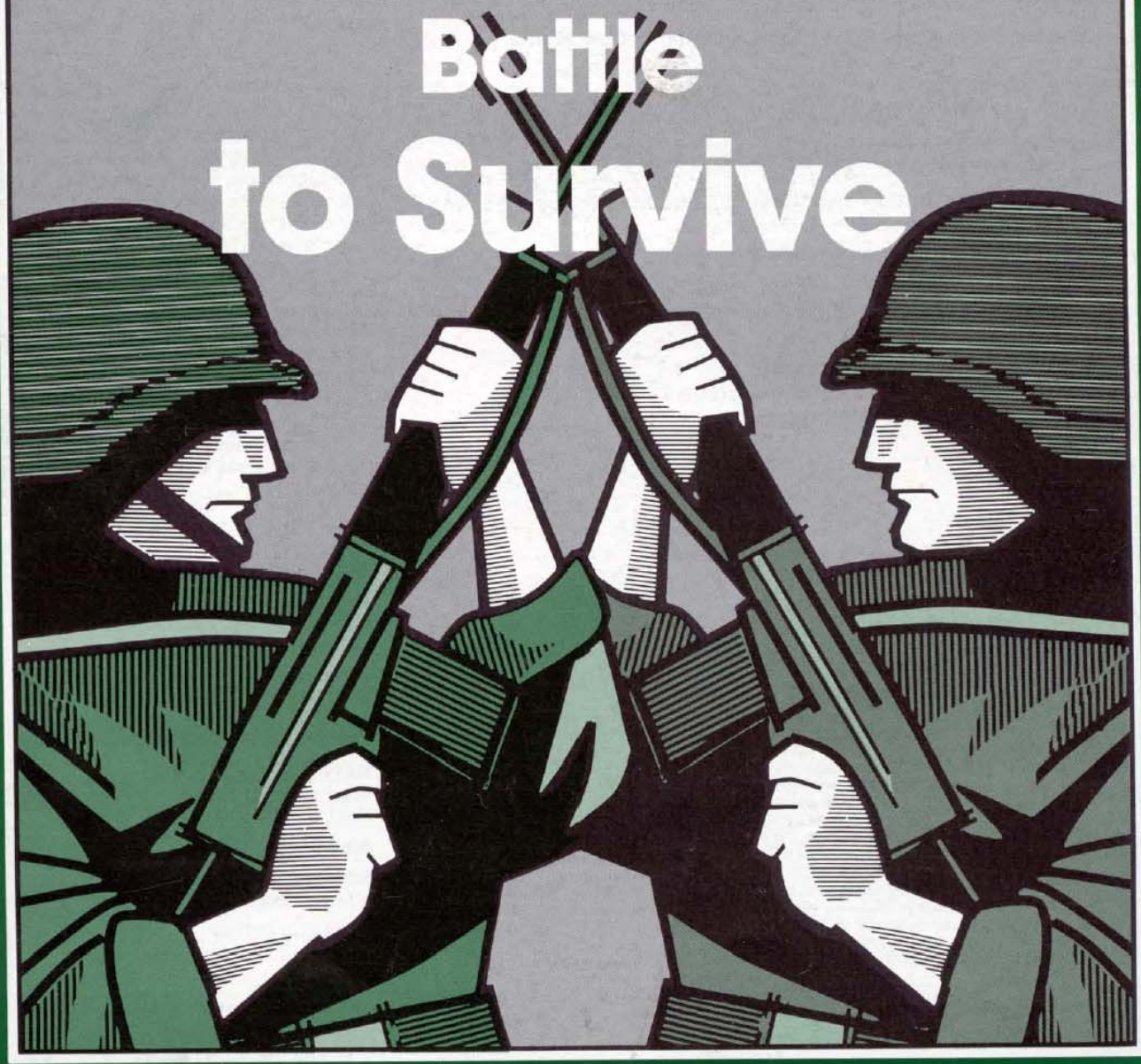
Field Artillery

A Professional Bulletin for Redlegs

April 1988

The Battle to Survive



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Articles

Features

***Field Artillery*—**A Professional Bulletin for Redlegs—(ISSN 0191-975x). Unless otherwise stated, material does not represent official policy or endorsement by any agency of the US Army. Approved for public release; distribution is unlimited.

PURPOSE (as stated in the first *Field Artillery Bulletin* in 1911): *"To publish a journal for disseminating professional knowledge and furnishing information as to the field artillery's progress, development, and best use in campaign; to cultivate, with the other arms, a common understanding of the power and limitations of each; to foster a feeling of interdependence among the different arms and of hearty cooperation by all; and to promote understanding between the regular and militia forces by a closer bond; all of which objects are worthy and contribute to the good of our country."*

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Fight to Survive!

After February's lofty look at joint and combined operations, *Field Artillery* returns to a unit-level theme that's as fundamental as they get—battlefield survivability. Though you might expect the tactics and techniques of one of the basics to remain the same, this issue will show you, once again, that change is the only constant.

Except for the thrust of the concept itself, a 1983 *Field Artillery Journal* article on survivability bears no resemblance whatsoever to the contents of this edition. In this edition, two fine Field Artillery senior noncommissioned officers look at better ways to stay physically fit to fight without expensive equipment. This issue also examines how urbanization affects the reconnaissance, selection and occupation of positions. Two articles offer suggestions for improving battery defense while others deal with counterfire, the use of radars, electronic warfare and artillery logistics. Also, Colonel Richard W. Wharton, Director of Combat Developments, Field Artillery School, explains how important survivability considerations are in the development and fielding of new hardware.

As a special insert, Lieutenant General Jerry Max Bunyard, Deputy Commanding General for Research, Development and Acquisition of the Army Materiel Command, explains the materiel acquisition management program for those who want a second-track career option closely related to the Field Artillery.

Train to survive—survive to win! This issue offers some ways to improve your chances.

Editor

On the Move

MAJOR GENERAL RAPHAEL J. HALLADA

Live to Defeat the Enemy

Field Artillery survivability must be driven by a single theme—live to defeat the enemy. We must protect our gunners and equipment in the hostile battlefield environment. We perform survivability measures for one reason: to allow the Field Artillery to better accomplish its mission. In short, Redlegs must survive to win.

Field Artillery survivability problems are as varied as the weapon systems we'll fight and the combat plans we must execute. For this reason, we must direct survivability advances toward the entire Field Artillery community. This means Active and Reserve Component Army and Marine Corps units supporting both heavy and light forces. We also must recognize that survivability requirements stem from specific tactical considerations such as the use of chemical and nuclear weapons and the factors of mission, enemy, terrain, troops available and time (METT-T).

Emerging technology continues to provide better ways to function on the battlefield. The following examples are some of the survivability-related innovations we are actively pursuing:

- Improving target acquisition to help us locate the enemy's fire support and target it for destruction with smart munitions like sense and destroy armor munition (SADARM). In addition to increasing the Firefinder radar's capacity to locate enemy artillery and mortars, we're also improving the radar by increasing its mobility, moving toward a "shoot and scoot" method of employment.
- With other proponents, we are developing a family of highly survivable, unmanned aerial vehicles (UAVs) that gives the commander real-time, over-the-hill battlefield intelligence. This urgently needed acquisition system will allow us to react smartly to the situation and, in effect, give us the capability to detect and destroy the right targets before the enemy can detect and strike us.
- Equipping self-propelled howitzers with on-board fire direction and self-location capabilities like those used with the multiple launch rocket system (MLRS). This will help us reap the full potential of shoot and scoot tactics. We are designing the HIP howitzer's crew cab to segregate ammunition and rerouting hydraulic lines, thereby enhancing redundancy and reducing the chance for fire and explosion. Cabs will have an NBC filtration system along with a special interior armor that will add further protection for the crew.
- Using single-channel, ground and air radio system (SINCGARS) and mobile subscriber equipment (MSE) to improve our ability to survive in an electronic warfare environment. The SINCGARS frequency-hopping capacity will lower the probability of enemy detection using their direction-finding devices.
- Developing deception devices to allow us to mimic friendly electronic signatures. Multi-spectral decoys will simulate specific false targets that resemble friendly Field Artillery weapons and vehicles.

Field Artillery survivability is limited only by our imagination and initiative.

As critical as future advances are, overcoming today's survivability challenges is equally important. Soviet and Warsaw Pact forces can employ a combination of counterfire, air and ground attacks, plus an electronic warfare system. But actual combat situations will dictate how often we move or how far we must disperse. The requirements for positioning a Field Artillery unit in the desert may call for frequent moves and significant dispersion. On the other hand, a firing battery engaged in a low-intensity conflict in a jungle or on other dense terrain may be positioned in a fire base.

The Field Artillery School and Center is committed to helping overcome the survivability obstacles of artillery units in the field. We are actively pursuing alternatives as we exchange ideas among Fort Sill and Field Artillery units throughout the world. We've seen many survivability innovations progress from unit SOPs to current doctrinal publications.

Split battery operations are an example. Individual units did a great deal of experimentation with split operations. The results of this work have directly influenced the contents of our revised FM 6-50 The Field Artillery Cannon Battery, which will be distributed soon.

Other ideas being explored include:

- Using non-traditional locations for positioning firing units. Firing platoons are positioned in towns or other built-up areas.
- Exploring better ways to harden units, particularly towed units. Towed artillery isn't easily hardened. But we can use individual fighting positions close to each howitzer. Depending on the situation, we can position prime movers away from the piece. It's possible Field Artillery units could "time-share" hardened positions with other support arms.
- Exploring ways to reduce electronic signatures. Methods include using directional antennas, plus remoting antennas and radios away from key installations. Other means of communications such as messengers, fiber optics and field wire should be considered.

These are some of the steps we are taking to ensure the survivability of the Field Artillery. We can implement many of these measures right now. Field Artillery survivability is limited only by our imagination and initiative.

We at the Field Artillery Center and School stand ready to help all Redlegs to meet the constant challenge of survival on the battlefield. This issue of *Field Artillery* should stimulate an even greater influx of survivability information, and we urge you to send us your ideas and questions. We must ensure the Field Artillery survives to win.

Incoming

LETTERS TO THE EDITOR

Another Way to Organize a Headquarters Battery

I recently completed 18 months as the commander of Headquarters and Service Battery (HSB), 2d Battalion, 320th Field Artillery at Fort Campbell, Kentucky. Like most commanders of similar units, I often experienced command and control (C^2) problems because of the unit's MTOE organization. With the Battalion commander's encouragement, I attempted to devise a better organization for the Battery to reduce those problems. Perhaps my solution will help other commanders with a similar organizations. Although I refer specifically to my battery, the thought process generally will apply to many other units.

The Battalion was organized under the J-series MTOE. However, the firing batteries controlled the fire support teams (FISTs) and the Battalion fire support elements (FSEs) which were detached to the firing batteries. The Brigade FSE and combat observation lasing teams (COLTs) remained in HSB. Also, the Battalion's ammunition, maintenance and mess assets were consolidated in HSB. This left 14 unique sections and platoons directly under the battery headquarters.

The lack of an intermediate leadership level created many problems:

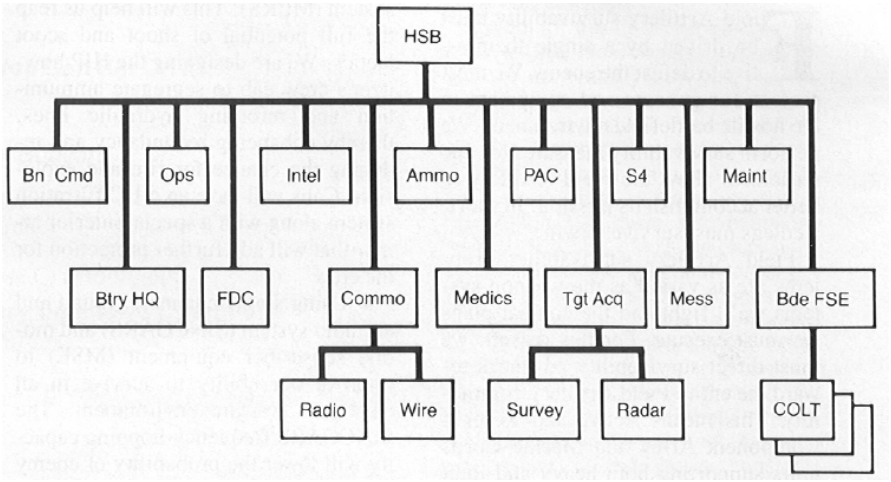
- C^2 in both garrison and field environments was difficult because of the extremely large span of control.
- Planning, coordinating and supervising maintenance and training was difficult.
- Problem resolution went directly from section to the battery commander (BC) and first sergeant (1SG) level.
- Proper care of soldiers' concerns was more difficult.
- Communications often did not flow properly, up or down.

I decided that if I were going to reorganize anything, I needed to accomplish five goals:

1. Develop more effective C^2, to include a better communications flow.

2. Establish an intermediate leadership level to resolve problems at the lowest level possible.

3. Develop more effective means of managing maintenance and training.



The Headquarters and Service Battery Organization Under the J-Series MTOE

4. Establish and strengthen platoon leader positions for professional development of junior officers.

5. Establish an organization that would help operations in both field and garrison environments.

To accomplish these goals, I developed three structural options. The first consisted of a small battery headquarters with support and operations platoons. The support platoon consisted of the maintenance, ammunition sections and the personnel administration center (PAC). The operations platoon consisted of the target acquisition platoon, the operations section, the fire direction center (FDC), the S2 and the Brigade FSE, including COLTs.

This arrangement grouped the sections logically and accomplished goals 2 and 4. Unfortunately, this organization left an extremely large support platoon. It also left two of my three lieutenants in the same platoon. Most important, this organization did not accomplish goals 1,3 or 5.

The second option had three platoons: staff, support and operations. The staff platoon contained all the Battalion staff elements, the Battalion command section and the Battery headquarters. The support platoon had the maintenance, mess and ammunition sections, the communications platoon and the medics. The operations platoon consisted of the target acquisition platoon, the FDC and the Brigade FSE. This arrangement accomplished objectives 1,2,3 and 4 and appeared to be a logical breakdown for garrison operations.

This structure had several problems, however. The support platoon was very large and still had two lieutenants in it. The operations section and the FDC, which needed to develop teamwork in garrison as well as the field, fell under different platoons. Finally, this arrangement did not accomplish objective 5, because it was good only for a garrison situation.

The third option also had three platoons: headquarters, operations and support. The headquarters platoon, with the communications officer as the platoon leader, contained the communications platoon, the PAC, the medics, the Battalion command section and the Battery headquarters. The operations platoon, with the reconnaissance and survey officer (RSO) as the platoon leader, consisted of the target acquisition platoon, the operations and intelligence sections, the FDC and the FSE. The FSE was under the operations platoon for administrative purposes only. The Brigade FSO was responsible for

the training, maintenance and field operations of the FSE and the COLTs. The support platoon, headed by the ammunition officer, consisted of the maintenance, mess, ammunition and S4 sections.

HQ Platoon	
Commo Plt	15
Bn Cmd	3
Btry HQ	5
PAC	7
Medics	6
	36 People
Operations Platoon	
Tgt Acq Plt	17
Operations	8
FDC	10
Intel	2
FSE (COLTs)	9
	46 People
Support Platoon	
Maint Sec	18
Mess	9
Ammunition	21
S4	5
	53 People

The Third and Best Reorganization Option

This option created platoons of roughly equal size and accomplished all five objectives. This arrangement does have the disadvantage, however, of displacing the communications platoon from the other support elements of the Battery.

Of course, option three is the one I chose. The three platoon leaders controlled the maintenance, training coordination and management of their platoons. Their immediate NCOs became the platoon sergeants. (For example, the target acquisition platoon sergeant became the operations platoon sergeant.) Although there were growing pains and a need for some role clarification, this structure accomplished what I intended.

Having three platoon leaders and platoon sergeants to take charge greatly reduced the unmanageable span of control and reduced the C^2 problems. It also improved the communications flow both in the field and in garrison. The platoon leaders had more responsibility, and the BC and 1SG could coordinate more easily with the staff sections. Finally, another leadership level existed to look out for the soldiers' welfare and concerns.

I implemented this system shortly before I turned over command. My successor, Captain Dave Rogers, is still using the platoon system and has confirmed its effectiveness.

Though this system worked in our battalion, there were some additional considerations. I had to keep all three lieutenant and 13B40 platoon sergeant positions filled for this system to work. The Battalion commander was committed to keeping the positions filled. These positions are as important to a battalion as are the more glamorous and popular ones in the firing batteries. Also, I needed to define clearly the roles of the platoon leaders and the various staff officers. I did this to increase staff cooperation and resolve conflicts. For these reasons, the platoon system in my HSB worked.

Again, I don't want to tell commanders to organize their headquarters batteries this way; I only want to give them food for thought.

Robert Snyder
CPT, FA
Ravenswood, WV

Observed Fire Training. Is It Good Enough?

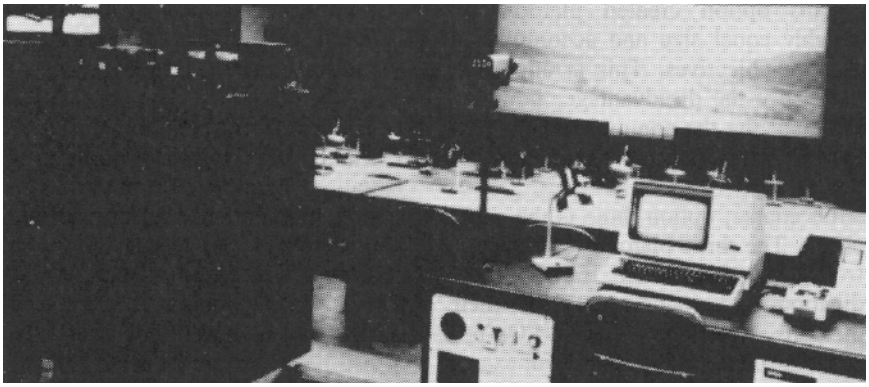
As the author of "TSFO Takes The Field In USAREUR" (*Army Trainer* magazine, Spring 1983), I want to share my views on the Invertron training set, fire observation (TSFO). The TSFO is a training tool for forward observers. The problem we face is a lack of highly trained operators. As a sustainment tool for fire support personnel, the TSFO offers a wide range of capabilities which, if used properly, enhance the soldier's ability to transfer his knowledge to the field.

When the TSFO first was fielded in 1982, those personnel designated as operators at various sites attended a one-week new equipment training (NET) course taught by the Invertron Corporation. This NET training included starting, stopping and trouble-shooting procedures, computer set-up and basic adjust fire missions. The NET team did a fantastic job of training the USAREUR operators at the observed fire training branch, Vilseck, West Germany, in 1983. But they aren't gunnery "gurus."

For those who are still unfamiliar with the TSFO, I list the tasks it can train:

- Basic and advanced map reading.
- Basic adjust fire missions.
- Target location using either the polar, grid or shift-from-a-known-point method.
- Battery and battalion massed fire missions.
- Precision registration, abbreviated registration and destruction missions.
- Suppression, immediate suppression and immediate smoke missions.
- Adjustment procedures by piece for a final protective fire (FPF) mission.
- Record adjust fire missions for playback and critique.
- Record and fire planned targets from the target-list worksheet.
- Quick smoke missions.
- Illumination and coordinated illumination missions.
- Simultaneous (simo) missions (up to four missions at one time).
- Moving target exercises.

To train our soldiers in these tasks, the TSFO operator must be familiar with Field Artillery and mortars. He must know what to enter into the computer to process a precision registration or final protective fire mission. Unfortunately, few operators in the field today can offer a soldier this solid, advanced training.



The Training Set, Fire Observation (TSFO)

How do we solve this problem? We must teach the operators how to process special missions with the TSFO. Both civilian and military operators must have the same knowledge to offer a high degree of training. The following are two possible solutions to this problem:

1. Establish a highly trained, mobile training team to instruct at the user's TSFO facility. Based at Fort Sill, this team should have enough instructors to help at least five TSFO facilities at any time. The instruction should accommodate 13F skill levels 1 and 2, at a minimum.

2. Establish a three-week operator workshop at Fort Sill with a projected student load of no more than eight students. This allows enough keyboard time for each operator.

We cannot continue to let this problem go unnoticed. If our soldiers are to prepare for future conflicts anywhere in the world, they must train to accomplish their mission. The TSFO is one of the best training tools we have to help them train for the future. I hope someone will read this and act to make it happen. Let's not put the TSFO in the same museum as the artillery and mortar puffboard.

Robert N. Waldron
SSG, FA
Fort Carson, CO

The Field Artillery School has a one-week training course for TSFO operators. Units can schedule operators for this course through the Gunnery Department operations officer at AUTOVON 639-5625 or commercial (405) 351-5625.

Ed.

Replot Procedure for BUCS

The battery computer system (BCS) has it. The tactical fire direction system (TACFIRE) has it. Even the Field Artillery digital automatic computer (FADAC) had it. So why doesn't the backup computer system (BUCS) have a replot program routine?

Though our active component (AC) artillery units now use BCS as their primary means of technical fire direction, most Reserve Component (RC) artillery units use BUCS as the primary means. So the question remains, if we rely so heavily on BUCS as a means of computing accurate firing data —why doesn't BUCS have it?

If this situation has escaped you or if you noticed but failed to note the significance of this omission, I invite your attention to chapter 8 of FM 6-40: "In many instances, fire-for-effect data may not reflect the actual location of the target as defined by its chart coordinates and altitude. (This, of course, also applies to the final BUCS fire for effect [FFE] grid.) This inaccuracy results from errors in initial target location and errors in determining the initial site fired (target altitude entered in BUCS) in an adjust fire mission. For the observer to accurately shift from a known point located by replot or for other units to mass fires on the same point, the actual target location and altitude must be determined as accurately as possible. To do this, the replot process is used."

The replot procedure will produce a more accurate target location *only* if corrections for all non-standard conditions affecting the ballistics of the rounds have been made. The final replot grid *is not* a surveyed grid.

Though there is no "built-in" replot program routine, replot is still possible.

BUCS Replot Procedure

Situation: Your unit has conducted a fire mission on an unsurveyed target. The initial target grid location came from the observer's terrain association and map spot. Using his map and the initial target grid, the fire direction officer (FDO) determined the target altitude used to process the fire mission. During the mission, the observer sent corrections to adjust the rounds onto the target, and (or) sent refinement corrections after the FFE phase. The observer then requested the fire direction center (FDC) record this as a target, or the FDO directed that the FDC record the target data for transfer to other firing units. To determine an accurate target grid and altitude so other units can mass their fires on the target effectively, you must use the following replot procedure:

Step 1. Compute firing data for the final adjustment and manually record the final target grid and altitude corresponding to that correction.

Step 2. Initiate an adjust fire mission (dry) on the final target grid and altitude (determined in Step 1) with a notional howitzer located at the geometric battery center. Record the center-of-battery to center-of-target (COB-COT) range and deflection and the computed firing data.

Step 3. Determine the map-spot altitude for the target grid (Step 1), enter the up or down correction to adjust the

BUCS altitude to the map-spot altitude and compute firing data.

Step 4. Use add or drop range corrections in subsequent adjustments until the computed BUCS firing data matches the firing data computed in Step 2. (See Note 1.)

Step 5. Determine a new map-spot altitude for the grid location corresponding to the firing data derived in Step 4, enter the up or down correction to the BUCS target altitude (as in Step 3) and compute firing data.

Step 6. Repeat Steps 4 and 5 until the new map-spot altitude determined in Step 5 is within 1/2 contour interval of the BUCS target altitude. Once this criterion is met, the final target grid and altitude determined *is* the replot location.

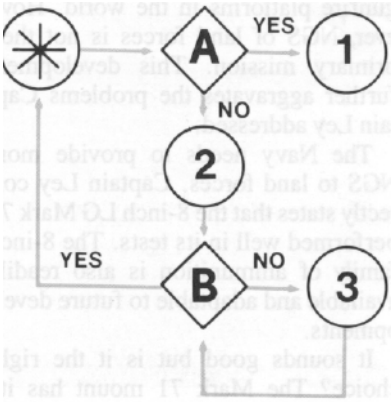
Note 1: The add or drop, range corrections are made along the gun-target (GT) line. Determine the azimuth of the GT line by converting the COB deflection recorded in Step 2 to an azimuth. Approximate the size of the range correction by using the WoRM formula [Δ meters = (GT range/1000) x [ΔmilsQE], or by using the tabular firing table (TFT). When using the TFT, determine the value in Column 5 of Table F for the correct charge at the COB-COT range in Step 2 and multiply this value by the ΔmilsQE.

Note 2: Regardless of the fuze fired in effect, fuze Q should be used for computing all data in the replot procedure.

BUCS Replot Flowchart

Instructions: Enter the flowchart at the point or procedural step identified by the asterisk (*) after completing Steps 1 and 2 of the replot procedure. The legend below shows the actions to take or questions to answer at each point in the flowchart.

James B. Williams
CPT, FA
Los Angeles, CA



Legend

* - Determine the map spot altitude.

A - Is the difference between the map-spot altitude and the BUCS altitude ⩽ 1/2 contour interval?

1 - The last computed grid and altitude *is* the replot location. End of procedure.

2 - Enter up or down correction to adjust the BUCS altitude to the map-spot altitude and compute firing data.

B - Does the computed quadrant (QE) equal the final adjusted QE (Step 2)?

3 - Determine and enter range corrections and compute firing data.

A Vote of Confidence for the AN/PRC-68

The introduction of the new portable radio, the AN/PRC-68, into the Field Artillery promises to enhance the combat readiness of units that take time to experiment with and learn its beneficial capabilities.

Our unit has benefited greatly from the addition of the AN/PRC-68. By replacing the standard antenna with an AN/PRC-77 whip antenna, we have found the AN/PRC-68 to be even more effective. We use the AN/PRC-68 to lay the battery and no longer run wire to the aiming circle. In addition, our advance party men can transmit their initial deflections to the howitzer sections up to four kilometers away. These factors have helped our battery improve its average daylight lay time to just less than four minutes.

The AN/PRC-68 also has given us much more control during convoys and is especially helpful in controlling convoy intervals and reacting to hipshoots, ambushes, air attacks, etc.

Finally, the AN/PRC-68 has been invaluable for training. We have used it to control six sections simultaneously, each doing a different task.

The soldiers of Howitzer Battery, 1st Squadron, 2d Armored Cavalry Regiment, challenge you to experiment with the AN/PRC-68 and discover just how valuable this small radio can be to your Field Artillery cannon battery.

Arthur L. Hartman
1LT, FA
1 Sqdn, 2 ACR

Response to "Naval Gunfire Support: What We Need to Understand"

Captain Ley's article titled "Naval Gunfire Support: What We Need to Understand" [February, 1988] comes at a perfect time. With budget cuts on the horizon, now is the time for the Army and Marine Corps to rally around the naval gunfire support (NGS) banner.

I agree with Captain Ley's analysis of current naval gunfire capabilities. The IOWA-class battleships are powerful, but they can't be everywhere at once, and the Navy will not routinely endanger TICONDEROGA-class Aegis cruisers to provide NGS. The Navy also has announced plans to modify 24 SPRUANCE-class destroyers with vertical missile launchers. These destroyers then can be controlled by Aegis ships to conduct anti-air warfare.

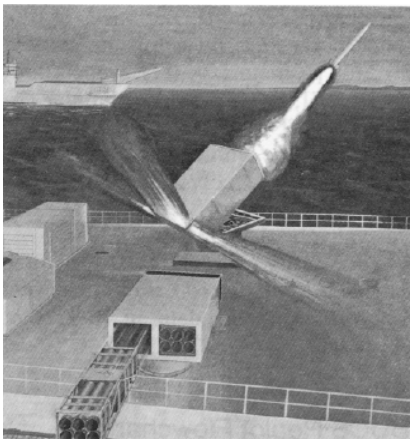
The TICONDEROGAs and SPRUANCEs are two of the best naval

gunfire platforms in the world. However, NGS of land forces is not their primary mission. This development further aggravates the problems Captain Ley addressed.

