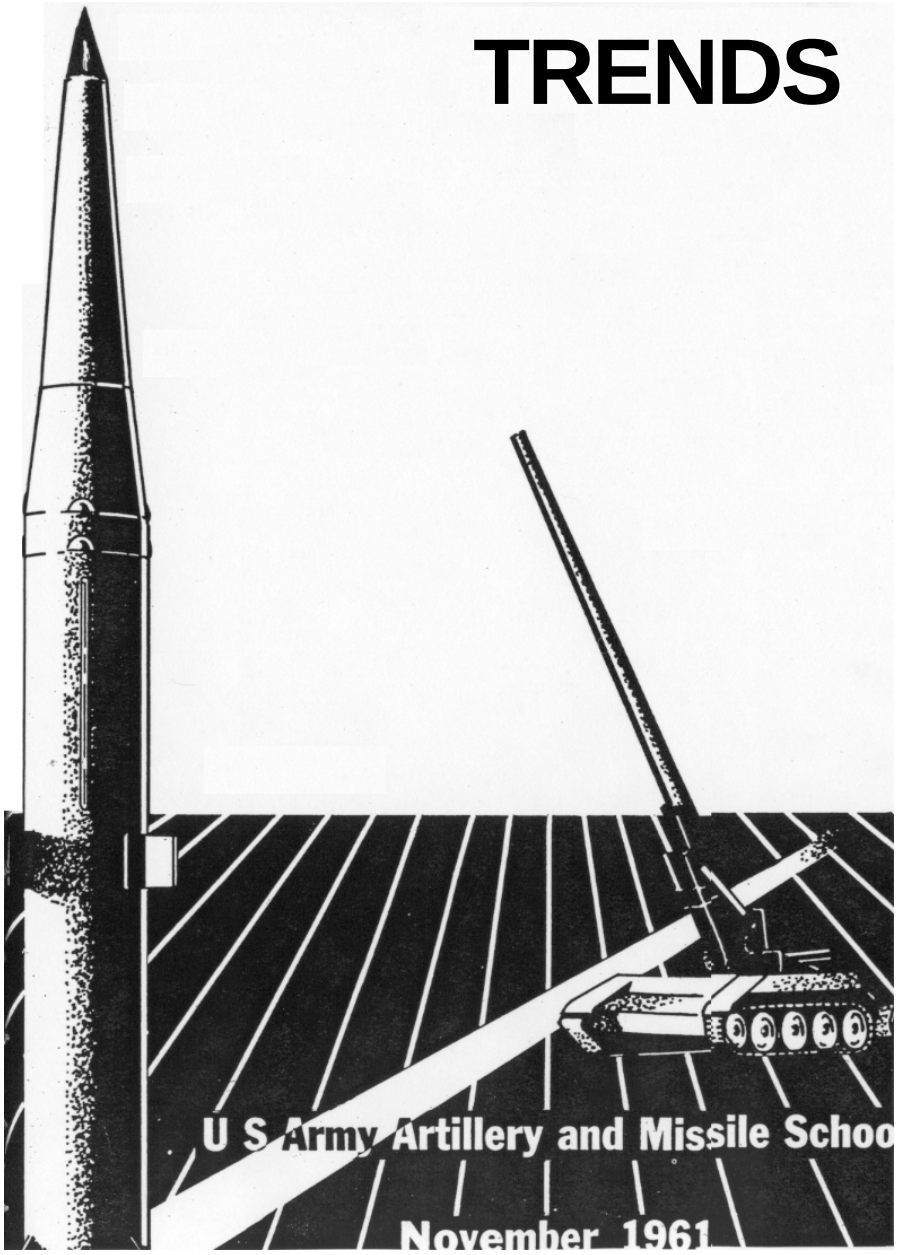
ARTILLERY TRENDS



ARTILLERY TRENDS

November 1961 **Instructional Aid Number 20**

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Bringing Cannon out of The Shadow. Too often the cannon is forgotten or slighted as artillerymen realize the vast new power that missilery places into their hands. THE FUTURE OF CANNON, beginning page 15, affords an opportunity to reevaluate the cannon's important position in new light.

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THE ARTILLERY SCHOOL IS AS CLOSE AS YOUR MAIL BOX.

faster, easier CMI . . .

RADIO/WIRE DISPLAY

Captain R. W. Pemberton
Communications/Electronics Department

The next time the Command Maintenance Inspection (CMI) for your communications equipment is due, try these displays for efficiency, ease, and comprehensiveness.

Before the CMI team arrives, all first- and second-echelon maintenance should be completed, and maintenance records and requisitions should be doublechecked to insure that all required items are accounted for or are on hand.

WIRE SYSTEM DISPLAY

When the basic requirements outlined above are met satisfactorily, the equipment display for telephones (fig 1) can be set up. First, connect half of the available telephones (TA-312) to each other by short

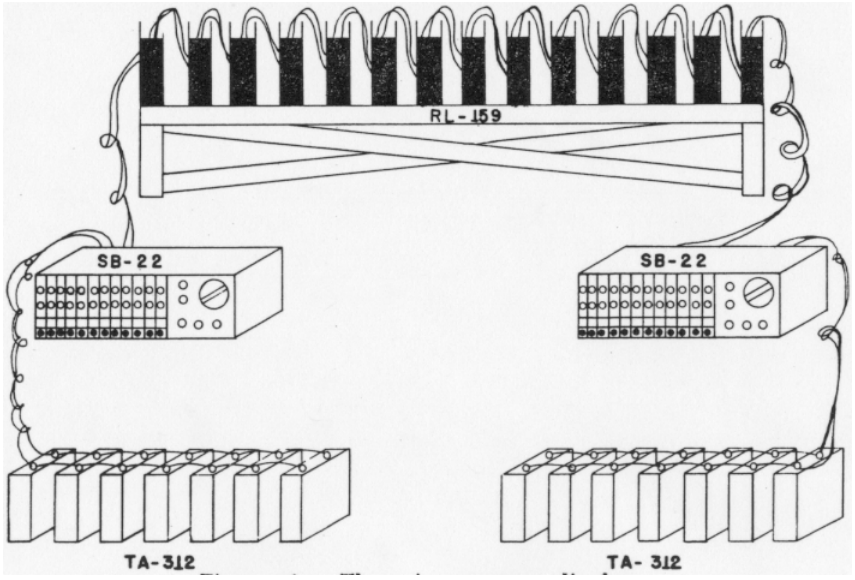

Figure 1. The wire system display.

jumper wires, with a single line (circuit) extending from the telephones to a switchboard (SB-22 or SB-86). Next, connect all available wire reels, RL-159, with the running end of the first reel connected to the standing end of the second reel, etc., until all reels are connected to form one circuit.

Connect the switchboard mentioned above to the standing end of the first RL-159. There is now a complete circuit from the first telephone through the wire of the RL-159's. Extend the circuit from the last reel to the remaining switchboard. Finally, connect the second half of the telephones to each other and to the second switchboard.

The CMI team can, with such a display, check the circuitry and perform a complete operational and cleanliness check of the instruments. The display eliminates unnecessary and time-consuming handling of individual telephones, switchboards, and wire reels.

RADIO EQUIPMENT DISPLAY

Figure 2 illustrates how to set up a unit's radio equipment for inspection. Normally, the CMI team first inspects the radio receiver-transmitter and the power supply (off the mount). Next, the mount is inspected for dirt and rust; and the operational clamps, the antenna base,

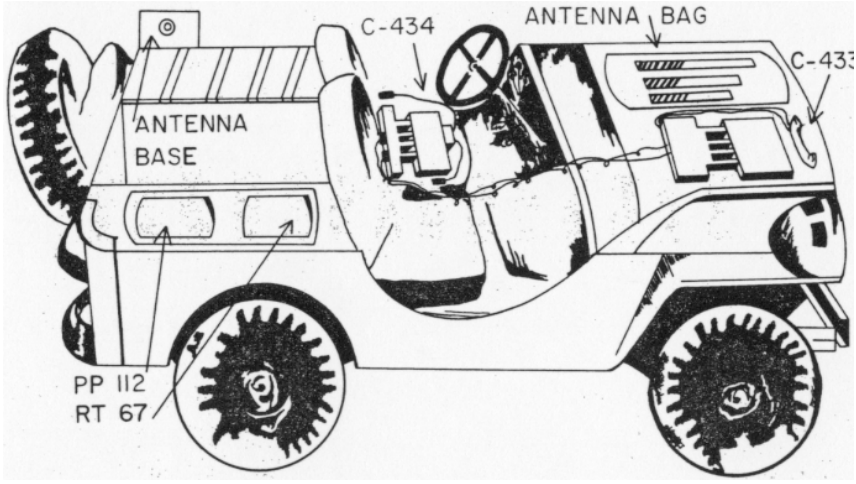

Figure 2. A radio equipment display.

and allied equipment are checked. During this time, the radio operator-driver should mount the receiver-transmitter, the power unit, and the remote controls, leaving the actual connections (cables, clamps) to be accomplished and checked by the inspection team. The unit being inspected should have an operational radio available to allow the inspection team to send and receive signals.

The procedures described above make a CMI less painful, time-consuming and tiring. In addition, the preinspection maintenance checks assure the unit commander that proper maintenance has been performed on the communications equipment.

Part III -- support of the guerrilla . . .

SPECIAL WARFARE

Offense is the key to success in unconventional warfare operations. The guerrilla in any kind of terrain (mountain, desert, as well as jungle) *is* a guerrilla because he knows his "battleground" better than his adversary, and can use it to make his offense devastating, even with a numerically inferior force. The mere knowledge of *defense* against enemy guerrilla activities is insufficient. The soldier who is always on the defense against the guerrilla, in the guerrilla's native land, will not, cannot always be successful. He will fail sooner or later, and failure means elimination. As artillerymen then, we must be prepared to support *offensive* guerrilla operations.

SUPPORTING FRIENDLY GUERRILLAS

Artillery support of guerrilla operations will normally be coordinated by Special Forces and generally will be *attached* to friendly guerrilla units which have been organized as task forces. This attachment probably will not involve units higher than the battery, and may even be down to platoon or section level. If the amount of artillery required exceeds more than one battery, an artillery commander must be designated. He and his headquarters must control all the artillery with the task force. This could conceivably be a two-battery artillery support force.

Estimation of required artillery support of guerrillas follows the traditional outline in FM 6-20-1, but with the following additional considerations.

- Artillery attached to a guerrilla task force in offensive operations must be as mobile and flexible as the supported force. A task force of platoon or company size may be given the mission of a raid, for example the destruction of an airfield or a communication center. For such a mission, an artillery section can be valuable for the quick, sure destruction necessary—but only if the piece(s) can be transported to the area without slowing down the task force, or without disclosing its movement and thereby losing the element of surprise.

Parts I and II of SPECIAL WARFARE ("the guerrilla," "the jungle") appeared in ARTILLERY TRENDS, August 1961, beginning on page 15. Part III is paraphrased from the new FM 6-20-2, FIELD ARTILLERY TECHNIQUES, now at United States Continental Army Command for review. Part IV ("fire control") follows this article, beginning on page 9.

- In support of a task force of this nature, the artillery must be self-sustaining during the operation. The section or the platoon must carry everything—from ammunition to rations, and enough of it—to last throughout the entire operation. This may require more equipment and personnel than usual.
- Ammunition must be carefully estimated for each mission, since it must be carried to each position. To save weight and provide mobility, ammunition must be kept at a reasonable minimum and yet there must be enough to accomplish the required support and to offer a reserve for any emergency (defense against attack; another unexpected destruction mission).
- Security for artillery may require external help in addition to the normal internal security defense. This means that the supported task force may be supporting the artillery as well as being supported by it. It may even be necessary to position artillery in such a manner that supported forces may provide necessary or adequate security.
- Massed fires will be the exception rather than the rule in this kind of warfare. A battalion time-on-target of 54 or 72 rounds will not destroy a communications shack, tear up a bridge, disperse a squad of enemy guerrillas any more effectively than a few 105-mm rounds timely placed and accompanied by an attack of friendly guerrillas.

Certain missions of the friendly guerrilla force can be effectively supported by artillery. In these missions it can be expected that results will be accomplished in more satisfactory fashion due to the employment of artillery.

Interdiction missions depend solely upon artillery, and in guerrilla operations, the interdiction mission—preventing the enemy the use of an area—can reroute the enemy to a path or another area where friendly guerrilla personnel can be waiting in ambush to apply the finishing touches. By the same token, critical objects—ammunition dumps, railheads, bridges, etc.—can best be destroyed by artillery. Indeed, for any critical object which requires an explosion for its destruction, artillery should be considered instead of the more dangerous alternative of sending valuable men armed with explosives to rig a system spontaneously.

Artillery can be used to lay down screening fires to protect friendly guerrillas during and particularly after an offensive operation which depends on surprise for success. A task force in an operation depending on surprise can make better use of it, if artillery rounds are dropped into the enemy area just before, or just after the infantry attack. The raid is a good example of this. Artillery can also serve well in missions of seizure of critical objective areas, protection of flanks and gaps, and linkup operations.

The artillery unit in support of guerrilla forces would do well to keep one thing in mind. There is no clear delineation between "offense" and "defense" in guerrilla warfare. *The two often merge*. A platoon or section dropping "offensive" fires on an enemy position in support of a

raid, had better be prepared to defend itself with "defensive" barrages, or even direct fire, in the event that the raid is unsuccessful, or met with a hard-charging counterattack. This sort of fluidity of battle is not only common, but characteristic of the guerrilla operation.

Although light artillery will certainly be the first affected by a call to guerrilla warfare, other caliber artillery is certainly not immune. Guerrilla warfare is not by any means limited to the jungle. Guerrillas are still guerrillas, even though they might be operating in the desert, the mountains, or built-up areas. To provide all-encompassing support, the artillery must be ready to employ everything it has into the fray. For certain operations, it may even be feasible that one battery will have various calibers within it. Remember that this is unconventional warfare; *unconventional thinking* will win.

GUERRILLA VS GUERRILLA

The section above dealt with the support of friendly guerrillas, which may at least have the smell of conventionality about it. Our guerrilla forces may be operating against enemy conventional forces for instance, or conventional targets. But this is not the case when supporting friendly guerrilla activities against other guerrillas. Here artillery may be akin to a cat in a war of mice—agile and powerful and a definite influence in its place—but unable to keep up with the swift moves and countermoves of small guerrilla forces as they pursue each other through the maze of the jungle or across the flat, naked, glaring openness of the desert. Here there is no field manual home for artillery. But again, unconventionality and quick-mindedness can win the day. If artillery *can be* effectively employed, then certainly he who discovers how will be on top. Artillery here is surely the last argument of guerrillas.

In such an environment, the survival of artillery through security measures will be a monumental task in itself. Apart from the paramount consideration of his mission, the primary concern of the artillery commander is the security of his command, both on the march and in position. He must reach for unconventional means to employ his unit, either wholly or in part, to give the antiguerrilla force the maximum of fire support. The normal perimeter defense will not be enough. Placing a man in a foxhole with a machinegun a couple of hundred meters away from battery center will only mean the loss of a man and a machinegun. The sentry must understand who he is up against and must use originality to protect himself and still do his job, even if it means climbing a tree without his weapon to act as a lookout. The perimeter defense *must* be as tight as the well-known drum.

Artillery targets will certainly not be lucrative. There will be no assembly areas, no tank pools, no company of men, and hence no massed fires. Even if a target such as a squad of enemy guerrillas is spotted, they won't be where they were after the first adjusting rounds land.

Artillery working in close conjunction with the friendly guerrilla forces will be a valuable asset. But care must be taken to insure security

of movement and occupation of position, which should be made at the latest time possible to maintain the secrecy desired by the supported unit and to provide the element of overwhelming shock and surprise. Guerrilla forces, to eliminate enemy guerrillas, must trap them, pin them down. This means encirclement. And when an encirclement is accomplished by the infantry force, artillery takes over. If the area is known, our weapons can shoot into it, and if the enemy is there, he will be flushed out where the task force can see him and eliminate him. (A detailed account of this procedure can be found in Part IV—fire control, SPECIAL WARFARE, page 9, this issue).

