and non-standard data is compensated for, by applying Range K. Generally, the application of Fuze K would create a differencé of +/- 0.2 fuze setting increments, with the preponderance of errors being positive (i.e., long, which means the projectile would function as a graze burst before the computed safe time would be reached).

This method does not compensate for fuze manufacturers tolerances or lot differences, which are captured as position constants after determining total corrections from either a registration or MET + VE technique. Once identified and applied in the form of a GFT setting, they will produce safer data, and safety should be verified and/or recomputed in accordance with the Joint Regimental Safety SOP.

ARTILLERY SUPPORT IN THE FAR EAST

By LtCol Michael Hull 14th Marines Staff

12th Marines, located at Camp Hansen, Okinawa, Japan is the 3rd Marine Division's direct support artillery regiment. The regiment is composed of two battalions, 3rd Battalion, 12th Marines located at Camp Hansen and 1st Battalion, 12th Marines located at Kaneohe Bay Hawaii. The 12th Marines provides close and continuous fire support to the 3rd Mar Div.



Although smaller than the other artillery regiments the 12th Marines remains very busy with elements of the Regiment deploying to places such as Hawaii, Korea, Thailand, Australia and the Philippines. In all, the Regiment had elements deployed 328 days of CY 99. The off-island deployments are in addition to the RSOP, CPX, field skills and small arms training conducted on Okinawa. By far the crown jewel of artillery training on Okinawa is the Artillery Relocation Training (ART) exercises conducted by 3/12, which are described below.

ARTILLERY RELOCATION BACKGROUND

Marines assigned to batteries that deploy to Okinawa are exposed to a unique artillery program. In March 1997 all artillery live fire exercises on Okinawa ceased. The central issue behind the cessation was to eliminate firing over Highway 104 (a major east-west highway on Okinawa). However, the discontinuation of on island live fire training resulted in the birth of the ART. ART negotiations and coordination began with the development of an Ad Hoc Working Group (AWG), which established five relocation sites on mainland Japan. In order to determine the five optimal sites, 12th Marines organized a site survey team that established a criterion of comparison for the maneuver areas at Camp Fuji, Japan and the Central Training Area (CTA) on Okinawa. With full cooperation of the Japanese Ground Self Defense Force (JGSDF) and the Japanese Defense Facilities Administrative Agency (DFAA), the survey team evaluated eight different maneuver areas and nine supporting bases in the three major geographic areas of Japan (Hokkaido, Honshu, Kyushu). The five sites identified and determined to be the best suited for training were: (1) Yausubetsu (Hokkaido), Japan; (2) Ojojihara (Honshu), Japan; (3) East Fuji (Honshu), Japan; (4) North Fuji (Honshu), Japan; and (5) Hijudai (Kyushu), Japan. Figure One shows the locations of all sites on mainland Japan.

The preponderance of the cost associated with this training is funded by the Government of Japan (GOJ). In most aspects, 3/12 works directly with the DFAA to coordinate each ART exercise. The agreement affected in 1997 authorized training until March 2002 and is scheduled to be renegotiated in 2001. The agreement is administered by a combined GOJ-United States Government (USG) committee called the Training Relocation Subcommittee (TRSC) with United States Forces Japan (USFJ) as the executive agent for the USG. ART allows 3/12 to schedule at least two live fire exercises for each Unit Deployment Program (UDP) battery during their UDP cycle. The training is also an opportunity for these batteries to experience new training areas and visit different parts of Japan.

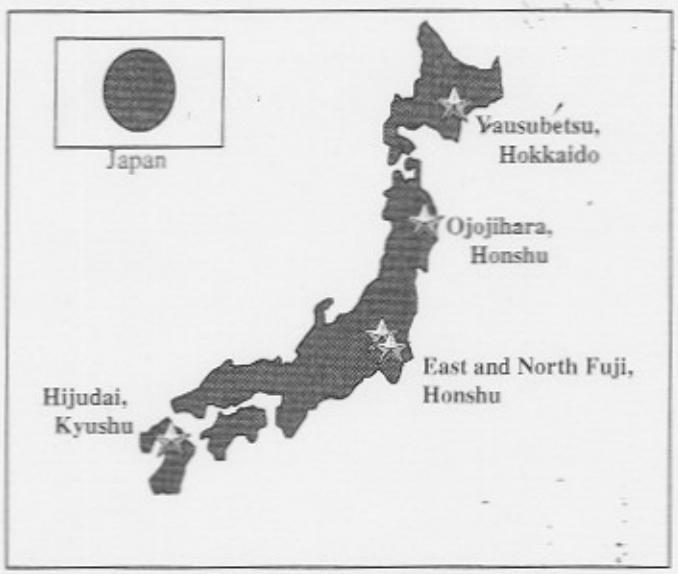


Figure One: Five Artillery Relocation Training (ART) sites on mainland Japan.

TRAINING AREAS AND THE TRAINING

Of the five designated ART sites Yausubetsu, Hijudai and Ojojihara were new to 3/12. Camp Fuji however, continues to remain one of the favorites (Figure Two). A recent battalion level relocation exercises in East Fuji was a complete success. Some Marines had the opportunity to climb Mount Fuji as well as enjoy liberty in Tokyo.

The other three relocation sites offer exciting training opportunities for artillerymen. Yausubetsu is the largest training area and allows excellent reconnaissance, selection, and occupation of position (RSOP). Additionally, it offers 3/12 the opportunity to fire the M119A1 propellant. Hijudai training area offers Marines the opportunity to train in cold weather operations. Relocation shoots to Hijudai normally occur in the early part of the year where temperatures reach negative 20 Celsius. Ojojihara also offers cold weather training with an average snowfall being 1-2 meters. Additionally, fairly steep hills, ridges, and one main river valley punctuate Ojojihara terrain. At all locations, 3/12 coordinates with the local JGSDF units to de-conflict any training and visits (Figure 3). On many occasions, senior-

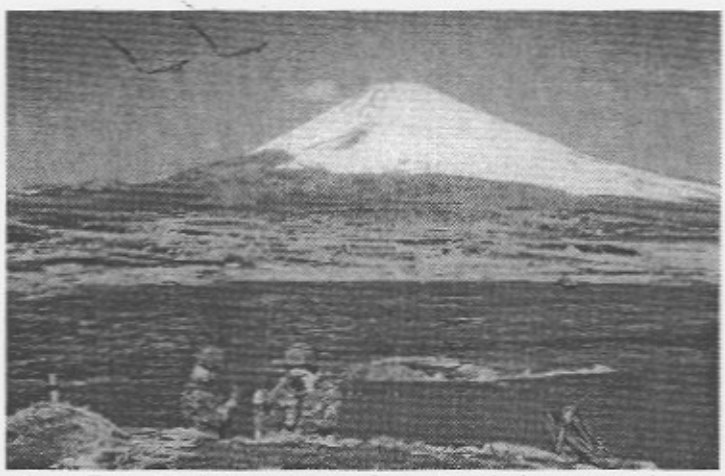


Figure Two: Marines training at Camp Fuji during a relocation exercise

ranking officers from the JGSDF visit 3/12 and they have uniformly commented that the Marines are professional in their duties and extremely proficient in their MOS.

Figure Three: Left: Marines deconfliting training areas at Hijudai. Right: A Japanese VIP visit during a battalion level relocation exercise in Yausubetsu.

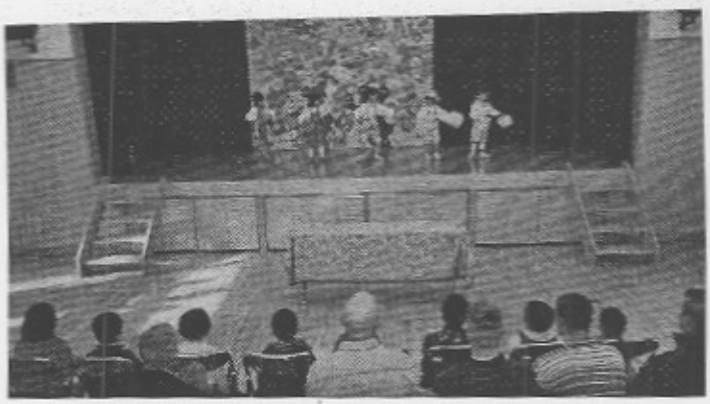


Figure Four: Marines enjoying a performance by Japanese elementary school children during a Community Relations visit in Ojojihara.

RELATIONSHIPS

In addition to superior training opportunities, Marines have the opportunity to conduct liberty in the surrounding areas. At each site, 3/12 and the DFAA coordinate cultural tours that allow Marines to observe Japanese customs. Marines also conduct community relation (COMREL) projects to include visits to homes of local residents, visits to elementary schools, and orphanages. These visits help strengthen the relationship with our host nation and allow Marines to learn about the Japanese culture. Figure (4) shows Marines enjoying a school performance by a Japanese elementary school in the Sendai (Ojojihara) area.

COORDINATION

The coordination and development of each relocation exercise occurs long before a battery arrives on Okinawa. 3/12 has developed a system of planning conferences that facilitate smooth transition from one exercise to another. The establishment of a Combat Service Support Detachment (CSSD), scheduling and participating in planning conferences, conducting site surveys, and working with interpreters to break the language barrier are all part of an aggressive planning process. Although working directly with a foreign government (and foreign contractors) may seem like a challenge, the experience

has been both rewarding and has resulted in a high state of readiness for 3/12. A key training evolution that occurs during every relocation exercise is the embarkation of all gear (rolling stock, howitzers, etc.) needed to conduct the training. The 3/12 logistics section has become well-versed in embarkation, debarkation and working with the host nation contractors. Figure (5) shows the offloads of battalion rolling stock as a part of the ART logistics support.