The Navy needs to provide more NGS to land forces. Captain Ley correctly states that the 8-inch LG Mark 71 performed well in its tests. The 8-inch family of ammunition is also readily available and adaptable to future developments.

It sounds good but is it the right choice? The Mark 71 mount has its drawbacks—it's heavy. At 170,000 pounds, it's 120,000 pounds heavier than the 5-inch Mark 45 and the ammunition weighs more per round. Additionally, space restrictions limit the quantity of ammunition on board.

Although the 8-inch gun is more effective than the 5-inch, the Navy chose to stay with the 5-inch guns. Why? Overall weight and ship stability considerations favored the 5-inch system. The performance of newer, lighter ships would suffer from the heavy mount and ammunition.



LTV Aerospace and Defense

The Assault Ballistic Rocket System

However, the Navy must field a system more effective than the current 5-inch gun. I recommend the assault ballistic rocket system (ABRS), the naval version of the multiple launch rocket system (MLRS). A brief description of the system appeared in the October 1987 issue of *Field Artillery*. MLRS is clearly the Army's weapon of the future.

If the Navy got behind MLRS munition development, we could see decreased costs and earlier fielding of sense and destroy armor (SADARM), terminally guided warheads (TGW) and tactical missile systems (TACMS). The ABRS would offer landing forces greater range and lethality than current 5-inch or 8-inch ammunition.

The US Army and Marine Corps have relied on NGS many times in the past. Several of the world's current hotspots are within the range of naval vessels. I hope we'll have naval support when we need it. I welcome the Army's interest in the naval gunfire problem and commend Captain Ley for his well researched and interesting article.

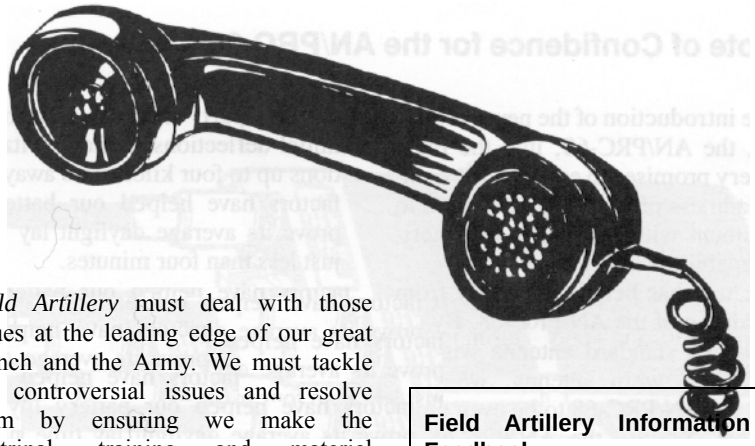
J.M. Lance
Capt, USMC
Fort Sill, OK

I Need Your Help

As the Assistant Commandant of the US Army Field Artillery School, I have a tremendous opportunity to see Redlegs in action around the world. As I visit units, I see creative solutions to Field Artillery problems vexing our other units. Though I share as much as I can, I need your help.

As you saw in the comprehensive December Red Book and the February "Joint and Combined Operations" editions of *Field Artillery,* our professional bulletin is an invaluable resource for Redlegs. It's our vehicle to exchange innovations to ensure we are an effective fighting force, creatively solving our problems. We are effective, and the creativity is out there.

If you have an idea, tell us. If you have a new fix to an old problem with organization, equipment or procedures, share it. If you disagree with some Field Artillery tactic or technique, tell us that too. Then tell us how we should be doing it and why. In short, share more of that creative energy I see in the field.



Field Artillery must deal with those issues at the leading edge of our great branch and the Army. We must tackle the controversial issues and resolve them by ensuring we make the doctrinal, training and materiel decisions to accomplish our mission most effectively. But at the same time, we must share our techniques and tips to do our daily jobs efficiently and prepare for war.

So, I call upon all Redlegs to look around your units and note what innovative things you are doing. Then share them with all of us—through *Field Artillery*.

Fred F. Marty
BG, USA
Fort Sill, OK

Field Artillery Information and Feedback

- ARTEP-SQT-AMTP-NTC-JRTC Hotline: AUTOVON 639-2064
- Redleg Hotline for other artillery-related subjects: AUTOVON 639-4020
- Fire Support Feedback System $(FS)^2$ for Artillery lessons learned: AUTOVON 639-3809 or 5644
- Editor, *Field Artillery,* for article or feature ideas: AUTOVON 639-5121 or 6806

Request For FA IO Information

I am assigned to the 26th (Yankee) Infantry Division Artillery [Massachusetts Army National Guard] as the Field Artillery intelligence officer (FA IO).

I have found there is very little information on the specific duties and responsibilities of an FA IO, keeping in mind this position is different from that of the "maneuver-type" S2. There are very few Field Artillery MTOEs [modified tables of organization and equipment] that carry the FA IO's position.

The FC 6-20-10 NTC Lessons Learned and the FM-71 series manuals have relatively good information. But I am trying to gather more to list the duties, responsibilities and requirements of an FA IO for OER support forms and an FA IO/S2 Workbook (SOP).

I am asking that anyone with information please forward it to me at:

HQ, 26th Div Arty
ATTN: FA IO
400 Fairview Avenue
Rehoboth, MA 02769-2696.

James C. Carr
MAJ, FA
Rehoboth, MA

"Letters from Vietnam"

I would like to thank the *Field Artillery* staff for doing such a great job with my article "Letters from Vietnam" [October, 1987]. In particular, please praise Donna Jeanne Covert [Art Director] and Charles Ivie [Publications Production Design Supervisor for Directorate of Training and Doctrine, Field Artillery School] who created the graphics for the article.

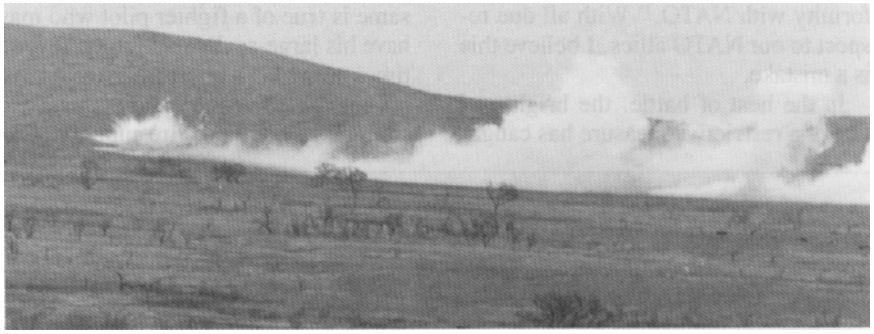
James J. Carafano
CPT, FA
West Point, NY

I appreciate your giving me the chance to recognize the consistently outstanding work of our Art Director Donna Jeanne Covert and one of the many excellent contributions of Mr. Charles Ivie. Surely these talented people were even more inspired by the quality of your article.

Ed.

Fire Support Coordinators, the Keys to Fire Support

Fire Support Coordinators (FSCOORDs) are those Redlegs at brigade, battalion and company levels who tie maneuver and fire support together. Assignment as a FSCOORD is not for the inexperienced or the weak at heart. The consequences of mistakes by FSCOORDs ripple throughout the fire support chain. Actions taken by the FSCOORD during training at the home station or the combat training centers or while performing his mission in combat determine the success of fire support. In the final analysis, we measure this success by who lives and who dies.



Much has been said in the last five years about the performance of our FSCOORDs. Our current crop of FSCOORDs are young, aggressive and highly talented. Sadly though, it is not enthusiasm but experience and knowledge that get the job done. The FSCOORD's inability to integrate fire support and maneuver is not a reflection on any one officer, but on the Field Artillery community.

Each job in the Army carries with it a certain amount of prestige. Until the advent of the National Training Center [NTC, Fort Irwin, CA] and the close scrutiny of fire support, the FSCOORD position carried no prestige or emphasis. To be branch qualified, an artillery officer does not need to be a FSCOORD, but a battery commander. We don't judge a battery or battalion commander on how well he can integrate maneuver and fire support. We judge him on how well he can place steel on or around stationary targets in the impact area. Two of the three critical elements that make this happen, the fire direction center and the line of metal, are in the firing battery.

It is only natural for direct support battalion commanders to assign their most trusted and competent officers to command firing batteries. The direct support battalion commanders feel it prudent to stay close to the action in the batteries. Why? The tasks performed in the firing batteries are observable, measurable and highly visible throughout the chain of command. In their defense,

the commanders only place the emphasis where all Field Artillerymen place emphasis: the battery command.

However at the NTC, the OPFOR [opposing forces] are not player pieces on a board, but dedicated soldiers who will continue to attack or defend until defeated or killed. Slowly but surely it has become apparent that it is the FSCOORD, not the battery commander, who determines the success of fire support.

Battery command develops junior officers and gives them the experience and seasoning necessary to be FSCOORDs. It is during battery command that Field Artillery officers can demonstrate the potential to be FSCOORDs. It is now the FSCOORD's performance that is observable, measurable and, to the chagrin of the Field Artillery community, very, very visible.

Suddenly the cry is, "What is wrong with fire support?" The call came, "Commander, we need more experience in our FSCOORDs." Again and again the cry has been heard from the bowels of the NTC to the highest levels of the Army. Yet we blindly continue assigning our most inexperienced officers as FSCOORDs.

In our defense, it is hard to equate the smell of cordite, the roar of the howitzer and the low rumble of shells exploding in the distance to the beep, beep of the DMD [digital message device] or VFMED [variable format message entry device] and the scratch of a pencil flying across a target-list worksheet. Regardless of tradition, regardless of what promotion boards may think, regardless of the marvel in your eyes when you see a hipshoot, the time to change is NOW. If there is a price to pay or a sacrifice to make, then let us pay the price or make the sacrifice. If Field Artillery is to remain credible as a branch and succeed in combat, we must assign the brightest and the best officers as FSCOORDs.

Wayne A. Boers
CPT, FA
Fort Sill, OK

Change in Fire Support Coordination Measures Could be Deadly—To Us

I have been away from Field Artillery fire planning for a while. Imagine my shock in seeing a recent message stating that all fire support coordination measures, both permissive and restrictive, will be in black on maps. Why? The point of contact at the Field Artillery Center said that the new procedure was "a STANAG [standard NATO agreement] to bring us into conformity with NATO." With all due respect to our NATO allies, I believe this is a mistake.

In the heat of battle, the bright red line of a restrictive measure has caught many a planner's eye and saved friendly lives. The potential is far greater now for fratricide. This is especially true if the measure is not clearly labeled on the map. For example, if a fire planner seeks to attack a target on the opposite side of a solid black line, he may not take the time to trace the line to a point where he can determine if it is a permissive or restrictive measure. The same is true of a fighter pilot who may have his large-scale map folded several times to make it more manageable in his cockpit. He could readily mistake a solid black line for a fire support coordination line rather than a restrictive fire line.

Using red for restrictive fire measures had a logical basis and the procedure is tried. We've proven its effectiveness many times in combat, including in joint and combined operations. What was that reason for change again?

James O. Harrison III
MAJ, FA
Fort Hood, TX

Coordinated Illumination

Many forward observers consider coordinated illumination a lengthy and complex fire mission. Therefore, the following discussion proposes a shorter and simpler method.

Current Procedures

FM 6-30 (pages 6-8 to 6-12) describes the current method for this mission.

First, is the initial call for fire:

P53 this is P67, adjust fire, over. Grid 616376, over. Vehicle noises, suspected tanks, illumination, over.

Second, is the adjustment of the illumination round until it bursts in the proper area and at the correct height of burst. A typical correction might look like this:

Direction 5800, right 200, down 100, over (assumes the previous round was spotted 100 mils left and burns out 40 mils too high, using an OT factor of 2).

The final portion requires the observer to adjust HE [high explosive] underneath the illumination:

Right 400, coordinated illumination, over. Adjust fire, over. Grid 611382, over. Two tanks and platoon of infantry, ICM in effect, over.

At this point, the observer waits for the next round of illumination and announces "illumination mark" when maximum illumination of the target takes place. On the next round of illumination, he starts the adjustment of HE and fires for effect when appropriate.

Proposed Procedure

The shortened method of coordinated illumination requires the battery FDC [fire direction center] to fire a round of HE when the observer says "illumination mark." Here is an example of how it works.

Right 400, coordinated illumination, over. Adjust fire, over. Grid 611382, over. Two tanks and platoon of infantry, ICM in effect, over.

However, at this point, the FDC computes firing data for the illumination and HE rounds. It sends firing data for illumination to one gun, firing data for HE to a different gun and puts both guns at its command. When the observer reports "illumination mark," the FDC immediately orders the other gun to fire the HE.

Meanwhile, the observer spots and adjusts the HE round and completes the rest of the mission in the normal manner. Although the observer does not enjoy maximum illumination on the initial HE round, he does on all subsequent rounds. Moreover, he conserves an illumination round by marking and adjusting the HE with the same round. He also saves time, enhances survivability and increases the chances of achieving the desired effects on target.

Conclusion

This shortened method of coordinated illumination requires the timely firing of an HE round when the observer says "illumination mark." The observer spots the round and makes the initial adjustment. The method is feasible because of the lengthy burning time of a 155-mm M485A2 projectile (120 seconds) and because it conserves ammunition, saves time, enhances survivability and increases the likelihood of achieving effects on target.

Tim Samorajski
CPT, FA
Chicago, IL

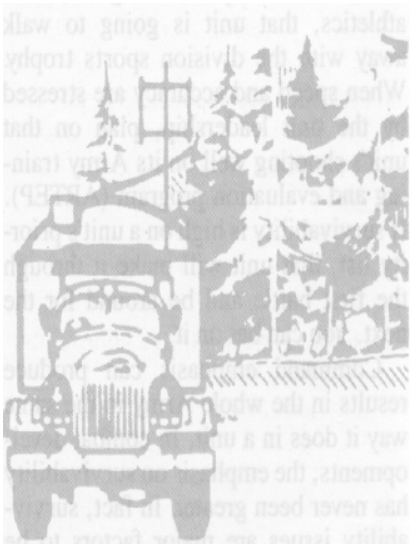
Our Command and Control is a Soviet Target

The points made in Major McCausland's article ["Soviet Disruption of Command and Control," October 1987] should not be taken lightly. The Soviets do not need to destroy or continually jam our communications systems to be effective. Any amount of delay or confusion they can inflict on us will contribute to the success of their mission.

The Soviets also will use deception techniques to confuse us. Specially trained operators will break into our radio nets and give confusing orders. The goal is to force us into uncoordinated reactions to Soviet operations.

We can compare command and control to the central nervous system of the body; if it is neutralized, the body becomes ineffective. The Soviets devote considerable resources to this because they believe neutralizing an enemy's command and control system is just as important as destroying its combat elements.

Bertrum L. Brown
Intelligence Research Specialist
Fort Sill, OK



FM 22-103 Leadership and Command at Senior Levels

A statement of principles, illustrated by examples, **FM 22-103** provides a framework for senior leaders to develop their own leadership styles. It fills three needs. First, it serves as an instructional text for professionals aspiring to lead and command at senior levels. Second, it is a resource for those already serving in senior positions. Finally, it serves as a common reference point for the many leader activities at senior levels. Though this manual does not replace FM 22-100 Military Leadership, the Army's basic leadership manual, it complements and expands on the basic BE-KNOW-DO concept as it applies to the challenge of leadership and command at large unit levels.

Available through normal distribution, account holders who are on 12 series distribution for FM 22-100 will automatically receive a copy.

For more information about FM 22-103, contact the Center for Army Leadership at AUTOVON 552-2793 or 4696, or write: Center for Army Leadership, ATTN: ATZL-SWC, Fort Leavenworth, KS 66027-6935.

Frederick W. Timmerman, Jr.
COL, AR
Fort Leavenworth, KS

Survivable Hardware Coming? You Can Bet On It!

by Colonel Richard W. Wharton

To paraphrase General Bruce C. Clark: A unit does well those things the commander wants done well.

Command emphasis has long been recognized as a key to any success. If a unit commander places a high value on athletics, that unit is going to walk away with the division sports trophy. When speed and accuracy are stressed by the unit leadership, plan on that unit's shooting well on its Army training and evaluation program (ARTEP). If survivability is high on a unit's priority list, that unit will make it through the first battle and be around for the next. You can bet on it.

Command emphasis can produce results in the whole Army in the same way it does in a unit. In combat developments, the emphasis on survivability has never been greater. In fact, survivability issues are major factors to be resolved in all ongoing combat developments programs, and survivability capabilities are one of the primary features in emerging Field Artillery system designs. Our senior leaders understand the ability to survive in battle is a common denominator of all facets of unit effectiveness. They have charged combat developers and weapon designers with the mission of making vast improvements in force survivability. The emphasis is there, and the results are coming soon.

This article describes many of our efforts to enhance survivability during the next 10 years. It explains how we are improving our ability to survive by developing technical innovations, how we are applying them to emerging Field Artillery systems and how they will make revolutionary tactics of survivability possible.

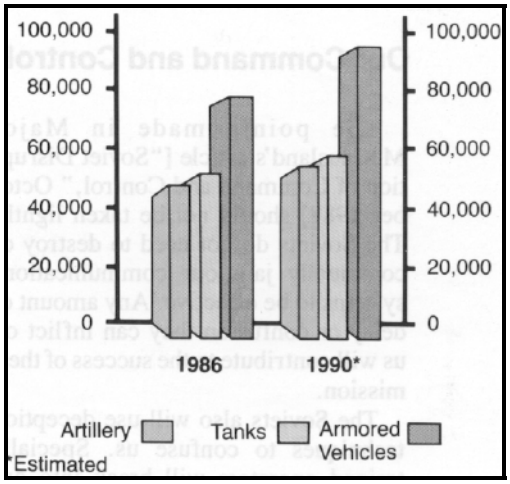
The Threat

But first, it's necessary to look at the overriding reason why we are being challenged to increase survivability. That reason is the Threat the United States will continue to face in the foreseeable future.

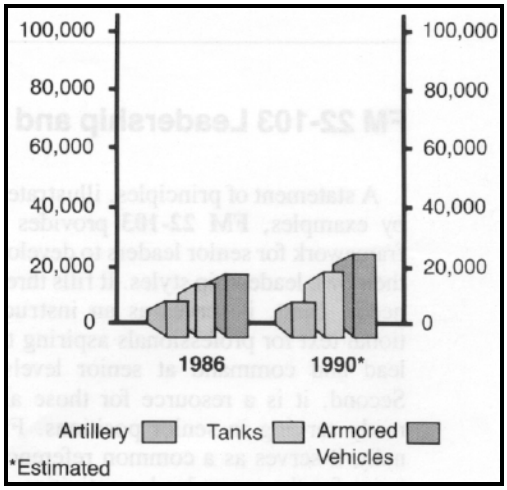
Our most dangerous threat continues to be in Europe. Warsaw Pact forces have achieved definite advantages in the number and quality of armored systems. Soviet artillery is becoming more lethal with the development of sophisticated munitions. The Soviets are becoming more effective in their ability to target and hit what they consider to be high-pay-off targets. They are aware of the benefits of counterfire.

We know they can acquire our Field Artillery and respond with counterbattery fires. We also know our own nuclear-capable artillery is high on their target list. In addition to providing advanced munitions, they've maintained vast stocks of conventional ammunition.

The Threat force's emerging technology is complemented by a number of operational and tactical developments—all of which are underscored by a doctrine that relies on the extensive use of artillery. The Soviets place great importance on their ability to achieve an overwhelming numerical superiority at the point of their main attack, particularly with artillery.



Trends in Soviet Artillery, Tanks and Armored Vehicles



Trends in US Artillery, Tanks and Armored Vehicles

Dealing With the Threat

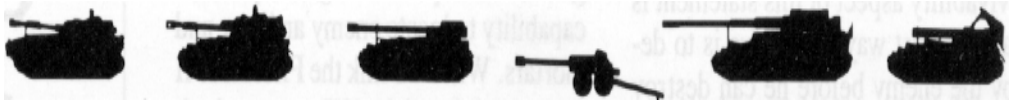
How do we deal with the growing Threat, especially from a fire support standpoint? We have a number of options.

- If you are outnumbered to start with, put more Field Artillery systems on the battlefield. This would include weapons, target acquisition assets and command and control (C^2) facilities. This solution is the most desirable, but there are obvious problems. Such an increase would be expensive in terms of materiel acquisitions. We probably couldn't afford the cost associated with this increase, and additional systems require an increase in personnel. Our total end strength is constrained by established ceilings to include the ceiling on how many troops we can forward deploy in Europe.
- If you have a fixed set of combat systems, make your systems last longer as the battle progresses. In other words, increase survivability. In a sense, increased survivability has the effect of increasing force structure over time. This option is cheaper, more cost effective and more psychologically acceptable to our soldiers and the American public.

Survivability Defined

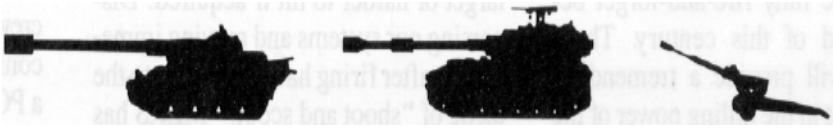
What does survivability really mean? Although there are many ways to define it, the following explanation captures what survivability is about. The objective of survivability is to have as many soldiers, weapons, and other equipment on hand and prepared to fight the second battle of a given conflict as you had at the beginning of the first battle. Our combat developments efforts are geared toward achieving this objective. In combat, we must be able to—

- Reduce the rate at which friendly forces become battle losses. We must provide artillerymen the best protection possible by equipping them with survivable gear. This includes equipment ranging from personal protective clothing to major weapon systems.
- Minimize maintenance losses. Materiel must be able to withstand the rigors of combat conditions. In addition to reducing the vulnerability to enemy



	2S1	2S3	2S5	M-1976	2S7	2S4
Towed/Self-Propelled	Self-Propelled	Self-Propelled	Self-Propelled	Towed	Self-Propelled	Self-Propelled
Caliber/Type	122-mm Howitzer	152-mm Howitzer	152-mm Gun	152-mm Gun	203-mm Gun	240-mm Mortar
Maximum Range (M)	15,000	27,000	28,500	28,500	30,000	9,700
Nuclear-Capable	No	Yes	Yes	Yes	Yes	Yes
Reflects current data						

USSR Selected Artillery



	M109A2/A3	M110A2	M198
Towed/Self-Propelled	Self-Propelled	Self-Propelled	Towed
Caliber/Type	155-mm Howitzer	203-mm Howitzer	155-mm Howitzer
Maximum Range (M)	18,100	22,900	18,100
Nuclear-Capable	Yes	Yes	Yes

US Selected Artillery

fire, we must ensure our equipment can withstand wear and tear on the battlefield. At the same time, we must be able to repair damaged equipment quickly and return it to action.

● Provide for System Redundancy. We give Field Artillery systems many types of operational backup systems. The purpose of a backup is to allow the system to continue to operate in combat, at least in a degraded mode. We refer to this concept as "graceful" degradation: We lose as little as possible for as long as possible.

Survivability Developments

We can categorize our developmental actions under the headings of lethality, mobility, materiel hardening and tactical deception. The following examples describe ongoing efforts to ensure the Field Artillery is prepared for the second battle.

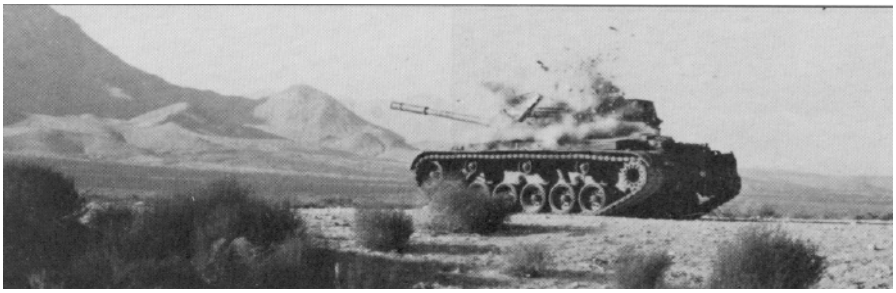
Lethality

George C. Scott, when starring as General George S. Patton, aptly said, "Wars are not won by soldiers dying for their country; the idea is to make the other SOB die for his country." The survivability aspect of this statement is clear: the best way to survive is to destroy the enemy before he can destroy you. This concept is the rationale for our work to develop more lethal Field Artillery munitions. In the coming decade, we plan to field cannon and rocket munitions that will greatly increase our ability to destroy the enemy.

Artillery has always been the greatest killer on the battlefield, but we've had to rely on vast amounts of ammunition to do our job. This has been so until the recent fielding of the laser-guided Copperhead projectile that homes in on point targets.

We expect to field truly smart munitions that are fully fire-and-forget before the end of this century. These munitions will provide a tremendous improvement in the killing power of the Field Artillery. We're working on the 155-mm Copperhead II (funding temporarily deferred) and the multiple launch rocket system (MLRS) terminally guided munition (TGW), which will allow us to attack and kill moving, armored targets such as tanks and infantry fighting vehicles (IFVs).

For our artillery to survive, we must be able to defeat the enemy's formidable artillery force, and we're working



With the Copperhead projectile, we don't have to rely on vast amounts of ammunition to do the job.

on a type of smart munition that will give us an improved capability. The sense and destroy armor munition, or SADARM, is being developed for the 155-mm howitzer and for MLRS. SADARM's technical design makes it an ideal weapon against enemy-emplaced, self-propelled howitzers and rocket launchers. When fired from the ideal counterfire weapon system, MLRS, as well as from the M109A5 howitzer (HIP howitzer), we'll have a truly effective counterfire combination.

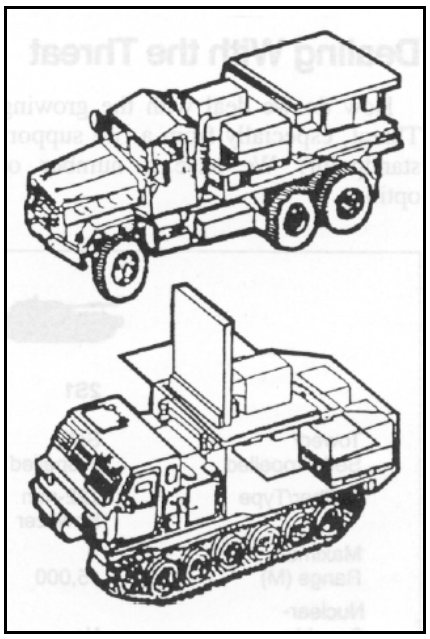
Survivability through counterfire requires more than just efficient weapons and munitions. The other components of the Field Artillery system must also contribute. The Firefinder II radar will give us an improved target acquisition capability to locate enemy artillery and mortars. When we link the Firefinder II to the MLRS and the HIP systems both armed with SADARM, we've almost completed the counterfire picture. The final component is C^2, and the advanced Field Artillery tactical data system (AFATDS) will give us a nearly real-time ability to find, process, shoot and destroy the enemy's artillery. This triple combination will allow us to get the enemy before he gets us.

Mobility

We can improve our chances for survivability by making ourselves less of a target or harder to hit if acquired. Dispersing our systems and moving immediately after firing have given rise to the tactic of "shoot and scoot." MLRS has paved the way for this technique.

We are exporting shoot and scoot to as many systems as feasible. After MLRS, the next shoot and scoot system we will field is the HIP howitzer.

Technical modifications will allow these weapons to perform semiautonomous operations. This means they can emplace and displace almost instantaneously. Onboard position and navigational aids plus FM radios allow these weapons to self-locate and orient themselves on targets automatically, eliminating the need for manual laying with aiming stakes and collimators. Like MLRS, HIP will be capable of performing onboard technical fire direction computations, thereby reducing the time required to fire.