Target acquisition, in the person of the forward observer, will be most important in the destruction of the guerrilla by artillery. The "hill" will no longer exist as such. The observer will have to be as mobile as the task force, probably going with them as a combination observer-liaison officer. The fluidity of operations and the rapid changes in the tactical situation make it necessary that the artillery commander be constantly ready to support *any* part of the operation. This means that he must provide support by attaching artillery observer sections to all forces which will be in contact with the enemy. Coordination of the movements and sectors of responsibility of the ground observers is at best difficult and air coverage must be used. When target acquisition agencies are not available, or are limited in number or effectiveness, the artillery observer must then preplan his fires on suspect or likely targets that may be developed. Concentrations and barrages are planned with a view toward dividing the guerrilla forces and destroying or neutralizing small elements.

Frequently, artillery may be the primary source of fire support, and as such, the only coordination required is that with the weapons of the supported force which includes mortars, assault guns, and antitank guns. However, fire support coordination becomes a very essential requirement when other means of fire support are available, such as air, chemical, and naval fire. In an operation such as this, fire support is then best accomplished at company level or below. This then means that the artillery commander must provide reinforced artillery liaison sections to the extent required.

The principle of establishing a reserve force is equally important in the scope of this type of operation. It must be assumed that the enemy guerrilla is capable of a breakout by counterattack. The reserve must then be committed to restore the perimeter or to plug the breach of the encirclement. Artillery support must be planned for all possible reserve force operations and liaison with the reserve force must be constant.

The guerrilla is a wily foe and a tough one. The very nature of his operations makes it difficult to identify his movements, his strength, and his likely concept of operation. His initial advantage is in the selection of terrain of his own choice. But when he is faced by a force trained in his own tactical sphere and supported by the demoralizing effects of artillery, he has met his match and is doomed for destruction, either piecemeal or total.

Part IV -- fire control . . .

SPECIAL WARFARE

1/Lt Cornelius J. O'Shea, Jr., USMC
Gunnery/Cannon/Rocket Department

In counterguerrilla operations, our military forces will have the primary mission of *elimination*. It will be their responsibility to seek out and destroy hostile guerrilla forces through the successful integration of political infiltration and military intelligence and superiority.

Elimination is usually best accomplished by encirclement, despite the fact that this tactic requires a force much larger than the guerrilla force. Encirclement is the most effective way to fix the guerrillas in position to permit their complete destruction. Mobility, with air superiority and use of helicopters, is necessary for complete, three-dimensional encirclement (guerrillas have yet to exhibit air capabilities or heavy conventional weapons, which need extensive logistical support).

Artillery in the encirclement maneuver can aid in the destruction or dispersion of the guerrilla force. One way to employ artillery in such an operation is described below.

In an encirclement, artillery would most likely be positioned around the perimeter as shown in figure 3. Its mission would be to support the

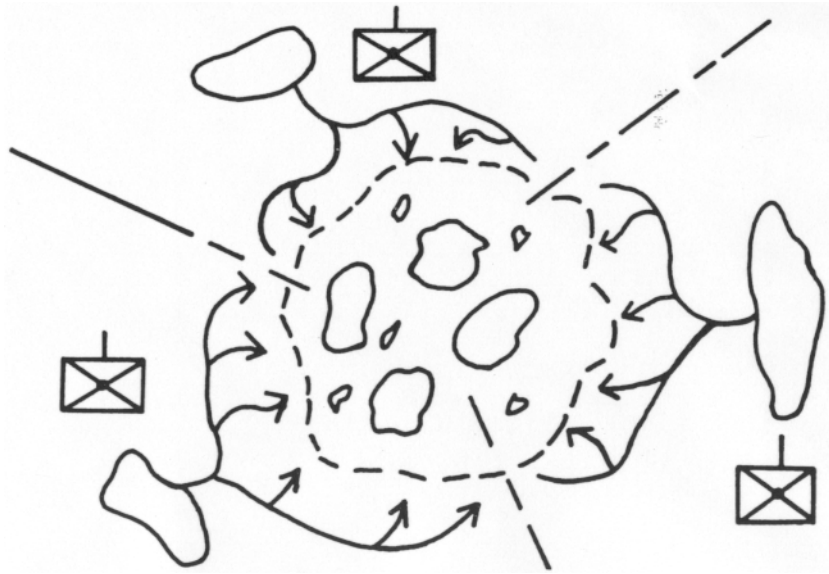

Figure 3. Positioning artillery for encirclement.

infantry forces and to disorganize the guerrilla force. The great psychological effect of artillery in counterguerrilla operations should not be underemphasized.

Guerrillas seek to negate our advantage in firepower and materiel by melting into the terrain. Their skillful use of jungle or mountainous terrain may, in many instances, make it almost impossible to establish and operate the communication, fire direction, and observation facilities we normally employ.

TACTICAL FIRE DIRECTION AND COMMUNICATION

A possible solution to this problem would be the use of an airborne observation-radio relay-fire direction center. In this system, the airborne FDC would adjust fires and monitor, relay, and perform tactical fire direction; that is, exercise command of units in the selection of targets, the designation of units to fire, and the allocation of ammunition. Technical fire direction could be accomplished by stationing a computer (preferably equipped with a GFT fan) at each battery position. Either inspected maps or observed fire charts could be used. FM 6-20 states that *the most important factor in determining the location of the FDC is the requirement to exercise control of the fires of subordinate artillery units*. The advantage of the system described above is that it would allow the necessary decentralized operation of firing batteries with continuous centralized control. A disadvantage would be absolute reliance upon radio communication. However, with a ground FDC, we would also probably have to rely on radio and, in addition, would be deprived of the flexibility of the relay facility and the mobility of the aircraft.

OBSERVATION

Guerrillas will, of course, use the terrain to restrict the observation of forward observers working with the encircling forces. The air observer can alleviate this problem by using combined observation. The forward observer can then make use of sound, creeping, and the air observer to identify his rounds. If an observed fire chart is used, the air observer might also conduct the registration (a percussion plot would be necessary) because the type of terrain in which guerrillas operate may prevent a forward observer from seeing a common registration point on which to register all batteries.

FIRING CHARTS

As mentioned previously, inspected maps or observed fire charts could be used. There would be a requirement for locating the firing batteries and the encircling forces on both types of charts.

(1) Inspected map. Normal artillery procedures would be used if maps were available. Battery positions would be located by inspection, and the positions of encircling forces would be plotted according to reported locations.

(2) Observed fire chart. Immediately after occupation of position, the air observer could begin registering the batteries on a common registration point in the guerrilla area. The adjusted data would enable chart operators to construct an observed fire chart in a normal manner, back-plotting the batteries from an assumed registration point (fig 4).

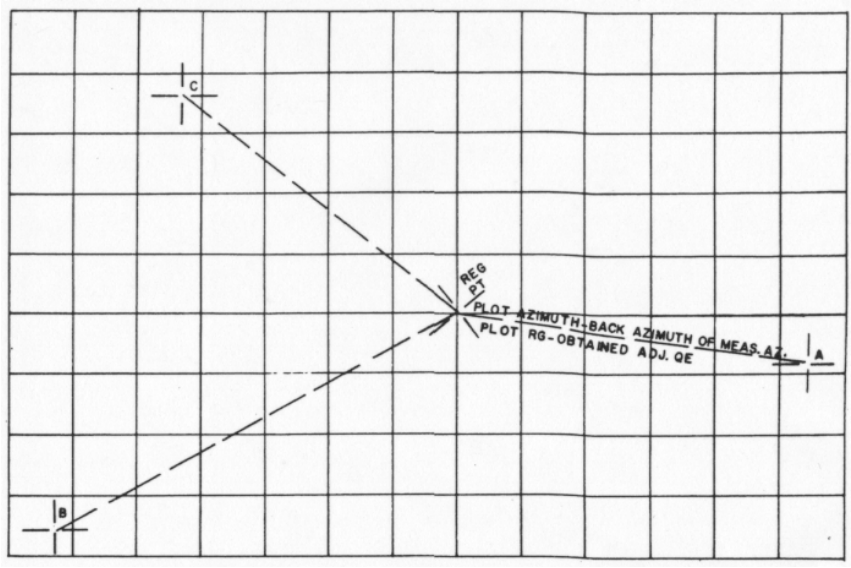

Figure 4. Plotting positions of batteries on an observed fire chart.

The problem is how to locate the encircling forces in relation to the guns. A possible solution lies with the helicopters which would bring the batteries into position. Immediately after dropping the guns, the helicopters would fly a straight-line course to the encircling forces at a constant speed. The counterguerrilla force could indicate its position with panels. One helicopter from each battery would report to the chart operators its flying azimuth, speed, and time of flight from the battery position to the encircling forces. The distance from the batteries to the friendly forces could then be computed by the simple formula rate of speed multiplied by the time of flight equals distance. Knowing the distance and azimuth from the batteries to the friendly forces, the chart operators could then plot points A, B, and C (fig 5).

A simple geometry theorem states that if we know three points on a circle, we can find the radius and circumference. This is done in the following manner: draw three equal, intersecting circles with their centers on the given arc (fig 6). Lines drawn through the intersecting points will meet at the center of the circle of which the given arc is a part. The radius will be a line from the center to either A, B, or C. We can now draw a circumference representing the encircling forces. This process can be completed quickly, in fact within seconds after the helicopter's report.

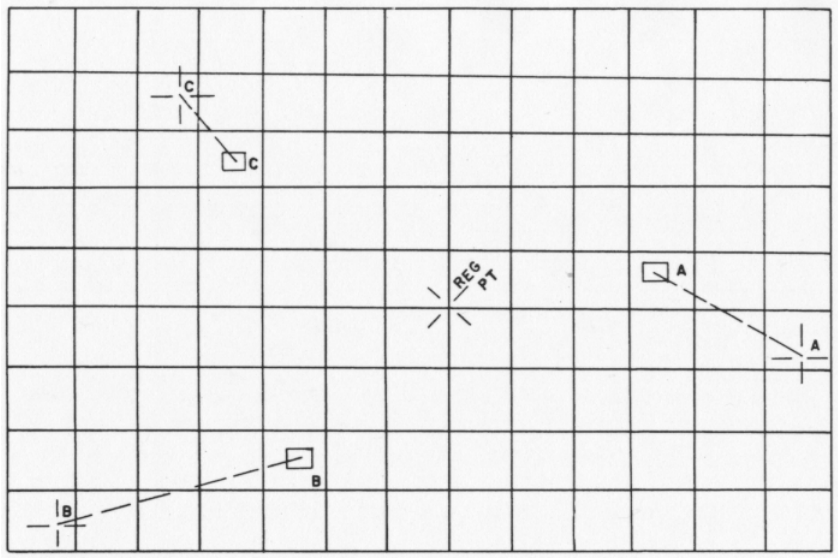

Figure 5. Plotting the location of contact points of helicopters with encircling forces in relation to battery positions.

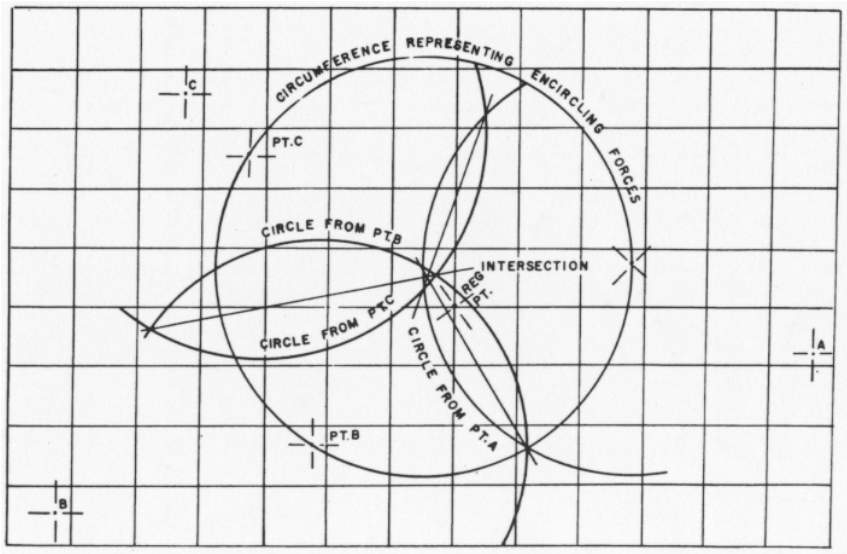

Figure 6. Plotting the center of the friendly force's encirclement.

The position of the counterguerrilla force can be determined periodically by rate-of-advance reports from the counterguerrilla commander (fig 7).

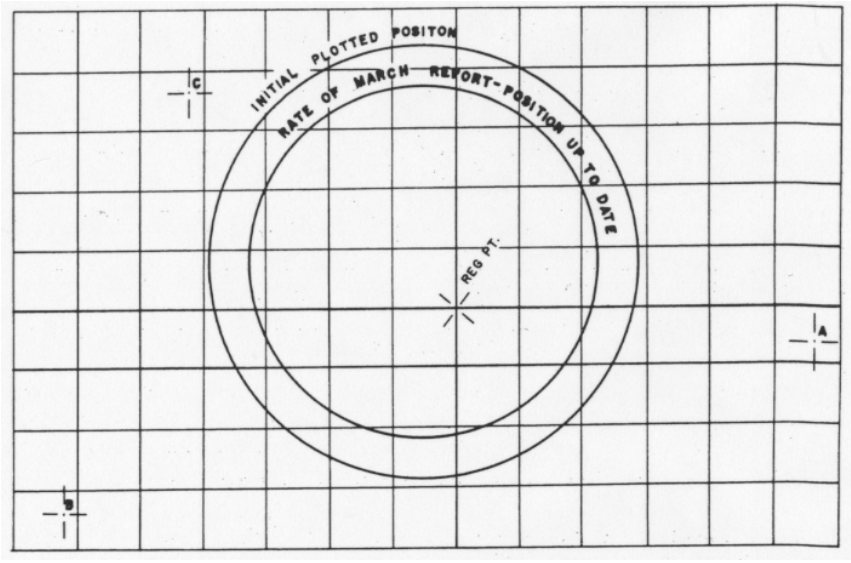

Figure 7. Plotting change of force position.

TARGET LOCATION

When using map inspected fire charts, all targets or breakout attempts are located by grid coordinates in the normal manner.

A method of accomplishing target location with the observed fire chart would involve dividing the encirclement area into eight or more sectors and assigning a ground observer to each sector (fig 8).

Upon locating a target or recognizing a breakout attempt, an observer would call a fire mission stated as "Breakout sector 1" and give his azimuth. A pin could be placed on the firing chart to approximately 500 to 700 meters in front of the presently plotted position of the encircling forces (with leeway for inaccuracies of a perfect circle), and a target grid would be oriented over the point (position X, fig 8). A marking round would then be fired. The air observer and the ground observer, working in conjunction, would bring the adjusting rounds on the breakout point and request fire for effect as quickly as possible. Battery "C" would be used for this mission because it would be firing most parallel to the encircling force and, hence, would be taking advantage of the smallest deflection probable errors.