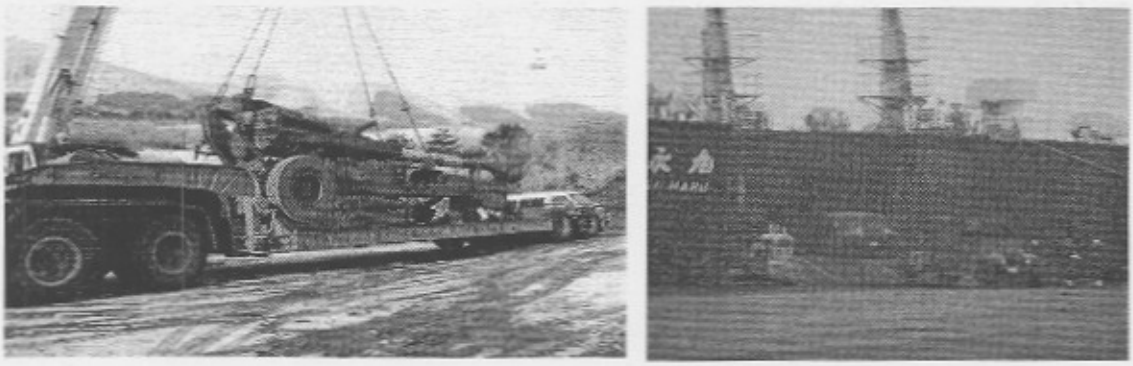
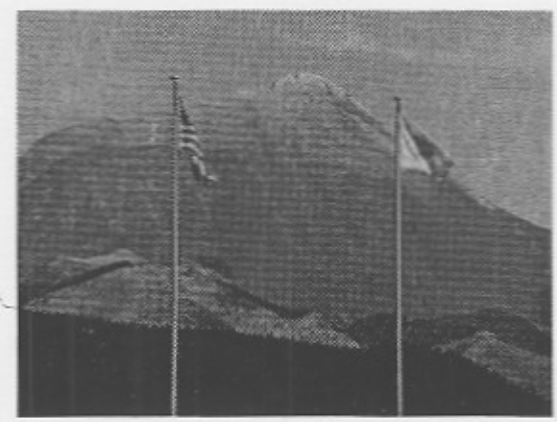


Figure Five: Left: Off-load of a stowed M198 by Japanese contractors. Right: Off-load of vehicles from Japanese shipping.

RESULT



The accomplishment of each relocation exercise is primarily the result of the professionalism and close working relationship of all the US and Japanese personnel. 3/12 is currently conducting planning for the 16th artillery relocation exercise in Hijudai. Planning is also underway for the negotiation of a new five-year agreement on Artillery Relocation Training. Thanks to the dedicated efforts of many determined Redlegs and their Japanese counterparts, what was a potential liability (the end of artillery live fire on Okinawa) has become an asset to the only artillery battalion on Okinawa. 3/12 reaps rewards in deployment preparedness, live fire sustainment training and cultural interaction. Artillery relocation training is a truly a Far East success story.

FIRE DRAGON 2000

In September of 2000, 12th Marines deployed to Camp Fuji, Japan to conduct Fire Dragon 2000, a regimental live fire exercise. HQ Battery, 12th Marines and elements of HQ Btry 1/12, (50 personnel, composed mostly of operations and communications Marines) deployed to Camp Fuji and linked up with 3/12 who was already conducting artillery relocation training. Fire Dragon provided the opportunity for the Regiment to tactically control multiple battalions in a live-fire-training scenario. The focus was on the Regiment's command and control of subordinate units and tactical fire direction in

support of 3rd Marine Division, executed through a scenario driven training exercise. Additionally, this provided the opportunity for the normally DS cannon battalions to exercise GS and GSR missions. No significant problems were encountered and the Regiment came out of the exercise with numerous after action comments that will improve our operations in the future.

CONCLUSION

Fire Dragon 2000 was a thorough and demanding exercise that tested the ability of 12th Marines to command and control multiple battalions in a scenario driven environment. As a result, 12th Marines is better prepared to conduct tactical fire direction in support of 3rd Marine Division.

MARINE CORPS SYSTEMS COMMAND

UPDATE FROM MARCORSYSCOM

Compiled by Capt D. A. Lovelace

Maj Garay - HIMARS

In a bid to address one of the tenets of CMC's precept to "Fix Fires," Marines of Marine Corps Systems Command have taken preliminary steps toward the multi-service procurement of the High Mobility Artillery Rocket System (HIMARS).

HIMARS will provide ground-based, General Support and General Support-Reinforcing (GS/GSR) indirect fires that accurately engage targets at long range with high volumes of lethal fire under all weather conditions. The HIMARS is a C-130 transportable, wheeled, indirect fire, rocket/missile system capable of firing all rockets and missiles in the current and future Multiple Launch Rocket System Family of Munitions (MFOM). The basic system (launcher) will consist of a Fire Control System, a carrier (automotive platform) and a launcher-loader module that will perform all operations necessary to complete a fire mission.

With congressional funding of 17.3 million dollars this year, the Marine Corps intends to purchase two prototype launchers, rockets and parts. Additional plans include the establishment of the program office that will oversee the studies and evaluations necessary to support the fielding of HIMARS. Significant upcoming initiatives include a Fleet Marine Force evaluation and developmental testing that will ensure that HIMARS addresses current/future fire support requirements.

Current plans are to field two battalions in the 14th Marines with 18 launchers each. The 14th Marines, who have the wartime mission of serving as the Force Artillery Headquarters in support of MEF-level operations, are ideally suited to receive this component of the next generation of Marine Artillery. Officials at Marine Corps Systems Command anticipate production, beginning in FY06, with an initial operational capability achieved in FY08. Questions regarding HIMARS can be addressed to Major Roger Garay, USMC at garayra@mcsc.usmc.mil

Maj Rogers - TLDHS, MBC, FAM

The Target Location, Designation, and Hand-off System is a modular, man-portable equipment suite that will provide the ability to quickly acquire targets in day, night, and near-all-weather visibility conditions. Operators will be able to accurately determine their own locations as well as that of their targets, digitally transmit (hand-off) data to supporting arms elements, and designate targets for laser-seeking Precision Guided Munitions (PGM) and Laser Spot Trackers (LST). The TLDHS will be fielded to FO Teams, NGF Spot Teams, Tactical Air Control Parties (TACPs), and Reconnaissance Teams. The TLDHS is composed of two subsystems: the Target Locator, Designator Subsystem, which is the Lightweight Laser Designator Rangefinder (LLDR), and Target Hand-off Subsystem (THS). The LLDR and THS can be used independently or together as the TLDHS to provide the target location, designation and hand-off capability.

The LLDR is scheduled to continue Development and Testing through Feb 2001; with an Operational Test in April 2001. A Marine Corps production decision will be made during July 2001 and Initial Operational Capability (IOC) in Feb 2004.

THS is scheduled to undergo Operational Testing in Nov 2001 for an Artillery and Close Air Support capability. A production decision is scheduled for March 2002 and IOC during Oct 2002. A Naval Surface Fire Support capability will follow in FY03.

Mortar Ballistic Computer

The Mortar Ballistic Computer will be funded in FY03. Once funding is restored, software development and selection of a ruggedized commercial hardware solution will proceed.

The MBC will follow an incremental acquisition approach to permit eventual fielding of a Complete System. An initial system will be developed which will provide a capability to compute technical mortar fire direction data. The complete system will be a MBC linked to the Marine Corps fire support command and control system via the Advanced Field Artillery Tactical Data System (AFATDS) for enhanced fire support coordination, situational awareness, and command and control capability.

Family of Artillery Munitions

The Trajectory Correctable Munition (TCM) will be an extended range, precision-guided, howitzer-launched 155mm artillery projectile. It will provide artillery batteries with the capability to more accurately engage targets at longer ranges. The TCM will utilize technologies to extend the effective range of Marine Corps artillery from 28 kilometers to 37 kilometers (40 km objective) and will possess the flexibility to carry a variety of submunitions such as Dual Purpose Improved Conventional Munitions (DPICM), Sense and Destroy Armor Munitions (SADARM), and a unitary warhead (Penetrator). The TCM will achieve extended range and improved accuracy over

currently fielded munitions. The TCM will utilize a ground-based fire control system to calculate technical firing data and an onboard GPS/INS guidance system to make in-flight trajectory corrections to the projectile thus reducing the circular error probable (CEP) of each projectile. The longer range capability will permit attack of deeper targets to include control points, air-defense sites, logistical resupply and refuel areas, and assembly areas while retaining the ability to attack close-in targets of counter-battery, light armored vehicles, standing and prone personnel, air defense artillery, and radar systems. TCM will provide first round hit probabilities and is projected to reduce ammunition expenditure significantly when compared with conventional artillery fire missions. At present, TCM consists of a $9M Firm Fixed Price (FFP) contract between the Swedish government and Bofors Weapons Systems, Sweden, signed in early September 1999, with the United States as party to this contract.

TCM is being pursued by the U.S. Army as an alternative technology for their XM982 Excalibur ammunition.

FAM (M795)

The M795 High Explosive (HE) Projectile utilizes technology to increase anti-personnel/anti-material effectiveness out to a 22Km range. It provides an additional 6 km in range & 30% greater lethality over the current M107 HE. It is ballistically similar to, and can be used for registration corrections for the M483A1 family of projectiles, increasing accuracy and reducing cost.

The projectile has been funded for procurement through FY05. The round is intended to eventually replace the M107 HE projectile. The M795 will initially fill in the war reserve stocks. The current M107 war reserve will be expended in training. The M795 will also have a 10 percent training allocation equating to approximately 7,000 M795 rounds for training per year. Units will be able to begin shooting the M795 during the 1st Quarter FY03.

Capt Lovelace - FFPAS, FF Upgrades, FTLM, SEPS, FIFACS

FFPAS

The Firefinder Position Analysis System (FFPAS) is a software tool that ensures effective citing of AN/TPQ-46A Firefinder radar. This software significantly reduces time required to perform site assessment, and provides more detailed data than manual analyses. FFPAS uses digital terrain data and detailed radar and weapon models to predict site-specific Firefinder performance. Recent improvements to the existing software include:

- Software reconfiguration (modularity, robustness)
- Improved probability of location models

The improved software also features a "new weapon" capability, which allows the operator to enter new (non-default) radar cross-sections and trajectories. Other improvements will continue to be made to FFPAS software through February 2001. Refer FFPAS questions to Capt Daniel Lovelace, lovelaceda@mcsc.usmc.mil. (703) 784-2006 ext 5087 (DSN: 278).

FF Upgrades

A Version 12.007 engineering build of Firefinder software was delivered to Camp Lejeune for Exercise Express Sword 00-2. Updates to 12.007 will be complete by February 2001, and field testing of that version of software will occur from February through May. Live-fire testing will occur during the first week in May, and Final Qualification Testing (FQT) will occur from May 1 through May 30, 2001.