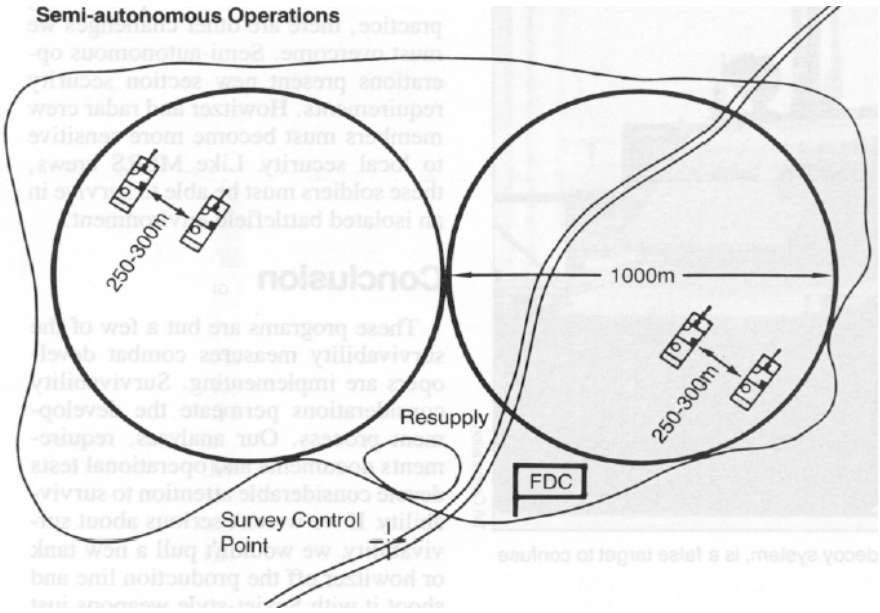


Firefinder II

Mobility is an important feature of the Firefinder II radar, our third shoot and scoot system. By reducing the crew size, combining all of the radar components on one vehicle and adding a POS/NAV device, we can reduce emplacement and displacement times by about 80 percent. This is important when we consider that the radar, like any other emitter, will be acquired and fired upon. When Soviet rounds come looking for Firefinder II, they will find only empty terrain.

Hardening

The ability to withstand a hit is another important survivability requirement.



Operational Concept

Mid- to high-intensity battlefields are intensely violent, and we must be prepared to take our hits from the enemy. But we can prevent a combat hit from turning into a catastrophic loss. For this reason, we are designing our Field Artillery systems to survive with the minimum amount of damage after being hit. The HIP Howitzer is a prime example. The survivability measures being taken with the HIP are advanced compared to the protective attributes of today's M109 howitzer. The following are examples of these measures:

External Armor. The turret of the HIP howitzer has reactive, "beefed-up" armor. This is located over the driver's compartment and on the rear of the bustle.

Fused Hydraulic Lines. Hydraulic fluids are highly flammable and hazardous if the enemy fire hits the vehicle. HIP designers have put fuses in the hydraulic lines at various points. If the lines are ruptured, the fuses close, preventing a loss of hydraulic fluid and reducing the chance of fire. Also, the hydraulic components such as accumulators have been put in protected compartments.

Ammunition Compartmentalization. Crew cab bulkheads will be between the ammunition storage compartments in the bustle and the crew compartment. This provides a degree of protection if hostile fire ignites propellant charges stored in the bustle.

Projectiles will be stored along the sides and near the floor of the cab. This location affords a degree of protection from projectile detonation by top-attacking enemy counterfire munitions.

Kevlar Spall Liner. HIP designers have lined the sides and the ceiling of the crew compartment with a Kevlar liner. This liner will reduce the damage caused by the spall effects of shaped-charge rounds.

Communications Equipment. Communications is vulnerable to the effects of electromagnetic pulse (EMP) and electromagnetic interface (EMI). We are now hardening radios and other electronic components to include automatic data processing (ADP) equipment associated with AFATDS, which will be on the howitzer.

Deception

One of the best survivability measures is to avoid being acquired as a target at all. Deception operations are being undertaken to mislead the enemy as to our locations and actions. Deception measures cover a range of activities to include:

The Use of Camouflage and Hide Positions.

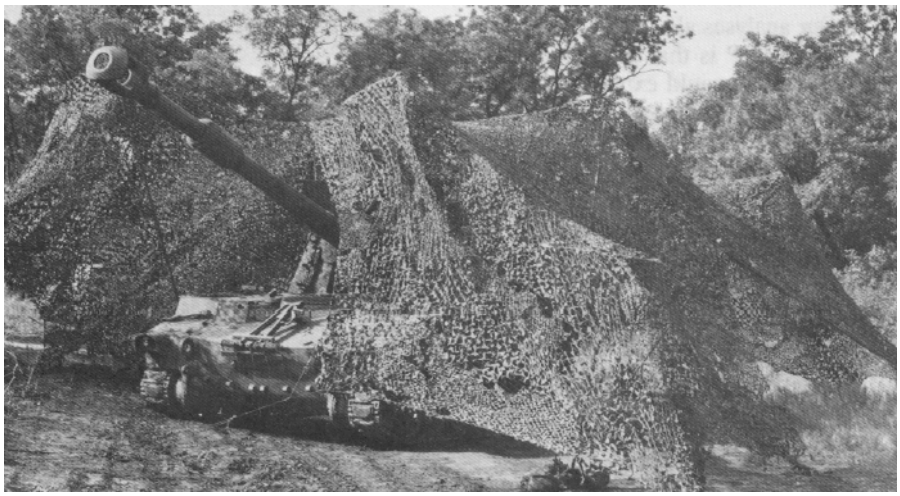
The Reduction of Electronic Signature. This includes using radios with frequency hopping capabilities. The single-channel, ground and airborne radio system (SINCGARS) will have this capability. ADP equipment will reduce the volume of radio traffic.

The Reduction of Noise in Electrical Power Generators.

The Use of Electronic Simulation Devices. These simulate friendly electronic signatures and cause the enemy to initiate communications or other electronic signatures.

The Use of Decoys. The multi-spectral decoy is a two-dimensional object that simulates the presence of friendly combat vehicles. It creates a false image to confuse the enemy and force him to consume time and ammunition on a target that doesn't exist.

Decoys can be constructed from canvas and aluminum frames. They present a colored image, and they could give off a thermal signature powered by small generators. Such decoys can represent individual weapons such as howitzers or launchers as well as C^2



A 155-mm howitzer uses camouflage to enhance its survivability.

TVI Corporation

This M-1 "tank," part of the close combat survivability decoy system, is a false target to confuse the enemy.

facilities that emit false electronic signatures.

Tactics of Survivability

The technical innovations that will allow us to disperse our systems, simplify command and control and implement shoot and scoot will revolutionize our tactics in the next decade.

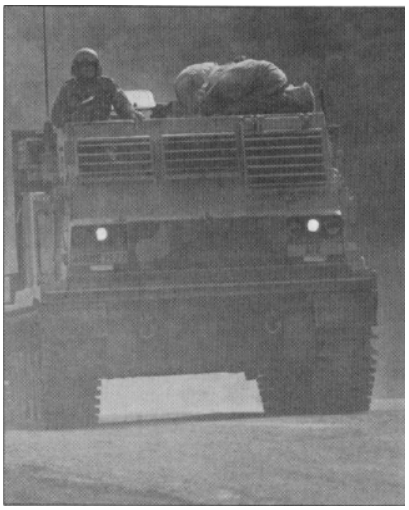
With some recent modifications, Field Artillery cannon batteries have been lined up hub to hub since the 18th Century. The HIP howitzer will change this. When we field batteries of HIP howitzers, the firing unit won't be the battery or the platoon, but rather the individual piece. This means a maneuver brigade area of operations will have at least 24 howitzers operating in areas dramatically different than those of the past.

Our analyses also show the real payoff with HIP is that after five days of conflict, we could expect to lose only 24 of our 96 weapons as compared to losing 72 of 96 of our current M109 howitzers. That's an increase in survivability of 200 percent.

The increased mobility of the Firefinder IP radar will enable its crews to practice shoot and scoot tactics. The radar will be able to pull into position, quickly set up, turn on its beam and acquire targets—all within a matter of minutes.

After emitting for a short period, the radar can displace rapidly to a new location and begin the process again. This mobility makes it survivable for the second battle or for the fourth and fifth days of the war. Another advantage of the Firefinder II's mobility is we can position the radar further forward, thereby increasing its range of acquisition.

The tactics of survivability will bring new challenges. Increased mobility and dispersion of Field Artillery means corresponding demands on position management. Shoot and scoot systems will occupy different types of positions, especially in the limited terrain of Europe. Field Artillery commanders will have to seek positions for one or two howitzers that would usually be closed to a full battery. Fire support officers will have to coordinate more for Field Artillery terrain.



LTV Missiles and Electronics Group

An MLRS moving out during REFORGER '87.

In addition to a new positioning practice, there are other challenges we must overcome. Semi-autonomous operations present new section security requirements. Howitzer and radar crew members must become more sensitive to local security. Like MLRS crews, these soldiers must be able to survive in an isolated battlefield environment.

Conclusion

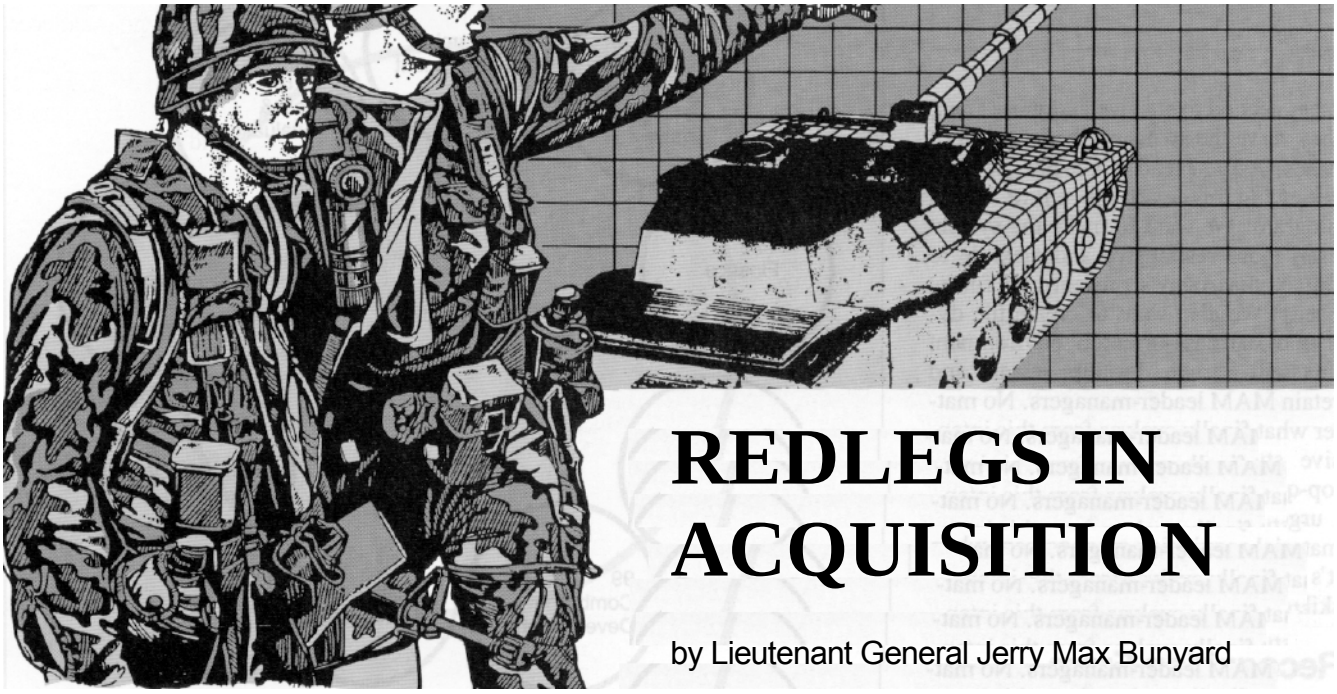
These programs are but a few of the survivability measures combat developers are implementing. Survivability considerations permeate the development process. Our analyses, requirements documents and operational tests devote considerable attention to survivability. If we weren't serious about survivability, we wouldn't pull a new tank or howitzer off the production line and shoot it with Soviet-style weapons just to see how it will withstand the attack.

The benefits of survivability are clear. Survivability reduces the need for combat replacements and reinforcements. Finally, survivable equipment instills confidence in crews.

The Threat forces we face continue to improve in quantity and quality. We can offset the Threat's improvements by developing Field Artillery systems with increased lethality and effective survivability features. We also can maximize our effectiveness within a finite number of resources.

The motto of a popular state lottery is "You've got to play to win." On the next battlefield, you will have to survive to win. But, it's not a lottery; it's something we can prepare for. The challenge to improve survivability is real. The emphasis is there. Our senior leaders are providing funds to support the programs. Our combat and materiel developers are responding. The results are coming—you can bet on it.

Colonel Richard W. Wharton is Director of Combat Developments at the Field Artillery School, Fort Sill, Oklahoma. During his three tours with the 82d Airborne Division both at Fort Bragg, North Carolina, and in Vietnam, he served as battery commander, battalion S3 and commander, Division Fire Support Element chief and Division Artillery commander. Colonel Wharton is a graduate of the Armed Forces Staff College, Norfolk, Virginia, and the National War College, Washington, D.C.



REDLEGS IN ACQUISITION

by Lieutenant General Jerry Max Bunyard

Captain Hardrock just finished a dynamite tour as the A Battery commander. We see him now as a project officer responsible for fielding a new cannon system. Sound exciting? It is. I've been there and want to share, as one Redleg to another, what it's like to be a Field Artilleryman and an acquisition manager. You already know what being a good Field Artilleryman is all about. Let me tell you about something you may not be so familiar with.

Today's Army has to accomplish our nation's security objectives and uphold our treaty commitments with fewer resources. Our research, development and acquisition (RDA) mission is to provide our Army the right equipment to defeat a numerically superior enemy, now and in the future. This mission poses a dilemma as we stand between the horns of cost and performance.

The Threat continues to develop and deploy high-quality weapons in large numbers. To counter this situation, the Army must have new and better equipment. Expanding technology beckons from all directions, promising increased capabilities through greater sophistication. However, more sophistication costs money. The prices of some new systems are beyond our budgetary reach. The complexity of the RDA process requires identifying and developing a highly qualified corps of officers to meet this challenge.

Few jobs in the Army afford as much satisfaction as serving with soldiers in a line unit. Yet, relatively few officers will be able to spend all their careers in troop assignments. It has been my experience that the RDA side of the Army also can provide tremendous professional rewards.

The materiel acquisition management (MAM) program allows an officer to channel his talents into the RDA field. It also permits him to maintain his branch qualifications and ties. Career management policies and procedures ensure full recognition for officers who specialize in RDA. Personnel actions are based on a comparative and objective analysis of each officer's entire record. The MAM program is a complement to, not a substitute for, basic branch duty.

Materiel acquisition managers provide soldiers the weapons and equipment

Program Executive Officer	The PEO is a general officer or civilian equivalent chartered by and reporting directly to the Army acquisition executive (AAE) for a series of related Army programs.
Program Manager	The program manager is a general officer chartered by and reporting directly to the AAE.
Project Manager	The project manager is a colonel chartered by and reporting directly to a PEO.
Product Manager	The product manager is a lieutenant colonel chartered by and reporting directly to a PEO.

A HQDA Board selects and assigns personnel the responsibility and delegates the authority for the management of a development, acquisition or materiel readiness program.

Materiel Acquisition Management Positions

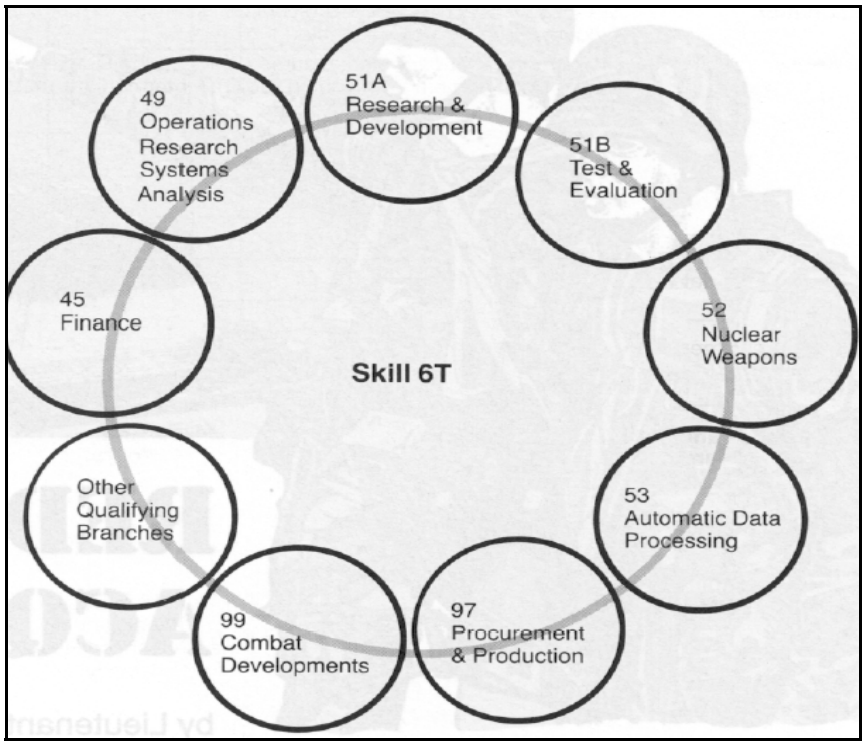
The complexity of the RDA process requires identifying and developing a highly qualified corps of officers to meet this challenge.

needed to survive and win. Thus, they serve the Army on the broadest of bases. As you read this article, we are reviewing in detail the entire MAM program. We want to make the system even more responsive and flexible to satisfy the Army's present and future needs. We also want to create the dynamic, success-oriented environment that will attract, develop, reward and retain MAM leader-managers. No matter what finally evolves from this intensive study, the underlying need for top-quality people remains unchanged. I urge my fellow Redlegs to consider materiel acquisition management when it's time to select functional areas and skill identifiers.

Recognition From the Top

The Chief of Staff of the Army, General Carl E. Vuono, was the guest speaker at the Military District of Washington Field Artillery Ball this past November. General Vuono outlined several challenges the Field Artillery faces today and in the near future. One of those challenges is to accomplish force modernization in a disciplined and evolutionary manner. He pointed out the legacy entrusted to the Field Artillery was to understand that mission. General Vuono said "...maintaining the capability to be responsive to each of these requirements is the pacesetter. We need adequate systems to perform today's missions and must decide when to field the systems we need to be responsive in delivering fire support in the future. I am committed to the modernization of the Field Artillery." He went on to say that "...our expertise in indirect fire is the accepted hallmark of an artilleryman. We need to develop that same hallmark as the masters of the integration of combat power, so our voices are heard in the formulation of doctrine and the design of structure and equipment...that reputation can be earned with the proper development of our leaders."

General Carl E. Vuono, Chief of Staff of the Army: "I am committed to the modernization of Field Artillery."



Functional Areas that Qualify for Materiel Acquisition Management

The Business Side of Army Acquisition

I hesitate to invoke the phrase "military-industrial complex" for all of its negative connotations. However, a partnership between civilian industry and the military RDA organization does exist. The materiel acquisition manager is the person who works the Army side of that relationship. In this capacity, he is a vital link in the development, test and fielding of modern weapons and equipment. He must understand in detail how things work in the field. It is equally important that he know how things don't work. Each materiel acquirer also must have hard-nosed analytical and business skills to be sure the Army gets what it wants, when it wants it and at a fair price. Just as we develop operational skills, we hone analytical and business skills through formal instruction and developmental assignments.

Deciding Early

Becoming a qualified materiel acquisition manager requires developmental assignments. That means making an early career decision. It also means you don't forsake the operational side of the Army to qualify. In fact, the opposite is true. We need fighters who understand their branch and also know materiel acquisition management. You don't have to give up battery or battalion command to become a qualified materiel acquisition manager. It's possible to maintain both branch and MAM qualifications during a full career.

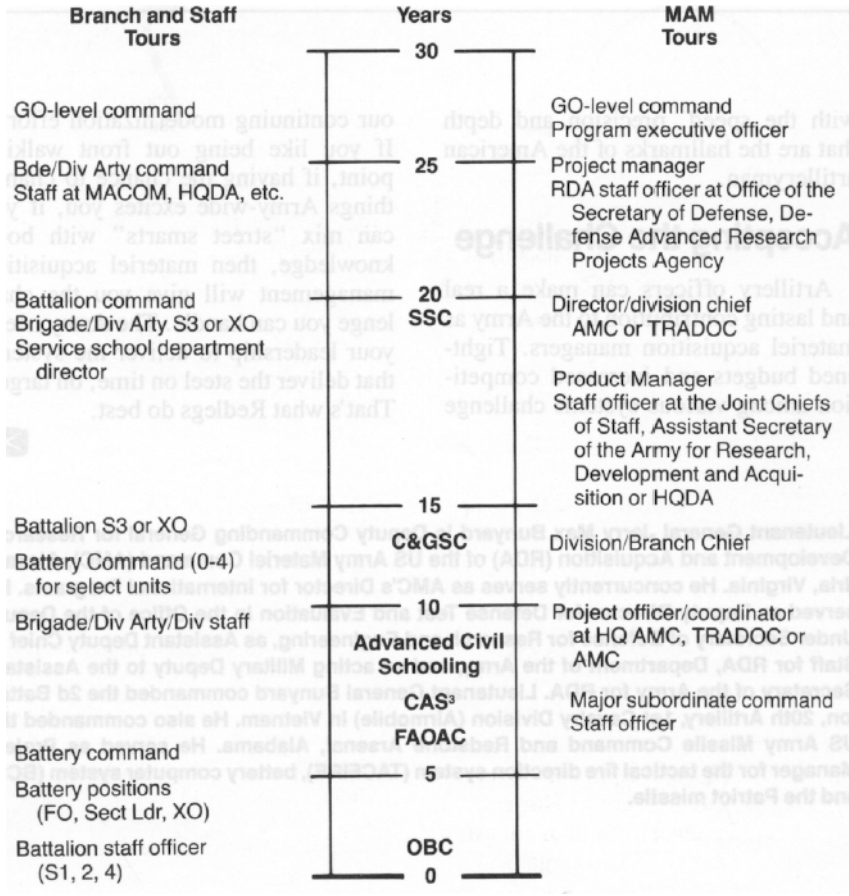
Keeping the "Field" in the Process

Materiel development and the field soldier's operational perspective are inseparable. This unique view of things as they really are cannot be computer-simulated, mathematically derived or substituted for. While simulation and mathematic models are important, field experience provides a leavening agent unavailable from any other

Education	BA or advanced degree in a technical, scientific or managerial field; master's degree desirable.
Training	The Program Management Course (PMC) at the Defense Systems Management College (DSMC); intermediate service school (i.e., C&GSC at Fort Leavenworth, Kansas); senior service school (i.e., Army War College) desirable.
Experience	Eight years in acquisition, support and maintenance of weapon systems, to include two years in a procurement command (i.e., AMC).

Public Law 99-145 states only the secretary of the military department concerned can waive the mandatory standards.

Program Management Eligibility Criteria



You can maintain both branch and MAM qualifications during a full career.

Career Development

source. Without it we would risk developing equipment that only works in sterile laboratory conditions. Army systems must stand the strain of the real world of mud, cold and hard running. They must endure the unforgiving, imperfect and disorderly processes of war. Conversely, involvement in materiel acquisition management expands and enriches the officer's own experiences and value to the Army. The relationship is truly a two-way street.

A Wide-Open Opportunity

The materiel acquisition field is wide open. Requirements for MAM-certified officers are growing at two-and-a-half times the available inventory. Critical skill paring further reduces the available support level (i.e., there may be a shortage of materiel managers who are also systems analysts). This situation probably will continue for some time. It affords an excellent opportunity for officers to develop business as well as military skills and qualifications—to improve and exploit not only their leadership but also their management talents.

Artillery officer MAMs added immeasurably to our war-winning capabilities and changed artillery organization and doctrine.

The Army needs materiel acquisition managers at all commissioned ranks, including general officers. The most recent colonels promotion board recognized this need. The board's instructions stipulated that a certain number of those selected for promotion would be materiel acquisition managers. The Army has room at all levels, including the top, for materiel acquisition managers.

The Payoff

Materiel acquisition management provides officers tremendous professional leverage at a relatively early point in their careers. By that I mean they directly influence what weapons and equipment the Army will buy and employ. This determines, in part, how it will fight. Five examples very near to my heart as an artillery officer are the tactical fire direction system (TAC-FIRE), battery computer system (BCS), multiple launch rocket system (MLRS), Pershing II and the Patriot missile systems. I had the good fortune to be the project manager for three of these systems: TACFIRE, BCS and Patriot. Later, as Commander, US Army Missile Command, I worked directly with project managers in developing, fielding and sustaining the MLRS, Pershing II and Patriot. Artillery officer materiel acquisition managers were

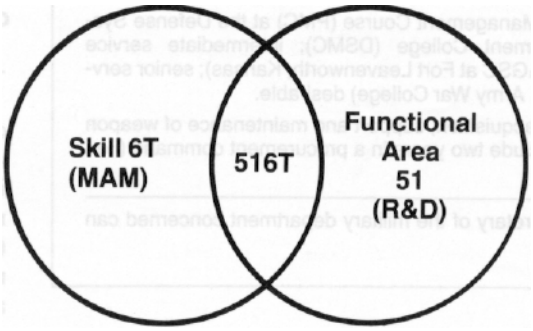
Requirements for MAM-certified officers are growing at two-and-one-half times the available inventory.

Typical Jobs
Product manager

Project manager

Office of the Assistant Secretary of the Army for Research, Development and Acquisition

AMC Staff Officer at a major subordinate command
Combat development (Training and Doctrine Command)



Typical Jobs
US Army Laboratory Command

Strategic Defense Initiative Office

Atmospheric Lab

R&D centers

Laboratories
Test and evaluation centers

Skill 6T and Functional Area 51

The Army has room at all levels, including the top, for MAMs.

involved in the research, development and acquisition of these major systems. They added immeasurably to our war-winning capabilities and changed artillery organization and doctrine. I know of no other situation where company and field grade officers can have such wide-spread influence.

That same opportunity to make an Army-wide difference exists today—NOW—for those who want to seize it. New systems are "on the way" that need the strongest, smartest and most determined officers working to get them into the field. The Army tactical missile system (ATACMS) and the smart munitions program are but two examples of such new programs. They will allow us to deliver fire support with the speed, precision and depth that are the hallmarks of the American artilleryman.

Accepting the Challenge

Artillery officers can make a real and lasting contribution to the Army as materiel acquisition managers. Tightened budgets and increased competition among various systems challenge our continuing modernization efforts. If you like being out front walking point, if having the chance to change things Army-wide excites you, if you can mix "street smarts" with book knowledge, then materiel acquisition management will give you the challenge you can handle. The Army needs your leadership to deliver the systems that deliver the steel on time, on target. That's what Redlegs do best.

Lieutenant General Jerry Max Bunyard is Deputy Commanding General for Research, Development and Acquisition (RDA) of the US Army Materiel Command (AMC), Alexandria, Virginia. He concurrently serves as AMC's Director for International Programs. He served as Deputy Director for Defense Test and Evaluation in the Office of the Deputy Under Secretary of Defense for Research and Engineering, as Assistant Deputy Chief of Staff for RDA, Department of the Army, and as acting Military Deputy to the Assistant Secretary of the Army for RDA. Lieutenant General Bunyard commanded the 2d Battalion, 20th Artillery, 1st Cavalry Division (Airmobile) in Vietnam. He also commanded the US Army Missile Command and Redstone Arsenal, Alabama. He served as Project Manager for the tactical fire direction system (TACFIRE), battery computer system (BCS) and the Patriot missile.