As stated previously, guerrillas seek to minimize our advantages in firepower and materiel by skillful use of terrain and by evasive tactics. The present lack of doctrine for artillery in counterguerrilla operations

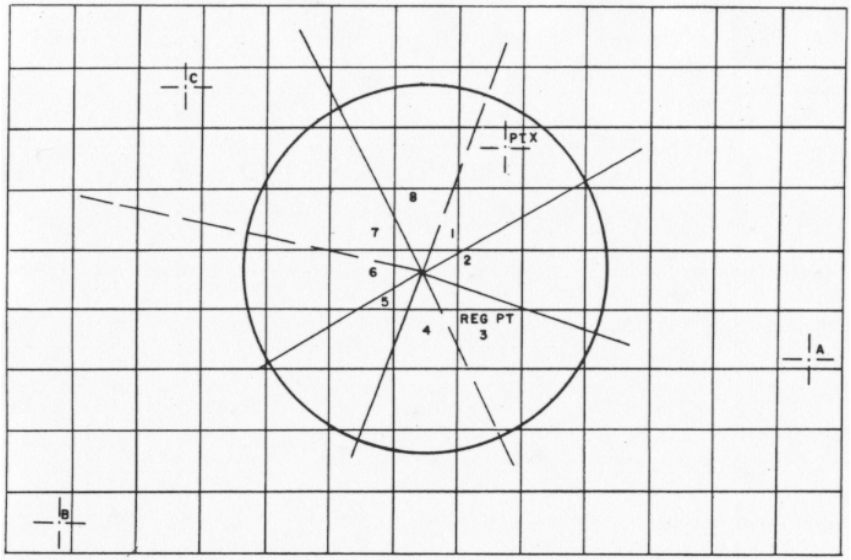

Figure 8. Dividing encirclement area into observer sectors.

seems to indicate that the guerrilla has been exceedingly successful. However, such a situation need not continue if the artilleryman will use ingenuity in overcoming the problems encountered in guerrilla warfare.

The above solution is one method of employing artillery against the guerrilla. Admittedly, the main responsibility of counterguerrilla operations will fall to the infantry forces. In many cases, we will have to use guerrilla tactics against the guerrilla. However, we can add some new tricks to the game which will give us an edge—namely, the firepower of artillery.

ARTILLERY NONNUCLEAR WEAPONS EFFECTS SLIDE RULE

In order to provide fire planning personnel with a tool to predict nonnuclear ammunition effectiveness, a slide rule device was designed, fabricated, and field tested at the US Army Artillery and Missile School.

The field tests resulted in certain revisions; the slide rule now contains scales for the rapid estimation of expected damage levels when the following factors are known:

1. Approximate size of target.
2. Nature of target (platoon of infantry in the open, patrols in a certain vicinity, etc.).
3. Range from weapon to target.
4. Firing unit (battery or battalion).

The revised rule has been forwarded to the US Continental Army Command for approval. When approved, it will become available to field units.

THE FUTURE OF CANNON

Colonel Jack F. Diggs

Office of Combat Development and Doctrine

Dramatic changes have taken place in field artillery during the past 10 years. The development of nuclear warheads containing devastating explosive force has made available to the artillery commander a power much greater than any he has ever before possessed. To carry these warheads long ranges, a family of missiles and rockets was prepared, and we are already at work on improved replacements for these weapons. It is imperative that these vital projects proceed to successful conclusions. At the same time, however, we must not lose sight of one clear fact—the artillery cannon is still the most versatile element of fire support.

At the outset of nuclear warfare, the United States Army artillery must be prepared to gain ascendancy over the enemy's missile artillery. During the raging exchange of blast and counterblast, the battlefield may remain curiously static, with little major maneuver by either combatant, as each force attempts to take maximum protective measures. Movement that does take place will probably be executed by small combat units of less than battalion size—too small to be attractive as nuclear targets.

Our success in this environment will depend upon the missiles in our inventory and our skill in their use. We must develop high standards of missilery. At the same time, however, it is necessary to recognize that missiles are special-purpose weapons designed to act as nuclear deterrents or to win an all-out nuclear war. Under conditions of limited war, or general nonnuclear war, their cost and complexity may prevent their widespread use. Cannon, on the other hand, will play a dominant role regardless of the use, or nonuse, of nuclear warheads. The missile is, in effect, a required complement to the mainstay of surface fire support—the field artillery cannon.

A PRIME WEAPON

What are the qualities inherent in a cannon which assure it a place on the battlefield of tomorrow? In the first place, it is *simple* and *rugged*. Battery personnel who fire it do not require a great amount of technical skills, and they attain proficiency without extensive training. The maintenance support required for the weapon is not burdensome. The weapon can be readily put into action. It is not easily damaged by enemy counterbattery fire or by accidents in transport which would disable a more delicate weapon. Because the cannon is simple, it is inexpensive. We can afford to buy large numbers of them for our arsenal.

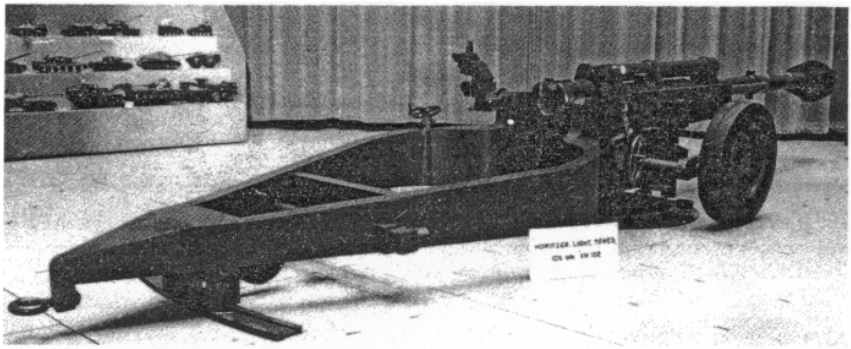

Figure 9. The XM102 towed 105-mm howitzer.

The cannon is *reliable*. To fire a shell, we merely wipe it off, set a fuze, place it in the tube (usually by hand), and fire it. This is the "wooden round" concept. There are no long periods required for checkouts, fueling, or maintenance, and there are no countdowns during which many things might go wrong to interrupt the firing. When a forward observer calls for cannon fire on a target he knows that he can get it *now!* His rounds are not likely to abort in the tubes or burst prematurely over someone's kitchen truck.

Above all, the cannon is *accurate*. Because the projectile is fired from a tube, it is possible to predict the ballistic trajectory with confidence. The dispersion and fuzing errors of cannon are small. Electronic countermeasures do not affect them to a significant degree. To attain accuracy, it is not necessary to have complicated guidance equipment at the weapon, at ground stations along the flight paths, or in the projectiles themselves.

A new standard of accuracy is materializing for the cannon artilleryman. The introduction of the digital computer for the preparation of firing data will give him an assurance of first-round accuracy on targets of known location for every mission he fires (ARTILLERY TRENDS' special issue, "ADPS," September 1960). The computer will apply corrections for true (unweighted) meteorological conditions along the trajectory and will display the correct firing data almost immediately.

With this new standard of deadly accuracy, we will be able to increase the effectiveness of our fires on the enemy because, without the necessity for adjusting rounds, the fires will be unexpected and the enemy personnel will be surprised by first-round fire for effect. Furthermore, we will gain a tactical advantage because we will be able to move units at night, or during other periods of reduced visibility, without having to conduct registrations which warn the enemy of our presence.

The qualities of cannon mentioned in the foregoing discussion, taken together, give the US Army artillery a capability which is vital to successful land combat; that is, the ability to deliver *sustained,* accurate firepower in support of the maneuver forces. The commander of the supported

infantry or armor force must be able to call on the field artillery to place highly accurate fires of the required types and quantities where he wants them and when he wants them. These concentrations will be fired again and again in some instances or will move across the terrain ahead of, yet close to, our forces without endangering them. The cannon is the only weapon which can perform this mission. Missiles would "overkill" in most cases or would not be responsive to the small unit requirement.

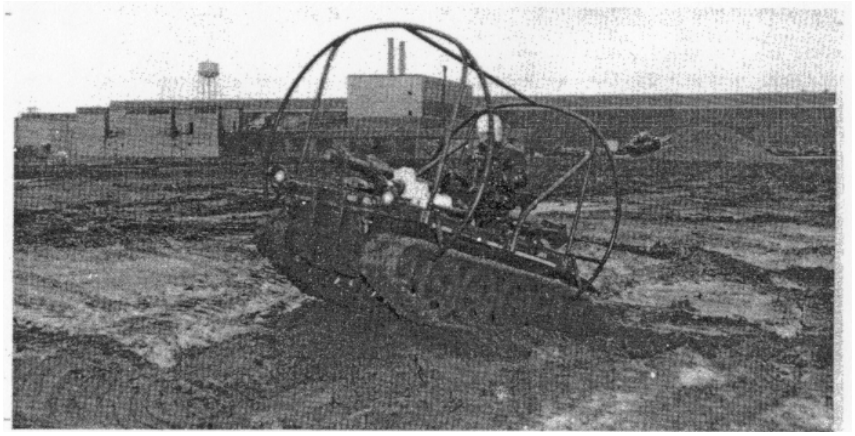

Figure 10. The XM104 self-propelled 105-mm howitzer.

To provide this sustained, accurate, "always ready" umbrella of firepower over the supported force, the cannon unit has a variety of warheads available. In addition to shells filled with high explosives, white phosphorus, chemicals, smoke, illuminants, and even propaganda leaflets—all of which we can afford to fire at the enemy in great numbers—we now have small nuclear warheads which may be fired from cannon. These are of great significance.

In the first place, since cannon are present in large numbers, a nuclear delivery means is almost always immediately available. It is therefore highly unlikely that the enemy will ever be able to eliminate our nuclear capability. Second, the accuracy and reliability of cannon indicate that they are ideal weapons for delivery of nuclear warheads, for we can allow no mistakes in the use of these warheads—especially when they are exploded close to our own front lines. A third point, to be discussed below, is that most of the tactical nuclear targets (after the opening nuclear holocaust) may be expected to require smaller warheads, precisely delivered. This situation dictates the use of cannon artillery.

Having discussed the virtues of cannon materiel, let us consider the tactical employment of cannon. They are superbly adapted for their missions. They can follow the maneuver elements almost everywhere that land combat is feasible. Towed or self-propelled models can operate under

most conditions of terrain. In more difficult situations parachutes, helicopters, and even pack mules can be used to get the weapons to their position areas. Once there, they can be placed into action quickly. Initially, they can fire observed fire even when survey has not been completed. As the position is developed, they soon are capable of massing fires and destroying targets throughout an extensive zone of action.

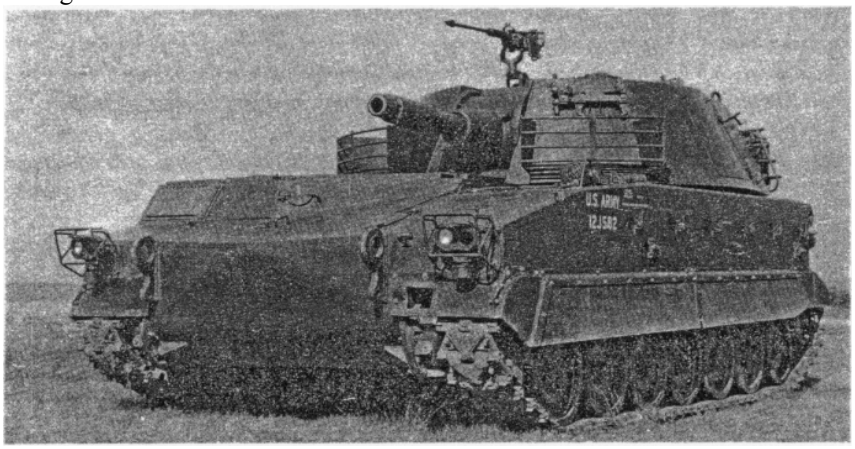

Figure 11. The T195E1 armored 105-mm howitzer.

Another capability we should not overlook is the use of cannon for direct fire. The Soviet Army, which has a large and powerful cannon inventory, appears to make great use of assault fires from cannon (See "Soviet Artillery," page 29). There is no reason why the US Army should not do the same. This is a particularly useful technique in the attack and when combating forces heavy in armored materiel. The accurate cannon is available for this job.

The employment of cannon gives the commander a flexibility of force. Cannon units and fires are maneuvered just as troops are maneuvered. By proper positioning of units and by allocating proper types of ammunition and massing of fires, the full weight of the cannon artillery can be brought to bear to influence the course of the battle. Fire support coordination, together with fire planning, are important techniques used to achieve this goal.

THE FLEETING TARGET

The most important consideration in attacking a target by fire is simply: What is it and where is it? We must be able to locate a target accurately in three dimensions, identify it, and bring fire upon it at the proper time—usually immediately, for a target is apt to be fleeting in nature.

Our enemy is not likely to deploy his forces without providing for fire support. This indicates that the bulk of the units which he may

bring to bear in the tactical land battle will be found on his side of the forward edge of the battle area (FEBA) at a distance not much greater (if any) than the ranges of his cannon artillery. These elements, then, are in our *"cannon country,"* and it is our own cannon which must destroy them. Most of these targets are relatively small—a platoon here, a firing battery there, an assembly area somewhere else. We will not require huge warheads for destruction of targets of this type, and the United States Army artillery must possess small warheads of varied lethality—both nuclear and nonnuclear—to kill them.

There will also be very important tactical targets, far to the rear, which we will attack—and the missiles of the corps and army must be able to do this—but it will be the exception, rather than the rule, to see a large agglomeration of enemy units sitting quietly and waiting to be hit with a mammoth warhead. We are interested in killing point and area *targets,* not merely in smothering a wide expanse of terrain with smoke and dust. The cannon is unexcelled for this job.

In a nuclear conflict we should expect to find combat units rather widely dispersed about the zone of action. This will require more and better cannon to give the force commanders the capability of dominating larger areas of terrain when maneuver is resumed, and of destroying enemy targets which are found interspersed with our own forces.

The cannon, then, is obviously a weapon which we need. What are we going to do about future cannon? The answer: "Plenty." A complete new series of cannon is under development now, and plans are already being drawn for the *successors* to this new series.

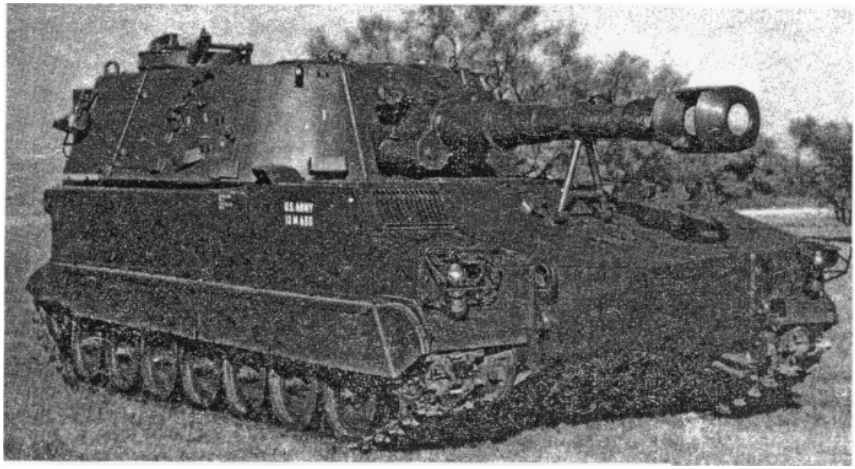

Figure 12. The T196E1 armored 155-mm howitzer.

CANNON UNDER DEVELOPMENT

Before considering the new models of cannon which are being prepared for test and issue to troop units, it is worthwhile to point out that

there has been a steady trend since the end of World War II toward a reduction in the number of models in use. We had a total of 11 types of weapons in World War II which could be considered as cannon suitable for use in the surface-to-surface role. At the present time we have only four types—the 105-mm, 155-mm, and 8-inch howitzers—with the 175-mm gun on its way into the inventory—and the 280-mm gun retained for nuclear warfare. The requirements for cannon continue to call for weapons suitable for the close support and general support roles within the division and for the general support mission by the corps and army artillery.