The next version of Firefinder software to be fielded will be (v)7. The software was renamed in order to make the number of the version of Firefinder software match the number of the current version of AFATDS. To say it another way, (v)7 Firefinder software will be fielded at the same time as (v)7 AFATDS.

Fielding and training will occur from January to May 2002. Refer Firefinder upgrade questions to Capt Daniel Lovelace, lovelaceda@mcsc.usmc.mil. (703) 784-2006 ext 5087 (DSN: 278).

FTLM

The False Target Location Mod (FTLM), also known as False Location Rate Reduction (FLRR) by the U.S. Army, is intended to reduce the false location rate of the AN/TPQ-46A radar. Included in this process are two major efforts: Tracking Loop Beamsplit (TLB) [software] modification and Side-Lobe Blanker (SLB) [hardware] modification. Other areas to be analyzed include CFAR and clutter map operation. The FMF should receive this equipment/technology in FY03. Refer FTLM questions to Capt Daniel Lovelace, lovelaceda@mcsc.usmc.mil. (703) 784-2006 ext 5087 (DSN: 278).

SEPS

The Shortstop Electronic Protection System (SEPS) is being considered as a solution, which may provide limited point force protection against VT fuzes. In theory, SEPS passively waits to receive signals indicating the presence of a threat. Once a signal is detected, control algorithms differentiate threat signals from non-threat signals. SEPS then responds appropriately, transmitting a signal spoofing the VT fuze into "thinking" it is near its target. "Thinking" it is near its target, the VT fuze detonates, prematurely, away from its intended target.

The Marine Corps Warfighting Lab (MCWL) conducted a live-fire test of SEPS in August and September of this year, and are in the process of producing a report

summarizing the extent of system effectiveness with which to brief MCCDC in late December or early January (2001). Refer SEPS questions to Capt Daniel Lovelace, lovelaceda@mcsc.usmc.mil. (703) 784-2006 ext 5087 (DSN: 278).

FIFACS

The Firefinder Antenna Calibration System (FIFACS) is a near-field antenna measuring system which will provide the FMF with a *portable* capability to determine the far-field antenna patterns and gain of the AN/TPQ-46A Firefinder antenna. This portable capability will eliminate the need for units to routinely send their antenna to a depot-level maintenance facility for calibration. With FIFACS, the calibration of antenna can be determined on-site, and units only send those antenna which are found to be outside calibration limits to maintenance facilities to be calibrated. A 15 January 2001 date is predicted for the FIFACS procurement/production decision, with production completed by 30 Sep 2002. Fielding of FIFACS will be complete by 15 October 2002. Refer FIFACS questions to Capt Daniel Lovelace, lovelaceda@mcsc.usmc.mil. (703) 784-2006 ext 5087 (DSN: 278).

CWO3 Lawrence - MMS, EMT

Meteorological Measuring Set (MMS) Upgrade

This upgrade includes the AN/TMQ–50 Semiautomatic Meteorological Station (SMS), GPS antenna, MWG 201 GPS Processor Circuit Card Assemblies (CCA), and supporting cables and installation materials. The upgrade consists of a meteorological sensor device, which collects surface data (temperature, pressure, humidity, wind speed and wind direction). This device will replace the anemometer, barometer, and sling psychrometer. Fielding of this upgrade started in the 4th quarter FY00 and finishes by the end of 1st quarter FY 01. All the MMSs have been completed with an exception of two reserve sites, which should be completed by the end of December 2000.

Electronic Meteorological Theodolite (EMT) Upgrade

Development of an EMT with a manual backup capability is underway. The EMT is a component of the MMS used to track met balloons. Fielding of the new theodolite will begin in the second quarter of FY 02.

MSgt Frank - ESS

The Environment Stabilization System (ESS) is a dehydration system that reduces maintenance costs by reducing moisture-induced failures of expensive components, mitigating the effects of personnel reductions in the maintenance technician occupational field. By reducing component failures, there are several benefits that accrue: (1) maintenance labor hours are reduced, (2) the deferred labor hours can be applied to other maintenance work that may not otherwise be accomplished, (3) component acquisition

and repair costs are reduced. In addition to a stabilized environment the ESS offers intrusion protection, asset visibility, remote monitoring, and fume sensing and fire alarms.

For use in garrison, the ESS will provide a preservation environment for the systems, equipment and materials associated with the Meteorological and Counterfire Radar Sections of the Marine Corps Artillery Regiments.

The ESS should result in cost avoidance benefits associated with an estimated 30-50% reduction in equipment maintenance time and a 30% reduction in Mean Time Between Failures (MTBF) of electronic equipment.

GySgt Arnold - ERLS

The Elimination of Radioactive Light Source (ERLS) modification replaces the tritium light source used to illuminate the M1A1 collimator's reticle pattern at night. A Light Emitting Diode (LED) powered by two relatively non-hazardous "C" size lithium batteries will illuminate the collimator reticle pattern. This effort includes a complete rebuild of all Marine Corps collimators. The numerous benefits anticipated to occur with this modification include: extended service life, reduced maintenance and repair costs, and elimination of tritium contamination concerns.

Marine Corps exposure to punitive fines periodically assessed by the Nuclear Regulatory Commission for radioactive material handling violations by this source is eliminated.

Presently, all active FMF and MARFORRES have been fielded. Maritime Propositioning Forces are being retrofitted on a rotational cycle.

U. S. MARINE CORPS ARTILLERY DETACHMENT

NOMADS OF THE BATTLEFIELD

In the old days before instant electronic position location the accurate location of artillery batteries and target location elements necessary for the massing of fires was an arduous task of the artillery surveyor, done on foot with transits, aiming circles, tapes, and slide rules. The magnitude of the effort was directly proportional to the number of units present, size and topography of the area of operations, the nature of the operations, and the extent and accuracy of existing survey control.

Survey teams were nomads on the battlefield, roaming over it during the day without higher level supervision and coming home to roost by dark, telling what they had done (and seen) and where they were going tomorrow. If the massing of fires worked then they had done their job right.

Today we put no more thought into having survey data available than we do into turning on a light switch. The equipment and training of todays surveyor has come a long way since the old days, but it still remains a technically challenging skill which takes a long time to master. Today the modern surveyor may be on the verge of extinction due to advances in technology and personnel cuts. Some proposals get rid of the surveyor all together while others will try and integrate him with other Military Occupational Speciality's (MOS's). But before the final decisions are made to do away with or integrate this nomad with other MOS's. It is important that the artillery community understand what it may be losing before we turn off the light switch and risk sitting in the dark.

The modern artillery surveyors of today are the 82C (Army) and the 0844 (USMC). Both MOS's receive unique skills and training which are needed to ensure that survey data can be provided in any situation. There are some major differences between what the Army and the USMC do with their survey personnel, but both services have proposals that could negatively impact the artillery community by downsizing or doing away with the surveyor entirely.

The Army 82C spends a little over 8 weeks at Fort Sill for their Advanced Individual Training (AIT). They receive the following training at the Field Artillery Survey Course (FASC);

Class	Hours
Introduction to Survey	1
Map Reading	12
Forward Entry Device (FED- Survey Computer)	12
Handheld Terminal Unit (HTU- Survey Computer)	12
Field Notes (Recording Survey Data)	6
T-16 Theodolite (Measuring Angles)	24
Survey Electronic Distance Measuring Equipment (SEDME)	4
Planetarium (Familiarization with Night Sky)	2
Astro (Azimuth using Stars and Sun)	33
Intersection	8
Precision Lightweight GPS Receiver (PLGR)	16
Position Azimuth Determining System (PADS)	44
FTX	24
Survey North Seeking Gyroscope (SNSG)	4
Communications	40

The remaining time is spent testing. Their sole responsibility is survey until they become a 13Z Master Sergeant. Along the way they will attend BNOC and ANOC to receive additional survey training. There are currently only about eight hundred 82C's who support the entire Army.

In contrast the Marine 0844 is much different than the Army 82C. His primary MOS is as a 0844 Fire Direction Controlman (FDC). He spends 8 weeks at Fort Sill learning FDC and upon graduation, ninety-nine percent of these Marines report to the Fleet Marine Force (FMF) where they may work in FDC or Survey. Approximately one percent of these graduates are kept behind to attend the Marine Survey course while the majority of Marines that attend the Survey course are returning to Fort Sill form the FMF. The Marine survey course is 4 weeks at Fort Sill and is considered a follow on school. The Marines receive the following training at the Marine Artillery Survey Course (MASC);

Class	Hours
Introduction to Survey	1
Trimble 4000 SSI (Geodetic GPS Receiver)	32
Handheld Survey Computer (HSC)	12
Traverse (Manual Surveying)	14
Field Notes (Recording Survey Data)	4
T-2E Theodolite (Measuring Angles)	6

DI3000 (Electronic Measuring Equipment)	**2**
M2A2 Aiming Circle	**8**
Astro Azimuths	**12**
Geodesy (Science Dealing with Size & Figure of Earth)	8
Precision Lightweight GPS Receiver (PLGR)	**18**
Position Azimuth Determining System (PADS)	**18**
FTX (Field Exercise)	**8**
Datums and Projections	**8**

Every Artillery Battalion and Regiment has a Survey section, but the 0844's that comprise these sections normally rotate through Survey, and FDC. When a 0844 becomes a Staff Sergeant he then attends the Marine Operations Chief Course (MAOCC) where he becomes an Operations Chief (MOS 0848). The 0848 can then act as a Survey Chief, Operations Chief, Radar Employment Chief, Meteorology Chief, or may also be assigned as a 81mm Mortar Platoon Sergeant with the Infantry Battalion. The key to this flexibility, as it impacts the Survey mission, is a Warrant Officer (0803), located at each survey section. He is considered the technical expert in Survey, Radar and Meteorology (MET) for the USMC.

Probably the single most advance in technology that is threatening the extinction of the surveyor is the Global Positioning System (GPS). The artillery community has put a tremendous amount of confidence into GPS technology and is counting on GPS being available at all times, which arguable may not be the case. Here are a few examples of current and future systems that are relying on gps to initialize and update with.

IMPROVED STABILIZATION REFERENCE PACKAGE (ISRP)

a. Application/Description - Provides north seeking and pointing functions as well as full 3-dimensional land navigation and location capability for the M270 MLRS and Army TACMS.