Redleg News

ITEMS OF GENERAL INTEREST

Redlegs Must Be Regimental

Redlegs who have not affiliated with a Field Artillery regiment are strongly encouraged to do so as soon as possible. The Army requires all combat arms soldiers be affiliated with a regiment. Officers may delay their affiliation until they attend the officers advanced course; first-term enlisted soldiers may delay their affiliation until they reenlist. Soldiers may choose any regiment to affiliate with they wish.

The Total Army Personnel Agency (TAPA)—formerly known as the MILPERCEN—will give primary consideration to soldiers affiliated with a regiment when making assignments to that regiment.

Redlegs who have not yet affiliated or those who would like to change their affiliation may do so by completing a DA Form 4187, Personnel Action, at their battalion personnel and administration center (PAC).

The Guns of Manchuria
The Guns of Manchuria

The Guns of Manchuria

by Major David T. Zabecki

The Russo-Japanese War of 1904-05 demonstrated the obvious superiority of rapid fire guns over previous existing systems. Owing to the invention of the artillery deflection and the panoramic sight, Russian artillerymen during this war for the first time used indirect fire, a new method of delivery of artillery fire.

Great Soviet Encyclopedia

It was a war of many firsts, but it was not the war of innovations the *Great Soviet Encyclopedia* would seem to imply. It was a war of "future shock," the forerunner of all modern technological wars. For the Russian Army, it was a disaster from which it, particularly the Russian artillery, learned hard lessons they would never forget.

The Significance of the Russo-Japanese War

From 1905, not only had the soldier to obey, but also to think; to know how to live as well as fight, not for hours only, but for days on end.

Major General J.F.C. Fuller
Author of *A Military History of the Western World,* 1956

The Russo-Japanese War of 1904 and 1905 was one of the pivotal points in Western history. The defeat of a powerful European nation by a supposedly backward group of Asians marked the beginning of the re-awakening of the East and closed the door forever on the era of European colonialism and empire.

On the tactical side, the war saw the first large-scale applications of radical new forms of military technology that would come to dominate the battlefield in the 20th Century. It was the first war in which hand grenades, telephones, motor vehicles, search lights and, above all, machine guns played a major role. The first use of poison gas was by the Japanese at Chi-Kuan. It also was the first test of "modern rapid-firing artillery" guns with recoil systems that eliminated the need to relay the piece after every round.

The new technologies also forced a revolution in tactics and techniques. The first combined arms operations in the modern sense took place in Manchuria. The panoramic telescope and the aiming circle made indirect fire possible for the first time; but vast improvements in both infantry and artillery firepower also made using indirect fire absolutely essential if the guns were to survive. It was the dawn of a new era in battlefield lethality.

The Opposing Forces

For many years the Russian Army had been permeated with the influence of Dragomirov....He had a violent scorn for modern inventions, for the achievement of victory by mechanical means instead of brute force and courage.

Tiemann N. Horn,
author of "Present Method and Lessons in Regard to Field Artillery Taught by the Russo-Japanese War," Coast Artillery Journal, 1908.

At first glance, it was a contest between a Japanese David and a Russian Goliath. The Russians could count 4,500,000 trained soldiers, including reserves, while the Japanese had only 800,000. But Manchuria is a scant 250 miles from Japan, and the Japanese could put the larger part of their standing army into the area almost immediately.

The Russian line of communications, on the other hand, stretched over 5,500 miles, most of it along the Trans-Siberian Railway. At the start of the war, the Russians had little more than 100,000 troops in Manchuria, including the Port Arthur garrison. It took more than a month for them to move an infantry battalion from Moscow to the war zone.

The Japanese advantage didn't end there. For years they had been slowly and methodically building up their army, patterning it after the best European models, particularly the German Army. Advancement in the Japanese Army was based strictly on ability.

By comparison, the Russian Army was a shambles. It was top-heavy in rank. Lieutenant colonels commanded artillery batteries. Rank was primarily a function of political and social position. Most of the Russian generals who served in Manchuria had never before held a command. Russian military thinking was handicapped also by a strong anti-technology bias, by the belief that wars could be won only with bayonets.

Organizationally, the differences at the tactical level were minor. Both were conscript armies with the Russians having a five-year service period and the Japanese having three years. The standard Russian infantry division had 16 battalions and was supported by an artillery brigade of six, eight-gun batteries.

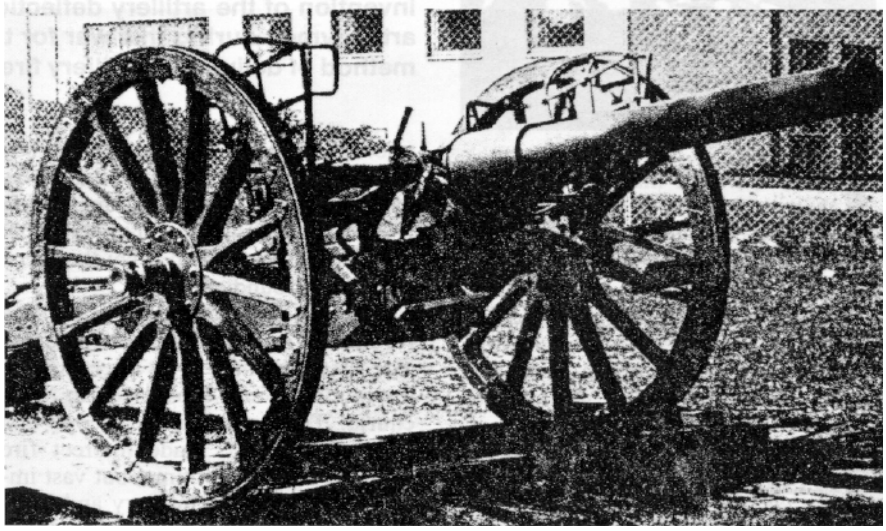
The Japanese division was somewhat lighter with 12 battalions and an artillery regiment of six, six-gun batteries. At the upper levels, however, the Russian command structure was muddled. The Russian Field Commander General Alexei Kuropatkin often was overruled by Admiral Alexiev, the Viceroy of the Far East and a favorite of the Tsar. In the case of the Japanese, command was firmly under one man, Field Marshal Oyama Iwao.

For all their anti-technology bias, the Russians' equipment was as good as, and in some cases better than, that of the Japanese. The main Russian fire support gun was the 76.2-mm M1900 Putilov Field Gun. It had a range of 6,400 meters and a 15-round-per-minute rate of fire. Its main drawback was that at 4,145 pounds, it was too heavy for the rough terrain in the area of operations.

The Japanese were armed with the 75-mm M1898 Arisaka Field Gun. It had a range of 5,000 meters and a rate of fire of only 10 rounds per minute, but at 3,300 pounds, it was much more mobile than the Russian piece. Where the Japanese held their greatest advantage was in the number of machine guns. By the battle of Mukden, the Russians had only 56 machine guns; the Japanese had 992.

General Alexei Nicolaivitch Kuropatkin, Russian Commander in Manchuria

Field Marshal Oyama Iwao, Japanese Commander in Manchuria



The Standard Russian Fire Support Gun in 1904, the 76.2-mm M1900 Putilov Field Gun

The Tactical Scenario

Generally speaking, the man who conquers in war is the man who is least afraid of death.

General Alexei Kuropatkin,
Russian Commander in
Manchuria

The key to Manchuria was the Russian naval base at Port Arthur, located on the southern tip of the Liao-Tung Peninsula, just northwest of Korea. The Japanese had taken Port Arthur from the Chinese in 1894 but were later forced to cede it to Russia. By 1904, they felt they were ready to take it again.

The Japanese plan consisted of a two-pronged attack: the Japanese fleet attacked the Russian fleet and blockaded the port from the sea while a ground force landed on the peninsula and conducted a siege from land. To protect the attacking force and prevent the garrison from being reinforced, a second ground force landed and started moving north toward the Russian garrison at Mukden.

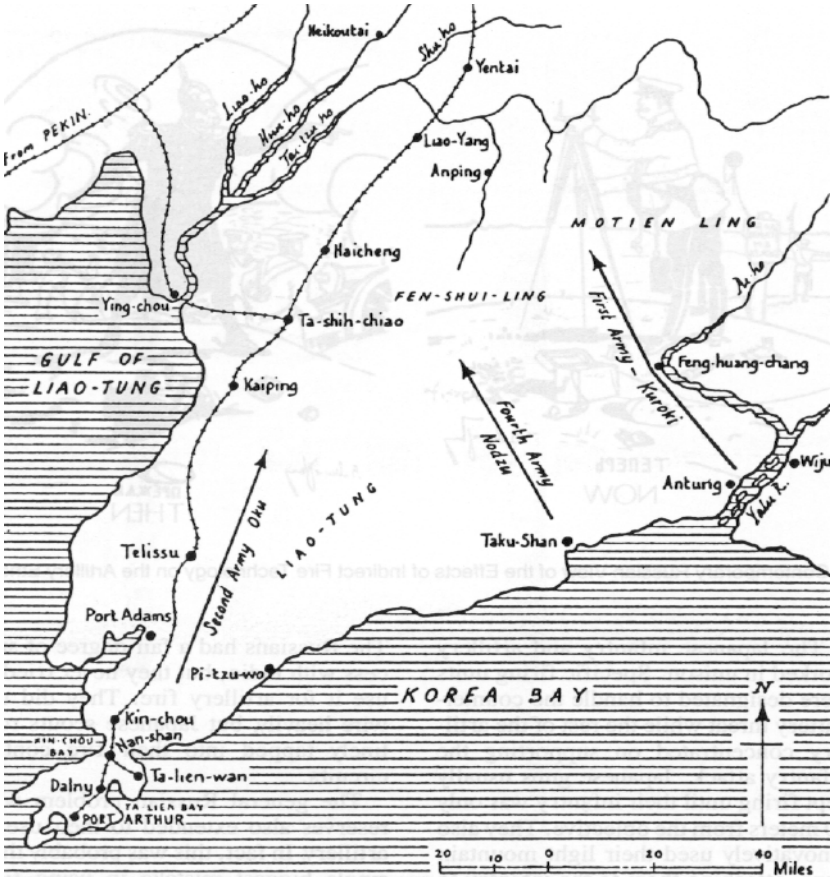
As the campaign progressed, the larger threat would be from the north as the Russians poured reinforcements into the war zone at the rate of 40,000 men per month. Oyama recognized this. Therefore the covering force, consisting of the Japanese 1st, 2d and 4th Armies, was much stronger than the siege force, consisting of the Japanese 3d Army. The Russian forces, meanwhile, started moving south from Mukden to engage the Japanese and relieve the besieged forces at Port Arthur.

Between April and August 1904, a number of small engagements took place in which the Russians were either defeated or out-maneuvered. The first major battle to the north of Port Arthur took place at Liao-Yang at the end of August 1904.

Complete lack of aggressiveness is the only way to describe the Russians in this war. At Liao-Yang, the Japanese attempted a double envelopment even though they were numerically weaker. This could have resulted in disaster for the Japanese, but it didn't. Although the envelopment was unsuccessful, the Japanese forces were able to disengage intact because of the Russians' passiveness.

Another problem that plagued the Russians throughout the campaign was their handling of reserves. The Russians started every action with huge reserves, often as large as 66 percent of the entire force. These large reserves were then squandered piecemeal as the Russian leaders tried to react to every little twist and turn in the action. Japanese reserves were seldom larger than 20 percent and always committed in mass, at critical junctures.

The results at Liao-Yang were indecisive, but Kuropatkin felt he had been defeated. He withdrew to the north and the Japanese followed. About a month



The Japanese Axes of Advance on the Liao-Tung Peninsula, 1904-1905

later, another major battle at Sha-Ho also was indecisive. Both sides were exhausted and dug in.

When Port Arthur fell on 4 January 1905, Oyama sent most of the Japanese 3d Army north to join his other three. Kuropatkin, realizing that as soon as their forces combined he would loose his numerical superiority, attacked at Sandepu with a force 35 percent stronger than the Japanese. He almost won, but the timidity of the Russian subordinate commanders again determined the outcome. The Japanese held them to a stalemate and Kuropatkin ordered his forces to fall back toward Mukden. Shortly thereafter, the 3d Army linked up with the rest of Oyama's force, and they started after the Russians.

Mukden was the largest battle in history at that time. Both sides had roughly 300,000 troops, and the action took place across a 40-mile front. Oyama attempted an envelopment and wound up pushing the Russian right flank around so it faced west rather than south. Again feeling that he had been outmaneuvered, Kuropatkin disengaged and withdrew his forces to Harbin. It was the last land battle of the war. Two months later, the Japanese fleet sank almost the entire Russian fleet at Tsushima, and the war came to an end.

Battle	Guns		Troops		Casualties	
	Japan	Russia	Japan	Russia	Japan	Russia
Siege of Port Arthur (8 Feb '04-4 Jan '05)	474	506	85,000	42,000	57,800	31,300
Yalu River (30 Apr-1 May '04)	132	48	42,000	18,000	1,100	2,500
Nanshnan (25 May '04)	216	110	30,000	13,000	4,600	1,500
Telissu (14-15 Jun '04)	108	94	35,000	25,000	1,200	3,600
Liao-Yang (23 Aug-3 Sep '04)	484	644	125,000	158,000	23,600	19,000
Sha-Ho (5-17 Oct '04)	618	722	170,000	200,000	20,000	40,000
Sandepu (26-27 Jan '05)	248	430	220,000	300,000	9,400	13,000
Mukden (21 Feb-10 Mar '05)	992	1,219	300,000	310,000	71,000	100,000

Russo-Japanese Battle Statistics

Use and Misuse of Artillery

Everything was new, everything was different than what we had to train with in peacetime.

A Russian Artillery General

The Japanese saw their first cannon when Commodore Perry gave them one in 1852. The *Great Soviet Encyclopedia* implies the Russians practically invented artillery. From their respective performances in Manchuria, it might have been the other way around.

The Russians started the campaign, putting their artillery on exposed high ground without cover or concealment. Although they had the technical ability to conduct indirect fire, they resisted using it. Older commanders, even the older artillery commanders, refused to believe the guns could hit targets they couldn't see. The ones who knew that it was possible believed it was cowardly not to fire from the front line. They forced junior officers to position in the open. The results were predictable. By 28 August, Kuropatkin had to issue orders that all artillery was to fire from concealed positions. Some Russian commanders resisted that order up to the very end.

The Japanese started the war by digging in. They positioned their guns well to the rear of their infantry where they were difficult to locate. They also extensively used dummy positions close behind the infantry line. They used small high explosive charges in these positions to simulate firing. The Russian artillery usually responded by firing on the dummy positions, thus revealing their own locations. The Japanese also extensively used night movements and occupations.

Coordination between the Russian artillery and infantry was poor, almost as if they were fighting two separate wars. The standard Russian procedure was to start an action with an artillery duel and follow it up with an infantry attack. There was little attempt to support the infantry attack with artillery fire. Russian infantry didn't provide much support for their artillery either. At Liao-Yang, the Japanese easily overran and captured 24 Russian guns after the Russian infantry, that was supposed to be providing security, withdrew without telling anyone.

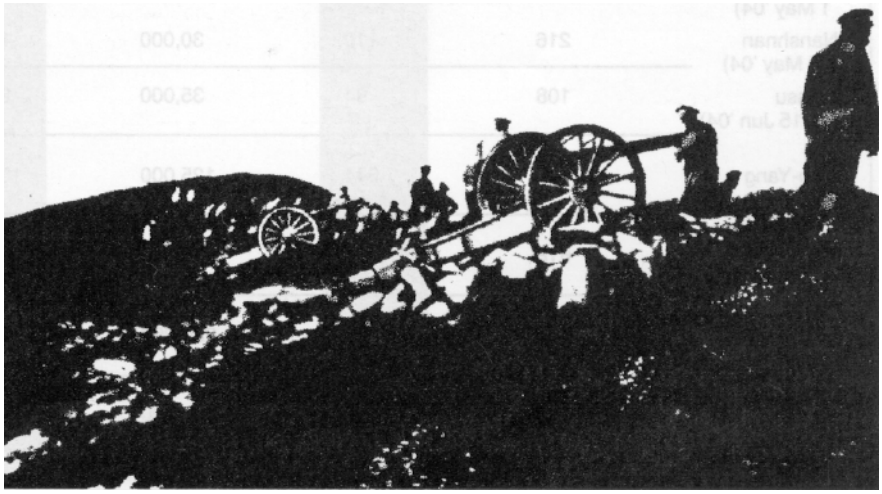
A Contemporary Russian View of the Effects of Indirect Fire Technology on the Artillery Ethos

The Japanese infantry and artillery worked in unison. Specific firing units were designated to handle the counterbattery threat while the rest of the artillery concentrated on supporting the infantry attack. Japanese guns usually kept firing until their infantry was only 50 meters from the objective. They also innovatively used their light mountain guns, attaching them to the infantry to accompany the attack.

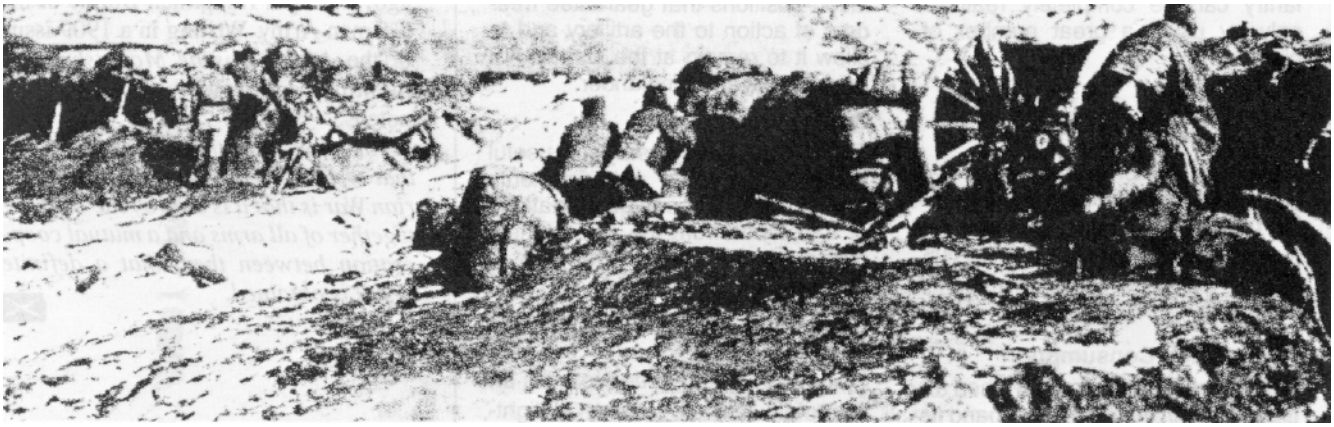
Russian fire was usually by battery, but they made no effort to mass above that level. The Japanese massed their fires quite effectively. Russian ammunition consumption was also erratic. At Liao-Yang, one battery fired 2,600 rounds while another fired 50 rounds.

The Russians had a fair degree of success with radio, but they never tried to use it for artillery fire. They did use wire heavily, but Japanese scouts routinely tapped into their fire control circuits.

The general Russian problem with reserves also extended to their use of artillery. In fact, this was probably their single biggest mistake in using firepower. In all four of the major battles from Liao-Yang to Mukden, the Russians had more guns on the ground than the Japanese, but their fear of losing guns resulted in the formation of large artillery reserves, positioned far to the rear. At Liao-Yang, 17 percent of their guns were held in reserve and never got



An Exposed Russian Battery on a Hill at Liao-Yang



The Japanese 2d Battery of the Guard Artillery Regiment on 27 February 1905 fighting the Russians on the heights of Tsio tso schan near Tang kia tun.

into the action. At Sha-Ho, it was 38 percent while at Mukden it was 10 percent.

Even the guns not held in reserve were employed ineffectively. Even though the Japanese were outgunned going into every major battle, the skillful use of their assets combined with the Russians' inability to use theirs gave the Japanese the upper hand at every turn.

The action in the sector of the Japanese Nambu Brigade at Mukden is an example. Only six guns supported the Brigade, but they were all positioned for maximum coverage of the action zone. The Russians had 14 guns available but held five in reserve in a gun park in the rear. Three of the remaining nine guns were at Tschegnan-tun, about 1,000 meters out of range. The Russians squandered their numerical advantage here as well as at every other point in the battle

The Influence of Lessons Learned

Artillery fire without a simultaneous attack by infantry cannot be productive of fertile results to the latter.

Russian *Instructions for the Operations of Field Artillery in Combat,* 1912

Almost everything about the Russian Army in Manchuria is contrary to the picture of the modern Soviet Army that is presented in *FM 100-2-1*. Timid actions and large reserves have no place in the current Soviet doctrine.

Following its stinging defeat in 1905, the Russian Army made a desperate attempt to overhaul and modernize its tactical doctrine. Between 1906 and 1912, a flood of new tactical manuals appeared. In them can be seen the rudimentary forms of many of the features that characterize modern Soviet doctrine. The revised artillery manual was issued on 12 March 1912 as *Instructions for the Operations of Field Artillery in Combat*.

The new manual stressed the absolute need for coordination between the infantry and the artillery and made the command relationship between the two very clear:

> *...coordination is manifested by the subordination of the artillery to the commander of the troops designated to deliver the decisive blow.*

It also stressed that while the artillery should be subordinate to the overall maneuver commander, it should be under the direct control of a single artillery commander:

> *All the artillery designated to support the attack...is under the orders of a single commander, responsible for the success of the operations;....*

Here is the prototype of the modern Chief of Missile Troops and Artillery (CMTA, formerly known as CRTA).

The Japanese success with using light mountain guns as accompanying artillery was not lost on the Russians either. The new manual stated that one of the primary uses of light mountain guns should be:

> *...in combat on a normal terrain, to act in close connection with infantry as artillery able to accompany infantry anywhere, and in particular, to accompany the infantry attack and reinforce the captured position.*

This is virtually the same role for Soviet accompanying artillery today.

	Japan	Russia
Total Guns Available	484	644
Guns Committed in Support of Critical Actions		
30 August	390	249*
31 August	408	235
31 August (night)	306	82
1 September	300**	78
2 September	380	112
3 September	342	82
* Maximum Russian Use was 39 percent.		
** Minimum Japanese Use was 62 percent.		

Use of Artillery at Liao-Yang, 1904

Fire Superiority

...the coordination of artillery with infantry can be completely realized only by using a great number of pieces.

Massing Fires

The concentration of fire of several groups will be obtained more from the concurrent solution of problems of fire...than from the simultaneous fire on a common objective.

Ammunition Consumption

...there are times in combat when artillery has not the right to husband its projectiles. Consequently, on one hand, it is necessary to economize as much as possible, and on the other, to assure an uninterrupted and abundant supply of ammunition.

Dug-in Firing Positions

...it is important to make use of defiladed positions that guarantee freedom of action to the artillery and to allow it to remain at the disposal of the [maneuver] commander.

Dummy Positions

To deceive the adversary, it is useful to construct hasty entrenchments and simulated observation stations at a distance from the actual ones; during firing, smoke will be made in the dummy entrenchments.

Night Occupations and Movement Security

Going into battery under cover is an extremely difficult problem....Nightfall will often solve the difficulty. The [battery] commander should not hesitate to follow a long and round about way to assure the movement is being made under cover.

Soviet Manual: Instructions for the Operations of Field Artillery in Combat

There were other tactical considerations in the new manual that still bear a resemblance to elements of the Soviet system today.

The Russians weren't the only ones who exhaustively analyzed their experiences in the war. Most of the Western nations had military observers in Manchuria, and right up until the eve of World War I, the lessons of the Russo-Japanese War were debated and redebated in the military journals of the world. Perhaps the most succinct summary of the lessons of that war, one that is as pertinent today as it was 80 years ago, was by a Hauptman Blume of the German Army. Writing in a 1909 issue of the *Artilleristische Monatshefte,* a monthly artillery journal, Blume noted:

For after all, the principal lesson that we may learn from the Manchurian War is that it is only by the working together of all arms and a mutual cooperation between them that a definite result is obtained.

Major David T. Zabecki won the 1987 US Field Artillery Association History Writing Contest with this article. A frequent author for *Field Artillery,* he also is Contributing Editor of *Military History* magazine. Major Zabecki, Field Artillery, US Army Reserve (USAR), is the Targeting Intelligence Officer for the USAR Military Intelligence Group supporting the NATO Central Army Group in Europe. He gratefully acknowledges the Bundeswehr's Militaergeschichtliches Forschungsamt (Military History Research Office), West Germany, for making its library available to him.

Fragments

FROM COMRADES IN ARMS

Quiet Generators

Survivability of new equipment has become one of the most important parameters in the developmental cycle. Various studies recently have identified deficiencies in systems that affect their survivability. One noted deficiency was the signature of our present family of generators: the sound and infrared (IR) signatures increase the using unit's vulnerability and make identification by hostile forces more likely. This increases the possibility of the using unit's becoming a lucrative target. To correct this deficiency, the US Army Engineer School started several generator programs. One such program is the signature-suppressed, diesel-engine-driven (SSDED) generator program.

As the SSDED name implies, the program's purpose is to reduce sound and IR signatures emitted by the present family of generators. The Army awarded two contracts to companies to design, fabricate and test 15 kilowatt (kw) 400 Hertz (Hz), 30 kw 50/60 Hz and 60 kw 50/60 Hz generator sets.

SSG Ronda S. Scott

Sergeant Arthur Hawkins, B Battery, 3-9 Artillery, hooks up the generator cable to the Pershing power distribution box.

The US Army Field Artillery Board tested the 30 kw generator at Fort Sill, Oklahoma, in September of 1987. The Board examined several primary objectives

during the evaluation: mission performance; detectability, survivability and vulnerability; reliability, availability and maintainability (RAM) and personnel requirements for the SSDED generators.

B Battery, 3d Battalion, 9th Field Artillery (Pershing) was the "player unit" (the unit using the equipment during the operational test) because a battalion is the typical user of the 30 kw generator. The battery provided one platoon of two missile sections, a battery control central (BCC), one platoon control central (PCC) and other support vehicles.

Before player training began, the prototype generators were mounted on B Battery's organic equipment. One generator from each manufacturer was mounted on the prime mover, organic to a missile section, to power the erector-launcher (EL). The two remaining generators were mounted on separate 2-1/2 ton M200A1 trailers to power the battery control centrals (BCCs).

Formal testing consisted of three, 72-hour tactical exercises driven by scenarios. Because the Board needed realistic scenarios, B Battery developed and Training and Doctrine Command experts reviewed the scenarios, using Pershing tactics and the unit's standing operating procedures (SOP).

The results of the test show the prototype generators provided the power needed to complete the tactical missions. The operators and mechanics were able to perform the tasks required at their level of maintenance with no additional personnel. Because of mechanical failures during the test, the mean time between failure (MTBF) for both manufacturers' generators was low, even though one generator did not experience a failure. However, the mean time to repair (MTTR) was very low, so the operational availability was extremely high—good indicators for future development.

During two of the exercises, a listening operation was conducted using player and Board personnel. Personnel were 300 to 400 meters from the generator positions to listen for sounds. The results of the exercises show most people couldn't hear the generators. Several commented that the tested generators were much quieter than the current 30 kw generator organic to the unit.

During another exercise, a United States Air Force (USAF) reconnaissance mission was conducted. The aircraft was equipped with photographic equipment and a forward-looking infrared (FLIR) sensor. After the mission was completed, photo interpreters examined the IR photographs to identify and locate the generators' positions. The interpreters were unable to locate the positions.

There is much work yet to be done on the SSDED prototype generators. Technical testing continues at Aberdeen Proving Ground, Maryland, with additional operational testing planned for the future. The results of this testing will determine the fate of the SSDED program. Although it is possible these SSDED generators may not make it to the field, the Army will field comparable systems that will have the characteristics of the present family of generators but with greatly reduced sound and IR signature. When this happens, we will eliminate another deficiency affecting unit survivability.