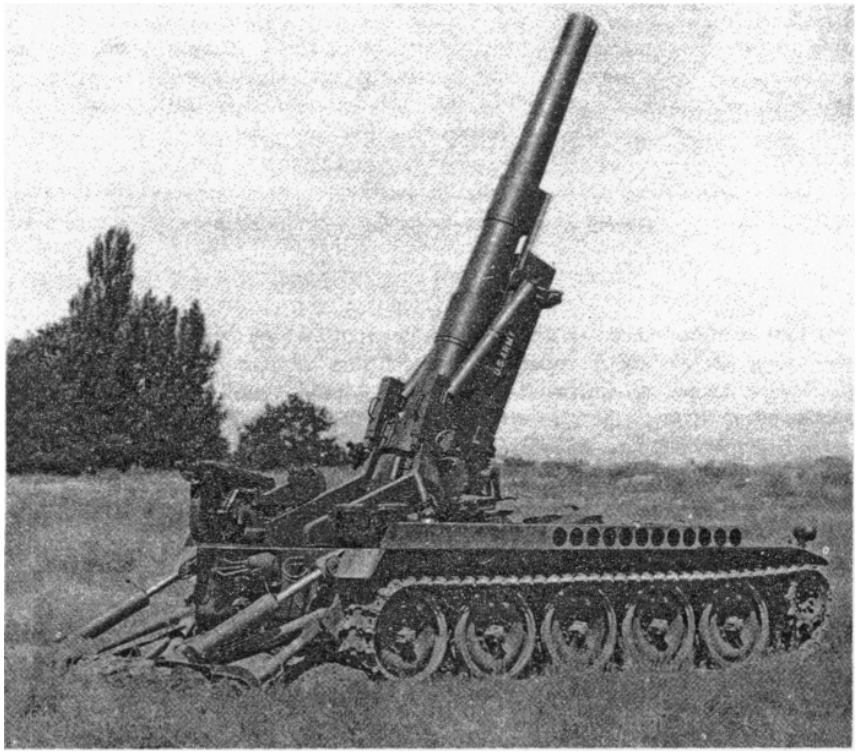

Figure 13. The M110 8-inch self-propelled howitzer.

There are three promising models of the 105-mm howitzer for use in the close support role—two of them, the XM102, a very lightweight, towed, air-transportable model; and the XM104, a lightweight, self-propelled model, powered by a jeep engine, which is expected to be helicopter-transportable. These were discussed in the article "Lightweight 105-mm Howitzer," ARTILLERY TRENDS, August 1961, and will not be considered in detail here. Each of them could be used in the airborne, infantry, and mechanized divisions. The XM104 with its compact design

and weight of only 6,000 pounds appears particularly promising and will help advance us toward the goal of self-propelled carriages. In addition to the foregoing, the T195E1 model is an armored version of the 105-mm howitzer on which development is proceeding. It is intended to be highly mobile with a water-crossing capability. It would be particularly well adapted for use in the armored cavalry where a high volume of rapid fire is a necessity. It will weigh about 41,000 pounds and may replace the current M52A1.

The new 155-mm howitzer under active development is the T196E1, which uses the same basic armored carriage as the T195E1. It weighs 46,000 pounds, will travel at a speed of 35 miles per hour, and has a water-crossing capability. A weapon of this type is suitable for the armored division where heavy firepower for the destruction of enemy materiel is needed. The United States Army Artillery and Missile School believes that the 155-mm howitzer should replace the 105-mm howitzer in the armored division and perform both the direct support and general support missions. For divisions other than armored, there is a need for a lightweight, unarmored. self-propelled 155-mm howitzer.

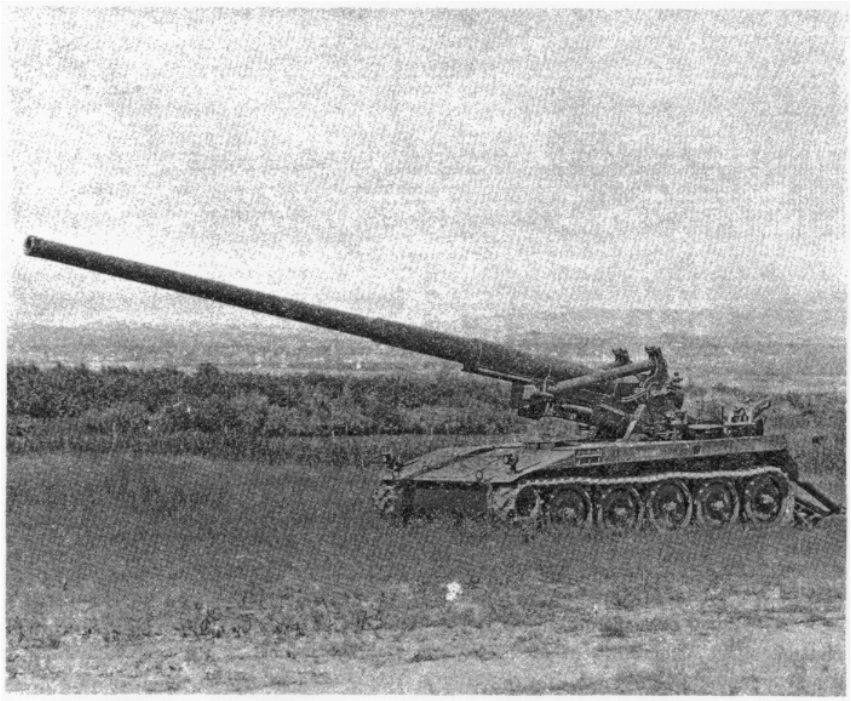

Figure 14. The M107 175-mm gun.

It is highly desirable that a single carriage be capable of mounting tubes of various calibers. This feature is being used with the T195E1

and T196E1. A highly successful development is the Mount T236E1, which is able to serve as a multipurpose prime mover. The new 8-inch howitzer M110, SP, and the new 175-mm gun M107, SP, use this carriage. It will also be used as a tank recovery vehicle.

The 8-inch howitzer should be retained at corps and army level because it has a nuclear capability and because it is extremely accurate and effective against small, hard targets such as pillboxes and materiel objects. Of course, it is also deadly to personnel targets. The new self-propelled model, the M110, is very mobile. It weighs 55,000 pounds and travels at a speed of 35 miles per hour. It is slated to replace the present M55 8-inch SP howitzer.

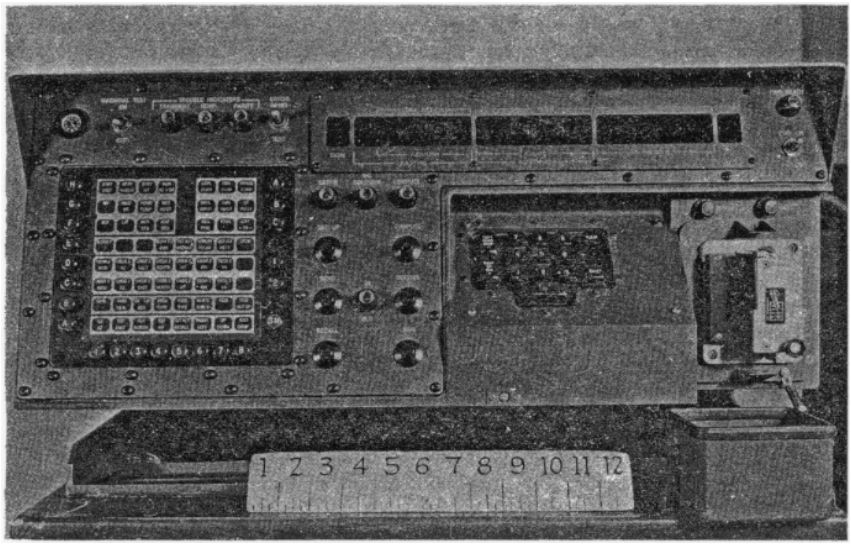

Figure 15. Field Artillery Digital Automatic Computer.

The latest addition to the counterbattery effort is the new 175-mm gun M107, self-propelled. It has a range far greater than other cannon and can blast the enemy's artillery and rear areas from a great distance. It has the longest range with accuracy of any cannon ever produced for the US Army artillery. It, too, possesses mobility and ease of employment. Weighing about 58,000 pounds, it travels at a speed of 35 miles per hour.

The weapons mentioned above, after successful testing, should give the field artillery the capability of a more rapid and powerful response in operations over the next few years. We possess not only weapons capable of "slugging it out" with an enemy equipped with heavy modern materiel, but also weapons which are light and easily transportable to distant theaters where they might be employed in difficult terrain against a more primitive enemy.

CANNON OF DAY-AFTER-TOMORROW

It is not sufficient merely to await the arrival of the developmental cannon of the present day. To insure that the US Army field artillery maintains an edge in quality over the weapons of our potential enemies, we must begin work on cannon which are now but a gleam in the Redleg's eye.

The paramount consideration in planning for the future is simply to determine what it is that the new weapon must do. After the mission has been established, it is possible to set the characteristics which are desired in the weapon. The US Army Artillery and Missile School uses a group of factors in its evaluation of new concepts for cannon:

Range
Effectiveness
Ground Mobility
Transportability
Survivability
Responsiveness
Logistics

It is easy to see that cannon must be given greater ranges so that targets far back in the enemy rear areas, or at greater distances on a dispersed battlefield, may be taken under fire more easily. Even though the missions are executed at longer ranges, high standards of accuracy must be achieved in order that the second quality, effectiveness, is not degraded.

The use of more lethal warheads fired from an accurate tube, with firing data figured precisely by an electronic digital computer, will give us a gain in effectiveness. Concurrent with the cannon projects, great advances in our target acquisition means must be made.

The factor of ground mobility is easily understoood. New carriages must be capable of rapid movement over difficult terrain for extended ranges. A water-crossing capability must be provided for the traversing of inland waterways. We must have armored carriages for use in armored combat, but we must also have lightweight, self-propelled carriages in order to gain the benefits of greater speed, traction, and ease of employment. These weapons must be able to keep up with the forces they support, and they must be economical in their requirements for fuel and maintenance.

One of the greatest challenges in the design of new weapons is the need for improved transportability. This requirement may call for some weapons to be moved to the theater of employment by strategic aircraft. After debarkation, many of the weapons may be flown to remote areas by tactical fixed-wing aircraft and helicopters. Because of the requirement for much of the field artillery to be air-transportable, the new weapons must be of low weight and small dimensions. Self-propelled weapons can be built to conform to the requirements of this type of transport. Furthermore, they can move away from the unloading areas at once without waiting for prime movers to be flown in.

To survive in combat, the cannon must continue to be rugged so as to withstand the shock of battle. Cannon with armored units, or cannon designed for a direct fire "slugging" match, require armor protection. In all cases, the crew and the supporting section equipment must have the same degree of protection against shellfire, flashburn, or inclement weather that exists for the supported force. However, we must not forget how to dig in, even when mobility is a prime tactic, for the earth affords protection and concealment of a high order.

Fluid, fast-moving operations place a premium upon the responsiveness of fire support. Infantry and armored unit commanders cannot afford to wait for half an hour after forward observers have called for fire before they receive artillery fire support. Future weapons must be placed into action quickly from the position of march order and, when in position, must be able to respond instantly to fire missions from human observers or electronic target acquisition devices.

The problem of logistics confronts us in all our operations. The ammunition fired by our cannon of tomorrow must be simple, reliable, and capable of easy transport and handling. The maintenance required for the weapons must be held to a minimum. Fortunately, the care of cannon is relatively simple. We must avoid, if possible, the procurement of weapons which need the constant attendance of highly-trained maintenance specialists with large amounts of complicated tools and gear.

No cannon is the perfect weapon. Developers must always balance one desired characteristic against another in order to produce the most effective weapons. Careful attention to the qualities listed above will make possible the adoption of sound weapons with improved capabilities.

THE REDLEG—KING OF THE BATTLEFIELD

The most important feature in any field artillery unit is not the weapon; it is the artilleryman who mans the weapon and the supporting equipment of the artillery weapons system. He must be made to understand that he operates the most powerful force on the battlefield. Without him there can be no battlefield success. All of his knowledge and skill and all of his energy and enthusiasm must be directed toward the effective operation of the weapon system. The cannoneer and his cannon have performed splendidly in the past. He provides the dominant element of flexible and responsive firepower on the battlefield today. With his cannon of the future, the Redleg will continue to be the proud and honored King of Battles.

———●———

"For two days I was without artillery in battle. For those two days I could only fall back. For those two days I was not a commander of soldiers, but merely a retreating leader of frightened men. For two days I was at the mercy of the enemy. May I never experience another such two days." Anon.

AIR GROUND --Communications

Captain Julius Spitzberg
Captain Joseph Del Monte
Communication/Electronics Department

During World War II, the Army Air Corps was an integral part of the Army. It became a separate and powerful combat arm—the United States Air Force—in 1947. Still included in the Air Force's mission, however, is a contract with the foot soldier which reads . . . "close support for the ground-gaining arms . . . ."

If you served as an artillery forward observer (FO) in the Korean conflict, you undoubtedly can recall the times when you and an infantry company commander decided to call for close air support. Korea provided an ideal proving ground for the trial of a new concept in close support by high performance jet aircraft. Some may comment on the "eternity" it took for the aircraft to appear; others may say that the air support was always right there when needed. The difference in opinion may be a result of the communication system used by the various commands in processing a request for Air Force support.

The infantry company commander, with guidance from his FO, makes the decision to ask for Air Force help in neutralizing a target. After the decision has been made, the request is transmitted to the next senior headquarters, the infantry battalion, over the battalion's command net. If the infantry company commander's radio set is out of operation, the request is sent by wire, messenger, or any practical means available.

AIR REQUEST AT INFANTRY BATTALION HEADQUARTERS

When the request for high performance aircraft reaches the infantry battalion headquarters, it is literally "out of the hands" of the infantry company commander. The battalion commander, in coordination with his S3 air and the artillery liaison officer, will decide whether the request can be satisfied with the firepower available to the battalion. This firepower includes that which is available through the infantry battalion's direct and indirect support infantry weapons, plus all of the howitzers of the direct support artillery battalion. If these weapons cannot handle the mission, the request is transmitted to the division Fire Support Coordination Center (FSCC) over the division air request net. The infantry brigade monitors this request; silence on the part of the brigade indicates approval.

When the request for the air strike is received at the division fire support coordination center (FSCC), it is studied by the fire support

coordinator (FSC), the air liaison officer, and the G3 air officer. The fire support coordinator or the assistant fire support coordinator (the representative of the division artillery commanding general) decides whether the target can be fired upon by the division artillery, which includes the nuclear-capable 8-inch howitzers and Honest John rockets. If naval gunfire is available, the FSC will receive the recommendation of the naval gunfire officer (NGO). At the same time the air liaison officer and the G3 air officer consider the request from the Air Force's viewpoint; that is, can the target be destroyed by ordnance delivered by high performance aircraft? Based upon the recommendations of the members of the FSCC, the FSC decides that the target is definitely one for high performance aircraft.

The time taken to reach the final decision depends on many factors. First, how well coordinated and informed are all the "fingers in the pie?" The availability of communications must also be considered. No communications—no strike! The personnel at the infantry division FSCC, which includes the Air Force representatives, will know at all times what and how much air firepower is available to the division. This firepower includes the air sorties allocated to the army tactical operations center. The air sorties must be used with discretion: as far as the user units are concerned, there are usually not enough.

When the personnel at the division FSCC have decided to process the request, it is sent by radio to the army tactical operations center (TOC) over the army air request net. In this situation, with an immediate air strike being requested, the corps TOC will monitor the request being processed over the army air request net. If the corps fire support agencies, which include the firepower available to the corps artillery, decide that the target cannot be handled by any of the corps weapons or is best suited to high performance aircraft, the request is allowed to go through without interruption by corps. If corps weapons can destroy or neutralize the target, corps will interrupt the air request and process the mission for organic weapons.

AIR REQUEST AT ARMY LEVEL

After the request arrives at the army TOC, it is again examined to determine if the target can be engaged by army organic weapons. This may sound like another stumbling block for the infantry company commander to overcome before he gets an aircraft on the target; but remember, this request has already been declared necessary by the division and the corps commanders, so little time will be taken to determine if some other weapon can do the job. The request for the air strike moves rapidly into the Air Force channels after it reaches army level.