GUN LAYING AND POSITIONING SYSTEM (GLPS)

a. Application/Description - Man-portable, north-seeking gyroscope with integrated PLGR capable of determining position, azimuth, and deflection to provide quick, accurate gun laying data to towed and non-Paladin howitzers. Current BOIP is one per firing battery or platoon.

POSITIONING AND NAVIGATION UNIT (PNU)

a. Application/Description - A Line Replaceable Unit (LRU) in the M270A1/HIMARS luanchers that replaces the current M270 ISRP/PDS system. The PNU provides launcher position and navigation data via a self-contained strap-down

inertial platform system, an embedded GPS receiver module, and associated GPS antenna.

BFIST/STRIKER EQUIPMENT MISSION PACKAGE (EMP)

a. Application/Description – The BFIST/STRIKER EMP provides the BFIST and STRIKER vehicles with 3D position location and azimuth, using an Inertial Navigation System (INS), PLGR/DAGR, and a Vehicle Measuring System (VMS).

In addition to all these artillery weapons there are also artillery munitions being developed to incorporate GPS technology to guide the round to the target. If GPS would be available at all times then there would be no need for concern but today's GPS technology has vulnerabilities which can cause it to function improperly, thereby denying users accurate position data at all times. There are modernization efforts being conducted today to enable GPS to be more reliable and robust so that GPS in the future may be relied upon as a sole means for receiving position data but these improvements won't be complete for many years to come. Some of these improvements include better receivers and future upgrades to the current satellite constellation.

The most profound vulnerability that GPS has is its susceptibility to jamming. The satellite signal strength that users receive on the ground can be compared to the strength that a 100 watt light bulb emits 300 miles away. In addition to this week signal the frequencies are published so that anybody with a few hundred dollars can manufacture a very inexpensive and effective jammer. In fact an industry has developed in recent years that will provide anyone who wants to buy one a GPS jammer. Several years ago at an air show in Russia a company called Aviaconversia demonstrated a 4 watt gps jammer that would jam gps signals within a 200 nautical mile radius. The cost of this GPS jammer is advertised at $4000 dollars. There are indications that business is booming for this company because they are on their fourth version of this device and have increased its power to 8 watts. Shown below in figure 2 is another example of a gps jammer. This is a 1 watt jammer that was disguised in a soda can. This device could easily be scattered throughout the battlefield, thereby denying US forces the use of GPS. In addition to these two examples there are many other countries that sell gps jammers on the open market also.

Figure 2
1 Watt Jammer with Effective Range 20-40 Nautical Miles

Another vulnerability that gps has is spoofing. This is the ability to record the gps signal and then at a later time re-transmit those same signals at a higher power while introducing position errors. Since this signal is transmitted at a higher power users would receive the spoofed signal that could provide inaccurate position information without the operator's knowledge. Military users that have the crypto fill loaded in their gps receivers are very hard to spoof but with technology advances in this arena it should still remain a concern because the industry will figure out how to spoof our current military receivers.

With these type of vulnerabilities the artillery community may be relying too heavily on gps technology to accomplish the mission. A good example of what this over reliance can do is in the artillery community's dwindling land navigation skills. It takes only a few hours to train an artilleryman how to use the PLGR but takes several weeks for them to master the skills of map, compass and terrain association. So inevitable the path that is chosen is the easy one, PLGR. It has become harder and harder today to jam users in the field because it affects many other users in the civilian sector. In order to jam a unit in the field a tremendous amount of coordination with all these other agencies has to occur before you can accomplish this. Therefore it is rare that users experience gps problems out in the field, which has led to a false sense of security among military gps users today. Commanders must ask themselves; Is the artillery community prepared to operate in a gps jammed environment? How often do units go to the field and evaluate their combat effectiveness without the aid of gps? There have been limited tests done to evaluate how well units perform in this environment and some of the results should raise concern. In once case just the threat of gps jamming caused units not to use the gps equipment, subsequently lots of personnel got lost. So lost in fact that one unit drove into an impact area. What if this had been a minefield? Units that eventually got jammed lost confidence in the equipment and put it away. Once again due to the lack of basic land navigation skills, personnel got lost. Another lesson learned was that jamming the support units can have the same defastaing affect that occurs when you jam the main forces. One example is when one tank unit had invested a tremendous amount of money into anti-jam technology so it would make it more difficult to jam so the unit that was conducting the jamming didn't attack the tanks, they attacked the log trains. The end result was that the tanks didn't get re-supplied and because the log train couldn't find their units without the aid of GPS.

In addition to todays surveyor being able to operate without gps , they also bring additional unique capabilities to the battlefield. One of these capabilities was demonstrated during Operations in Southwest Asia. During operations in desert storm the artillery community found out very quickly how difficult it can be to operate with several different datums. We discovered that allied forces, different services, and individual units all used their own maps or mapping systems with different datums. Zone to zone transformations and datum conversion weren't as easy as expected. An important lesson learned here was that the surveyor is critical in helping to overcome these obstacles. Envision a scenerio where gps is unavailable and all the maps of the area are all in geographic coordinates. The surveyors can convert the geographic coordinates to Universal Tranverse Mercator (UTM) and then establish a survey control point (SCP). From this established SCP they can extend survey control to all elements thus ensuring all are on common grid. There are currently over 1000 map datums identified by the

National Imagery and Mapping Agency (NIMA) and this agency is working to reduce all these datums to one world-wide datum called WGS 84. But until NIMA completes this arduous task the artillery will still have to face the challenge of operating in different datums. Operating in different datums without the proper conversion can large errors so it's important that the surveyor is still around so the artillery community will have personnel to turn to when the need arises. This need is still valid today because some of the map products available have not been converted to WGS 84 and until these inventories of maps are exhausted we will have to continue to use them.

When the gps becomes more robust and less vulnerable and the entire world converts to WGS84 then there may come a day when this nomad of the battlefield will no longer be needed but today his skills are still a vital part of those five requirements for accurate predicted fires. His role may no longer be as the primary means for how artillery receives its position data but as the backup. Commanders must ask themselves; Do I want to go to war without this nomad of the battlefield, this soldier or Marine who can provide me with position data 24 hours a day, 7 days a week and in any type of environment with or without the aid of gps.

Who will we turn to when these gps aided systems are being jammed or when they malfunction? In closing I'd like to quote something Mark Twain said that will hopefully cause some food for thought. If you are going to put all your eggs in one basket then you better watch that basket very carefully". How well are we watching our gps basket?

DEPARTMENT OF THE ARMY,
UNITED STATES ARMY FIELD ARTILLERY SCHOOL
FORT SILL. OKLAHOMA 73503-5600

ATSF-GC 8 Sep 2000

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: AN/PSN-11 Precision Lightweight GPS Receiver (PLGR) White Paper

1. Over the past several months USAFAS has received numerous inquiries pertaining to the use of the PLGR for artillery positioning. The attached white paper is furnished in response to these field inquiries.

2. The AN/PSN-11 is approved for the use of artillery positioning when users are properly trained to use the PLGR in accordance with TM 11-5825-291-13, and the safety and training guidelines set forth in this white paper.

3. POC at USAFAS is CWO3 Barnes or SFC Jones, Survey Branch, Gunnery Department, DSN 639-2805/6616.

William M Barnes
CWO3, USMC
Chief, Survey Branch

AN/PSN-11 PRECISION LIGHTWEIGHT GPS RECEIVER (PLGR) USED FOR ARTILLERY POSITIONING

1. PURPOSE. The purpose of this paper is to approve the Precision Lightweight GPS Receiver AN/PSN-11 (PLGR) as a method of determining coordinates and height for artillery positions. When discussing artillery positioning data, three elements are included. These elements are orientation, coordinates, and height. If any of the three elements are not established accurately enough to meet current accuracy specifications, the position is considered a hasty position. The PLGR cannot establish azimuth as a stand alone piece of equipment but it can provide the coordinates and height needed to initialize and update the Gun Laying Positioning System (GLPS), and the MLRS's and Paladin's on board Inertial Navigation systems.

2. DISCUSSION. This paper addresses the use of the AN/PSN-11 GPS Receiver. Earlier models of GPS receivers such as the AN/PSN-8, 9, and 10 are not addressed in this paper and therefore may not be used to determine position location.

a. GPS AND PLGR. GPS is a space-based navigation system that provides world-wide, continuous, all weather, three-dimensional position information. The GPS system consists of three primary segments. First, the space segment which is the satellite constellation. The space segment is complete, insuring world wide coverage with a minimum of four satellites in view at all times. The PLGR must be able to acquire at least four satellites before a three-dimensional position can be determined. Second, the control segment consists of monitoring stations and master control stations. Third, the ground segment which encompasses all user receivers. Currently, the primary receiver being issued for ground forces is the AN/PSN-11 (PLGR). This PLGR can achieve the accuracies needed for cannon artillery as outlined in the current Standardization Agreements (STANAG) and the artillery Position and Navigation POS/NAV) plan.

b. GPS accuracy requirements are expressed in terms of Probable Error (PE), and Circular Error Probable (CEP). PE is a value that is exceeded as often is it not, ie it has a 50% probability of occurrence. CEP is the radius of a circle, centered about the true position, such that any measured or calculated position has a 50% probability of lying within that circle.

ACCURACY FOR THE PLGR IS:

Horizontal: 10 meters Circular Error Probable (CEP)
Altitude: 10 meters Probable Error (PE)

c. ARTILLERY POSITIONING REQUIREMENTS. Current STANAG stipulate the standard position accuracy requirements for cannon artillery, rockets, and target acquisition assets. These are shown below in figure 1.

SYSTEM	HORIZONAL POSITION (M) CEP (50%)	VERTICAL POSITION (M) PE (50%)	DIRECTION (MILS) PE (50%)
105T How	17.5	10	0.4
155T How	17.5	10	0.4
155SP How	17.5	10	0.4
MLRS	8	3.6	1
BFIST/Striker	30	20	2
Q-36	10	10	0.4
Q-37/Q-47	10	10	0.4
Q-25A/Q-58	43.7	10	3
MMS	114	10	9

Figure 1

d. SURVEY vs PLGR. Artillery survey is still considered the primary means of establishing position and directional control within a firing location. The Positioning Azimuth Determing System (PADS) has been the mainstay of field artillery survey for the last 15 years, however due to its age the PADS has become difficult and expensive to maintain. PLGR merged with inertial navigation systems have been fielded to provide alternatives for commanders in the event that their survey assets are unavailable. These systems can be used to provide positioning and orientation data when survey is not available. The following systems are authorized for use.