Rocket-Propelled Line Charge

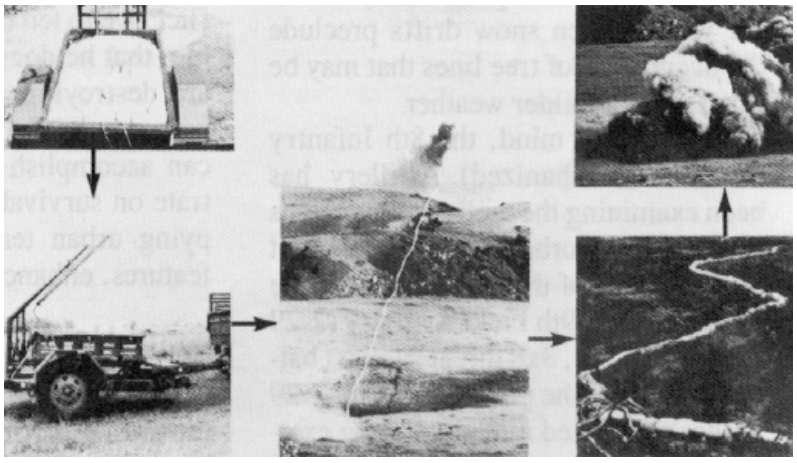
The 9th Infantry Division, Fort Lewis, Washington, received the first units of a new rocket-propelled mine clearing line charge (MICLIC). The system is a joint Army-Marine Corps development adopted for the Army by the Troop Support Command's Belvoir Research, Development and Engineering (RD&E) Center.

Towed by a light engineer vehicle, a tank or an armored personnel carrier, the system features a Marine Corps launching system and an explosive line charge mounted on a standard Army trailer. In operation, a rocket propels the line charge across an enemy minefield from a standoff position. Detonation of the charge causes the mines to explode and clears a path 100 meters long by eight meters wide.

Three new safety improvements will be incorporated in MICLIC during the fielding process: an improved fuze, an arresting cable disconnect and a trailer disconnect.

MICLIC in Loaded Configuration

Line Charge Detonating



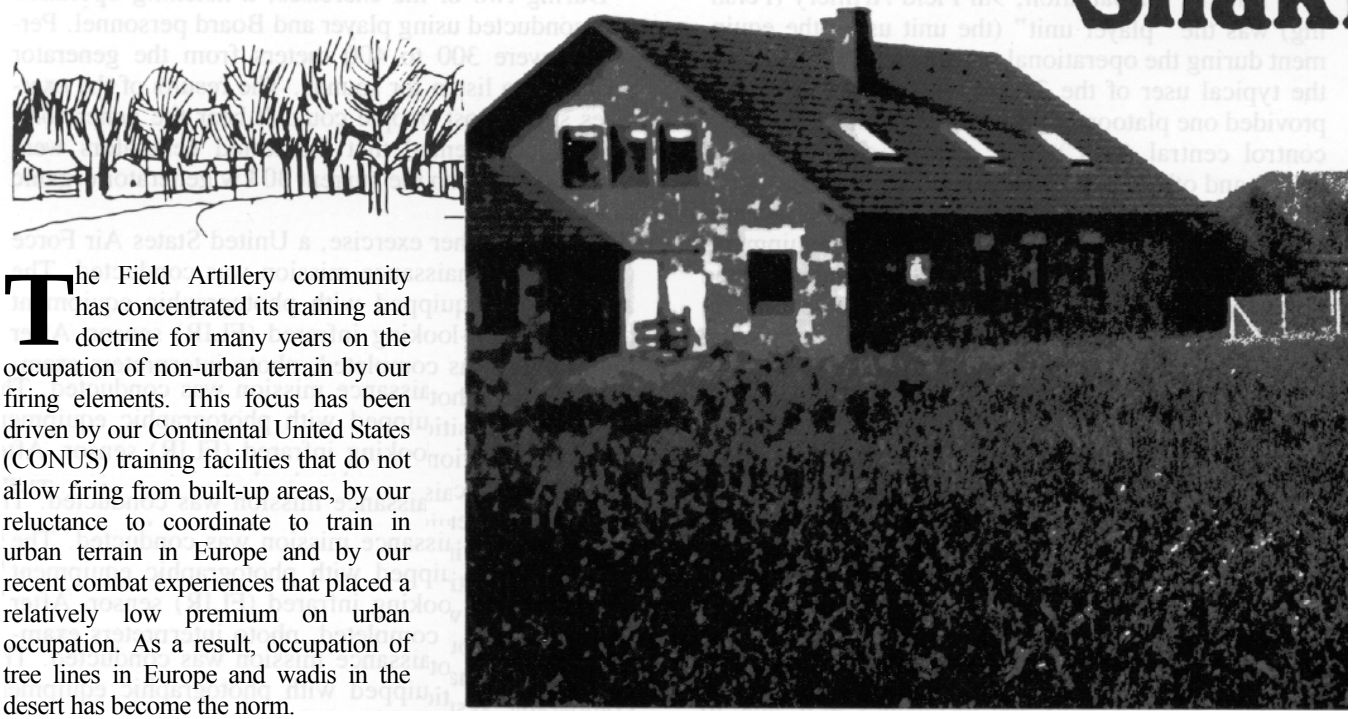
MICLIC Prepared to Fire

Line Charge Firing Over Minefield

Line Charge in Plac After Firing

The Army plans to field about 1400 systems throughout the continental United States and Europe.

Shak



by Lieutenant Colonel Christopher C. Shoemaker

The Field Artillery community has concentrated its training and doctrine for many years on the occupation of non-urban terrain by our firing elements. This focus has been driven by our Continental United States (CONUS) training facilities that do not allow firing from built-up areas, by our reluctance to coordinate to train in urban terrain in Europe and by our recent combat experiences that placed a relatively low premium on urban occupation. As a result, occupation of tree lines in Europe and wadis in the desert has become the norm.

A closer examination of the European battlefields of the future, however, reveals that in many places we are driven to a Hobson's choice [no choice at all] in selecting firing positions: either we occupy built-up areas or we don't occupy anything. Many of the rugged positions maneuver units select as the most defensible can be supported only by firing units positioned in towns and villages. This is particularly true in the winter when snow drifts preclude the occupation of tree lines that may be accessible in milder weather.

With this in mind, the 8th Infantry Division (Mechanized) Artillery has been examining the tactical dimensions of occupying urban terrain. The test bed for much of the work has been the 2d Battalion, 29th Field Artillery (2-29 FA), a 155-mm, 3x8 direct support battalion. During the past 18 months, 2-29 FA has conducted nine week-long exercises in urban terrain. From this experience, we have learned a number of important lessons, some of which I outline in this article. Our conclusion, is we must consider German towns and villages in the reconnaissance, selection and occupation of a position.

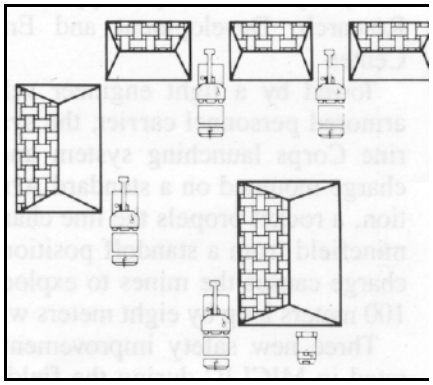
Survivability

The ability of our cannons to survive the enemy's counterfire is the most important determinant of success or failure on the central front. Tube for tube, we are superior in every important measure: lethality, accuracy and timeliness. Only the enemy's vast numbers offset his disadvantages. We must inflict five to ten times the tube losses on him that he does on us, even while we are destroying advancing enemy maneuver units. This is a tall order, and we can accomplish it only if we concentrate on survivability measures. Occupying urban terrain, with its unique features, enhances our survivability.

Semi-Hardened Positions

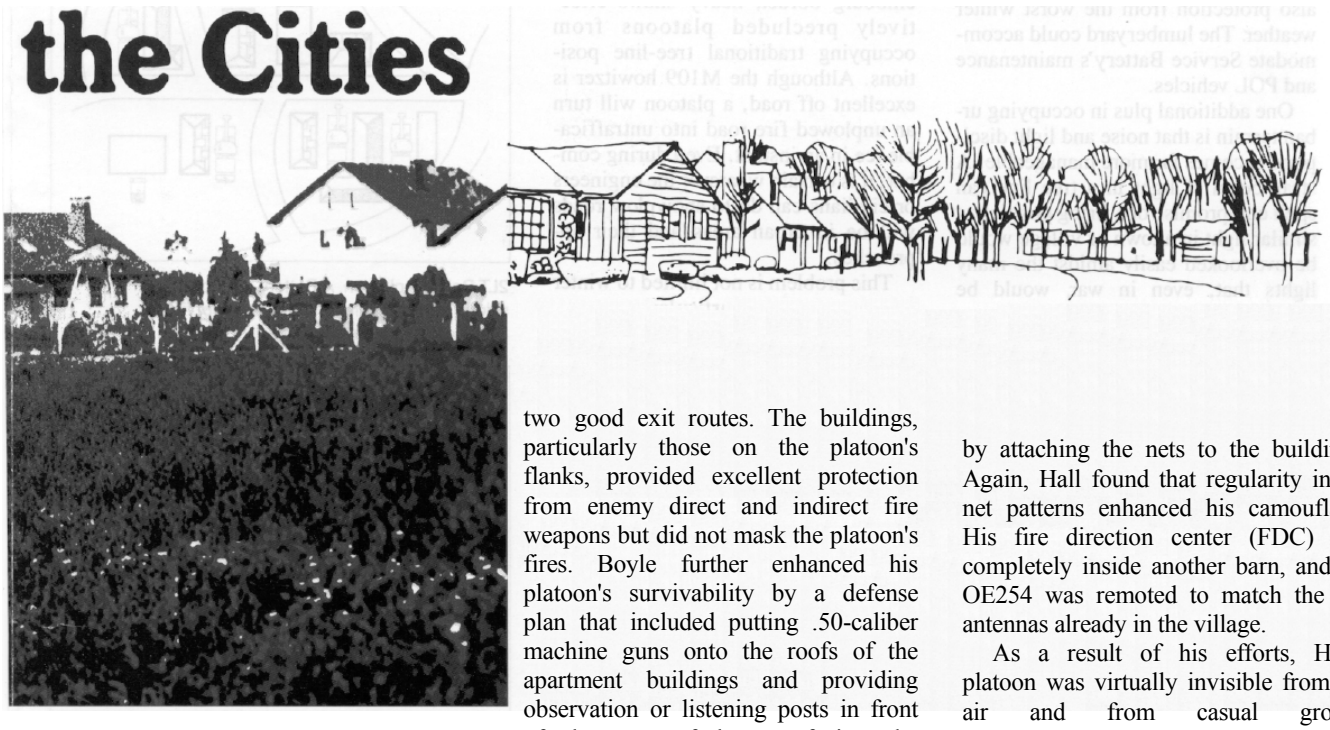
Hardening firing positions is one of the most effective ways to enhance survivability. The primary drawbacks to hardening, however, are the lack of engineer assets and time, both of which are essential to harden tree-line positions. In urban terrain, the situation is different, particularly in larger, more modern cities.

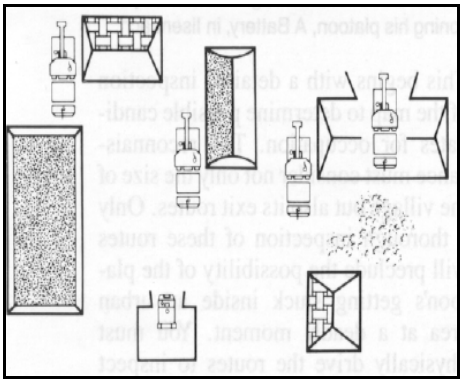
The occupation of the city of Altenstadt by First Lieutenant Brian Boyle, C Battery, 2-29 FA, illustrates this point. The four howitzers of the platoon occupied two adjacent vacant lots on the edge of the city opposite the direction of advance of the enemy. The lots were flanked by modest apartment buildings and hidden behind a row of houses. To the rear of the platoon position were several farm buildings and



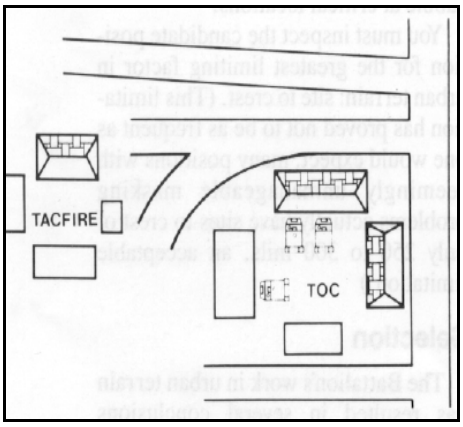
1LT Boyle's platoon, C Battery, 2-29 FA, takes up semi-hardened positions in Altenstadt, West Germany.

the Cities





1LT Hall's platoon, A Battery, conceals itself among farm buildings in Engelshof.



HHB and the Battalion TOC use urban terrain for concealment in Hocksdorf.

two good exit routes. The buildings, particularly those on the platoon's flanks, provided excellent protection from enemy direct and indirect fire weapons but did not mask the platoon's fires. Boyle further enhanced his platoon's survivability by a defense plan that included putting .50-caliber machine guns onto the roofs of the apartment buildings and providing observation or listening posts in front of the row of houses facing the downtown area and the enemy's route of advance. These actions, coupled with the excellent exit routes, helped guarantee the survivability of Boyle's platoon.

Concealment

Our experience in urban terrain also demonstrated the possibilities such areas offer for camouflage and concealment. As in any terrain, the trick is to blend into the surroundings, to replicate the environment. In wooded areas, we concentrate on irregular patterns and on natural camouflage. In urban areas, the challenge is somewhat different. Here, we found the most effective camouflage is to use very regular patterns to appear to be of human design. In Altenstadt, Boyle used his nets in block patterns, tying them into the apartment houses and overlapping other distinctively urban features.

First Lieutenant Tom Hall's platoon (A Battery) took a slightly different approach, based on the nature of the village it occupied. Hall's platoon occupied the farming village of Engelshof. By placing howitzers inside barns, Hall did not need camouflage nets, except over the few feet of tube necessarily exposed. His other guns, snuggled between the farm buildings, were easily and quickly camouflaged by attaching the nets to the buildings. Again, Hall found that regularity in his net patterns enhanced his camouflage. His fire direction center (FDC) was completely inside another barn, and his OE254 was remoted to match the TV antennas already in the village.

As a result of his efforts, Hall's platoon was virtually invisible from the air and from casual ground reconnaissance. Although the construction of the farm buildings did not offer the same degree of protection that was afforded Boyle's platoon, the enhanced concealment compensated adequately.

The concealment advantages urban terrain offers are clearly not limited to firing elements. Our Battalion tactical operations center (TOC) found refuge in a series of small farming communities and then occupied the town of Hochsdorf, an ideal location.

The TOC and the rest of Captain Don Renner's Headquarters and Headquarters Battery occupied several of the many courtyards that dot every German farming community. Although nets were used, they proved unnecessary; only slow-flying aircraft that knew exactly where to look would be able to find any of the positions in the town.

Renner's biggest concern was that by placing the TOC in a position completely surrounded by two-story buildings, he'd have problems with critical voice and digital communications. This proved to be an unnecessary worry. Again by remoting the antennas even a distance of only 50 to 100 feet, communications were as good as the battalion had ever experienced.

In the town of Langenleiten, Service Battery found a semi-active lumberyard that, with its large, covered area, provided not merely concealment but

also protection from the worst winter weather. The lumberyard could accommodate Service Battery's maintenance and POL vehicles.

One additional plus in occupying urban terrain is that noise and light discipline becomes far more manageable. A stray beam of light in a tree line can spell compromise of a firing position; a similar light in a town or village would be overlooked easily amidst the many lights that, even in war, would be present. Similarly, noise normally associated with a firing platoon, such as howitzer engines or generators, is muffled or masked far more effectively in towns than in tree lines.

Sustainability

In addition to the survivability advantages urban areas offer, the Battalion found enormous sustainability benefits, particularly during adverse weather. Even in the rudest farming village, urban areas offer a host of assets simply not available in tree lines. These include water and food, heat, shelter and some measure of creature comfort. During a 48- to 72-hour field training exercise, these are relatively unimportant. But in combat, particularly under the conditions we can assume we'd have in a European war, these may become essential for victory. Certainly, the Field Artillery's experiences during World War II in Europe underscore this point.

On a much smaller scale, 2-29 FA's operations appear to sustain this historical lesson. Operating between Grafenwoehr and the Czechoslovakian border in March of 1987, the Battalion experienced particularly cold and snowy conditions during which off-road mobility was precluded by snow drifts of up to eight feet. Despite a scenario that had some platoons moving as many as 25 times during a 72-hour "battle," we had no significant degradation in capabilities nor did we experience any cold weather injuries. Soldiers slept in barns, used sports halls for showers and latrines and, in general, developed imaginative techniques for using the built-up areas to avoid the worst of the cold.

Accessibility

In some cases, accessibility alone drove us to the occupation of urban terrain. During a February field training exercise in the Trier area along the Luxembourg border, heavy snows effectively precluded platoons from occupying traditional tree-line positions. Although the M109 howitzer is excellent off road, a platoon will turn an unplowed fire road into untrafficable ice in an instant. Even during combat, it is certain whatever the engineers or civilians can do to snowplow roads will be in urban areas and their approaches.

This problem is not limited to winter months. During a particularly wet August in Hesse, occupations of tree lines proved difficult because of mud, soft ground and rain-slicked grass, again, driving us into urban areas. In any weather, forward urban areas offer multiple routes of advance and, more importantly, exit without the telltale signature of tracked vehicles crossing open fields. Asphalt forgives many sins.

Flexibility

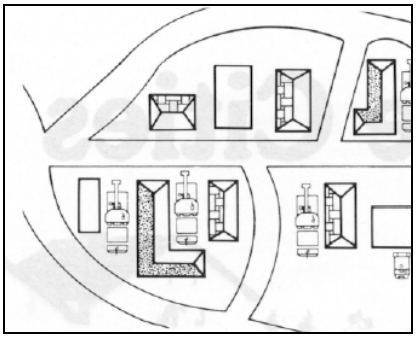
Perhaps the greatest advantage that occupation of urban terrain gives us is flexibility to use a wider range of positions to provide continuous fire support. Our flexibility to occupy urban terrain is greatly enhanced by the 3x8 organization. Many villages we occupied during the past six months would have been unusable had we still been organized into the ponderous six-gun batteries. By standing operating procedure (SOP), 2-29 FA fights our firing batteries with light firing platoons and a battery trains, adjusting to a heavy and a light platoon as the tactical situation dictates. A "slim" four-gun platoon can occupy any built-up area with ease; heavy platoons are more restricted. A six-gun battery, with all of its associated support, would find many villages out of the question.

Procedures

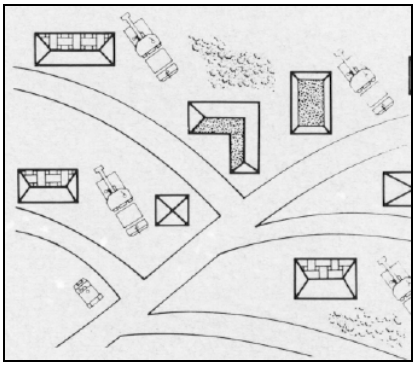
The experience of the 2-29 FA with occupation of urban areas has been, on the whole, very positive. There are several lessons we have learned and several pitfalls to be avoided.

Reconnaissance

A thorough reconnaissance by the battery commander is essential to successful occupation of urban terrain.



2LT Balzer's platoon, A Battery, occupies positions perpendicular to the azimuth of fire in Sandberg, the ideal orientation.



1LT Fowles used his imagination when positioning his platoon, A Battery, in Ilsenbach.

This begins with a detailed inspection of the map to determine possible candidates for occupation. The reconnaissance must consider not only the size of the village but also its exit routes. Only a thorough inspection of these routes will preclude the possibility of the platoon's getting stuck inside an urban area at a deadly moment. You must physically drive the routes to inspect them for features not evident on the map (e.g., construction, extremely narrow points, bridges). You also must check exit routes for post-counterfire rubble at critical locations.

You must inspect the candidate position for the greatest limiting factor in urban terrain: site to crest. (This limitation has proved not to be as frequent as one would expect; many positions with seemingly unmanageable masking problems actually have sites to crest of only 250 to 300 mils, an acceptable limitation.)

Selection

The Battalion's work in urban terrain has resulted in several conclusions about the type of village most conducive to occupation.

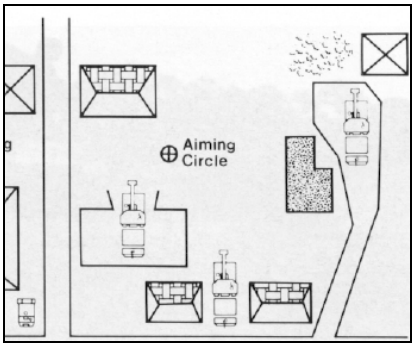
Size. The ideal town size is a function of the element to occupy it. Firing platoons do best in villages of about 500 people and at least six inhabited streets; battalion TOCs fit best in slightly larger villages with enclosed farming courtyards, and battalion trains should look for more heavily urbanized areas to take advantage of the facilities.

Orientation. The lay of the village is as important as the size. Most small German towns have a distinct orientation, extending from the main road running through the town. The ideal orientation for such a town is perpendicular to the azimuth of fire. Since most driveways and farm roads are perpendicular to the main highways, such an orientation is highly conducive to occupation. As long as the village is appropriately oriented, much can be done with the howitzer formation.

Degree of urbanization. Again, the ideal depends on the element. Firing platoons and TOCs do best in farming villages while the trains should be spotted in more developed areas. Particularly desirable are those villages with lumberyards. Lumberyards provide excellent positions for both firing platoons and support elements.

Occupation

Occupying an urban area is at once easier and more complex than moving into a tree line. It is easier because the road network already exists, is more frequently free of snow and may even have lights. It is more complex because we, as a community, are unfamiliar with such terrain and the unique challenges it presents.



1LT Carter, A Battery, solved his platoon's aiming circle problem by positioning the circles as tactically as his howitzers.

Sweeping Towns. Sweeps of towns and villages by the advance party are considerably more complex, especially if the local population is on our side. You must consult town authorities in advance to determine if enemy units have occupied the area; the advance party must know how to root them out. In the attack, this problem is more pronounced because of the high probability that residual enemy elements may be in town. One advantage is that a live civilian population indicates the area is not chemically contaminated.

Multiple Aiming Circles. Give up on trying to lay the platoon with a single aiming circle. Multiple aiming circles and reciprocal laying are essential to ensure you take the best advantage of the village. Moreover, it is essential to position the aiming circle as tactically as a howitzer. Nothing is more revealing than an aiming circle sitting in the middle of an open field.

After considerable experimentation, First Lieutenant Bill Carter (A Battery) solved his platoon's aiming circle problem. Carter used aiming circle #1 to lay his first two howitzers and lay aiming circle #2. Aiming circle #2 then laid howitzers three and four. Both circles were tactically emplaced and, like the howitzers of the platoon, were invisible to casual observation. Other platoons have used three circles and reciprocal lay. These are important, often neglected techniques.

Occupation Time. It takes longer to occupy a village than it does a tree line. Although training and thorough reconnaissance can cut occupation time down, commanders must, nonetheless, anticipate a 15 to 25 percent increase.

Anchoring Howitzers. Anchoring howitzers on hard stand presents some difficulties. In some positions, spades dig nicely into asphalt and gravel. In other positions, we had to chock them. We found that the NATO rail tie downs and chock blocks are a viable alternative to spades on hard surfaces. In anticipation of this requirement, our howitzer sections carry this equipment as part of their basic issue items (BII).

Using Wire. You must plan to use plenty of wire to take advantage of existing networks, such as gutters, and to use the overheads of surrounding buildings. We found we used 25 to 30 percent more wire in platoon positions in urban areas than in tree lines.

Training

The best way to train to occupy urban terrain is to do it. We have found that this is easier than it might appear, at least here in Germany. Because we do relatively little damage, especially when compared to our Armor colleagues, we are able to train more inside the villages and sustain long-term cooperation. The Germans are generally helpful and sometimes even invite howitzers to occupy their driveways (although we have been kept out of one area by an angry German farmer with a pitchfork). Coordination for maneuver rights areas can be difficult and requires a long lead time, but that is a relatively small price to pay for the training benefits.

In the 2-29 FA, every exercise we now conduct has a maneuver rights area and an urban terrain component, and we have added the ability to occupy urban terrain to our mission essential task list (METL). As a starting point to our urban terrain program, we found it extremely useful to occupy the military operations in urban terrain (MOUT) training village in Grafenwoehr.

Summary

We do not pretend to have discovered something new in the occupation of urban terrain, nor should our enthusiasm be misconstrued as arguing for an exclusive urban focus. On the other hand, we cannot afford to concentrate our training and thinking solely on tree-line reconnaissance, selection and occupation of position. The potential European battlefields of the future demand more realistic thinking and imagination.

Lieutenant Colonel Christopher C. Shoemaker commands the 2d Battalion, 29th Field Artillery, 8th Infantry Division (Mechanized) Artillery, Baumholder, West Germany. He has served in several 109-mm howitzer battalions in the continental United States and Europe and commanded A Battery, 2d Battalion, 18th Field Artillery, at Fort Sill, Oklahoma. Lieutenant Colonel Shoemaker is a graduate of the Command and General Staff College, Fort Leavenworth, Kansas, and has a masters in international relations and a doctorate of philosophy in political science, both from the University of Florida.

Engineer Support of Field Artillery Defensive Operations

by Captain Edward J. Boylan

Time and time again, all of us have watched an old World War II movie on the television where you see infantrymen in battle on a remote island in the Pacific or in a field in central Europe. Some parts of the movie are always the same: weather conditions are usually terrible, the hero never gets shot and the infantrymen are always fighting from individual fighting positions. They are always "dug in." Have you ever seen tanks or howitzers dug into the ground? Most of the time you never even see a howitzer in the movies!

As the commander of a battery, my most frequent threat was counterfire from enemy artillery. The Soviet attack ratio for artillery is six or eight to one, with a minimum acceptable ratio of three to one. The Soviets can put 40 rounds per tube (122-mm) per battery into a fire for effect once they have found my position. This averages out to be about one round per meter within a usual battery front. Unfortunately, most Field Artillery pieces are not designed to provide crews with adequate protection from fragmentation or direct fire.

I can't expect to occupy urban areas where I can use structures for protection every time my battery has to move to a different position. Available terrain can provide some protection. However, dug-in or prepared positions would offer far better protection for my crews.

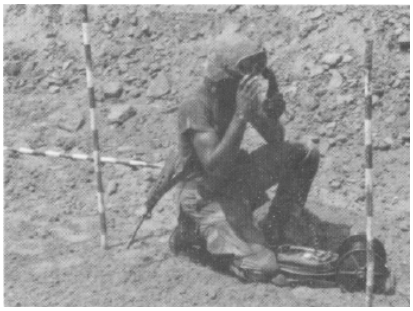
How to Dig In

During a recent battalion-level deployment to Fort Chaffee, Arkansas, in August of 1987, I had engineer support during my battery internal evaluation. Keep in mind we were operating in a friendly environment: no one was shooting at us, and time was not a major factor. Due to the lack of engineering assets, deliberate positions—specifically hull defilade—were used as opposed to protective positions, which required extensive engineer assets and material.

The engineers dug positions for four M110A2 howitzers, their four M548 ammunition carriers and the fire direction center's M577, using the D7 Crawler tractor, commonly called bulldozer. Each position was dug to these specifications or as close to them as possible: four to five feet deep, 15 feet wide and approximately 70 feet long. It took 60 minutes to complete each position.

I was surprised at how excited my soldiers were to take on a new and different task such as this. It was a welcome change of pace, and because they were unfamiliar with the prepared positions, the crew chiefs and section members had to think a little harder about how they were going to tackle the task of safely setting up their howitzers in the positions. In addition, it allowed my soldiers to see another portion of the combined arms team in action.