Even at this level, communication is the key to the success of the mission. Air Force radio nets now carry the request to the fighter base and the strike aircraft will "take off." Information of the time of arrival of the aircraft on the target and the radio frequencies being used by the pilot are transmitted to the air liaison officer at the division fire support coordination center.

Meanwhile, the forward air controller (FAC), with a jeep and special radio equipment provided by the infantry battalion, arrives at the infantry company position. He is an experienced Air Force pilot. He is usually at battalion headquarters but has been sent to the company to guide the incoming aircraft to the target. He establishes contact with the air liaison officer with his special radio equipment and receives the information on the time of arrival of the aircraft and is informed of the frequencies on which he can talk to the pilot. The company commander and the FO point out the target to the FAC and he prepares his transmissions to the pilot.

As the aircraft arrives over the company sector, the pilot contacts the FAC, who informs him of the target location. The FAC may have the FO mark the target with a marking artillery round for easier identification. When the aircraft attacks the target and destroys or neutralizes it to the satisfaction of the infantry company commander, the FAC releases the aircraft.

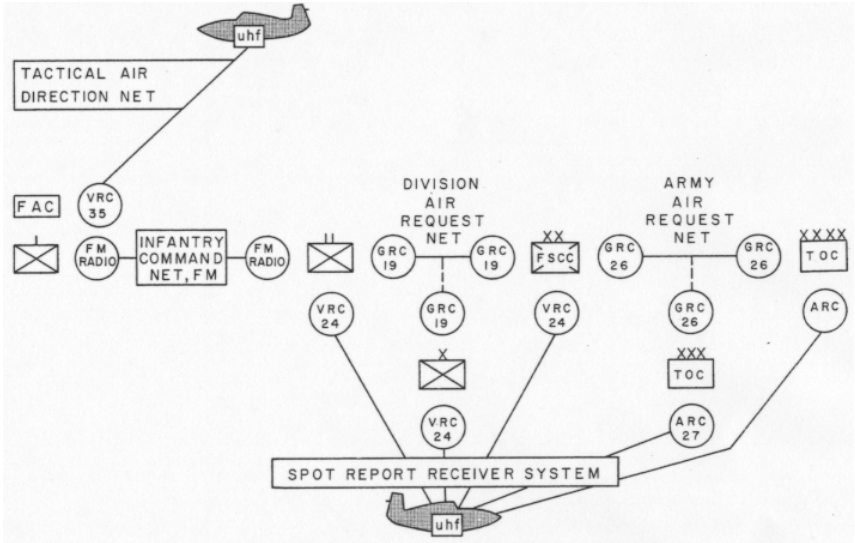

Figure 16. A graphic presentation of air-ground operations.

PILOT BROADCASTS RESULTS OF MISSION

The pilot will broadcast his report concerning the air strike over the spot report receiver system. He will include information on the results of the mission, the number of casualties or amount of enemy equipment destroyed, if possible, and any other important information. The spot report receiver system is monitored by the major commands of the field army. All intelligence broadcasts over this net by in-flight aircraft are

evaluated by the intelligence agencies within each command. The pilot of the strike or reconnaissance aircraft will also broadcast any reports concerning enemy activity observed while in flight to or from his mission. Since such data will cover a larger sector, it will be of considerable importance to the commanders receiving it.

You have just read what happens when a request is made for an immediate air strike (fig 16). The routine is the same for requesting preplanned air strikes, except that the preplanned requests are processed through the infantry brigade and the corps TOC to army.

Time is important. Fire support coordination agencies at various levels of command must determine whether the requested strike could be accomplished satisfactorily by any of the organic weapons before they can process this request to higher echelons. This processing takes time but through experience and training, much of this time can be saved. Communication failure never should be allowed to add to the time loss. Personnel cannot obtain "on the job training" when processing an air mission. The means of communication are available and the user personnel must be trained to perfection . . . the enemy will not wait.

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Soviet Armor and ARTILLERY

Major John C. Burney, Jr.
Tactics/Combined Arms Department

In the year 500 B. C., the famous Chinese philosopher and general, Sun Tzu, stated: "If you know the enemy and know yourself, you need not fear the results of ten thousand battles." An essential element of the artilleryman's military knowledge is an understanding of his potential enemy's organizations, weapons, and tactics. Armed with this knowledge, he will be able to employ more effectively his own organizations, weapons, and tactics.

Our mightiest potential enemy today is the Soviet Union, whose army possesses the world's largest and most powerful armor force. The Russians have emphasized the development of mobile forces equipped with modern and effective tanks and self-propelled artillery. To better understand the capabilities of these forces, let us examine their structures and equipment.

The Soviets did not stress the use of armor until after they had fallen victim to a devastating German blitzkrieg in the early years of World War II. But the Russians learned quickly, modeled their organizations after those of their assailants, and came roaring back in some of history's most spectacular armor exploitations. In 1944, during the Bessarabia-Moravia campaign, they drove armor spearheads deep into organized German defense areas, where the terrain consisted of heavily wooded areas and thawing swampy ground. The Japanese, too, were treated to a display of Soviet armor power. In the amazing dash through Japanese-held Manchuria, some armored units were reputed to have covered 700 miles in five days.

During these campaigns, the Soviets quickly learned that the combined arms team of tanks, infantry, and artillery could be decisive. Accordingly, after World War II they increased their armor strength while America was conducting its postwar demobilization in both men and machines.

Two basic types of Soviet armor formations resulted from World War II—the tank division and the mechanized division. The mechanized division is comparable to our armored division in that it is approximately a balanced combined arms team with like quantities of tanks, infantry, and artillery. In contrast, the tank division is strongly tank heavy.

THE TANK DIVISION

The tank division is built around an armored shock element of three medium tank regiments and one heavy tank and assault gun regiment

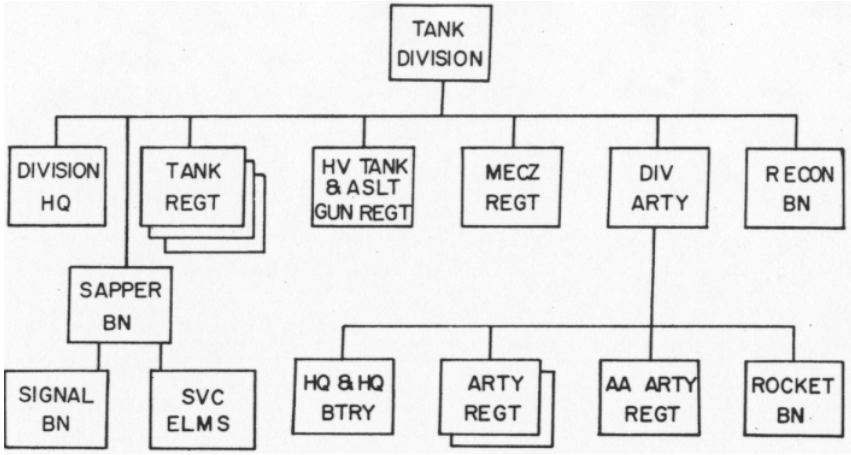

Figure 17. The tank division.

(fig 17). Infantry support is provided by a mechanized regiment and fire support by a division artillery of two artillery regiments, an antiaircraft regiment, and a rocket battalion. These units are the basic building blocks in both the tank and mechanized divisions, so let us examine them in more detail.

THE TANK REGIMENT

The tank regiment (fig 18) is a combined arms team heavy in tanks. It has three tank battalions, a motorized rifle company, a reconnaissance company, and an antiaircraft artillery battery. It is interesting to note

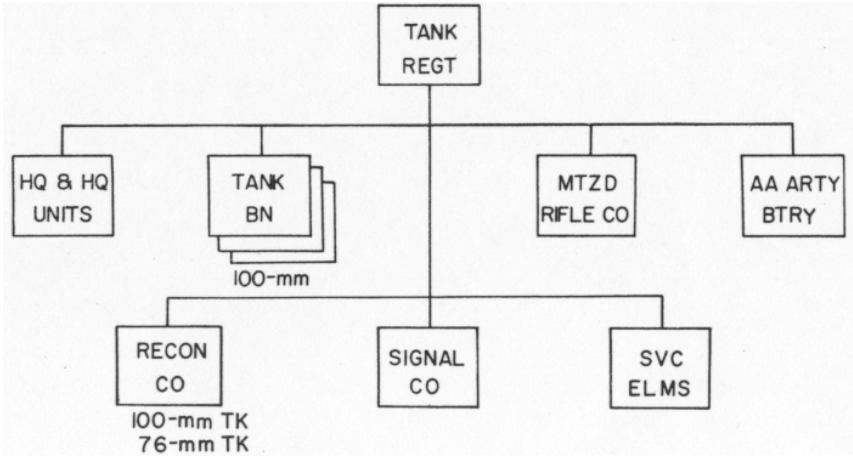

Figure 18. The tank regiment.

that the Soviets have continued to place antiaircraft artillery at both division level and regimental level, whereas the US Army has eliminated these elements from its structure.

The basic weapon of the tank regiment is the T-54 tank. Each tank battalion has 34 T-54's (fig 19). This very capable tank was introduced

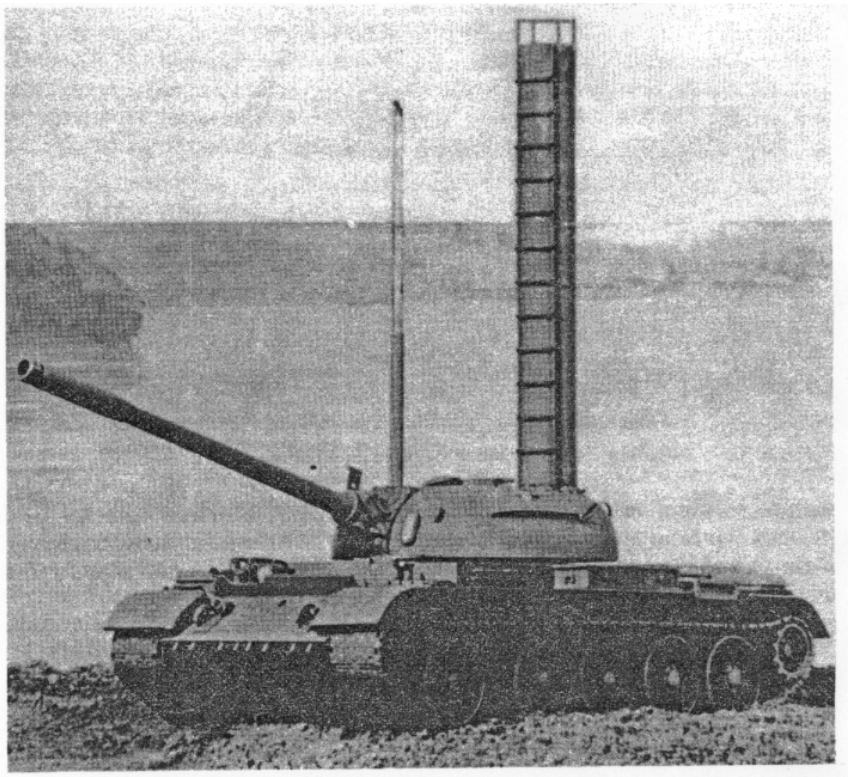

Figure 19. The T-54 tank equipped with snorkel.

in 1955. Its main armament is a 100-mm gun (our M48 has a 90-mm gun and our M60 a 105-mm gun). With a weight of approximately 36 tons, it is less heavily armored than the M48 or M60 but has greater mobility. It has a flat track, which permits a low silhouette. Like all Soviet medium and heavy tanks, it is diesel-powered. The T-54 shown in figure 19 is equipped with an underwater breathing apparatus, which enables the tank to cross rivers underwater.

Still in use in some Soviet units is the T-34 tank. An excellent weapon, the T-34, introduced in the early stages of World War II, firmly established Russia's prominent position in tank development. T-34's now in use mount an 85-mm gun comparable in performance to the famous German 88. This tank has enjoyed a truly remarkable life span.

The reconnaissance company has five T-54 tanks and five PT-76 amphibious tanks. The PT-76 (fig 20) was introduced in 1955 and represents

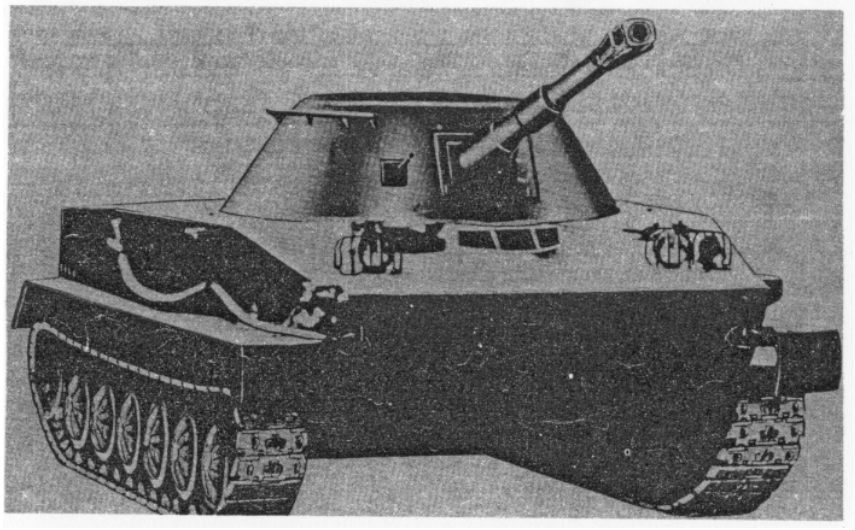

Figure 20. The PT-76 amphibious tank.

a revival of Soviet interest in amphibious armored vehicles. It is armed with a short-barreled 76-mm gun. While essentially a reconnaissance vehicle, its ability to cross inland waters makes it valuable for rapid exploitation.

The antiaircraft artillery battery of the tank regiment has six 57-mm self-propelled antiaircraft guns (fig 21). This twin-barreled weapon is

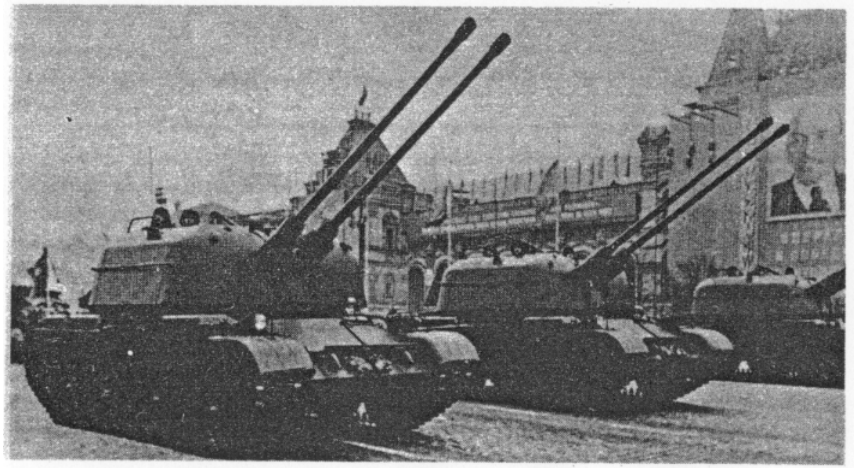

Figure 21. The 57-mm self-propelled antiaircraft gun.

the only self-propelled antiaircraft gun to be introduced by the Russians since World War II. It consists of standard 57-mm antiaircraft guns mounted on a T-54 tank chassis. It can also be used for ground support, as can the US M42 SP AA gun.