1. MODULAR AZIMUTH POSITIONING SYSTEM (MAPS)& HYBRID (MAPS/H)

2. POSITION AND AZIMUTH DETERMING SYSTEM (PADS)

3. IMPROVED STABILIZATION REFERENCE PACKAGE (ISRP)

4. GUN LAYING AND POSITIONING SYSTEM (GLPS)

5.POSITIONING AND NAVIGATION UNIT (PNU)

6. BFIST/STRIKER EQUIPMENT MISSION PACKAGE (EMP)

3. SAFETY AND TRAINING. Safety. As with all artillery procedures, safety and proper checks are a critical issue. The following checks and safety procedures must be used with the PLGR.

WARNING

Azimuth determined with the PLGR is for navigation only. The PLGR azimuth is not accurate enough for artillery orientation and should never be used for this purpose. Observations at Fort Sill demonstrated azimuth, accuracies that were very erratic. Azimuth errors ranging from 0.7 mils to 50 miles have occurred.

(1) **Verify PLGR setup.**

(a) **Crypto.** The proper crypto keys must be loaded before the PLGR will function using the Precise Positioning System (PPS). Recently the President ordered that Selective Availability (SA) be turned off. The rationale was to improve the accuracy available to civil users. This benefits many commercial GPS applications, including air, road, marine and rail navigation, telecommunications, and emergency responses. Note that these are all peacetime activities. Second and more important to the military user, the President's statement made clear that the Department of Defense retains the ability to selectively deny GPS signals on a regional basis when our national security is threatened. This means it is more critical than ever that military users only operate with PPS-rated receivers, capable of operating under intentional signal degradation and other forms of hostile interference. So while the President's policy change improves the efficiency of commercial GPS, it does not mean that military users can use commercial GPS systems that do not operate with a crypto fill.

(b) **Datum.** Map datum should be the same as the operational datum. If not, significant position errors relative to the operational datum are possible.

(c) **Coordinates.** The UTM coordinate format will normally be the preferred selection since UTM is used by survey and most fire control systems.

(d) **Elevation.** Mean sea level is the normal selection.
Most military maps refer elevation to mean sea level. The elevation hold mode is used to increase the accuracy of the PLGR when elevation is poor, such as:

1. When only three satellites are available due to poor satellite geometry, reduced satellite availability, or line of site blockage of satellite signals due to terrain, vegetation, buildings, vehicles, or other obstructions.
2. When at least four satellites are available but poor geometry exists.

For more information on elevation hold mode see TM 11-5825-291-13.

(e) **Units of measurement**. Meters are the normal selection. Most military maps refer to distance and elevation in meters.

(2) **Figure of Merit (FOM)**. FOM is an accuracy estimation displayed by the PLGR, which ranges from one through nine. A FOM 1 is the best accuracy estimation displayed

by the system. When artillery positions are determined, only coordinates obtained when FOM 1 is displayed will be considered for use.

(3) **Mode of Operation.** The PLGR offers Fix, Continuous, Averaging, and several other modes of operation. The averaging mode yields the most accurate data and is preferred when determining a position for indirect fire weapons. The PLGR should achieve a minimum amount of averaging hits of 200 before the location and elevation from a PLGR is accepted. In this mode you must not move the receiver.

(4) **Verify Position.** Position verification to check for unacceptable errors must always be done prior to firing. The following are possible solutions to the verification problem.

(a) Always use a two-person check on the PLGR data by using two different PLGRs to independently determine the position data. Your position data should agree within 10 meters.

(b) Use resection or graphic resection if identifiable points are visible.

(c) In identifiable terrain, a map spot is the minimum acceptable verification and should be conducted along with all other means of verification.

(5) **Verify Satellite Signal Strength.** On the fourth page of the Status screen validate the satellite signal strength to ensure that is between 25 to 50 dB. The Fort Sill survey branch has demonstrated that the PLGR can take several minutes while it is being jammed before the FOM value drops below 1. So in essence the PLGR may be jammed for several minutes and during that time receive bad position data.

ARTILLERY OAG

Phase I of the PP&O effort to "Fix Artillery" took place at 14th Marines in September 2000 with the Ground Fires Structure Review. This review examined manning, training and structural issues integral to addressing current deficiencies in Marine artillery. The Executive Officers of all four artillery regiments and the Operations Officer of the Marine Corps Artillery Detachment, Fort Sill, as well as the 08XX Occupational Field Sponsor, signed the document provided below. This document was forwarded to the Artillery Operational Advisory Group (OAG) for consideration. None of the proposals or recommendations have been acted on as of December 2000, though the OAG may use some of the issues as background material for proposals to the Ground Board.

From: Ground Fires Structure Review Group
To: Artillery Operational Advisory Group

Subj: CONFERENCE REPORT: GROUND FIRES STRUCTURE REVIEW PHASE I

Encl: (1) Proposed Marine Liaison Element (MLE) Implementation Point Paper
(2) Cannon Section Structure
(3) Integrated Logistics Concept
(4) Major Organizational Change Issues for GCE Conference
(5) Universal Observer Team
(6) Phase III Structure Review/ MAGTF Fires Proponency
(7) Tables of Organization (T/O) change requests

Ref: (a) CMC message DTG 211200Z SEP 00.

1. The PP&O directed Artillery Operational Advisory Group sponsored Phase I Ground Fires Structure Review met from 26-29 Sep 00.

2. Representatives from 10th Marines, 11th Marines, 12th Marines, 14th Marines, Marine Corps Artillery Detachment Fort Sill, I MEF, PP&O, and MCCDC attended.

3. Structure review efforts were focused on scrubbing all T/Os within the artillery regiments, strengthening our liaison organizations, examining ways to improve the health of the artillery community, and identifying ways to successfully address future issues. All T/O change recommendations are incorporated in the T/O change requests in encl. 7.

4. Issues discussed were as follows:

a. **0803 Career Asssignments**- The OAG developed a proposal to more effectively employ the 0803 (Target Acquisition Officer) within the MEF. The proposal is centrally focused on establishing the 0803 as (1) the Target Information Officer (TIO) at the division and MEF level, and (2) the Fires Tactical System Officer (FTSO) in artillery regiments and battalions.

The Phase I Ground Fires Structure Review examined implementation of this proposal for 0803 billets within the Marine Artillery Regiment. Billets at the MEF level were deferred pending resolution of the compensatory reduction required to add a TIO to the MEF Force Fires Coordination Center. A representative from Ground Combat Element, Total Force Structure Division, MCCDC, consolidated the proposal for the other 0803 billets into a Table of Organization Change Request (TOCR) that will affect the following changes:

- Marine Artillery Regiment, T/O 1101
  -Line 48A, FTSO, CW0-2, 0803, is added.
  -Line 57, Counter Battery Radar Platoon Commander, CWO-3, 0803, changes to CWO-2, 0803.
  -Line 75, TIO, Captain, 0802, is changed to CWO-3, 0803.
  -Line 91, Survey Officer, changes title to Survey/ Metrological Officer.
  -Line 102, Metrological Officer, is deleted.
  (Note: for T/O 1101N, 12th Mar, line 48A is C coded)
- Marine Artillery Battalion, T/O 1142
  -Line 44B, Target Information Officer/ Fires Tactical System/Survey Officer, CWO-2, 0803 is added.
  -Line 34, Survey Officer, WO-1, is changed to CWO-2 and "X" coded (filled by line 44B).

Implementation of the initiative within the artillery regiment/ battalion will be at the commander's discretion, based on current requirements and successful AFATDS and M777 & Towed Artillery Digitization (TAD) fielding.

b. **Battery Liaison Chief Sergeant to Staff Sergeant**- Sometime prior to the deactivation of the ANGLICOs, the battery liaison chief billet was downgraded from staff sergeant to sergeant in an effort to shape the grade. This was a mistake! T/O grade structure should not be driven solely by the need to grade shape. T/O grade structure should be determined by the experience required to accomplish our wartime mission. The battery liaison chief must be a staff sergeant. If the increase of the grade of the liaison chief needs to be tied to total structure increase in the 0861 community for grade-shaping reasons, then the opportunity exists with the establishment of the interim MLEs for LANT and PAC in FY01. The battery T/O change should take place as soon as possible since the interim MLE units will begin to be staffed in accordance with a draft MLE T/O in FY01.

c. **Introduction of Liaison Chief MOS**- The structure review reaffirmed the need to create a 0869 Liaison Chief MOS. Since this is tied to the billet of the liaison chief beginning at the battery level it will be for rank of staff sergeant through MGySgt. The MOS will be granted upon promotion to SSgt **and** completion of the Liaison Chief

Course at the Field Artillery School at Ft Sill, OK (normally attended upon promotion to Staff Sergeant). Marines promoted to the rank of SSgt but unable to immediately attend the Liaison Chief Course will retain their basic MOS of 0861 until graduation from school. This will not preclude them from being assigned to a 0869 billet only place an imperative need for the receiving unit to allow them time to attend school. The implementation of this MOS should occur as soon as possible and be applied to all T/Os in the USMC force structure that currently possess 0861 SNCOs.

d. **FSPG Issue on Artillery Regimental Headquarters Reorganization**- FSPG 99 recommended adding 43 structure spaces to the 12th Marines T/O, making it mirror all regimental headquarters T/Os, and adding an embark officer 10th, 11th and 14th Regimental Headquarters. The enclosed proposed T/O 1101P makes those changes. T/O 1101H and 1101A changes include the addition of the embark officer.

e. **0811 Grade Shape**- The structure review did not determine any specific changes to fix the 0811 grade shape but agreed we have a problem. The nearly identical requirements for sergeants and staff sergeants are adversely affecting our ability to promote the required inventory of staff sergeants. The structure review recommended looking at adding another sergeant to the cannon section and examining changes to the ammunition section. In developing a suitable grade shape, it would be a "lesser evil" to have the required population for corporals and sergeants near identical rather than sergeants and staff sergeants.

f. **0802 Major on Infantry Regiment T/O**- The current T/O for an infantry regiment has a billet for one 0802 in the S-3 section. The structure review recommended C-coding this line number billet in order to enhance the regiment's ability to conduct operations during wartime or contingencies. This will free up three manned structure spaces to apply to the artillery regimental T/O (1101H) where they have a greater requirement for a major on a day-to-day basis in peacetime and combat. These structure spaces should be applied as indicated. The TOCR at enclosure 7 includes this recommendation.