Example of a Hull-Defilade Position



An advance party man checks his data with the aiming circle minutes before the howitzers arrive.

An advance party man leads the howitzer into position.

Problems Resolved

Attempting something for the first time, such as working with another unit or occupying prepared positions, usually brings about a few problems. We were no exception.

A howitzer pulls into position. Note the advance party equipment on the outside of the position.

The front end of the howitzer digs into the side of a position that's too narrow as it powershifts.

The howitzer and M548 ammunition carrier barely fit into the larger position.

Safety and meeting Army training and evaluation program (ARTEP) standards for lay were two major concerns. Fortunately, all howitzers were emplaced safely, and only one of the howitzers failed to meet ARTEP standards for the lay.

The advance party personnel slowly brought the howitzers into position and layed and safed them. After completion of the lay, we conducted an after action review to discuss problems and lessons learned.

Safety has to remain a top priority, especially during night operations. Soldiers quickly forget there are five big holes in the ground within the battery perimeter, which could injure anyone who might fall into one of them.

We found we needed to widen each position as much as an additional 10 feet, so the advance party man could set up his equipment in the position. The additional room also allowed the howitzer to powershift to locate the aiming circle. This was caused by the inaccuracy of the D7 Crawler tractor when digging on the predetermined azimuth of lay. When the spade of the howitzer is emplaced, it lengthens the howitzer by four feet. If the position is too narrow, the front and rear of the howitzer digs into the walls of the position when the howitzer has to powershift.

In addition, we found the howitzer sections that did have their advance party men in the positions had faster lay times than the ones who had their advance party men outside of the position. This was because the advance party man on the outside of the position could not bring his howitzer in on the azimuth of lay as accurately as the ones inside the positions. The more accurately the advance party man can place the howitzer on the azimuth of lay, the faster the lay time.

It is very important the positions are not too deep because when you consider the dirt piled up on the outside of the position (one to eight feet), the depth of the entire position can reach more than 10 feet. The depth may hinder the gunner from seeing the aiming circle. Of course, this depends on the terrain, depth of the hole and condition of the berm.

The position must be as level as possible. If the ground on which the howitzer is emplaced is shaped like a bowl, the howitzer spade cannot absorb the shock of recoil. Not having the position as level as possible also could cause the weapon to sit on a cant of greater than 90 mils and, if fired, could result in injury to personnel or damage to the equipment.

Digging in did not affect net emplacement or communications. The positions cause only the howitzer crews and the fire direction center to adjust the way they set up their own positions. The rest of the battery conducted business as usual.

Realistic Evaluation

The overriding problems that would occur in a wartime situation would be emplacement time and limited engineer assets. If I am lucky enough to get this kind of support, would I have the time to use it? Realistically I would need five hours added to the time given me to move my unit to another position. This does not count the coordination time it would take to meet with the engineer liaison team and show them where I wanted them to dig and in what direction. I may be wasting valuable assets and time because of the strong possibility the tactical situation could change, and I may never occupy the position prepared for me.

Conclusion

We must protect our soldiers, no matter what the cost! Time and availability of assets will always be a major concern. If time permits and assets are available, even if you can only provide protection for a few sections, you must do it. Some protection is better than none.

Captain Edward J. Boylan commanded A Battery, 4th Battalion, 4th Field Artillery, 75th Artillery Brigade, III Corps Artillery, Fort Sill, Oklahoma, and coordinated the engineer support for the Battery. He also served as Assistant S-3 for the 75th Brigade. Captain Boylan is a graduate of the Virginia Military Institute and the Field Artillery Officers Advanced Course. He's currently attending the Combined Arms Services and Staff School at Fort Leavenworth, Kansas, after which he will return to Fort Sill to teach tactics in the Fire Support and Combined Arms Operations Department of the Field Artillery School.

Redlegs Fit To Fight

by Sergeants First Class Raymond E. Coots and Richard W. Barnes

In peacetime training, you won't pump 2,000,000 artillery rounds down range in a single week as cannoneers did during the Battle of the Somme in 1916. Likewise, while conducting live-fire training at Grafenwoehr, chances are slim you'll get the fire order "Fire for effect, battery 67 rounds" as one battery did during the Lorraine Campaign in 1944.

Ever stop to think about all the back-breaking work those cannoneers did before they pulled the lanyards? Cannoneers used their arms and backs to uncrate, lift, carry, stack and finally load ammunition on and off the trucks and trailers. In anyone's book, that's a lot of "projos" and powder to handle. On top of all this, throw in short-handed crews, 24-hour operations and shoot-move-shoot tactics, and no doubt exhaustion will quickly overcome your unit on the AirLand Battlefield.

To fight, win and survive is the mission of those who serve in the Field Artillery. Physical fitness training contributes directly to accomplishing that mission.

Total physical fitness training is not only muscle strength and endurance, but also cardiorespiratory endurance and flexibility. Each component enhances the cannoneer's survivability on future battlefields.

What are you doing as a leader to develop muscle strength and endurance in your soldiers? More specifically, what exercises do you lead your soldiers in during the daily PT session to increase their upper body strength? If designed correctly, your weekly PT program can focus on the exact same muscles your cannoneers would use if they did stack, uncrate, lift, carry and load thousands of rounds per week.

The exercise program in your battery should emphasize the development of the muscles used during expected combat operations. Proper planning by leaders can produce cannoneers who can sustain 24-hour operations and have the physical strength and endurance to accomplish the mission.

When you design your program, take into consideration several key points. First, consider the seven principles of exercise:

Regularity: Three to five times a week.

Progression: Increasing intensity.

Overload: Beyond normal demands.

Balance: Between muscle groups, upper and lower body.

Variety: Variety of activities.

Specificity: Specific improvements.

Recovery: Hard-easy-day concept. Next, incorporate the frequency, intensity, time and type (FITT) principle:

Frequency: How often you exercise.

Intensity: Amount of weight lifted (resistance).

Time: Eight to 12 repetitions, to muscle failure times three sets.

Type: Type of exercises performed. Finally, encourage leader creativity. Remember, when the leader enhances the physical training of his unit, he also increases its chances of survival.

The cannoneer is the workhorse of the firing battery. Take a look at the other demanding duties of the cannoneer besides handling ammunition. He lifts, pulls and carries a variety of equipment to emplace the howitzer. He puts up the camouflage net, maintains section equipment and digs individual and crew fighting positions. He is constantly on the go.

Improving the strength of howitzer crews is complicated, and it's too late when they go to war. To overcome their weaknesses, they must train vigorously. Once the weight training program begins, it will take about four to six weeks to see improvement.

There are two elements of muscular fitness: strength and endurance. Working against resistance produces gains in both elements. For greater strength gains, fewer repetitions (one to eight) with more resistance (75 to 100 percent of maximum) is the best formula. For greater endurance gains, more repetitions (12 to 20) with less resistance (50 to 75 percent of maximum) gives the best results. Muscle failure should occur between the eighth to twelfth repetition. (Muscle failure occurs when the exerciser is unable to perform another repetition correctly.)

You have many reasons (excuses) for not taking muscle strength and endurance training seriously in your battery. First of all, it's resource intensive. Getting access to the post gymnasium equipment is a problem. The time and effort it takes to get the entire battery to the gym is another problem. Plus, the gym only has a few sets of weights. This alone makes it impossible to get the entire battery weight training at the same time. The troops will just stand around and wait. Any other excuses?

The answer is simple. Don't go to the gym. You can accomplish muscle strength and endurance training within the confines of your battery area. The only limiting factor is your imagination. You can obtain all the materials you need from the motor pool and supply room, as well as from within your sections. The cost to you and the Army is minimal.

The need for special training is clear. The body will cease to function, if not conditioned properly and if overworked. The exercises to improve muscle strength and endurance are simple to perform. A complete range of motion involves exercising a joint and its associated muscles through its full range. The chance of injury is minimal, if you do warm-up exercises before each weight training session begins.

Always take a positive approach to special training. Don't ridicule soldiers who lack the strength to perform a set number of repetitions or find it difficult to do pullups or chinups. Assess their shortcomings and develop a program to improve their fitness level.

Successful conditioning of the body will increase the cannoneers' chances of survivability in future battles. You owe it to yourself and your soldiers.

Cannoneer PT Exercises

Conduct the following exercises to develop muscle strength and endurance and cardiovascular improvement. Add your own creative thinking to these exercises and produce a wide variety of workouts for your cannoneers. Chapter 4, FM 21-20 Physical Fitness Training, explains the fundamentals of flexibility training.

Caution: Before soldiers engage in any type of physical activity, they should warm-up to increase the muscles' temperature and flexibility.

Fireman's Carry

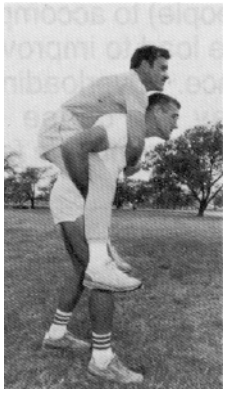
- Pair soldiers of equal height and weight.
- Have each carry the other 10 to 20 meters.
- Switch positions.
- Make 3 to 5 trips each.

Variations:

- Single-shoulder Carry: carry soldier lying on partner's shoulder.
- Cross Carry: soldier lies across partner's back.
- Saddle-back Carry: soldier rides on the back of other soldier.

Camouflage Pole Lift

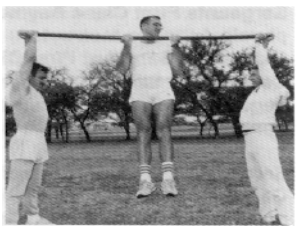
- Join two camouflage poles; tape the middle.
- Group soldiers in threes of equal height and weight.



- Put one soldier in the middle and one on each end.
- Have middle soldier hang while others do the military press.
- Exhale while pushing up; inhale while lowering.

Variation: Chinup or Pullup Bar with Camouflage Poles

- Group soldiers in threes of equal height and weight.
- Put one soldier on each end, arms extended.
- Have soldier in the middle do the exercise.
- Rest 30 to 45 seconds between sets.
- Inhale while pulling up; exhale while lowering.
- Switch positions until all soldiers have completed the exercise.



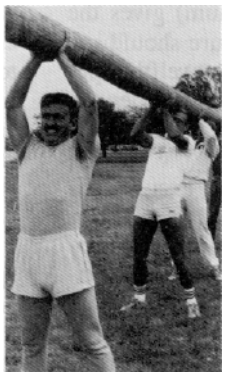
Sandbag-Carry Relay

- Divide into three-person teams.
- Fill sandbags to weigh approximately 40 to 60 lbs.
- Have two teams face each other 50 meters apart.
- Have each soldier carry the sandbag to the other; everyone makes the trip five times.
- Walk fast; don't run.
- Add more weight and sandbags and increase distance for progression.

Telephone Pole Lift

- Group in teams of 7 to 10 soldiers of equal height.
- Lift telephone pole to waist first, then to shoulder and then over head.
- Exhale when pushing up; inhale when lowering.

Note: Telephone pole should be approximately 30 feet long and weigh about 300 to 400 lbs.



Variation: Arm Curls

- Use the same team setup as above.
- Lift telephone pole to waist first, then to chest; cradle in arms.
- Exhale when curling up; inhale when lowering.

Caution: Experiment with size and weight of telephone pole before attempting this exercise.

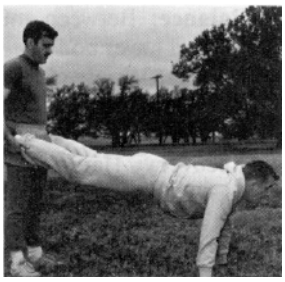
Duffle Bag Leg Dips

- Use a duffle bag filled with soldier's TA50.
- Have soldier stand in place with duffle bag on shoulders and do leg dips.
- Increase weight of duffle bag.

Note: You can use a fellow soldier in place of a duffle bag. Safety Note: Do not confuse a shallow leg dip with a deep knee bend; knee damage could occur.

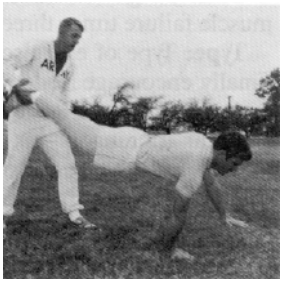
Elevated Pushups, Two Angles

- Pair two soldiers of equal height and weight.
- First level: have one soldier place feet on the hips of the other soldier.
- Conduct pushups until muscle failure.
- Second level: place feet on shoulder of partner and conduct the elevated pushup until muscle failure.



Wheelbarrow Walk

- Pair two soldiers of equal height and weight.
- Have one soldier hold the feet of the other.
- Have soldiers conduct rapid relays 10 to 20 meters.
- Stop, rotate and return to start point.



Vehicle Pull

- Divide PT formation into two groups.
- Secure ropes to front bumper and rear bumper.
- Have one soldier in vehicle act as brakeman.
- Have one group pull vehicle 20 to 50 meters on level ground.
- Have other group pull vehicle back to start point.

Variation: Pull with your chest facing the vehicle, then pull with your back facing the vehicle. This works different muscles.

Do these exercises in three sets with 8 to 10 repetitions per set. Determining a starting weight is a challenge; just add or subtract weight (or people) to accomplish this. Periodically increase the load to improve muscle strength and endurance. Overloading the muscles is the only way to cause improvements. *You must achieve muscle failure*.

Sergeants First Class Raymond E. Coots and Richard W. Barnes are graduates of the Army's Master Fitness Training course and are physical fitness instructors in the Fire Support and Combined Arms Operations Department of the Field Artillery School, Fort Sill, Oklahoma. Sergeant First Class Coots has served in VII Corps, West Germany, as a gunner and section chief; in the Army Training Center, Fort Sill, as a platoon sergeant and chief of firing battery and in the 2d Infantry Division, Korea, as a chief of firing battery. He began his career as a cannoneer in the 9th Infantry Division, Fort Lewis, Washington. He is a graduate of the basic and advanced noncommissioned officers courses.

Sergeant First Class Barnes has served three tours with the 2d Infantry Division, and two tours with the 8th Infantry Division, West Germany. His duties have included cannoneer, gunner, chief of section, supply sergeant and battalion special weapons noncommissioned officer. Sergeant First Class Barnes is a graduate of the basic and advanced noncommissioned officers courses.

Light Fighter Battery Defense

by Captain Howard E. Lee

Shoot, move, communicate, survive and sustain. These five missions describe in broad terms what an artillery battery must master if it is to fight and win on tomorrow's battlefield. The Army's conversion to light infantry divisions challenged the Field Artillery to find solutions to tough questions involving tactics and training. One of these questions, raised at the 1985 Fire Support Conference, is how to defend a light artillery battery against ground attack while delivering timely and accurate fires in support of maneuver forces. The challenge of battery defense will sorely tax the new light artillery battery's full complement of only 67 men if it uses conventional perimeter defense tactics.

Background

The Army developed the new light infantry divisions to employ in low- to mid-intensity conflicts. We can expect that Threat forces in this environment would have a moderate yet effective counterfire capability. More significantly, we can expect them to have a large number of soldiers employed in three- to five-man, special-purpose forces in our rear areas. These forces would infiltrate through our lines or come out of the local population. Their mission would be to disrupt our command, control and communications elements, destroy or delay our logistical support, direct attacks on US forces with emphasis on air defense sites and artillery batteries and sabotage our activities in general. When you tie this combat scenario to the fact that leaders have trimmed a considerable amount of maneuver combat power, the role of the artillery as a combat multiplier becomes even more vital.

Traditionally, artillery batteries have been a primary target for ground, air or counterbattery fires. Threat forces are willing to expend great energy to neutralize or destroy a light artillery battery to reduce the maneuver force's combat power. The Threat forces can accomplish the same reduction if they force the light artillery battery to stop firing and go into ground defense operations. In either case, the effect would be the same—degradation of support to maneuver forces. With this in mind, we can see that the threat to a light artillery battery is significant.

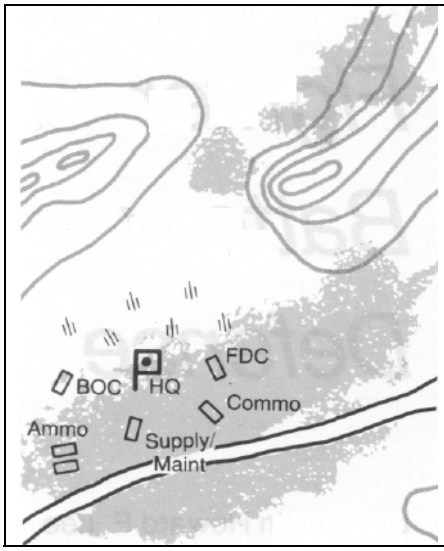
To simplify this article, I will explore only one standard light artillery table of organization and equipment (TOE). A light artillery battery has 64 enlisted soldiers and three officers. It has six M102 series howitzers, 11 high-mobility, multipurpose wheeled vehicles (HMMWVs)—six prime movers and one for the battery commander, fire direction center, battery operations center, supply and maintenance section, and communications section—two 5-ton trucks for the ammunition section, nine M60 machine guns, two AN/VRC47 radios, three AN/VRC46 radios and 11 AN/PRC68 radios. Additionally, the battery has the battery computer system (BCS), the back-up computer system (BUCS) and gun display units (GDU) at the gun positions and can pass data to the gun line by wire or radio with the AN/PRC68.

Problem

Because the light artillery battery is so small, some question its ability to protect itself against ground attack and execute its primary mission at the same time. Traditional artillery doctrine for ground defense calls for a perimeter that circles the battery area with several crew-served weapons positions supporting the perimeter and listening and observation posts established farther out. Each howitzer position would have two to three fighting positions immediately around the howitzer to protect the crew. The battery also would have several individuals serving as a reaction force. Setting up the ground defense severely taxes a light battery's manpower supply. If the unit were under attack, it might not be able to bring the deadly support of artillery fires to the maneuver forces. Considering the importance of the mission, the Field Artillery needs to solve the problem of delivering timely support to the ground-gaining forces while defending itself against ground attack.

Discussion

The solution to this problem is to discard conventional methods of perimeter



Disadvantages

- Defense requires holding the entire perimeter and all the area within.
- M60 machineguns on the gun line, which could best support defense to the rear, have limited fields of fire and must fire through the trains.
- If an M60 from the gun line is moved behind the battery, it dangerously reduces crew strength on the line of steel.
- With the reaction force deployed, manpower constraints could limit the unit's ability to sustain steady rates of fire. The whole battery can be affected by one small unit attack.

Traditional Ground Defense Battery Formation

defense and develop different guidelines for establishing a battery position and conducting a ground defense.

The largest drain on manpower is defending the perimeter around the battery. Unfortunately, the majority of that perimeter is just open space between the guns. That space defines the area we want to keep clear of enemy forces and is important. The first step toward climinating the manpower drain is to defend only those points where friendly forces actually occupy space on the ground. This is done by concentrating the available manpower at selected points and consolidating the various battery sections into defensive hard points.

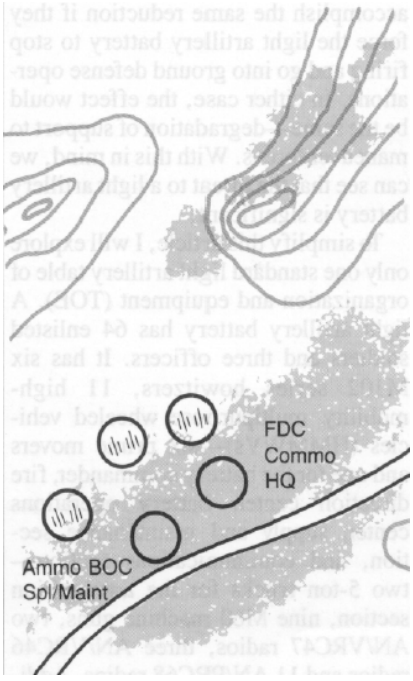
Leaders can do this by breaking the battery into five distinct elements. Three elements are its three firing platoons. Each becomes a hard point with 14 crewmen, two M102 howitzers, two HMMWVs, and two M60 machine guns. A fourth hard point consists of the fire direction center (one officer and six enlisted men), the three-man communications section and the battery headquarters. This section has 13 men, three HMMWVs and one M60. The final hard point is the battery operations center, the four-man ammunition section and the supply and maintenance section, for a total of 12 men, two HMMWVs, two 5-ton trucks and two M60s.

By combining sections, the battery increases its ability to defend itself against ground attack. Leaders, then, would spread these defensive positions far apart to avoid exposure to enemy counterfire. Depending on the nature of the threat, these hard points could be200 to 400 meters apart, giving the battery a frontage of 800 meters and a depth of 600 meters. Although the platoons themselves are far apart, each howitzer position should be 10 to 15 meters from the other to enhance its defensive capability.

The senior section chief of the platoon should organize the ground defense operations. The chief of firing battery and gunnery sergeant could locate with the flank platoons, though they may want to maintain flexibility by moving from position to position. Men at each position would harden the sites and prepare their perimeters as time, materiel and threat conditions allow.

This plan is flexibile and responsive to changing threat conditions. Using the hard-point concept, you can reduce the size of the battery position to a single point such as a firebase or spread it out to cover a 1,000-meter front. The unit training would reflect this operational concept. If the unit trains as individual platoons, it would be able to respond no matter how the battery commander spread his position. This simplifies the unit's training requirement since trainers would use the same formation in every situation.

Leaders should plan to drop the concept of a reaction force in this defense



Organization

- The battery is organized into three to five individual hard points.
- The size of the battery formation is reduced or increased, depending on the nature of the threat.
- Each hard point has enough manpower to both defend its position and maintain its rate of fire.

Proposed Battery Ground Defense Formation

and make each hard point responsible for its own ground defense. This is necessary for two reasons: first, such a force would drain manpower unacceptably; second, you would have to assemble the reaction force from several widely spread positions, and individual soldiers moving to a rally point would be vulnerable. Unlike a normal perimeter where soldiers can race to a threatened sector behind the perimeter cover, they would be out in enemy territory.

Additional Considerations

Unfortunately, the battery loses internal integrity with this configuration. The unit will not have interlocking fires between sections nor will it have internal lines of communication. Its communications wire will be susceptible to destruction by enemy forces. The PRC68s are critical as a backup system. Although each section will lose the support of the entire battery, the enhanced defensive characteristics of the platoon positions more than make up for this loss.

Counterbattery fires pose another danger to the unit. In a normal battery position, the individual sections are spread from 50 to more than 100 meters apart. If one section is hit, another section may escape fire. However, if a battery is located accurately by a counterbattery source, it may lose a system or two simply because there are so many targets (sections) in the area.

The enemy commander will expend enough firepower to neutralize or destroy the detected battery. By consolidating the sections and decreasing the number of targets, you reduce the probability of a direct hit. However, if the section does receive accurate fires, the unit must be prepared to lose two complete sections.

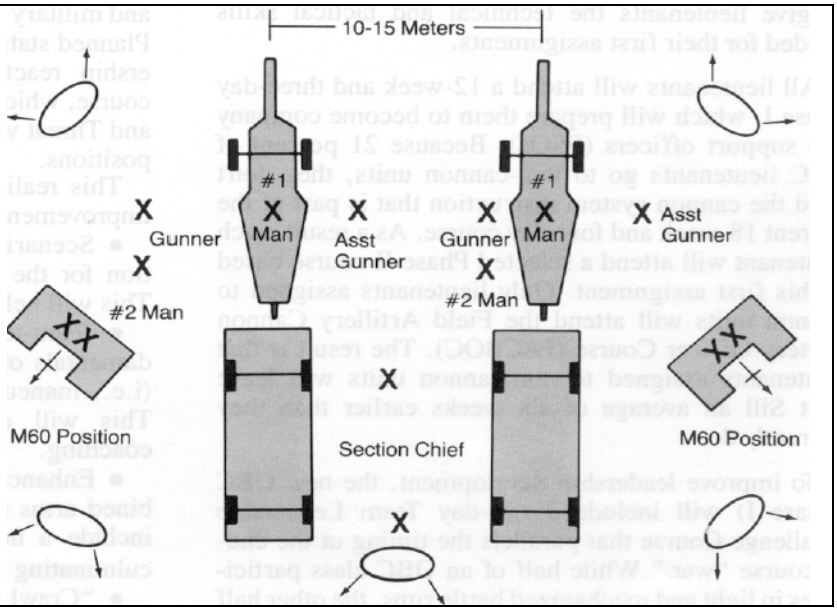
Another problem this organization creates is that it reduces manpower in the battery operations and fire direction centers when the support elements are executing their normal missions. This reduction could make them much more vulnerable to ground attack. A solution to this is to consolidate the remaining personnel and equipment with a flank howitzer position, thereby reducing the number of hard points to three. This alternative enhances the defensive ability of both the support and howitzer sections.

CPT Mark Newell

C Battery, 2-8 Artillery, 7th Infantry Division (Light), prepares an M102 105-mm howitzer position.

Advantages

- Can man guns even when defending the position.
- Can offer a stronger defense than that provided by one gun alone.
- Has redundancy of equipment so the platoon can continue to operate even as equipment breaks down or is lost in combat.
- Can transition into 24-hour operations very effectively by using reduced crews and one chief to supervise both weapons.
- Enhances air assault operations:
  - — Reduces dust signature.
  - — Maintains platoon integrity.
  - — Keeps the platoon in one location for quick identification and lifting.
  - — Accustoms units to operating independently.



Ground Defense Formation for Each of the Five Hard Points

Another consideration is the loss of communications equipment through battle damage or normal breakdown. With two sets of equipment at each platoon position, the unit has built-in redundancy. If the communications wire system fails or is destroyed, the PRC68s back it up. Each section has two PRC68s and two GDUs, so it can lose one and still operate. A battery configured in this manner could operate with only 50 percent of its communications equipment functional.

A final consideration closely fits one of the unit's primary missions—air assault operations. Because the platoons are spread far apart, an air assault operation with one platoon would not impede the unit's support as it might in a conventional battery formation. This is because the battery could continue to fire with helicopters hovering in the area, which they normally wouldn't do. Further, a dust cloud at one platoon's position would not reveal the remaining battery location to an observer. Finally, this organization enhances individual platoon's skills in two-gun operations, and it raises the unit's ability to conduct an artillery raid.

Conclusion

The methods now used to protect a light artillery battery from ground attack are suspect. The small number of soldiers in the battery makes it difficult to deliver fires and conduct a ground defense simultaneously. Therefore, battery leaders should reconfigure their units into five platoon battle positions and spread these positions far apart. Further, these hard-point positions should be responsible for their own defense. Fully trained to meet the challenge of simultaneous delivery of fires and ground defense, the light artillery battery in this configuration will be able to fight and win on tomorrow's battlefield.

Captain Howard E. Lee is the Headquarters, Headquarters and Service Battery Commander for the 2d Battalion, 11th Field Artillery, 25th Infantry Division (Light) Artillery, Hawaii. He received his Regular Army commission from the Reserve Officer Training Corps at Oregon State University and is a graduate of the Field Artillery Officers Basic and Advanced Courses. His past assignments include fire support team chief, fire direction officer, executive officer, fire support officer, plans and operations officer and battalion S1.

View from the Blockhouse

FROM THE SCHOOL

New Officer Basic Course Better Prepares Lieutenants for First Assignment.

The US Army Field Artillery School has restructured the officers basic course (OBC), which will start in late May. The focus of the new, two-phased course is to give lieutenants the technical and tactical skills needed for their first assignments.

All lieutenants will attend a 12-week and three-day Phase I, which will prepare them to become company fire support officers (FSOs). Because 21 percent of OBC lieutenants go to non-cannon units, they don't need the cannon system instruction that is part of the current 18-week and four-day course. As a result, each lieutenant will attend a selected Phase II course based on his first assignment. Only lieutenants assigned to cannon units will attend the Field Artillery Cannon Battery Officer Course (FACBOC). The result is that lieutenants assigned to non-cannon units will leave Fort Sill an average of six weeks earlier than they currently do.