THE HEAVY TANK AND ASSAULT GUN REGIMENT

When one encounters the medium tanks of the tank regiments, close by will be the tanks and assault guns of the heavy tank and assault gun regiment (fig 22). The missions of these weapons are to provide over-watching

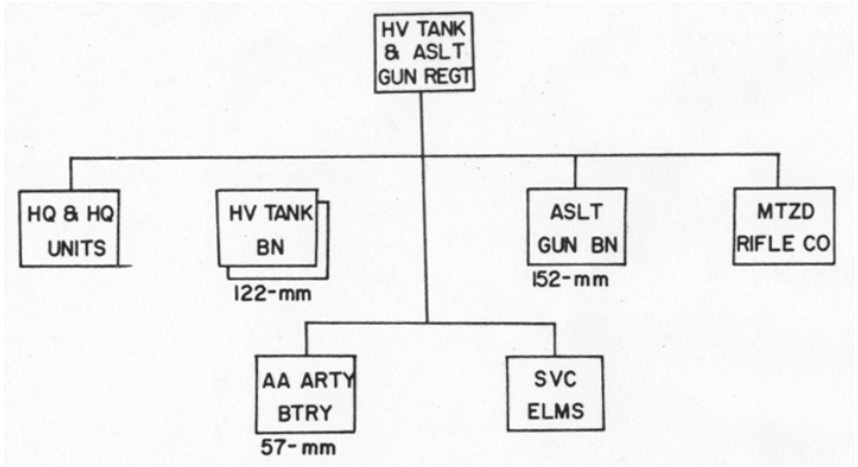

Figure 22. Heavy tank and assault gun regiment.

fire for the medium tanks and to destroy enemy armor. To accomplish these tasks, the regiment has two heavy tank battalions and one assault gun battalion, and, like the tank regiment, the heavy tank and assault gun regiment also has an antiaircraft artillery battery.

Each heavy tank battalion has twenty-two 122-mm gun tanks. The Soviet heavy tank or Josef Stalin (JS) tank first appeared in 1944 and was very effective. At the end of World War II, the JS-3 made its appearance. With the largest tank gun in the world today and a modern-prow-shaped hull, this tank is most impressive. It combines a powerful gun with a weight of only 46 tons and a low silhouette. Since 1957, some heavy tank units have received the new heavy tank, the T-10 (fig 23). This tank is essentially the JS-3 with a lengthened chassis and such design refinements as a bore evacuator.

The assault gun battalion of the heavy tank and assault gun regiment has 22 assault guns. These long-range tank killers have a fixed, heavily armored superstructure mounted on a tank chassis. This superstructure houses the armament, crew, and ammunition. Assault guns employ direct fire and are designed for destroying centers of resistance, enemy tanks, and artillery. They follow the tanks and infantry at not

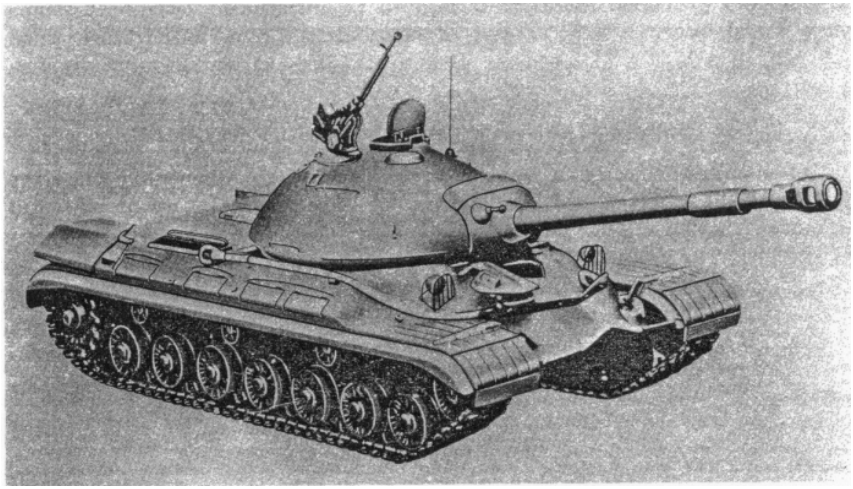

Figure 23. The T-10 heavy tank.

more than 400 meters. The Soviets have a family of three assault guns. The 100-mm assault gun SU-100 combines high armor penetration with mobility and substantial armor protection. Assault guns of calibers above 100-mm are referred to as JSU's, "Josef Stalin Mounts." One of these is the JSU-122 with a 122-mm gun. The heaviest is the JSU-152, which mounts a 152-mm gun howitzer (fig 24). This weapon is found

Figure 24. The 152-mm assault gun-howitzer.

only in the heavy tank and assault gun regiment. These powerful JSU's clearly indicate the Soviet intent to provide their armor with the heaviest possible fire support.

THE MECHANIZED REGIMENT

The infantry component of the combined arms team is the mechanized regiment (fig 25). Herein there are three motorized rifle battalions equipped with personnel carriers.

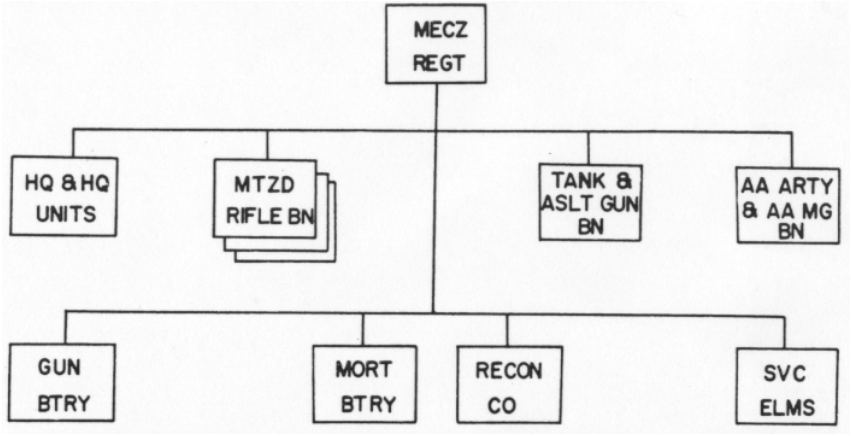

Figure 25. The mechanized regiment.

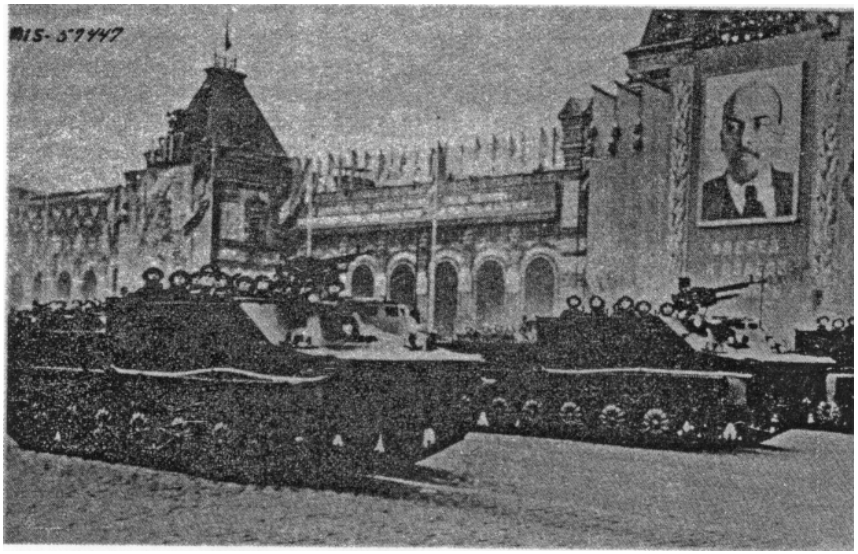

Figure 26. Armored amphibious personnel carrier (BTR-50).

Soviet mechanized infantry has lacked good infantry carriers in the past, but rapid strides have been made in recent years. Recently introduced in large numbers is the BTR-152 armored personnel carrier. This

versatile vehicle can be used as an infantry carrier, reconnaissance vehicle, or artillery prime mover. Full use of the BTR-152 will probably not be accomplished because a new carrier may replace the BTR-152. The BTR-50 armored personnel carrier (fig 26) is full-tracked and amphibious.

To provide fire support for these rifle battalions, the regiment has a tank and assault gun battalion, an antiaircraft artillery and antiaircraft machinegun battalion, a gun battery, and a mortar battery. The tank and assault gun battalion has 34 T-54 tanks and 11 JSU-122 assault guns. The antiaircraft artillery and antiaircraft machinegun battalion has seven 14.5-mm AA machineguns and six 57-mm SP AA guns. The gun battery has six auxiliary propelled antitank guns, a new innovation. This unique weapon, a field artillery piece, consists of an 85-mm gun mounted on a light carriage, to which is attached a small engine and steering mechanism. The gun can thus travel under its own power and carry a full crew and basic load of ammunition without a prime mover. However, it is normally towed by a prime mover on long hauls. The mortar battery has six 120-mm mortars, which are employed as light artillery. The 120-mm mortar, a truck-towed weapon, has a range of 6,500 meters. The Soviets continue to emphasize the use of mortars, as they have in the past.

DIVISION ARTILLERY

Turning now to the division artillery, each of the two artillery regiments, organized as shown in figure 27, has two howitzer battalions

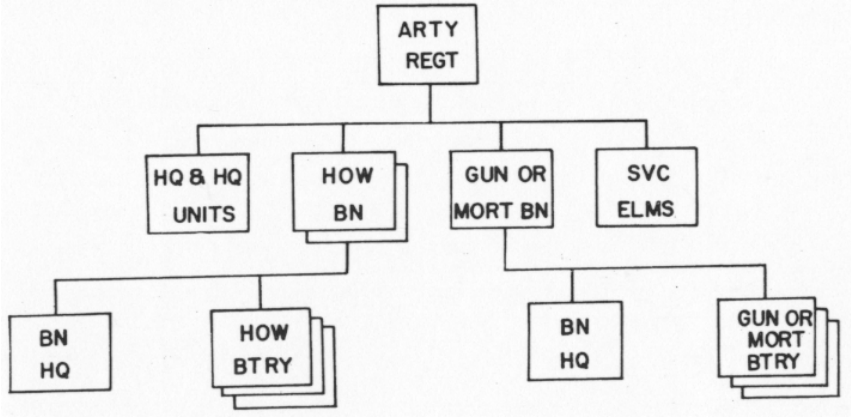

Figure 27. The artillery regiment.

of twelve 122-mm howitzers each. One regiment has a mortar battalion of twelve 160-mm mortars; the other, a gun battalion of twelve 85-mm towed guns. Most howitzer battalions are equipped with the 122-mm howitzer M1938 (fig 28). The 160-mm mortar M1953 has a long tube which breaks near the base plate for loading (fig 29). The round is then inserted through the open breech, and the weapon is fired by a trigger.

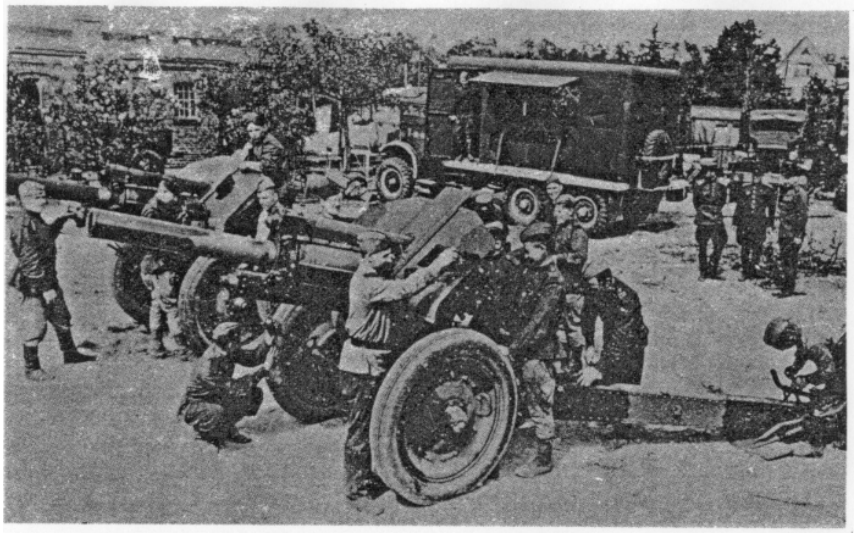

Figure 28. The 122-mm howitzer.

The antiaircraft artillery regiment has two light batteries of six twin 57-mm SP AA guns each and two medium batteries of six towed 85-mm AA guns (fig 30).

The Soviets employ rockets on a larger scale than any other army. The rocket battalion has twelve 150-mm BM-14 multiple launchers (fig 31). These may be replaced by a six-round launcher, which first appeared in a Moscow parade in 1957 (fig 32). These 17-foot rockets were estimated to be 240-mm in caliber. Apparently, the Soviets intend to expand the use of these mobile area fire weapons, which have served them so well in the past.

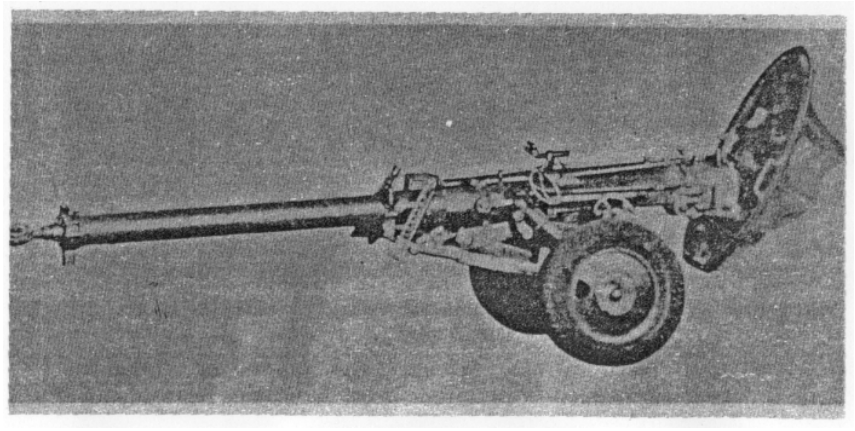

Figure 29. The 160-mm mortar.

THE MECHANIZED DIVISION

With knowledge of the tank division, the mechanized division is easily understood. The same regiments are used in different numbers to make the division a balanced force. Instead of three tank regiments, the

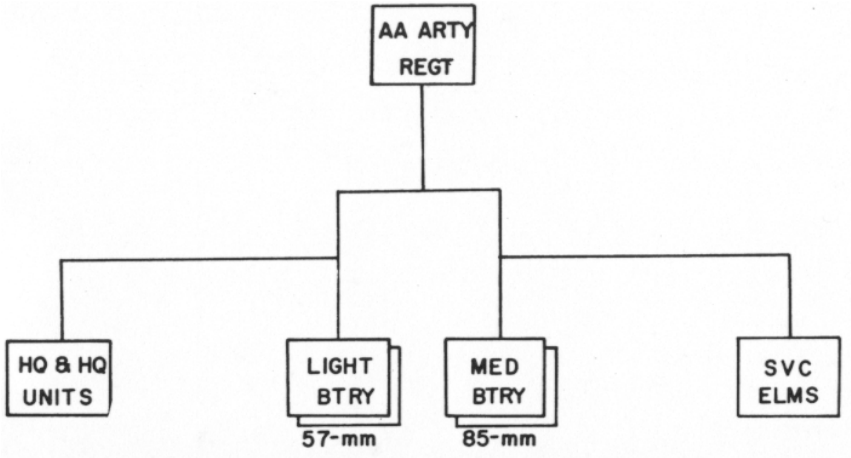

Figure 30. The antiaircraft artillery regiment.