- Change line number 73A from C-code to a manned billet.
- Add line 73B assistant FSC as a C-coded billet.
- Add line number 46A assistant S-3; change line 47 to FDO.
- Add line number 31A assistant S-4; change line 33 to regimental supply officer.

g. **Monitored Command Codes (MCCs)**- MCCs for headquarters battery, artillery battalion and regiment were assigned to 1st Marine Division. For assignment purposes MCCs at this unit level had no adverse impact on 11th Marines or 1st Marine Division. As pro-share commands, staffing precedence level does not change. MCCs did not preclude 11th Marines from reassigning Marines however requests had to be routed through division to HQMC (MM) prior to affecting movement between units. This change was only temporary for 1st Marine Division. Establishing regimental and battalion headquarters battery MCCs should be further evaluated.

h. **Battery I&I Assignments**- The practice of assigning post command/CLS-grad captains to battery I&I billets was discussed. Although this practice ends up assigning

officers who will in almost all cases spend at least their third year in the captain's billet as a major, this practice must remain in place as the standard. The requirements necessitating an experienced, post-command captain are well known and accepted. In some cases certain officers and certain I&I commands collocated near their battalion headquarters may allow the assignment of a CLS grad who has not had command in the operating forces. These cases are currently worked as required with the monitor. Officers assigned to I&I should be sent back to the operating forces upon tour completion. MARFORRES representation on promotion boards should continue to stress to board members the requirements necessitating the assignment of an experienced captain/major to the captain I&I billet. CO 14th Marines attempted to designate the battery I&I billet as a command billet but was told that other reasons, too many to describe here, prevented this designation.

i. **Draft HIMARS T/Os**- Requirements Division, MCCDC has developed draft baseline T/Os for a HIMARS battery and battalion headquarters battery. These T/Os are based on the Army draft HIMARS T/Os. They do not yet accurately reflect logistics/ maintenance requirements for the Marine Corps. During FY01, MARCORSYSCOM will capture the required logistics capabilities. Once that is done, we must determine where the capability will reside. Due to the fact that a reserve battery will be employed within a battalion headquarters, a reserve battery may not look like an active duty battery. When we build the T/O for an active duty battery, we must add additional logistical support and command and control. Specific changes to the T/Os were submitted directly to MCCDC.

G. T. STARNES
10TH Marines

N. S. WOOD
11TH Marines

Not available
for signature.
M. S. ALMQUIST
12th Marines

T. S. STENT
14th Marines

B. J. KRAMER
MCAD Ft. Sill

R. L. SARTOR
I MEF

K. A. HAWLEY
HQMC, PP&O

M. C. KAMIN
MCCDC, TFSD

ENCLOSURE 1- MLE IMPLEMENTATION

Topic: Implementation of ANGLICO like MLE

Discussion:

The Commandant has stated that an ANGLICO-like capability will be reestablished in PAC and LANT (I and II MEF). This is being addressed with an interim and a future solution.

For the interim MLE establishment, the structure left over from the deactivated ANGLICOs, approximately 90 personnel, was divided between I and II MEF. The interim T/Os differ slightly but will require approximately twenty additional 0861s (18 of these Marines being Sgt and below). Manpower will have to slightly increase the total 0861 population beginning in FY01 to compensate for the staffing of the interim MLE T/O. Until the MLEs are activated the drain on the operating forces 0861 population will be very significant. Initially, operating forces will see less 0861s yet may continue to provide personnel for an MLE detachment for deploying MEUs.

Two courses of action (COAs) are being developed for the future MLE with the main difference revolving around the placement of linguists within the structure. PAC has identified the requirement for Foreign Area Officers and linguists as part of their structure in a separate Coalition Liaison Team. LANT does not have a requirement for a separate linguist capability. Both COAs for the MLE T/O resemble the old ANGLICOs with a headquarters and 3 platoons consisting of 2 SALTs and 4 Fire Power Control teams (FCTs) in each platoon. The biggest problem the Marine Corps must address with either COA will be the creation of approximately 200 additional structure spaces.

Recommendation:

1. Interim

The OAG needs to address the establishment of an interim MLE during FY01, in particular:

- Manpower's ability to staff the interim MLEs while also providing the required staffing for current units.
- How the 08XX community will effect the manning of the interim MLEs units.

HQMC (M&RA) should give a high priority to the requirement to create more 0861 Marines out of the depots, reduce the amount of 0861s on B-billets, and increase the reenlistment bonus for 0861s. Decreasing the amount of 0861s on B-Billets must be addressed with the FY01 summer rotation. A key element is convincing the first term 0861s to reenlist. This remains a chronic problem and will not be solved unless bonuses increase, promotions improve, and the community stabilizes.

The interim MLE T/O requires two 0802 Lieutenants. These officers should not be assigned directly from Ft Sill but instead come from the operating forces after completing two years in a firing battery. The interim MLE T/O should be changed to read Captain 0802 vice Lt 0802. Upon tour completion these officers should be sent to CLS, then back to the operating forces. The maintenance management officer/team officer billet filled by an 0802 should be changed to read logistics officer/team officer to better reflect the assignment of an 0802 to this billet.

2. Future: The OAG will need to remain engaged in the COAs development of the future MLE/ANGLICO units. This will help ensure that once the T/O is approved the lead time to activate the much larger 150-man MLE/ANGLICO at I and II MEF includes a proper phased introduction allowing for the production and promotion of Marines of the right grade and MOS (both officer and enlisted).

ENCLOSURE 2- CANNON CREW STRUCTURE

Topic: 0811 Cannon Structure.

Discussion: The structure review examined the implications of fielding of the M777 Lightweight Howitzer with TAD on 0811 structure in the artillery regiment. The M198 crew consists of nine canoneers and one driver. Requirements Division, MCCDC, has a stated requirement for an identical crew size for the M777 with TAD. Discussion concerning potential structure adjustments has been introduced mainly due to misinterpretation of the existing Operational Requirements Document (ORD). Although the ORD states the howitzer should be fully operable and maintainable by a crew of ten men (nine crew and one section chief), certain tasks such as emplacement, speed shift, and displacement call for performance by as few as five Marines. This figure does not include the manpower necessary for crew supervision, ammunition handling, local security, and other combat essential tasks. The M777 Multi-Service Operational Test & Evaluation (MOT&E), beginning in November 2000, will be the best gauge (to present) of the actual requirement. No decisions on adjustments to 0811 structure are warranted until the MOT&E is complete and an Artillery OAG analysis is completed.

Recommendation: The OAG should closely monitor the M777 MOT&E, and provide a position on 0811 structure issues upon the successful fielding of the M777 and TAD. In the interim period, the Artillery OAG should ensure that the following considerations are consistently enforced during all discussions on future 0811 structure:

1. Safety. The M777 Howitzer with TAD will have the potential to significantly alter the responsibilities of the Howitzer Section Chief and his crew. The section chief will be burdened with technical and tactical responsibilities that may inhibit his ability to directly oversee individual tasks on the weapon. Decreasing crewmembers may exacerbate the increased safety risks.
2. Ammunition Handling. The M777 howitzer will have a sustained rate of fire that exceeds that of the M198. This increased rate of fire will provide a challenge to the crew tasked with manning the weapon. Reduction of crew size would negatively impact the ability of the section to perform its mission.
3. Mission recording. The basic howitzer does not eliminate the requirement to maintain a Marine in the position of recorder.
4. 24-Hour Operations. A howitzer section, as presently manned, has the minimum number of crewmen necessary for 24-hour operations. Reduction in crew size would have an adverse impact on this capability.
5. Crew Fatigue. While improvements in emplacement and displacement times for the M777 enhance the ability of artillery to maintain pace with mobile maneuver forces, the added factor of increased crew fatigue is introduced.
6. Local Security/Force Protection. The potential of semi-autonomous operations for a M777 howitzer with TAD creates survivability challenges that potentially exceed that of the M198. Maintaining structure for local security will be critical.

ENCLOSURE 3- INTEGRATED LOGISTICS CONCEPT

Topic: Integrated Logistics Concept (ILC) consolidation.

Discussion: Based on a joint Marine Corps/Penn State study on logistics in the summer of 1998 the ACMC in October 1999 directed MCCDC to explore and implement ILC initiatives through the DOTES process. Initiatives from the joint USMC/Penn State study included secondary repairable (SecRep) management migration to Material Command (MatCom), 4th EOM migration to MatCom, and using unit supply and maintenance functions migration to intermediate maintenance activity (IMA). During October 2000 an ILC consolidation of echelons of maintenance Working Integrated Process Team (WIPT) will meet in Quantico to explore the scope of 4th echelon maintenance migrating from the IMA to MatCom. The WIPT will explore what limited 5th echelon maintenance can be conducted at the IMA level and what 3rd echelon maintenance can better performed at the MatCom level. Of great concern to division units is the migration of using unit maintenance and supply functions to the IMA. Equipment maintenance and re-supply are core competencies in our warfighting missions. Artillery employment across the spectrum of conflict requires an organizational maintenance capability. This includes but is not limited to; communications/electronics, ordnance, motor transportation, and engineer equipment. The same electronics maintenance section that performs organizational maintenance on communications/electronics equipment can and does perform intermediate maintenance (3rd and 4th echelons) more efficiently than if the equipment was evacuated to the IMA. Maintenance should be accomplished at the lowest authorized echelon and as far forward in conflict as possible.

Recommendation: There are ways to enhance supply and maintenance efficiencies such as the Central Issue Facility (CIF). Technology is but one example that has and will continue to be leveraged to streamline these processes. The following recommendations are offered for review:

1) No organizational maintenance will migrate to the IMA without review by the appropriate OAG and approval by the GCE.
2) No 3rd or 4th echelons of maintenance will migrate to the IMA or MatCom without review by the appropriate OAG and approval by the GCE.
3) Proposals from ILC consolidation of echelons of maintenance WIPT during October 2000 address warfighting missions of MSCs.