To improve leadership development, the new OBC (Phase I) will include a two-day Team Leadership Challenge Course that parallels the timing of the end-of-course "war." While half of an OBC class participates in light and mechanized battle runs, the other half will experience the Challenge Course; at the end of the two days, the two halves switch.

The Challenge Course will be a physically demanding, task-oriented exercise run in groups of 10 to 15 students. It will test land navigation, fieldcraft skills and military qualification skills (MQS), levels I and II. Planned stations include the obstacle course, the leadership reaction course and a target identification course, which will test students' knowledge of friendly and Threat vehicles using scaled silhouettes in tactical positions.

This realistic leadership course is only one of six improvements in OBC. Others are—

- Scenario-based instruction to provide a foundation for the application of AirLand Battle doctrine. This will help the students see the "big picture."
- Team-teaching, where each section learns the fundamentals of fire support from a team of instructors (i.e., maneuver tactics, fire support, gunnery, etc.). This will enhance continuity of instruction and coaching.
- Enhanced fire support training based on combined arms instruction throughout Phase I. This will include a new, day-long fire support field exercise culminating in a hasty defense at night.
- "Crawl-walk-run" training which intensifies as the course progresses. More than two-thirds of the course will be hands-on training.

- Improved certification relying more on performance. The scenario-based examinations will cut across departmental lines and test multiple aspects of fire support and general Field Artillery knowledge.

One of the best aspects of the OBC restructure is these innovations won't cost the Army more money. The School will implement the new OBC with no increase in troop support, ammunition or instructors.

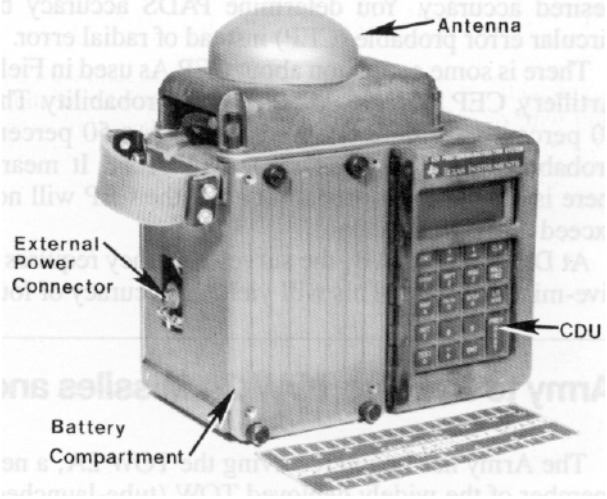
Battleking

BK 3-87, Manpack Global Positioning System (GPS) (Source: Texas Instruments).

The GPS is a space-based radio position and navigation system. It provides worldwide, three-dimensional position data on a 24-hour-a-day basis to an accuracy of 10 meters circular error probable (CEP). GPS weighs 8.6 pounds and is 9x7x4 inches. The Field Artillery plans to use the GPS in conjunction with the position and azimuth determining system (PADS) and the modular azimuth positioning system (MAPS).

In a United States Army Field Artillery Board (USAFABD) evaluation conducted on 22 July 1987, the GPS was capable of giving coordinates only for the point directly under the set. This is acceptable in the manpack configuration but could be a limitation when the system is vehicle-mounted.

GPS is still in early development and testing stages. When fielded, it may be used down to platoon or squad levels.



Manpack Global Positioning System (GPS)

PADS Versus Conventional Accuracies

With the fielding of the position and azimuth determining system (PADS) and the future fielding of other position and navigation systems such as the global positioning system (GPS) and modular azimuth positioning system and dynamic reference unit (MAPS/DRU), there is some confusion about survey accuracies. This article will answer many of the questions about accuracies.

In the Field Artillery, there are two types of surveys: conventional and PADS. You can use both types to meet survey requirements; however, the two accuracies are quite different.

Conventional surveys can produce fourth- or fifth-order accuracies. The specifications for these accuracies are listed in Appendix B, FM 6-2 Field Artillery Survey.

The division artillery (Div Arty) or the target acquisition battery (TAB) survey sections perform fourth-order survey, using the .002 mil theodolite (T-2) and associated conventional survey equipment. Artillery battalions perform fifth order conventional surveys, using the 0.2 mil theodolite (T-16) and associated conventional survey equipment.

With conventional surveys, you determine accuracy by using radial error. This is the actual error found when comparing a true set of coordinates of a point with those computed in a survey. This radial error and the distance traversed in the survey tell you exactly how much error the survey has. There are no probabilities involved, only true values.

PADS survey can produce two accuracies. PADS accuracy depends on zero-velocity corrections (Z-Vel). Zero velocity corrections allow the PADS to correct itself to its present location, and you must perform them at certain time intervals to produce the desired accuracy. You determine PADS accuracy by circular error probable (CEP) instead of radial error.

There is some confusion about CEP. As used in Field Artillery, CEP is based on 50 percent probability. The 50 percent CEP does not imply there is a 50 percent probability that a certain error will occur. It means there is a 50 percent probability that the CEP will not exceed a specific standard.

At Div Arty or TAB, the survey accuracy requires a five-minute Z-Vel. This will yield an accuracy of four meters CEP in position, two meters probable error (PE) in elevation and 0.4 mils PE in azimuth.

At the artillery battalion level, the survey accuracy requires a 10-minute Z-Vel. This will yield an accuracy of seven meters CEP in position, three meters PE in elevation and 0.4 mils PE in azimuth.

A five-minute Z-Vel will yield a CEP accuracy of four meters; this does not meet fourth-order survey specifications as outlined in Appendix B, FM 6-2. A 10-minute Z-Vel will yield a CEP accuracy of seven meters; this does not meet fifth-order specifications, also in Appendix B.

PADS was not designed to meet these specifications but to meet the accuracy needs of all artillery and target acquisition systems. PADS meets these requirements within the specifications outlined in Appendix F, FM 6-2.

If you have questions about PADS or conventional survey accuracies, call the Survey Division, Target Acquisition Department, Field Artillery School, Fort Sill, Oklahoma, AUTOVON 639-6616 or 2823.

Army to Receive TOW 2A Missiles and Cobra-Nite

The Army has begun receiving the TOW 2A, a new member of the widely deployed TOW (tube-launched, optically-tracked, wire-guided) missile family designed to defeat advanced armored targets.

Used by infantry, armor and cavalry units, the TOW 2A's tandem-warhead armament system achieves increased lethality against the latest reactive armor by adding a small warhead to the missile probe. This initial charge explodes on a tank's reactive armor, clearing the way for the primary warhead in the missile body to penetrate the tank. The main warhead on the TOW 2A is the same as that used on the TOW 2.

Hughes Aircraft Company, the TOW 2A contractor, also has begun producing a night targeting system to allow gunners of the Army's AH1S Cobra attack helicopters to see through darkness, smoke and haze.

The system, called Cobra-Nite (C-Nite), augments the airborne TOW missile system, which accurately directs TOW anti-tank missiles, cannon and rocket fire. It also features a thermal imaging system and can fire and guide the new TOW 2 missile, day or night. The TOW 2 features dual-track guidance and a more potent warhead to defeat advanced armor.

The systems will be installed on the existing Cobra helicopter fleet. C-Nite will upgrade two versions of the Army's TOW fire control system: the M65 with the standard optical sight and the M65L with the laser-augmented, airborne TOW (LAAT) sight.

SQT References

During each skill qualification test (SQT) period, the US Field Artillery School (USAFAS) receives numerous hotline inquiries and letters telling us the answers to some SQT questions are outdated.

Each soldier receives an SQT notice that lists each task and the reference for that task, usually the appropriate soldiers manual. The soldiers manual lists references that apply to that task. Soldiers should review the SQT notice carefully and use only those references to answer the SQT questions.

During SQT test development, USAFAS uses references such as field manuals (FMs) and technical manuals (TMs) that are current at the time of development. Soldiers should not use field circulars (FCs), training circulars (TCs) or messages that relate to soldiers' training and performance or tactics and doctrine as reference material for the SQT because the information may not be permanent or totally accurate. These are often published while the test is being written or after it has been written. So check the reference in the SQT notice to determine the correct answer.

If you have questions, write Commandant, US Army Field Artillery School, ATTN: ATSF-DTD, Fort Sill, OK 73503-5600 or call the SQT hotline, AUTOVON 639-2064 or commercial (405) 351-2064, 3420 or 4050.

The Counterfire Battle—

The Missing Element in Today's Training

by Lieutenant Colonel Eric C. Deets

B Battery, 1st Battalion, 30th Field Artillery, had just finished a survivability move at 0200 hours when the incoming artillery started. Even with a well executed, hasty displacement, the unit still lost two M110 howitzers, the fire direction center's (FDC) M577 and an M548 and had several soldiers killed and many wounded. The maneuver brigade had been expecting an attack by a tank regiment at first light, and B Battery had hoped to avoid the enemy's preparation fires with the survivability move.

Without the Battery's knowing, an enemy long-range patrol had observed it as it moved into the new position. The Battery commander, realizing his two guns were not much use without an FDC, quickly radioed the Battalion for permission to split his remaining guns between A and C Batteries. His purpose was to add the 8-inch weight to the defense. His direct support partners also were suffering counterfire, this time caught by the enemy's ARK-1 counterbattery and countermortar radar as they fired in support of the counter-reconnaissance battle. C Battery, 2d Battalion, 78th Field Artillery (2-78 FA), lost one M109 howitzer and an M548 and had several soldiers wounded, while the 2d Battalion's B Battery, positioned in the rubble of a ruined village, had only a few wounded.

World War III? No. An exercise at Grafenwoehr? No. A performance-oriented battle at IronStar 87, the US Army Europe (USAREUR) version of the National Training Center (NTC). IronStar is the yearly battalion army training and evaluation program (ARTEP) for the 1st Armored Division's 10 maneuver battalions and is a performance-oriented, force-on-force exercise fought on the terrain we will fight on in wartime.

Realism

The name of the game is realism. The village where B Battery, 2-78 FA, survived the opposing force (OPFOR) prep is left over from World War II, and the enemy tank regiment of 120 armored vehicles overran several batteries before 0630 hours. All the artillery tracked vehicles and personnel were equipped with the multiple integrated laser engagement system (MILES),

and all batteries were in the main maneuver area of Hohenfels Training Center.

The terrain of this southern-Germany training area features heavily wooded ridgelines and valley floors covered with one to three feet of mud. The maneuver forces must mingle with the artillery as they move from the rear assembly areas to forward battle positions. Battery commanders can't depend on getting the position selected by battalion headquarters because the position may have been occupied at the last moment by other maneuver or support units.

One of the main differences between IronStar 86 and 87 was a realistic counterfire environment. Even knowing the large enemy advantage in artillery, we have never truly trained to combat the Threat. The Commander-in-Chief of USAREUR has stated that if the NATO artillery can keep the enemy artillery from crippling our maneuver forces, then our task forces are more than a match for the enemy's. All of the talk about how to win that artillery duel is worthless, however, unless we train to the requirement.

Training Objectives

Five months before IronStar 87, the commanders of the 1st Armored Division Artillery (Div Arty), 17th Field Artillery Brigade and the four participating artillery battalions agreed upon several major fire support training objectives. The first priority was to provide fire support to a two-task-force brigade, and the second was to provide counterfire within the brigade sector. A series of meetings among battalion staffs and commanders provided a means to share the fire support workload between the direct support and the reinforcing battalions. Command post exercises and low-level, live-fire exercises at Grafenwoehr Training Area worked out the majority of technical problems inherent in having two active artillery tactical fire direction systems (TACFIRE) within one brigade sector. IronStar 87 was to be the final proving ground.

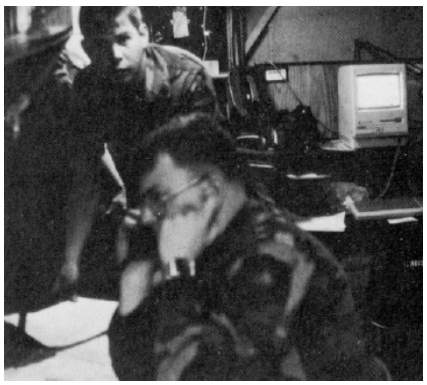
The counterfire training environment was created by the 1st Armored Div Arty Headquarters with help from B Battery, 25th Field Artillery, Target Acquisition Battery (TAB); A Battery, 94th Field Artillery, multiple launch rocket system (MLRS) and 501st Military Intelligence Battalion. The goal was to create a realistic environment in which the artillery units could test their previous training. In addition, the attention to realism would help develop the 3x8 doctrine in the Div Arty.

The components of the training system included the Red Artillery cell, chief of missile troops and artillery (CMTA formerly known as CRTA), ARK-1 radar, ground reconnaissance units, radio direction finders, fire markers with firing elements and the opposing forces (OPFOR) artillery simulation system (OASS).

Exercise Procedures

The Red Artillery cell (RAC), staffed by the Div Arty and 17th Brigade S2s, sought out the Blue Artillery using templating and inputs from OPFOR reconnaissance elements, radio direction finders (RDF) provided by the 501st Military Intelligence Battalion and an ARK-1 radar. ARK-1 is activated once a Blue fire unit exceeds a certain threshold of volleys from a single position. The threshold varies, depending on whether the fire is high-or low-angle and whether the unit fires its volleys as part of battalion missions or alone.

After receiving permission from the CMTA to fire, the RAC called to the OPFOR fire direction center (FDC) (located in the fire marker control center) for mission processing. The OPFOR artillery was doctrinally portrayed by the OASS, which is comprised of software written by the 1st Armored Div Arty and run on a Macintosh computer. OASS kept track of ammunition and locations for 10 battalions of OPFOR artillery, queued all

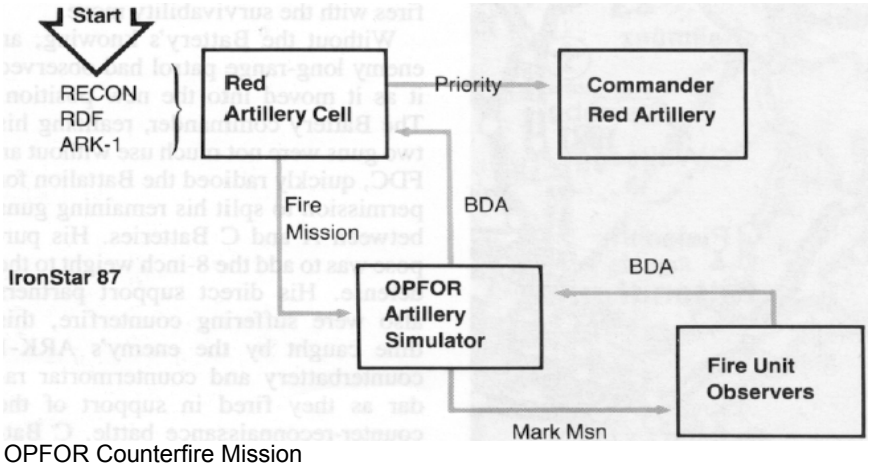


OPFOR Artillery Simulation System (OASS) in the Fire Marker Coordination Center.

planned missions and planned fires, counterfire and target of opportunity missions at the sustained rates of fire for the various weapon types.

Once the mission was through the queue, it was radioed to fire markers (A Battery, 94th Field Artillery) stationed with each Blue fire unit. The fire markers damaged units based on rounds fired, distance between guns, hardening (engineer prepared positions or the villages mentioned above) and type of vehicles in the position. An absolute was that any exposed personnel became casualties as their individual MILES was actuated by the observers' Universal Killer (God Gun). Battle damage assessment (BDA) results were called back to the OASS for after-action reporting and forwarding to the RAC.

The 1st Armored Division and 17th Field Artillery Brigade were also busy trying to kill the OPFOR artillery before it brought its weight down on the task forces. On the deliberate defense, the task force faced, within the brigade sector, the equivalent of two regimental

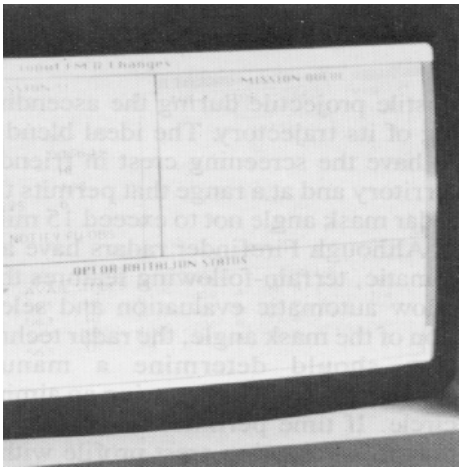


OPFOR Counterfire Mission

artillery groups (RAGs) and a division artillery group (DAG) for a total of 10 battalions of artillery. RAGs could not fire across regimental boundaries, meaning the ARTEP task force itself faced only five battalions of artillery.

The only target acquisition means available to the Blue was the Firefinder radar. All possible OPFOR artillery positions had been determined beforehand by B Battery, 25th Field Artillery, using the Hohenfels map and the field exercise mode (FEM) of the AN/TSQ-36 Firefinder radar. This list of positions was then programmed into the OASS and were the only positions used by the OPFOR.

A queuing routine was also programmed into OASS, which would simulate the Q36. Whenever the Q36 was radiating, the OASS would check to see which OPFOR units were firing.

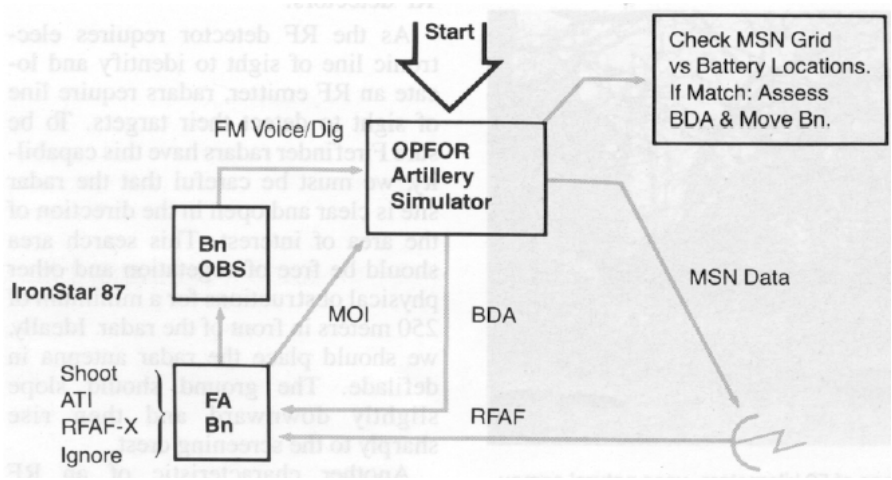


Close-up of OASS showing the mission to be marked (upper left), missions-to-be-fired queue (upper right) and the OPFOR battalion status (bottom).

OASS could detect up to 10 batteries and send the FEM target numbers, not the grid location, to the Q36. The Q36 crew set this information into the FEM program, and the result was a digital request for fire transmitted to the TACFIRE computer of the reinforcing battalion. After processing and receiving an acknowledgement from the fire units, the counterfire mission data was sent to the OASS by the 17th Field Artillery Brigade's battalion observation team. The fire mission grid was entered into OASS, and the computer determined if an OPFOR unit was still located there. Given a match between mission data and current locations, the computer automatically assessed the OPFOR unit damage, using information from the joint munitions effectiveness manual (JMEM). Unless overridden by the RAC, OASS also would move the fire units automatically to the closest, unoccupied FEM-derived position.

In addition, OASS would display a message directing the fire markers to stop marking the target the displaced OPFOR unit had been shooting at. The result was an immediate reward for doing well at counterfire. The exception to displacing upon receiving counterfire was when firing a preparation. Blue learned this quickly and, given positive BDA, would continue attacking the located unit.

Did counterfire always work? No. Some direct support units didn't trust their reinforcing artillery to handle the counterfire and attempted to control both close support and counterfire. The results were an equal loss of howitzers by Blue and OPFOR—not a good ratio.



Blue Force Counterfire Mission

When the reinforcing battalion was in charge and all understood the procedures, the exchange ratio climbed to 13 OPFOR howitzers lost for each Blue loss.

The counterfire battle did exert extra stress on the direct support battalion, as they had to set priorities between close support and counterfire. During one deliberate defense, the direct support battalion ran low on ammunition and had to switch the reinforcing battalion to firing all close support missions. This was the only battle in which the Blue lost more howitzers than the OPFOR did.

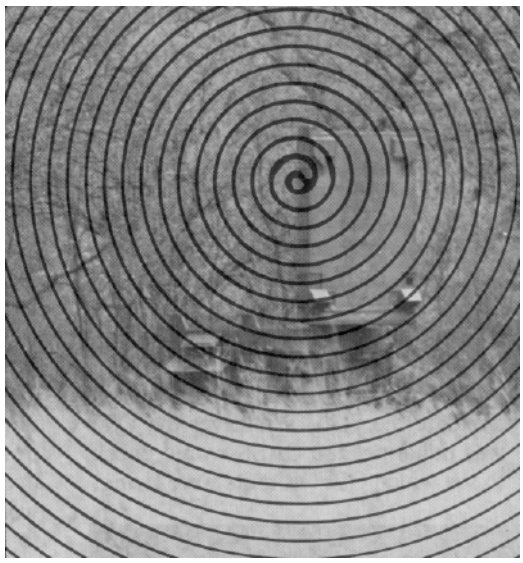
Conclusion

Post-exercise interviews with soldiers and officers from all the units clearly showed the counterfire battle was well fought. Having fire markers stationed with each fire unit gave immediate feedback on the devastating results of the counterfire battle. Artillerymen of all ranks learned the price necessary to do their job. For the first time, artillerymen were on the receiving end of sudden and violent death. Perfect? No. With the improvements gathered from after-action reviews, we will have a dynamite exercise for IronStar 88.

A critical question raised by distinguished visitors to IronStar 87 was, "Was the effort worth it?" Our answer—train as you are going to fight and be willing to pay the price to create the training environment to allow you to do just that.

Lieutenant Colonel Eric C. Deets, currently enroute to Fort Sill, Oklahoma, was the executive officer and S3 of the 1st Armored Division Artillery, West Germany. He graduated from the Command and General Staff College, Fort Leavenworth, Kansas. Lieutenant Colonel Deets has a masters degree in industrial engineering (operations research and systems analysis—ORSA). His assignments include ORSA action officer, Office of the Joint Chiefs of Staff, Washington, D.C.; S3 of the 6th Battalion, 37th Artillery, 2d Infantry Division, Korea; Fort Sill, Oklahoma; S3 of the 1st Battalion, 77th Artillery, Fort Hood, Texas; and the Fire Direction Officer of the 1st Cavalry Division Artillery, Fort Hood. He commanded C Battery, 1st Battalion, 33d Artillery, 1st Infantry Division (Forward), West Germany.

Increasing Survivability of Firefinder Radars



by Chief Warrant Officer Thomas Curran

Whether or not Firefinder radars are survivable depends on which vulnerability report you read.

Some reports indicate the radars are easily targeted as soon as they radiate, while others suggest the radars have state-of-the-art electronic counter-countermeasures (ECCM) features that reduce the need for concern. One factor in both arguments is constant: any radio frequency (RF) emitter is subject to detection and subsequent targeting.

The question is not if Firefinder survivability is an issue but rather what actions can increase that survivability on the modern battlefield.

Choosing a Radar Site

There are some requirements we must address when choosing a radar site. During the initial reconnaissance, the radar technician must use natural and manmade features to enhance survivability.

An important element in evaluating the site is the location and physical characteristics of the screening crest. We use the screening crest to ensure the beams generated by the radar will stay high enough to reduce the possibility of the enemy's determining "electronic line of sight" with ground detectors. However, it is imperative the screening crest be low enough for us to detect a hostile projectile during the ascending leg of its trajectory. The ideal blend is to have the screening crest in friendly territory and at a range that permits the radar mask angle not to exceed 15 mils.

Although Firefinder radars have automatic, terrain-following features that allow automatic evaluation and selection of the mask angle, the radar technician should determine a manual screening crest profile, using an aiming circle. If time permits, he could support this screening crest profile with a visibility diagram of the area of interest. This will give the detailed graphic representation necessary to ensure radar coverage is complete. It also will identify elevations in the hostile area that would be ideal for fixed and mobile RF detectors.

As the RF detector requires electronic line of sight to identify and locate an RF emitter, radars require line of sight to detect their targets. To be sure Firefinder radars have this capability, we must be careful that the radar site is clear and open in the direction of the area of interest. This search area should be free of vegetation and other physical obstructions for a minimum of 250 meters in front of the radar. Ideally, we should place the radar antenna in defilade. The ground should slope slightly downward and then rise sharply to the screening crest.

Another characteristic of an RF emitter is the existence of sidelobes.

The Firefinder AN/TPQ 37 radar, with a maximum range of 50 kilometers, uses natural camouflage to enhance survivability.

Common Sense Steps for Radar Survivability

1. Keep the radar section apprised of the tactical situation and electronic warfare threat. This ensures efficient battlefield coverage.
2. Use the radar transparent and scattering nets appropriately.
3. Use natural camouflage.
4. Control overlapping radar coverage by using blinking techniques.
5. Keep radio and digital transmissions to a minimum.
6. Follow all ECCM and meaconing intrusion, jamming and interference (MIJI) procedures.

Sidelobes can best be described as overflow energy that is present at the bottom, sides and the top of the radar antenna. Sidelobes produce an electronic signature that is subject to detection.

A method known as tunneling can substantially reduce or absorb sidelobes and, thereby, enhance survivability. By positioning the radar in a location that covers the sides and bottom of the trailer (for example, in a tree line or a berm), the signature produced by the sidelobes could be absorbed partially. Although not always possible, we should consider tunneling during site selection.

Reducing Operating Time

The best countermeasure to radar signature is simply not transmitting;

The Firefinder AN/TPQ 36

however, reducing the operating time is a more practical method. The radar should never radiate unless it is actively searching its area of responsibility. The automatic terrain following (ATF) feature on the AN/TPQ-36 radar should be used (on the battlefield) only if the section aiming circle is lost or destroyed. Since the radar is transmitting when it performs the ATF, it is susceptible to detection rendering the ATF feature less desirable than the manual measurement method.

A very effective method of signature reduction is cueing. Cueing consists of turning the transmitter on and off at various times during operation. There are two types of cueing: random and situational.

Random. As the name implies, random is cueing on some type of nonstandard schedule. The transmitter is turned on and off at various times for various intervals. One example is using computer-generated schedules selected by the computer's random number generator. One such program, written in MicroSoft Basic and designed to run on the Unit Level Logistics System (ULLS) Radio Shack Model 16, is currently available to target acquisition batteries (TABs).

The advantage of random cueing is it reduces the possibility of an RF detector's figuring out the radar transmit interval. It forces the detector to search continuously in a large, general area.

Situational. This cueing is relative to battlefield activity. For example, if an observer reports weapons firing in a general direction, Firefinder would be instructed to search that area and report detections. Although helpful, in some ways we cue situationally after the fact. We should base situational cueing on intelligence estimates. We should cue Firefinder when the collection of intelligence information indicates enemy activity is probable.

This method is very effective in reducing signature unless we lose control of authority to cue Firefinder. It is very dangerous if the radar is cued indiscriminately.

Some TABs have had great success with a combination of random and situational cueing. Blending these methods with other unit-level procedures can greatly enhance survivability. Keeping the cumulative radiation less than two minutes is imperative. After two minutes of transmitting, you should move the radar.