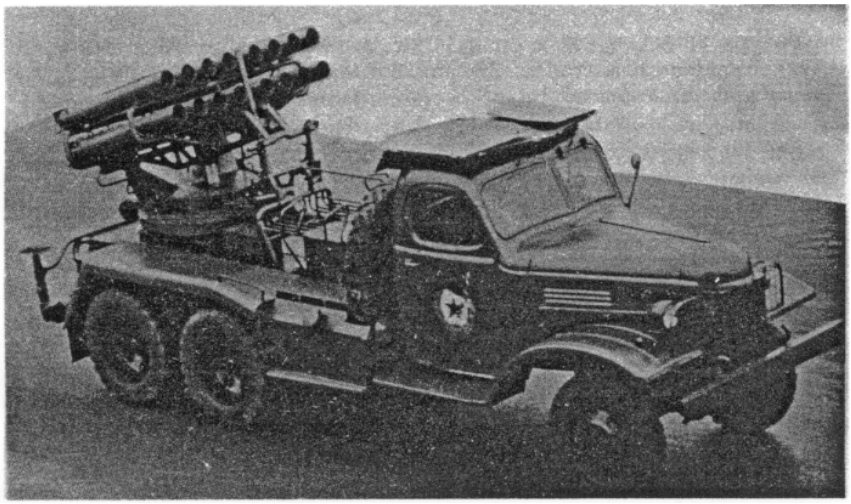

Figure 31. The 150-mm rocket launcher (BM-14).

mechanized division has only one; however, the number of mechanized regiments is increased from one to three. Both divisions have identical heavy tank and assault gun regiments, and the division artilleries are almost identical.

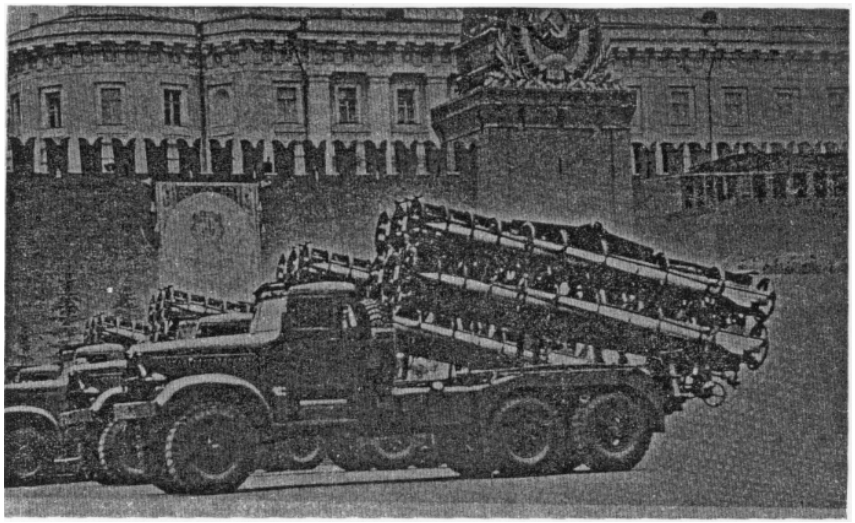

Figure 32. Truck-mounted 6-round launcher.

A comparison of strengths of the Soviet tank and mechanized divisions and the US armored division is shown in figure 33.

WEAPON	SOVIET TANK	DIVISIONS MECZ	US ARMORED DIVISION
Tank, heavy gun	46	46	0
Tank, medium gun	377	277	306
Tank, light gun	25*	25*	34
Assault guns	33	55	0
Artillery mortars	18	30	0
Howitzer, light	0	0	54
Howitzer, medium	48	48	12
Howitzer, heavy	0	0	4
Artillery rocket launcher	12	12	2
Artillery guns (85-mm)	18	30	0
Antiaircraft guns	54	54	0

* Amphibious

Figure 33. Comparative strengths

Now that we have discussed the organizations of the tank and mechanized divisions, let us see how they are used.

EMPLOYMENT

The tank division is usually employed as part of a mechanized army of two tank divisions and two mechanized divisions.

In the offensive, the tank division, as part of a mechanized army, is used for maximum shock action. After a breakthrough has been effected, the division advances rapidly as part of a highly mobile exploitation force and is committed whenever it appears that the enemy is forming a new defensive line. The tank division strikes and scatters enemy reserves and, with the mechanized divisions, overruns enemy artillery, command posts, and supply installations. This employment is very similar to that of the US armored division.

In the defense, also, the employment of the Soviet tank division is similar to that of the US armored division. As a mobile striking force or reserve, it is employed to deliver a decisive counterattack against an attacking enemy. To use the division in a position defense is uneconomical because it can hold ground only for short periods.

Like the tank division, the mechanized division also is used as a mobile exploitation force. The mechanized division may be employed either as part of a mechanized army or as part of a rifle corps. As part of a mechanized army and being a balanced force, it is better suited for overcoming enemy defenses and can hold ground better than can the tank division. It is particularly well suited for the pursuit. In the pursuit, it maneuvers on the flanks of a retreating enemy and cuts off elements of his force. It can move rapidly to seize and hold important terrain positions, such as river crossings, defiles, and key road junctions. When used as part of a rifle corps of two or three rifle divisions, the mechanized division adds mobility and considerable shock power.

In summary, Russian armor forces have occupied an important position for many years. Since the harsh lessons administered to it by the German Panzer divisions, the Soviet army has continually improved the organization and equipment of its armor formations. Thus, by constant effort and by being fully aware of the potentialities of armor, the Russians have built a formidable mobile striking force effective on both nuclear and nonnuclear battlefields.

The Soviets now possess the world's most powerful armor force. Their two basic armor units, the tank division and mechanized division, are well equipped with 100-mm gun tanks; 122-mm gun tanks; amphibious tanks; amphibious armored personnel carriers; 100-mm, 122-mm and 152-mm assault guns; 122-mm howitzers; 120-mm and 160-mm mortars; 150-mm and 240-mm rocket launchers; and 57-mm and 85-mm antiaircraft guns. As for numbers of weapons, General Bruce C. Clarke, in the July-August 1959 issue of *Armor,* said: "If I ever doubted the potential of armor, such doubts were erased when, as Commander of Seventh Army, I assessed the capabilities of the 70,000 tanks just across the Iron Curtain."

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"Artillery Battalion Survey," extension subcourse 501, will bring you up to date on the subject.

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Prescription: take artillery subcourse 503, "Advanced Artillery Survey," to become an expert survey officer.

Preventive Maintenance of Communications Equipment

Captain Luis F. Hernandez
Communication/Electronics Department

Preventive maintenance and proper care are absolutely necessary if peak performance, dependability and maximum life are to be obtained from communication equipment. Experience has shown that a large majority of failures occurring in the field can be decreased by a proper preventive maintenance program. Although corrosion and wear are inevitable, a definitive and strong preventive maintenance program will, in most cases, detect faulty and worn equipment *before* actual breakdown. In many cases, replacement of a worn part prevents unnecessary damage to equipment and eliminates long periods of deadline.

The most important operation in the preventive maintenance program is the physical check of the equipment through the "tools" of our senses. For this operation careful observation is required. Users of communication equipment must make every effort to become thoroughly familiar with all the signs of proper operation detectable by the physical senses. If this is accomplished, signs of abnormal operation will be immediately discovered, and corrective action can be taken.

SIGHT: All parts of equipment should be visually inspected. Rust dirt, corrosion, and mildew growth are all sources of possible trouble which can be detected by observation. Discoloration of parts (resistors, condensers, etc.), blistering, bulging of the part or container, melted wax, oxidation of contact surfaces, and plate color (bright) of tubes are signs of overheating.

Close inspection may reveal loose mounting bolts and screws, ground connections, or clamping rings. Resistors, transformers and other parts may actually smoke under heavy loads. When any of these signs are discovered, the equipment should be immediately turned off and repaired before further damage results.

FEEL: This operation is very valuable in checking blower and drive motors, generators, transformers, filters, and other similar parts for excess heat. The purpose of this operation is to evaluate the temperature of the bearing, housing, or item being checked and in this way, determine whether lubrication is needed or whether some defect exists which requires correction. Normal operating temperatures will vary with different parts.

User personnel should become thoroughly acquainted with the normal operating temperatures of the various components so that any abnormal heat will be recognized.

The "feel" operation can also be applied to mechanical assemblies in order to determine if maintenance is necessary. For example, if a tuning knob becomes abnormally hard to turn, the need for cleaning or oiling is indicated. Loose knobs or dials can be felt while tuning. They should be tightened, or a note of the conditions made so that it can be remedied as soon as the equipment is shut down.

The efficiency of the equipment during operating periods is largely dependent upon the effectiveness with which preventive maintenance practices are carried out, and the prime function of preventive maintenance is to prevent breakdown and, therefore, the need for repairs.

SMELL: Radio parts operating under normal loads have no odor. However, under high overloads, the paint on the container, insulation on the wire or other material may emit an odor due to excessive heat. This may be accompanied by smoke which will help in locating the part being overloaded.

Heat sufficient to cause a burning odor is an indication of an overloaded circuit. The equipment should be shut down immediately, and the trouble corrected before further damage results.

HEARING: Every transmitter, receiver, power motor, generator, etc., has its own characteristic sound while in operation. This characteristic is caused by transformer hum; movement of air from blowers, generators and pumps; keying and teletype relays; calibration operations; or any other moving or electronic parts.

Communication personnel must be familiar with the characteristic sound of the equipment while it is operating properly so that improper operation of any part or component can be recognized by a change in its characteristic sound.

Most preventive maintenance services are little things, and because they are, there is a tendency to think of them as "not very important." But remember, one little thing always leads to another. One small loose fuze cap in a power supply, if not attended, may lead to a lost fuze, and the loss of a fuze will cause the whole radio to be deadlined.

Careless handling of the antenna connector on your receiver-transmitter RT-67 may cause a break in the wires connecting your antenna to the switchover relay in the set. Correcting this trouble takes time (especially if the radio mechanic is not available). You may not have one, and a radio minus an antenna connector is just an expensive pile of junk (especially if you were planning on using that radio for displacement).

Do not pass up minor preventive maintenance procedures as "not very important." They are important—they are vital!

DIFFERENT BALLISTIC DIFFERENCE TABLE

The values in the ballistic difference tables which appear on page 34 (figure 21) of the August issue of ARTILLERY TRENDS are for purposes of format illustration only. It should not be construed that these values were taken verbatim from the firing tables, and the figure should not be used in lieu of the firing tables under any circumstances.

CONCEPT OF EMPLOYMENT

Major Edwin W. Basham
Target Acquisition Department

The concept for employing an artillery meteorological (metro) team can be stated in 18 words. *It is located in the zone of action from where it can best sound the most appropriate atmosphere*. This concept is based upon a consideration of the metro team's organization, mission, capabilities, and limitations; time-space validity of messages; and communication requirements.

The artillery metro team is comprised of 1 warrant officer and 14 or 16 enlisted men. The team has a radiosonde sounding system, a radio, four vehicles, and a 30-day supply of expendables. It is capable of 24-hour operation for more than 30 days. Only the most severe weather conditions would silence equipment operation. If the electronic equipment were to fail, the metro team is equipped and prepared to use alternate visual techniques.

Each division artillery has an artillery metro team assigned to it, while each corps field artillery target acquisition battalion (FATAB) has two teams. There are six artillery metro teams in a type corps of two infantry divisions, one mechanized division and one armored division (fig 34). Because air defense units use guided missiles, they seldom have a requirement for metro data; therefore, they do not have organic metro sections. For the type army of 3 corps, 18 artillery metro teams are organic to the artillery with the corps. Artillery metro teams are the *only* source of upper air data in the field army area.

Besides assignments in the type field army, artillery metro teams are assigned to missile commands and airborne divisions. Airborne division artillery metro teams are reduced in strength, vehicles, and amount of expendables; therefore, they are capable of sustained operations for not more than 5 days. These teams have 1 warrant officer and 9 enlisted personnel.

MISSION OF THE METRO SECTION

Now, what is the mission of the artillery metro section (fig 35)? It provides, as required—

(1) Ballistic metro messages, NATO types 2, 3, and computer.
(2) Radiological fallout messages.
(3) Sound ranging messages.
(4) Upper air metro data to Air Weather Service (AWS) units.
(5) Special data to missile units.

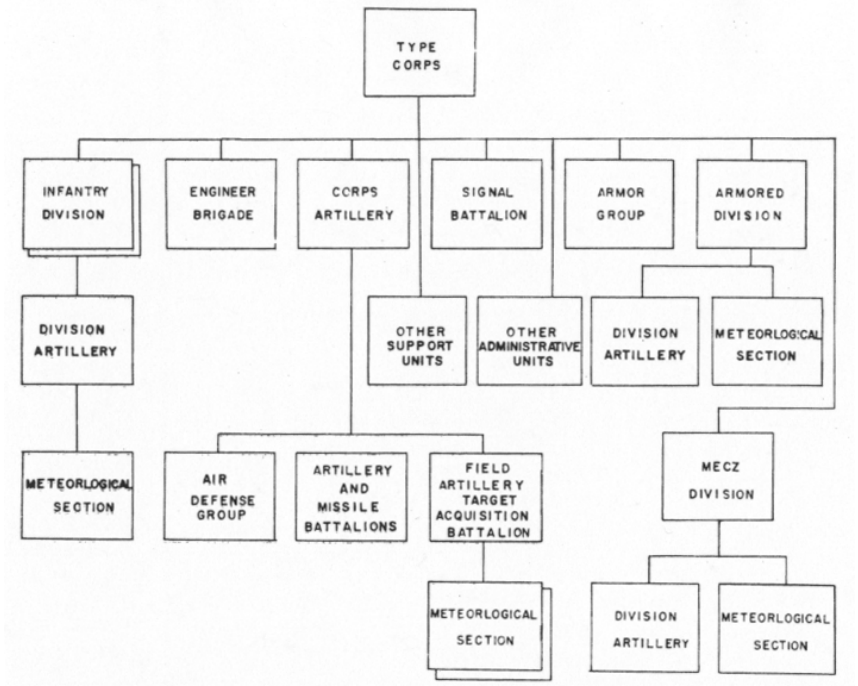

Figure 34. A type corps of two infantry divisions, one mechanized division and one armored division, with the six artillery metro teams shown.

The data collected from just one sounding may be used in accomplishing the preceding requirements. The metro team can measure atmospheric winds, temperature, humidity, pressure, and density from the surface to 102,000 feet. Rockets and howitzers firing at surface targets require only a type 3 NATO message. Low altitude ballistic messages can be produced on a 2-hour cycle, while several message types require a 4-hour cycle. The metro team is also capable of producing computer messages for use with FADAC. Data is exchanged with other metro teams within the corps by radio communications. There will be few or no requirements for type 2 (antiaircraft fire) messages. Messages for radiological fallout prediction are required every 2 hours; usually only one team in the corps is required to produce the fallout message. Fallout messages require atmospheric soundings to heights much greater than the height required for ballistic data. Although sound ranging units have a metro measuring capability, artillery metro teams have a requirement to support sound ranging activities. Air Weather Service units desire upper air data to heights comparable to that of fallout meteorological data, but much less frequently—about one sounding every 6 hours.

However, artillery metro sections do have limitations. For example, the time required to sound the atmosphere limits the frequency of soundings to a 2-hour cycle. The time for soundings and manual methods of

computation limit the frequency of producing multiple messages to a 4-hour cycle. Also, metro teams are *not* capable of communicating directly with the user of data, bulky equipment slows the emplacement time of a metro team to about 1 hour and march order to about 30 minutes, metro teams cannot forecast or extrapolate metro data, and radiosonde equipment can fall prey to jamming and electrical interference.

A ballistic message is considered valid to 20 miles over fairly level terrain, such as in the Central United States. In mountainous terrain and in areas near large lakes, seas, and oceans, the valid distance may be reduced as much as one-half. Several tests of metro message validity indicate that messages produced more often than every 2 hours do not substantially improve the quality of the message. When the general weather pattern is stable, messages may be valid to periods of 4 hours.

No tests have been conducted to establish a time-space validity for fallout metro data. Based only on the requirement as established by TC 101-1, a fallout message is valid for 2 hours for a corps area.

METEOROLOGY FOR SOUND RANGING

Meteorology for sound ranging is concerned with the lower atmosphere (surface to 2,600 feet). The lower atmosphere is less stable than the upper atmosphere; consequently, messages for sound ranging are valid for a shorter distance than for a ballistic message. Tests have not been conducted to determine a valid distance or time; however, all sound ranging platoons have the capability of producing their own data using surface observations and pilot balloon techniques. Artillery metro sections will produce messages for sound ranging when located in the immediate vicinity of the sound base and when a sound ranging platoon cannot observe because of lack of visibility.