ENCLOSURE 4– Major Organizational Changes Recommendations

Topic: GCE Conference directed recommendations for major organizational changes.

Discussion and recommendations: The September 00 GCE Conference directed the OAGs provide recommendations on major organizational changes. The Phase I Force Structure Review Conference submits the following recommendations for possible inclusion in the next OAG report to the GCE.

1. Creation of a T/O Structure for Artillery Training School (ATS). The fielding of AFATDS, TCO, and eventually TAD as well as other digital data systems requires both entry level schooling (Ft Sill) and sustainment/refresher training at home station (ATS). To formalize the ATS instruction, the operating forces (10^{th} & 11^{th} Marines) need T/O structure to eliminate the current practice of manning ATS 'out of hide'. A proposed T/O for ATS is being developed. In addition to conducting instruction for AFATDS operators, survey personnel, operations chiefs, and liaison chiefs, Ft Sill will also be required to develop and maintain the POI used by ATS for sustainment training and possibly create a standing mobile training team to assist and evaluate the regional ATS instruction. This requirement might require additional structure assigned to Ft Sill.

2. Modification of Administration Structure at Battalion/Regiment Level. Second Marine Division has activated its Division Personnel Admin Center (DPAC). First and Third Marine Divisions are in varying stages of a similar program. The creation of DPAC has drastically changed the admin structure at Battalion and Regiment within the artillery operating forces. In that we are in the process of modifying the T/Os and addressing other changes for implementation in FY04, the question of what admin support Marines remain in the battalion/regiment and what is incorporated into a DPAC structure at Division needs to be addressed. Understanding that unit diary and personnel duties will be moved to DPAC leaving admin, publications control, and legal with the operating forces, the structure below is proposed as the basic requirements for the Battalion/Regiment.

UNIT	0180	0170	0193	0151
Arty Battalion	1		1	6
Hq Btry Regt				2
Arty Regiment	1	1	1	4

3. Modification of Supply Warehouseman T/O Structure. As with the consolidation of certain administration functions within DPAC, the divisions are in varying stages of creating a Central Issue Facility (CIF). In a similar fashion to the creation of DPAC, personnel required to establish and operate the CIF have been drawn from the unit T/Os. If the CIF experiment is going to remain the way the division operates then the T/O structure for the battalion/regiment needs to be adjusted to reflect the reassignment of supply/warehouseman to the CIF.

4. Future of Food Services in Operating Forces. Uncertainty is the common description applied to the move to civilianize the chow halls within the operating forces. Since the decision to civilianize the chow halls has been made, the operating forces need to immediately address questions of food service capability on all T/O&Es, sustainment training and employment away from home station. As a part of this discussion/decision process an over arching question must be answered concerning whether food service will:

(1) Remain divided among the operating forces (GCE, ACE and CSSE);

(2) Be consolidated within the CSSE; or

(3) Reorganized to maintain small unit employment capability while most of the larger element support capability is consolidated.

5. Grade Change for 0402 at Artillery Regiment Level. The T/E structure, maintenance management effort and motor transport capability in an artillery regiment requires an increase in grade. The grade of the maintenance management officer and motor transport officer at regiment should increase from lieutenant to captain to reflect the required knowledge base and responsibility expected of these officers. The regimental supply officer is a captain because he must have the expertise to manage the entire regimental budget and provide guidance to the battalion supply officers (Lts). The maintenance management officer has similar duties especially when one considers that the maintenance management effort resident in an artillery regiment equals approximately 40% of the entire division's effort (based on the T/E). Traditionally the motor transport officer at regiment was an LDO 3502 Capt, extremely knowledgeable and possessing the requisite experience to guide the battalion motor transport officers. The incorporation of the 3502 MOS to 0402 and the reduction of the regimental MTO to a lieutenant has reduced the experience and leadership level of a unit that possesses over 40% of the entire division's rolling stock. Accordingly, the MMO and MTO at regiment should be 0402 captains.

6. Creation of a Universal Observation Team. The next enclosure will discuss this issue.

ENCLOSURE 5- UNIVERSAL OBSERVER TEAM

Topic: Implementation of the Universal Observer Team (UOT) concept.

Discussion: Implementation of the UOT concept is proposed to more effectively utilize the capabilities of the artillery firing battery liaison section. The introduction of improved target acquisition capabilities and enhanced firing unit selection options for the Forward Observer justify examination of the UOT concept. An inherent principle of the UOT concept is gaining efficiencies for the maneuver commander. A UOT team capable of controlling artillery, aviation, NSFS and mortar fires may allow the maneuver commander to realize efficiencies that may be better used for other requirements.

The Structure Review examined the organizational options and the desired capabilities of the UOT.

- Organizational Options:
  - -Maintain the current Firing Battery Liaison organization within the Firing Battery; Battery Forward Observer teams become UOT's.
  - -Consolidate Firing Battery Liaison Teams into the Artillery Battalion Headquarters Battery Liaison Section. Firing Battery Forward Observer Teams become UOT's under direct control of the Battalion Liaison Officer/Infantry Regimental Assistant Fire Support Coordinator.

- Desired UOT capabilities:
  - -Call and adjust artillery cannon and rocket fires for the maneuver commander.
  - -Call and adjust infantry mortar support for the maneuver commander.
  - -Call and adjust Naval Surface Fire Support for the maneuver commander.
  - -Provide terminal support of Close Air Support (CAS) for the maneuver commander.

Recommendations:

1. The OAG should state the artillery community's willingness to work toward the UOT concept, with the objective of gaining efficiencies for the maneuver commander. The organizational options and capabilities described should be prioritized by the OAG as a departure point for UOT discussions. As the UOT concept is directly tied to the successful fielding of improved target acquisition, communication and C2 systems, a formal UOT proposal to the Ground Board at present is not warranted.
2. Limited experimentation of organizational options (ongoing in 2d Marine Division), and additional training of artillery forward observers in mortar employment, NSFS employment and control of CAS (in accordance with peacetime training requirements, i.e., the presence of a FAC on an Observation Post) is recommended.
3. As an interim step, the structure review recommends consolidating the responsibilities of the naval gunfire spot teams found at the artillery battalion with the artillery battery FO teams. Remaining structure would be distributed to the battalion and battery liaison sections to strengthen these critical organizations. The TOCR at Enclosure 7 includes this interim step.

ENCLOSURE 6- MAGTF FIRES PROPONENCY

Topic: MAGTF Fires Proponency

Discussion: The need for a "…single high level decision-making body focused on the integration of MAGTF fires systems and processes to ensure MAGTF fires initiatives are coordinated and mutually support MEF single battle operations…" has been previously recommended and documented. The MAGTF Fires Proponent would vet fire support issues and proposals across all communities for the coordinated improvement of MAGTF operations. That need still remains and is of an ever-increasing priority due to the sheer volume of systems, subsystems, and components that are currently in any given stage of development or are available in commercial off-the-shelf configurations. Competing demands for resources, particularly personnel, are driving discussions on structure reductions within existing operational units at a faster rate than the "anticipated personnel savings" brought about as a result of a successful and effective application of technology. Fire support components and subsystems are being tested and or fielded that are not compatible or interoperable with existing systems, or even some replacement systems that are "on the horizon" and not yet fielded. This causes the need for operational units to devise workarounds to make those systems work, which, more often than not, requires more personnel to accomplish the same function which has been "promised" by some application of technology. There are long-term structure issues that cannot be evaluated until such time as any of the various fire support systems are fielded and the operational impact is fully understood. A MAGTF Fires OAG, working through the CE Board, would provide the coherent, coordinated direction to ensure the integrated development of MAGTF fire support systems (at all echelons of the MAGTF) that would slice laterally through current OAG "stovepipes" that are based on battlefield operating systems reporting to the GCE, ACE and CSSE. The MAGTF Fires OAG would seek to curb the growth of unrelated, independent intelligence, operations, and C4I systems that are not interoperable with the joint/combined world.

Recommendation: Capitalizing on lessons learned from the Ground Board structure, recommend the Command Element (CE) Board include a MAGTF Fires Operational Advisory Group (OAG). The MAGTF Fires OAG would fulfill the role of addressing "fixing MAGTF/Marine Corps fire support as a whole" issues and assume "ownership" of the MAGTF fires "roadmap." It is further recommended that the following working groups be established to support the MAGTF Fires OAG:

Doctrine (MAGTF, Joint, & Combined)
C2W (includes IO, non-lethal, etc.)
C4I (includes systems integration issues, fires & C2)
Targeting (collection, development, & prosecution)
Naval Surface Fire Support
Aviation support
Ground Surface Fires (Fires System Triad)
Ammunition / Supportability/ Deployability

ENCLOSURE 7- TABLE OF ORGANIZATION CHANGES

Topic: T/O changes

Discussion: All the T/Os in the artillery community needed revision. Since changes are being made to each to affect the major changes of staff sergeant battery liaison chief, implementation of the 0803 plan, and FSPG related changes numerous other changes were incorporated. Regimental T/Os are mirror imaged with variations only in the coding of certain billets. No changes were made to the 14th Marines T/O for the force artillery mission. With the exception of the FSPG associated additions, the T/O changes are structure neutral, no losses or gains.