Moving the Radar Site

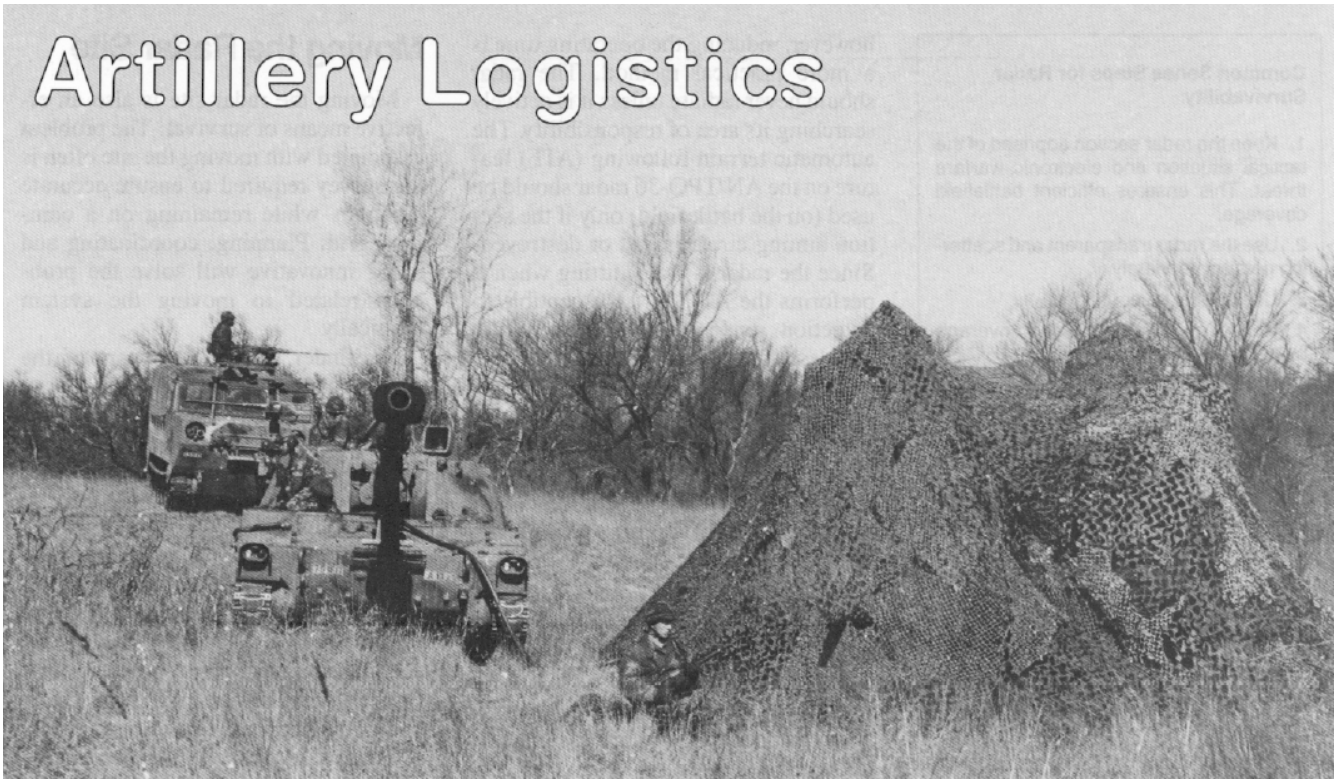
Moving the radar site is also an effective means of survival. The problem associated with moving the site often is the survey required to ensure accurate locations while remaining on a common grid. Planning, coordinating and being innovative will solve the problems related to moving the system physically.

Firefinder sections are part of the survey plan. A primary and secondary position for each battlefield plan is requested. The radar technician should perform his initial map and ground reconnaissance planning to move three to four times within an assigned "goose egg." Rather than request four surveyed positions that must be tagged or identified in some other way, he could plan two survey positions that would act as his survey control point. Visible from a variety of possible sites within a one-kilometer area, these points would afford him the survey control necessary to perform accurate hasty surveys. This allows the section to move more effectively from one site to another. He can emplace quickly if he uses the radar antenna as a subtense instrument. This method eliminates the need to position the trailer over a precise point and, thereby, cuts the emplacement time dramatically.

Conclusion

Anytime RF energy is present on the battlefield, it is susceptible to enemy detection. Although future systems will aid survivability, implementation of a survival plan now is the best defense. Including the technical and tactical suggestions covered here will greatly help reach the goal of keeping Firefinder alive.

CW3 Thomas Curran is the Firefinder Project Officer, Radar Division, Target Acquisition Department at the Field Artillery School, Fort Sill, Oklahoma. His past assignments include serving as senior radar technician, 1st Armored Division, West Germany, and radar detachment commander, H Battery, 25th Field Artillery, 4th Artillery Brigade, 4th Infantry Division (Forward), West Germany.



The Other Side of the Battle

by Major Thomas B.L. Stanford

Much has been written about how to train for war and win at the National Training Center (NTC), Fort Irwin, California, by providing responsive and accurate fire support. However, we have a shortage of information about artillery logistics, the other side of the battle. This article will discuss some of the techniques the 5th Battalion, 29th Field Artillery (5-29 FA) "Eagles" from the 4th Infantry Division at Fort Carson, Colorado, used to win the logistics battle during its rotation to the NTC.

Battalion Trains

The 5-29 FA employed, as do most units, both a combat trains and a field trains. Because of the requirement to keep up with the battle, the combat trains was kept as lean as possible. It consisted of the administration and logistics operations center (ALOC), M578 tracked recovery vehicles, fuel tankers, uploaded ammunition carriers, the armament contact team from the support battalion, a tool truck and the battalion aid station.

Supervised by the S4, the combat trains was positioned well forward, usually three to four kilometers behind the firing batteries during offensive battles. It was the S4's responsibility to monitor the battle and anticipate or react to logistics requirements. He selected his own positions to provide concealment and allow him to respond quickly to the units' needs. When the firing batteries moved, he would not wait for movement instructions but would move the combat trains forward as the last battery moved up.

The keys to responsive support are to monitor the battle closely, anticipate requirements and act aggressively. In the defense, the combat trains should be close enough to support, but not so close that it cannot move in time to avoid being overrun. We used 10 to 15 kilometers behind the firing batteries as a planning figure. When selecting a position, we used the elements of mission, enemy, terrain, troops available and time (METT-T) and the intelligence preparation of the battlefield (IPB).

Whenever possible, the 5-29 FA field trains was in the brigade support area (BSA). Under control of the service battery commander, it consisted of representatives from the S1 and S4, the consolidated food service operation, battalion maintenance (minus elements in the combat trains), empty ammunition carriers and the automotive contact team from the support battalion. Collocation with the BSA provided greater security for the field trains than they could have provided themselves and made it easier to coordinate direct support assets.

Unit Maintenance Collection Point

The battalion employed a unit maintenance collection point (UMCP) during several of the battles. Under the control of the battalion motor officer (BMO), we used the UMCP if we had major work to do to a vehicle and would lose too much time evacuating it to the BSA, sometimes 50 kilometers away. When this was the case, the UMCP was set up roughly midway between the

The tactical situation and other conditions, such as poor roads, most frequently require a "fix forward" philosophy.

combat and field trains. Again using METT-T and IPB when selecting a position, the BMO was responsible for position selection, security, camouflage and concealment; monitoring the battle and maintenance support.

We used a system based on the number of hours spent to repair a vehicle to determine where to repair it. We repaired all the vehicles we could at the battery. If we could not repair a vehicle there and the repairs would take less than two hours, we evacuated the vehicle to the combat trains. A two- to six-hour repair job went to the UMCP. Jobs that took more than six hours went to the field trains.

The UMCP was valuable because it reduced the time it took to get a mechanic on the job. Time previously spent towing the vehicle to the BSA was now spent fixing it. When we set up a UMCP, it often consisted of the maintenance assets usually found in the field trains.

Major Assembly Push Package

The single most important action we took to decrease vehicle down time was to coordinate with our support battalion for a major assembly push package. This consisted of major assemblies for our tracked vehicles and for several types of our wheeled vehicles. We based the composition of the package on historical usage data and "gut feeling."

The NCOIC of our support battalion contact team signed for and controlled the push package. We provided an M520 Goer to haul the assemblies, located in either the field trains or the UMCP, depending on where we needed them. We cut turn-around time on major assemblies from several hours to none. Engines, transmissions and transfers were immediately available. We measured down time for major assemblies in hours instead of days. This is a system that worked for the 5-29 FA, and I highly recommend it.

Ammunition Resupply

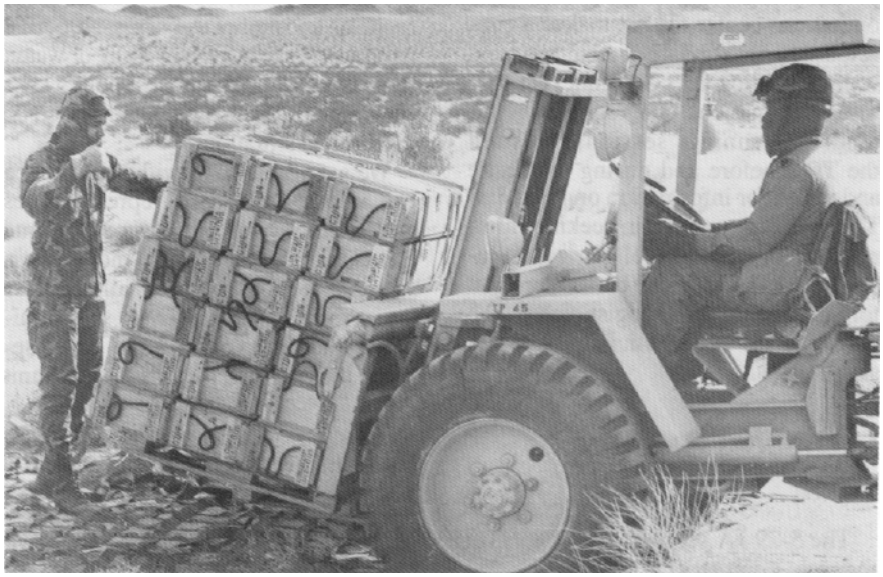
The days of expending limitless amounts of notional ammunition during the force-on-force phase are over. The NTC requires realistic resupply activities to occur if the battalion is to have ammunition during force-on-force. While this increases realism, it places a burden on the logistics system not usually experienced in peace time. Close coordination between the S3 and the battalion ammunition officer (BAO) is critical. The BAO must know what ammunition the S3 needs and who is to get it. Poor coordination results in the BAO's guessing, which is often wrong. The vast amount of ammunition required for preps and counterpreps causes the ammunition carriers to spend most of their time on the road transporting ammunition between the BSA and the firing batteries.

A hot upload point is the best way to conduct resupply. However, the amount of ammunition needed often exceeds a battery's haul capacity. In this case, you must deliver to the unit. Resupply can take many hours if the ammunition supply point is 50 kilometers away, as it sometimes is.

A system we used in this case was to send convoys to all three batteries simultaneously: one under the control of the BAO and the other two under responsible people who have a vehicle and radio and, most importantly, who can read a map. The battalion executive officer, command sergeant major, BMO and communications and electronics staff officer (CESO) are all candidates for the job. The advantage of this system is obvious—instead of one convoy's going to all batteries, the batteries are all resupplied simultaneously. We cut resupply time by two-thirds.

Mass Casualties

Casualty handling is another realistic activity recently incorporated into NTC battles. You must process casualties correctly and quickly to allow them to return to action. Slow or incomplete processing will result in losing critical personnel for that battle.



Ammunition use during "combat" at the NTC places additional demands on the resupply system used in routine, peacetime activities.

One lesson we learned is the medical section must have a radio. Direct communications with the aid station increases responsiveness and allows the medical personnel to prepare for casualties.

The biggest problem the 5-29 FA had in handling casualties was evacuation. The battery evacuated casualties to the battalion aid station. Vehicles to accomplish this were hard to find. We ultimately used supply trucks, but that created the problem of where to put the equipment usually carried in the supply trucks. It was not feasible for the aid station personnel to pick up casualties from the batteries. Limited vehicle assets in the medical section made timely evacuation impossible if the entire battalion was suffering casualties.

A technique we often used was to establish a casualty collection point (CCP) between the firing batteries and the battalion aid station. Batteries then evacuated casualties to the CCP. Medical personnel met and treated the casualties and evacuated them to the aid station. This system reduced the amount of time it took the battery to return the evacuation vehicle to the road and reduced the time between injury and treatment.

Information Flow

The people responsible for logistical support for the battalion can't do their jobs without accurate and current information on the tactical situation. Too many times logistics sections are forgotten in the planning phase. This problem can be solved if the tactical operations center (TOC) makes a conscious effort to update combat and field trains and if logistics personnel actively seek information. Our logisticians attended planning sessions, visited the TOC before and during the battle and called for information on the radio. They were aggressive in seeking information. TOC personnel can get so involved in fighting the battle they can forget to update the logisticians. The burden is on the logistician to get and stay updated.

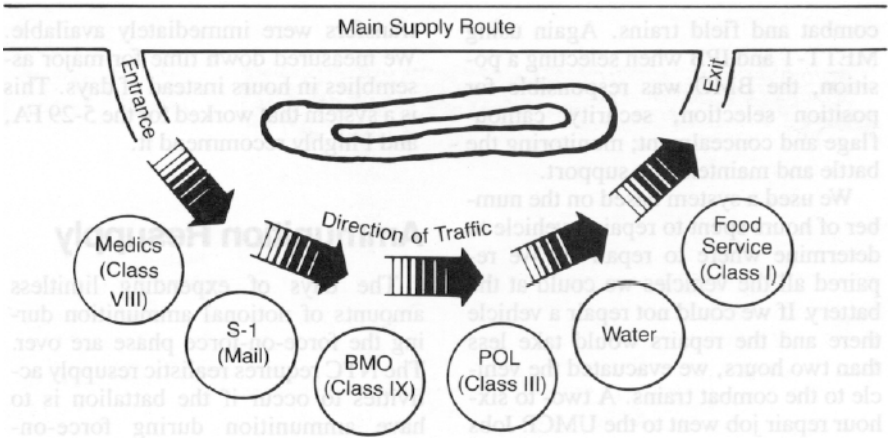
Logistical Resupply Point

The 5-29 FA set up a daily logistical resupply point (LRP). The S4 selected an area in a covered and concealed position as close to the firing batteries as the tactical situation would allow. Attending from the logistics team were the battalion executive officer, S1, S4, BMO, service battery commander and first sergeant (1SG) and medical and food service personnel. The firing battery and headquarters and headquarters battery commanders and (or) the 1SGs also would attend. Routine activities that occurred at the LRP included distribution of mail, submission of parts requests and daily DA Forms 2406, distribution of parts and resupply of water, fuel, rations and medical supplies. The LRP time frequently changed, based on the tactical situation.

We set up the LRP with an entrance and an exit point. Unit representatives would enter, visit all resupply points and exit. This kept traffic moving in a single direction, ensured all logistics representatives were visited and minimized the time spent in the area. Because the LRP is a lucrative target, unit representatives should spend no more than 15 minutes there.

Besides resupply of logistical needs, the LRP also provided a convenient place to hold impromptu meetings to update the batteries on tactical and logistical activities. When setting up an LRP, don't forget to notify any attachments you support, i.e., radar, air defense assets, etc.

Handling casualties is realistic at the NTC; you must process them correctly and quickly to keep from losing personnel.



Conclusion

The critical area of logistics is one to which we haven't given its fair share of print or doctrinal guidance. I hope this article will generate some discussion among artillery logisticians. We need to remember that, although our mission is to provide fire support to the combined arms team, we cannot accomplish our mission unless we have responsive support. Keep 'em Rolling!

Major Thomas B. L. Stanford, a student at the Command and General Staff College, Fort Leavenworth, Kansas, will serve next with the US Army Element, Land Southeast, Izmir, Turkey. He has served as the Executive Officer and S3 of the 5th Battalion, 29th Artillery. He also served with the 2d Battalion, 27th Artillery, in Friedberg, West Germany; the 1st Battalion, 35th Artillery, Fort Stewart, Georgia; the 528th US Army Artillery Group, Cakmakli, Turkey; and as Assistant S3 of the 4th Infantry Division Artillery, Fort Carson, Colorado.

Electronic Warfare: *Sudden Death*

by Captains Donald K. Saylors and Frederick J. Maxwell

Station 1: "*D2E, this is D3Z; what is your current situation, over*."

Station 2: "*D3Z, this is D2E; zzzzzzzzz the zzzzzzzzzzzz is zzzzzzzzzzz south of zzzzzzzzzz, over*."

Station 1: "*D2E, this is D3Z; your last transmission was broken, say again, over*."

Station 2: "*D3Z, this zzzzzzzzzzzzzzzzzzzzzzzzzzzzzz, over*."

Station 1: "*D2E, this is D3Z in the plain, over*."

Station 2: "*D3Z, this is D2E in the plain, over*."

Station 1: "*D2E, this is D3Z; what is your status, over*."

Station 2: "*D3Z, this is D2E; I am currently moving northeast along highway two, approximately three miles south of Rensburg. I am moving to Grid 781328, over.*"

Station 1: "*D2E, this is D3Z, roger out*."

This dialog illustrates a number of possible FM radio conversations that occur during a tactical operation. Let's break down this conversation and evaluate it in terms of electronic warfare.

Both stations (D3Z and D2E) were initially communicating in a secure FM net. However, an enemy jamming station identified secure net operations over that frequency. The enemy jamming station began harassment jamming to degrade and confuse net operations.

Neither station realized the interference was deliberate. The stations immediately attempted to establish communication in the clear by turning the Vinson (KY-57) off. The enemy monitored the now nonsecure voice traffic and stopped jamming. The fact the jamming stopped reinforced a belief that secure voice equipment was the cause of the interference. The Threat continued to monitor as both stations revealed sensitive information without using approved codes.

Since neither station recognized the jamming, they never submitted a meaconing, intrusion, jamming and interference (MIJI) report and made no attempt to locate the source and suppress it through the chain of command. The enemy succeeded in causing a loss of confidence in secure voice equipment and forcing D3Z and D2E to stop using it.

Let's look at another situation. Station 1, D3Z, is the commander's callsign.

Station 1: "*E2D, this is D3Z, over*."

Station 2: "*D3Z, this is E2D, over*."

Station 1: "*E2D, this is D3Z; Get your unit into position immediately! You people have been dragging your feet for two hours!*"

If this were a nonsecure radio net, the commander just gave away a critical piece of information. His excited voice and direct criticism told the enemy that D3Z was the commander's callsign. The enemy can use that information immediately to exploit friendly elements. If units don't authenticate orders and instructions, enemy imitative electronics deception (IED) experts can move them around the battlefield at will. If skilled enough, Threat IED can actually replace a commander on his own net by jamming him out.

These are just two examples of how we can succumb unwittingly to radio electronic warfare. Even with the most advanced firepower, we can't win the battle if we fail to protect our vital communications links.

Transmission Pitfalls

Experience at the National Training Center, Fort Irwin, California, shows the opposing forces (OPFOR) can exploit us with impunity using electronic countermeasures. Here are some examples of lessons learned.

- Although the Threat can't decrypt the tactical fire direction system (TACFIRE) and Vinson (KY-57) digital signals, he can jam them, and that usually forces us to talk in the clear. We continually fail to recognize jamming and, therefore, never report or suppress it.
- Radio operators are frequently unaware they should not transmit essential elements of friendly information (EEFI) in the clear. The OPFOR can receive so much valuable information that the outcome of the battle could be predetermined.

Jill Ponto

This jammer, used by OPFOR at the NTC, can jam three frequencies at the same time.

- Operators talk too long and too often using the Vinson. Vinson does not mask or hide your electronic signature. The Threat often can track the signal back to the transmitting antenna and target it using direction finding equipment, especially if the transmission lasts more than 15 seconds.
- The Threat can use imitative electronics deception to the hilt when operators fail to authenticate orders and instructions. If enemy IED experts can enter our nets successfully using valid callsigns (even instructing stations to operate nonsecure), we lose our command and control.
- When commanders issue orders or instructions, it is imperative they keep their voices steady and calm. Do not criticize subordinates over the radio. The Threat can recognize voice characteristics and associate commanders and staff with their respective callsigns.
- Operators who chatter too much after a frequency change make it relatively easy to identify the new frequencies. Units change frequencies at the same time every day. The enemy knows that pattern and can stand by at that time to identify friendly operating frequencies. With nonsecure nets, the enemy often can identify the specific unit by the voice characteristics of the operator. The jammers or radio direction finders can receive all operating frequencies almost immediately after the frequency change.
- Many units have no plan to go to an alternate frequency when necessary. Confusion and lost command and control soon result. Making unscheduled frequency changes is an extremely difficult procedure. The level of difficulty requires frequent rehearsals to reduce the impact on the operation.
- Units rarely plan alternate means of communication. The probable reason for this is the impractical nature of alternate means during highly mobile operations. Some alternate means include wire, messenger, smoke, flares, panels, etc. Undesirable as these may be, a commander must have a means to restore command and control if FM communications are partially or completely lost.

The radio can be a lethal weapon directed against us. The advantages radio offers diminish because of poor operator training in electronic

counter-countermeasures (ECCM). A unit must use a radio as a tool and not as a crutch. Planning and prior coordination with subordinate, supported and reinforcing units will reduce the need to use the radio unnecessarily. The less we use radio communications, the less vulnerable we make ourselves.

For more information, FM 24-33 Communication Techniques: Electronic Counter-Countermeasures provides preventive and remedial ECCM techniques to combat electronic countermeasures.

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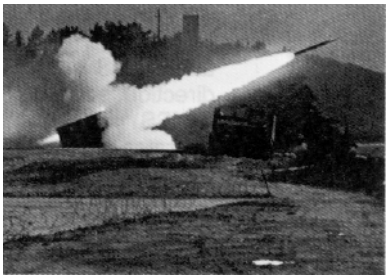
Captain Maxwell served as a signal officer for the 1st Battalion, 59th Air Defense, 8th Infantry Division (Mechanized), West Germany, and commanded B Company, 8th Signal Battalion, also in the 8th Infantry Division.

Rocket and Missile MOS Career Guide

This article is part two of the three-part series dealing with the duties and career-developing assignments for specific Field Artillery MOSs. It covers the multiple launch rocket system (MLRS) and the Lance and Pershing missile MOSs.

MOS & Skill level	Duties	Typical Assignments
13M10	An MLRS Crew Member can expect to start in the ammunition section as the driver of an M985 heavy expanded mobility tactical truck (HEMTT). He then may move to the self-propelled loader launcher (SPLL) and work on the fire control system (FCS).	MLRS battery or ammunition section.
13M20	After graduation from the primary leadership development course (PLDC), an MLRS crewman becomes the gunner on the launcher and is responsible for editing and processing fire missions. He helps in the reconnaissance of primary and alternate routes to the platoon operational area (OPAREA), visually reconnoiters selected platoon OPAREAs and recommends positioning of platoon elements. He should attend the basic NCO course (BNCOC) as soon as possible.	
13M30	A staff sergeant serves as section chief or platoon ammunition sergeant. He is responsible for training, vehicle and equipment maintenance and firing safety. As ammunition section chief, he coordinates ammunition resupply with the firing platoon headquarters. He should prepare to attend the advanced NCO course (ANCOC) when notified.	Firing section or ammunition platoon.
13M40	A sergeant first class serves as either a firing or ammunition platoon sergeant. As firing platoon sergeant, he supervises the launcher personnel and the platoon ammunition and fire direction sections. As the ammunition platoon sergeant, he helps select and reconnoiter routes to and from the ammunition transfer point (ATP) or ammunition supply point (ASP) and maintains ammunition document registers and accountability files.	Firing or ammunition platoon.



Rocket and Missile MOS Career Guide
(continued)

MOS & Skill level	Duties	Typical Assignments
13N10	A Lance Crew Member begins his career in an assembly and transport (A&T) platoon or firing section. In an A&T platoon, he maintains a wheeled or tracked vehicle and inspects the ammunition for accountability and serviceability. In the firing section, he operates the M39A1 missile-handling unit.	Lance A&T platoon or firing section.
13N20	After completing PLDC, an E5 is a gunner or monitor programmer in a Lance firing section. As a gunner, he lays the launcher for direction and elevation. As a monitor programmer, he ensures the missile is armed and programmed for firing. He should attend BNCOC as soon as possible.	
13N30	A staff sergeant is responsible for the equipment and vehicles assigned to the firing section. He trains the personnel to assemble, mate and fire the Lance missile and warhead, perform receipt inspection and store, handle and move the missile. He should prepare to attend ANCOC at the earliest opportunity.	
13N40	A sergeant first class serves as either a platoon sergeant in a Lance firing battery or the A&T platoon sergeant in service battery. As a platoon sergeant, he employs laying equipment and organizes firing positions. He lays the launcher for direction and verifies the final missile tests before firing. As the A&T platoon sergeant, he oversees operator and crew maintenance on the vehicles and section equipment. He also is responsible for the resupply of ammunition and missiles to the firing sections and for the accountability, storage and security of ammunition.	Lance firing battery or A&T platoon in service battery.
13P10	An MLRS or Lance Fire Direction Specialist learns both Lance and MLRS operations and procedures. He operates the fire direction system (FDS) and the back up computer system (BUCS) in the battery fire direction center (FDC). Also, he operates and maintains the 4.2 kw generator, FDC vehicle and other section equipment.	Lance or MLRS battery or battalion FDC.
13P20	After PLDC, a sergeant is responsible for computing firing data using the FDS for MLRS or the FDS and BUCS for Lance. He also helps the chief of section train the section personnel. He should prepare to attend BNCOC at the earliest opportunity.	
13P30	A staff sergeant is responsible for the FDC vehicle and section equipment and ensures the production of safe and accurate firing data for the weapons. As the fire direction computer, he helps the operations officer command and control the unit firing elements. He should prepare to attend ANCOC.	
13P40	A sergeant first class serves as the chief fire direction computer in an MLRS battalion, Lance battalion or Lance firing battery fire direction center. He supervises the computation of firing data and reviews, consolidates and prepares technical, personnel and administrative reports covering fire direction activities. His duties also include disseminating emergency action information and training FDC personnel in tactical fire control.	Lance or MLRS Battalion.

MOS & Skill level	Duties	Typical Assignments
15E10*	A Pershing Missile Crew Member will be a vehicle driver in either the Pershing battalion at Fort Sill, Oklahoma, or one of the Pershing battalions or Pershing detachments in Germany. He provides physical security for the missile and its components and participates in firing platoon procedures, to include preparation for firing and warhead mating.	Pershing battery or detachment.
15E20	After graduating from PLDC, a sergeant is responsible for the operations performed by missile handlers who draw, transport and store missiles and components. He performs operator maintenance on the erector-launcher and prime mover. He also performs emergency message authentication systems (EMAS) duties and serves as a custodial agent during convoys, ensuring constant two-person control of the weapon. He should attend BNCOC as soon as possible.	
15E30	A staff sergeant and his crew practice emplacement of the Pershing missile as well as provide security for the firing section. He performs EMAS duties and controls the operation of the erector-launcher, prime mover and firing section countdown. He also supervises firing platoon procedures such as warhead mating and field firings. He should attend ANCOC at the earliest opportunity.	
15E40	A sergeant first class serves as platoon sergeant responsible for three Pershing missiles, associated vehicles and equipment and the platoon personnel. He reviews, consolidates and prepares technical, personnel administrative and readiness reports covering Pershing missile unit activities. He also coordinates the operations, firing and ammunition platoon activities. He prepares target cartridges for the Pershing missile system and is the liaison to the targeting elements at battalion headquarters and the 56th Field Artillery Command Pershing liaison section.	56th FA Command, Pershing battalion or FA group headquarters.

* As this issue of *Field Artillery* went to press, little information about the future of MOS 15E was available. However, soldiers affected by future force structure changes resulting from removing Pershing missiles from the Army's inventory will be able to reclassify into different MOSs. Army requirements and soldier preferences and qualifications will determine reclassification.

Redleg Hotline Correction

Field Artillery regrets that the Redleg Hotline number (639-2520) on page 13 of the February 1988 issue is incorrect. The correct number is AUTOVON 639-4020.