Recommendations:

A. Proposed changes for T/O 1101A

1. Add line number 5A Field Artillery Chief from line number 35 (delete line number 35)

2. Add line number 31A major 0802 Asst S-4, Qty 1. Compensation from T/O 1096F line #30A, Qty 1
3. Change billet description line number 33 to Regt Supply Officer
4. Line number 34 grade change to LT, delete 3502 additional MOS (aligns with active T/O)
5. Add line number 33A Supply Admin Clerk from line number 175
6. Change line number 41 Embarkation Chief to line number 41A
7. Add line number 41 Embarkation Officer 0430, WO (Reserve) (FSPG issue)
8. Add line number 46A Asst S-3, 0802 major, Qty 1, compensation from T/O 1096F line #30A, Qty 1
9. Line number 47, change billet description to FDO
10. Change billet description on line 48 to ASST S-3/FDO from ASST S-3/FDO/NBC, remove additional MOS 5720.
11. Add line 48A Fires Tactical Systems Officer CWO2, 0803. Compensation from line #102.
12. Change line number 50 to line number 51
13. Change line number 51 to line number 52
14. Change line number 52 to line number 50
15. Change line number 52A to line number 53A
16. Change line number 52B to line number 53B
17. Change grade line number 57 from CWO3 to CWO2
18. Add line number 59 Radar Section 2 Each
19. Add line number 60 Section leader SSGT 0848 (1)
20. Add line number 61 Watch Chief SGT 0842 (1)
21. Add line number 62 Watch Chief/Radar Operator CPL 0842 (2)
22. Add line number 63 Radar Operator/Organ Tech LCPL 0842 (1)
23. Add line number 64 Radar Operator LCPL 0842 (1)
24. Add line number 65 Radar Operator PFC 0842 (3)
25. Add line number 65A Radar Section 3 Each (X coded)

26. Add line number 65B Section Leader SSGT 0848 (1)
27. Add line number 65C Watch Chief SGT 0842 (1)
28. Add line number 65D Watch Chief/Radar Operator CPL 0842 (2)
29. Add line number 65E Radar Operator/Organ Tech LCPL 0842 (1)
30. Add line number 65F Radar Operator LCPL 0842 (1)
31. Add line number 65G Radar Operator PFC 0842 (3)
32. Change line number 73A from "C" to Manned Billet compensation from T/O 1096F line #30A, Qty 1
33. Add line number 73B "C" coded 0802 major asst FSC Qty 1, from line number 73A
34. Change line number 75 from Capt 0802 to CWO3 0803. Delete 0202.
35. Change line number 84 to line number 83A
36. Change line number 83A to line number 84, quantity 2
37. Delete line number 83B
38. Change line number 83C to line number 85, quantity 2
39. Delete line numbers 86-88. X coded billets tied to old VMO T/O. No structure associated.
40. Line number 89, change description to Survey Meteorological Section
41. Combine Meteorological section with Survey section.
42. Line number 91, change billet description to Survey/Meteorological Officer
43. Delete Line number 101, section description
44. Delete line number 102, Metro Officer billet consolidated with line number 91. Provides compensation for line #48A.
45. Add line number 105 Met Team 5 Each (X coded)
46. Add line number 106 Team Chief SSGT 0848 (1)
47. Add line number 107 Arty Metro Man SGT 0847 (1)
48. Add line number 108 Arty Metro Man CPL 0847 (1)
49. Add line number 109 Arty Metro Man/Driver LCPL 0847 (2)
50. Add line number 110 Arty Metro Man/Driver PFC 0847 (1)
51. Add line number 129, Counter Mortar Radar Rep Man CPL 2887 (5)
52. Change line number 168A to line number 168Z
53. Change line number 168Z to line number 168A
54. Delete line number 175, moved to line number 33A
55. Line number 178, change quantity to 3, from line number 179
56. Delete line number 179.
57. Line number 210, change billet description to electrician
58. Line number 25 Medical Admin Tech, should be armed
59. Change all comm MOSs
60. Change all 0861 SNCO billets to MOS 0869

B. <u>Proposed change to 1101B</u>

1. Delete line numbers 101 to 110 Meteorological section, move to T/O 1142A
2. Change T/O description to DET RADAR, HQ BTRY, ARTY REGT, 4TH MARDIV.

C. <u>Proposed changes for T/O 1101D</u>

1. Change line number 31 grade to LCPL

2. Change line number 34 quantity to 1

D. Proposed changes for T/O 1101H

1. Add line 5A Field Artillery Chief from line 35 (delete line number 35)
2. Add line number 31A Asst S-4 0802 major; Qty 1; compensation from T/O 1096F line #30A, Qty1
3. Change billet description for line number 33 to Regt Supply Officer
4. Addition of line 33A supply admin man from line 175
5. Change line number 41 Embarkation Chief to line number 41A (FSPG issue)
6. Add line number 41 Embarkation Officer 0430, WO
7. Add line number 46A assistant S-3 major 0802, Qty 1; compensation from T/O 1096F line #30A, Qty 1
8. Change billet description line number 47 to FDO
9. Change billet description on line 48 to ASST S-3/FDO from ASST S-3/FDO/NBC, remove additional MOS 5720.
10. Add line 48A Fires Tactical Systems Officer CWO2, 0803. Compensation from line 102
11. Change line number 50 to line number 51
12. Change line number 51 to line number 52
13. Change line number 52 to line number 50
14. Change line number 52A to line number 53A
15. Change line number 52B to line number 53B
16. Change grade line 57 from CWO3 to CWO2
17. Change line number 73A from "C" to Manned Billet compensation from T/O 1096F line #30A, Qty 1
18. Add line number 73B asst FSC major 0802 "C" code Qty 1
19. Change line number 75 from Capt 0802 to CWO3 0803. Delete 0202
20. Change line number 84 to line number 83A
21. Change line number 83A to line number 84, quantity 2
22. Delete line number 83B
23. Change line number 83C to line number 85, quantity 2
24. Delete line numbers 86-88. X coded billets tied to old VMO T/O. No structure associated.
25. Line number 89, change description to Survey Meteorological Section
26. Combine Meteorological section with Survey section.
27. Line number 91, change billet description to Survey/Meteorological Officer
28. Delete Line number 101, section description
29. Delete line number 102, Metro Officer, billet consolidated with line number 91. Provides compensation for line #48A.
30. Consolidate line numbers 129 and 129A.
31. Delete line number 129A Counter Mortar Radar Rep Man CPL 2887 (1) moves to line 129.
32. Change line number 168A to line number 168Z
33. Change line number 168Z to line number 168A
34. Delete line number 175, moved to line number 33A
35. Line number 178 increase to 3 from line number 179

36. Delete line number 179
37. Line number 210, change billet description to electrician
38. Line number 25 Medical Admin Tech, should be armed
39. Change all comm MOSs
40. Change all 0861 SNCO billets to MOS 0869

E. Proposed changes to T/O 1142A

1. Add line 5A, Field Artillery Chief from line 83.
2. Change line number 19A to line number 20
3. Change line number 19B to line number 19A
4. Change line number 20 to line number 21
5. Line 34, "X" code. Note should read billet filled by line number 44B (change billet grade to CWO2).
6. Add line 44B Target Information Officer/ Fires Tactical Systems/ Survey Officer CWO2 0803 (1). Compensation from line #34.
7. Delete line number 63
8. Delete line number 70
9. Delete line number 71 two 0802 LTs. Compensation for line 44C, 55A.
10. Delete line number 72 two 0861 LCPLs. Compensation for line 38A T/O 1113G.
11. Delete line number 73 two 0621 CPLs. Compensation for line 39 T/O 1113G.
12. Delete line number 74 two 0861 LCPLs. Compensation for line 47 increase and T/O 1113G line 38A.
13. Delete line number 75 two 0621 LCPLs. Compensation for line 49 and T/O 1113G line 39.
14. Add line number 42 Regt Met Section Detachment. Footnote will read: Line 42, Regimental Met Section Detachment, "X" coded from 14th Marines T/O 1101A
15. Add line number 42A, Met Team
16. Add line number 42B, Team Chief SSGT 0848 R E (1) P
17. Add line number 42C, Arty Metro Man SGT 0847 R E (1) M
18. Add line number 42D, Arty Metro Man CPL 0847 R E (1) M
19. Add line number 42E, Arty Metro Man/Driver 0847 R E (2) M
20. Add line number 42F, Arty Metro Man/Driver 0847 R E (1) A
21. Change line 47 to Qty 2; Compensation from line 74, Qty 1
22. Line number 49, increase Qty to 3 Compensation from line number 75 Qty 1
23. Add line number 44C; Assistant Liaison Officer LT 0802 Qty 1; Compensation from line number 71 Qty 1
24. Add line number 55A; Assistant Regt Naval Gunfire Liaison Officer Lt 0802 Qty 1 Compensation from line number 71 Qty 1
25. Delete line 83 (moved to line 5A)
26. Change all 0861 SNCO billets to MOS 0869

F. Proposed changes to T/O 1142G

1. Change line number 19A to line number 20
2. Change line number 19B to line number 19A
3. Change line number 20 to line number 21

4. Line 34, "X" code. Note should read billet filled by line number 44B (change billet grade to CWO2).
5. Add line 44B Target Information Officer/ Fires Tactical Systems/ Survey Officer CWO2 0803 (1). Compensation from line #34.
6. Delete line number 63
7. Delete line number 70
8. Delete line number 71 two 0802 LTs. Compensation for line 44C, 55A.
9. Delete line number 72 two 0861 LCPLs. Compensation for line 38A T/O 1113G.
10. Delete line number 73 two 0621 CPLs. Compensation for line 39 T/O 1113G.
11. Delete line number 74 two 0861 LCPLs. Compensation for line 47 increase and T/O 1113G line 38A.
12. Delete line number 75 two 0621 LCPLs. Compensation for line 49 and T/O 1113G line 39.
13. Delete footnote line number 44, Footnote moves to line 73 on 1101H T/O
14. Change line 47 to Qty 2; Compensation from line 74, Qty 1
15. Line number 49, increase Qty to 3 Compensation from line number 75 Qty 1
16. Add line number 44C; Assistant Liaison Officer LT 0802 Qty 1; Compensation from line number 71 Qty 1
17. Add line number 55A; Assistant Regt Naval Gunfire Liaison Officer Lt 0802 Qty 1 Compensation from line number 71 Qty 1
18. Change all 0861 SNCO billets to MOS 0869

G. Proposed changes to T/O 1113A

1. Add line 38A Fire Support Man 0861 LCPL (1); compensation from T/O 1142A line 72 Qty 2, line 74 Qty 1
2. Line number 36, change billet grade to SSGT from SGT, MOS 0869
3. Change line number 39 to line number 39A
4. Add 39 Field Radio Operator CPL 0621; compensation from T/O 1142A line 73 Qty 2 line 75 Qty 1, one uncompensated grade increase from LCPL to CPL

H. Proposed changes to T/O 1113G

1. Add line 38A Fire Support Man 0861 LCPL (1); compensation from T/O 1142G line 72 Qty 2, line 74 Qty 1
2. Line number 36, change billet grade to SSGT from SGT, MOS 0869
3. Change line number 39 to line number 39A
4. Add 39 Field Radio Operator CPL 0621; compensation from T/O 1142G line 73 Qty 2 line 75 Qty 1, one uncompensated grade increase from LCPL to CPL