Division artillery metro teams should be located within the division zone of action where soundings can best sample the atmosphere through which artillery trajectories will pass. The location may be the division artillery command post (CP) or the perimeter of a subordinate artillery battalion. The choice of location should depend upon the direction of the prevailing weather, the location of the artillery with the division, the communication facilities available, the plan of maneuver, and the logistical support requirements.

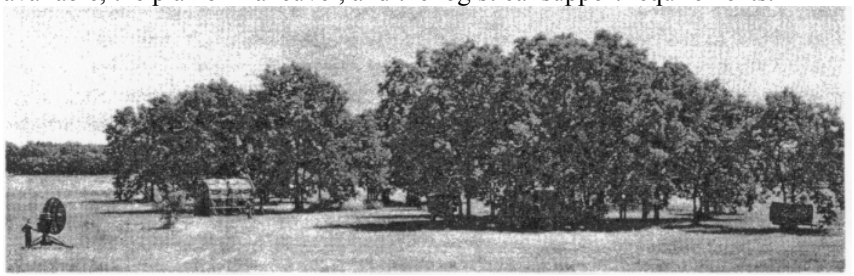

Figure 35. An artillery meteorological section under simulated combat conditions.

LOCATION OF FATAB TEAM

One FATAB team may be located in any corps artillery CP area, consistent with communication requirements, weather, artillery location, plan of maneuver, location of division artillery metro stations, and logistical support requirements. Because of the requirement for providing fallout metro support, one FATAB team is located near the corps rear boundary and within the perimeter of an army service unit for communications and logistical support.

The corps metro radio net is an amplitude modulated (AM) net, using the medium power radio AN/GRC-19. This net permits coordination of observation, radiosonde frequencies, and exchange of data. Although transmissions can be monitored over the receiver GRR-5 by units requiring metro data, the GRR-5 is not considered practical as a means of sending messages; it has no facility to acknowledge receipt of a message.

Metro messages and data should be disseminated over established artillery teletype nets. Teletypewriter is considered necessary for accurate and efficient transmission of data. Considering the length, the types of metro messages (2, 3, computer, fallout, and AWS), and frequency (every 2 hours), there is a need for automation such as found in a teletypewriter. The division artillery and corps artillery command and fire direction nets, teletypewriter, are recommended as the most practical means for disseminating metro data to gun and rocket units.

DIVISION ARTILLERY S3 AND STAFF SUPERVISION

Staff supervision at division artillery level can be accomplished best by the division artillery S3, assisted by the metro warrant officer of the division artillery team. The S3's familiarity with the calibers of artillery, tactical disposition, and employment plans makes him best prepared to establish the requirement for metro support.

Staff supervision of the FATAB teams and coordination of the metro teams within the the corps can be accomplished best by a staff officer trained in meteorology. The need for such an officer has been recommended to USCONARC by the US Army Artillery and Missile School, Fort Sill, Oklahoma. Under the staff supervision of the corps S3, this metro staff officer is needed to coordinate schedules of observations, supervise exchange of data so that ballistic data is available on a 2-hour basis, supervise training, expedite requisitions for metro supplies, provide technical advice on meteorology, and establish liaison with AWS units. Since the AWS staff officer at corps is a major, this officer should be of field grade rank.

The need for a special staff officer at army level for meteorology has also been stated by the Artillery and Missile School. The duties of this commissioned officer at army artillery level would parallel those of the metro officer at corps artillery, except for scope of interest. His grade should be lieutenant colonel to be commensurate with the grade of the AWS staff officer at army.

Effective staff supervision of artillery meteorology must exist at division, corps, and army levels. This staff supervision is accomplished best by the S3. Pending establishment of metro staff officer positions, the S3 can obtain assistance and advice from appropriate artillery metro warrant officers assigned to FATAB and division artillery teams.

To reemphasize, artillery metro teams are located in the zone of action where they can best sound the most appropriate atmosphere. Successful use of this concept will provide artillery commanders with timely, precision metro data and, hence, more effective artillery fire.

DON'T FAIL

An average attrition rate of 20 percent has been experienced in the Nuclear Weapons Employment subcourse of the Associate Field Artillery Officer Career Course, and only a smaller percentage of failures occurs in the Artillery Officer Career Course.

The main reason for these failures is a lack of fundamental knowledge of mathematics. It is strongly recommended that all officers about to begin either of the career courses apply for the preparatory subcourses:

470—Employment of Nuclear Weapons

526—Artillery Mathematics

and, if necessary,

Engineer subcourse 125—Slide Rule I.

The nuclear weapons subcourse is unclassified, and covers the employment of nuclear weapons integrated with other means of fire support; command guidance in planning; burst capabilities of assumed weapons; target analysis and damage estimation; troop safety considerations; and passive defense against enemy nuclear attack.

Subcourse 526, on mathematics, is completely new and just published, and covers the fundamental principles of arithmetic, algebra, plane geometry, trigonometry, and logarithms. Beyond that, however, many of these principles are exemplified in artillery applications, such as: single and double interpolation of firing tables; computation of horizontal and vertical shifts using the Worm Rule and sine factors; survey computations without the use of standard forms; metric system conversion; artillery round-off procedure; and the use of proportional parts tables, among others. The new subcourse features a self-contained text which you can keep for those occasions when a "brush-up" is necessary.

All subcourses are listed in the "Extension Courses for Artillery" catalog, 1961-62. Enrollment procedures and forwarding instructions are also included in the catalog on pages 7 through 10. DA Form 145 should be forwarded to:

Commandant
US Army Artillery and Missile School
Nonresident Instruction Department
ATTN: Extension Courses Division AKPSINI
Fort Sill, Oklahoma

Communications Systems in the New Divisions

Lt Col (Ret) Edward C. Campbell
Communication/Electronics Department

"The lesson shines forth clearly that when battle troops lack effective communication, and when they do not understand down to the last man that fullness of information is the mainspring of operations, the fight is already half lost." S.L.A. Marshall, in "The River and the Gauntlet," 1953.

The supplemental issue of ARTILLERY TRENDS, August 1961, was devoted to the artillery organization of the new infantry, armored, and mechanized divisions. The major items of communication equipment were listed under the organization of each unit. Inadequacies of equipment and personnel are apparent in some of the units, and recommendations to correct them have been submitted by the US Army Artillery and Missile School.

This article deals with the communication systems to be used by the artillery of the infantry, armored, and mechanized divisions. Only the internal communication systems of the division artilleries will be discussed; it is assumed that the external requirements and systems utilized by the division artilleries will not be materially altered.

STANDARDIZATION

The theme of standardization, a basic concept in the reorganization of the Army divisions, has been applied to the communication field. Communication systems of the present infantry, armored, and airborne division artilleries are being revised to meet the additional needs of the proposed divisions. Proposals for communication systems bring forth one main fact—the same systems will be employed by all division artilleries, with minor exceptions in the airborne division.

The advantages of a standard communication system throughout the artillery of all the reorganized divisions will have an immediate effect on the majority of artillery personnel. Communication officers and communication personnel, when reassigned to another division, will no longer be required to learn a new communication system; teaching artillery communication systems at service schools will be simplified; standardization of equipment and personnel will simplify training of communication personnel and, in the case of brigades and maneuver battalions, will facilitate operations, since the artillery communication systems and personnel

structure will be the same in all divisions, except for minor differences in the airborne division.

The communication systems of the artillery in the reorganized divisions will be adapted from the combat-tested and combat-proved communication systems utilized by the armored division for some 20 years. The explanation of the new communication systems follows in brief.

RADIO SYSTEM OF DIVISION ARTILLERY HEADQUARTERS

FM Radio Net

Each division artillery will operate one FM radio command/fire direction net (CF) (currently utilized in armored and infantry division

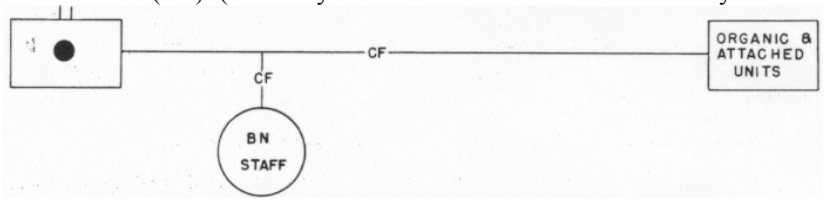

Figure 36. The command/fire direction net, FM (CF).

artillery). This net (fig 36) is reserved for staff coordination and command and control of all subordinate units (including army aircraft) within the capabilities of the equipment.

AM (Radioteletype) Nets

The division artillery will utilize two AM radioteletype (RATT) nets. The two AM radioteletype nets have been designated "command/fire direction net 1 (CF-1)" (fig 37) and "command/fire direction net 2 (CF-2)" (fig 38). The functions of these nets can best be differentiated by the capabilities of the units which operate in the respective nets; these

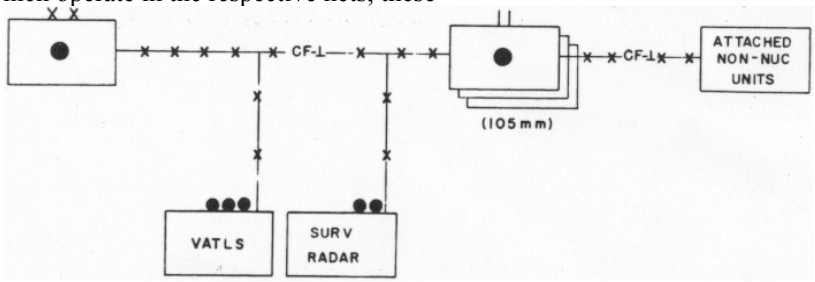

Figure 37. The command/fire direction net 1, AM, RATT, (CF-1).

capabilities, generally classified, are nuclear and nonnuclear.

The CF-1 net will link the division artillery headquarters, the three 105-mm howitzer battalions, the surveillance radar station(s), the visual airborne target locator section (VATLS) and any attached nonnuclear artillery. Division artillery headquarters will be net control station (NCS).

The CF-2 net will be composed of the division artillery headquarters (as NCS), the 155-mm/8-inch howitzer battalion and its 8-inch battery,

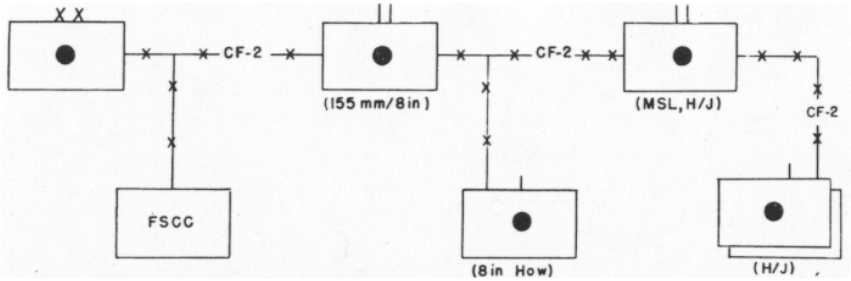

Figure 38. The command/fire direction net 2, AM, RATT, (CF-2).

the Honest John (HJ) missile battalion with its two Honest John batteries, and any attached nuclear-capable artillery. The division FSCC also operates in this net.

RADIO SYSTEMS AT BATTALION LEVEL

The 105-mm howitzer battalion of all divisions will utilize a radio system identical to that of the 105-mm howitzer battalion of the current armored division. This system consists of four FM radio nets—the battalion command/fire direction net (CF) (fig 39) and three fire direction nets designated F1, F2, and F3 (fig 40).

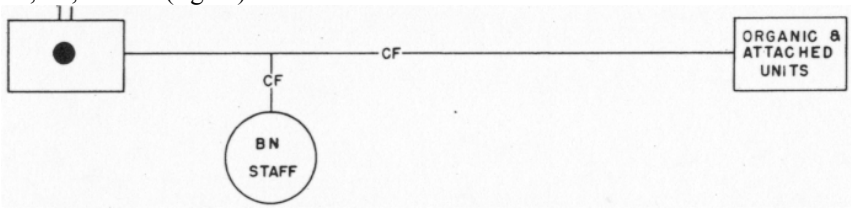

Figure 39. The battalion command/fire direction net, FM (CF).

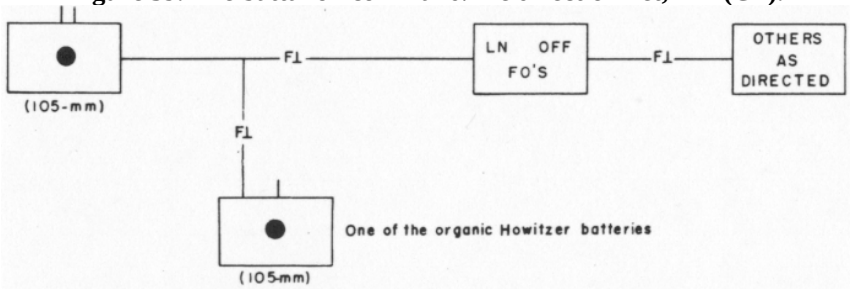

Figure 40. The battalion fire direction net 1, FM (F1). Nets 2 and 3 are identical.

The command/fire direction net (CF) serves the same function as in other artillery battalions—staff coordination and command and control of organic or attached units.

Stations operating in each of the three fire direction nets are the fire direction center (as NCS), one howitzer battery, one liaison officer (at the maneuver battalion), and the forward observers (three or more) associated with that particular liaison officer. Other installations or units (radar, aircraft, mortar platoons, VATLS, etc.) will operate in the battalion "CF" or "F" nets as directed.

The radio system utilized by the 155-mm/8-inch howitzer battalion and the Honest John missile battalion (of the infantry, armored, and mechanized divisions) is identical with that of the present rocket/howitzer battalion of the armored division. It consists of:

One battalion command/fire direction net, FM (CF).

One battalion fire direction net, FM (F).

THE WIRE SYSTEMS

The wire systems to be utilized by division artillery, the 105-mm howitzer battalion, and the 155-mm/8-in howitzer battalion are comparable to those used by similar units of the current armored division. The wire system employed by the Honest John missile battalion will be similar to that of the new 155-mm/8-inch howitzer battalion.

The wire system of all artillery units will, in general—

a. Parallel and supplement radio communication, when practicable.

b. Provide priority circuits for conduct of fire, to link battalion FDC to liaison officers and forward observers, and to connect battalion to the supported unit.

c. Provide other circuits for command, administration, and lateral communication, as directed.

Emphasis must be placed on utilization of the area system as an alternate means of communication for all artillery units.

Wire installation will begin prior to and during occupation of position and will be continuously improved until displacement is necessary.

INTEGRATION OF RADIO AND WIRE SYSTEMS

Radio/wire integration devices (AN/GSA-7) will be issued to each division artillery and battalion headquarters battery. The AN/GSA-7 provides the facility for interconnecting the FM radio system and the wire system of each headquarters. Now that the battalion and division artillery wire systems can be interconnected to the radio systems, artillery is afforded its first practical method for radio/wire integration.

The wire system will be integrated with the battle-tested radio system; together they will be combined with other available auxiliary means of communication. This system when forcefully implemented will assure the commander of that "fullness of information which is the mainspring of operations."

———●———

"Artillery, artillery, artillery . . . the word itself is as strong and powerful as the support it affords." Anon.

A GEM FOR THE COMMUNICATIONS OFFICER

For those units still equipped with telephone EE-8, the following two methods can be used to integrate communication systems of the radio set control AN/GSA-7 with RT-67.

1. Place the screw switch to the CB position. Install batteries BA-30. Press down and close the lever switch to RECEIVE. Release the lever switch and close the handset switch to TRANSMIT. All other operations are normal.

2. Place the screw switch to the NEUTRAL position. Install batteries BA-30. Connect key J-47, or some other type switch, to binding posts marked "12" and "BAT—." To transmit, close key or switch connected to binding posts 12 and BAT—, close handset switch, and speak into transmitter. To receive, release key and handset switch. All other operations are normal.

—submitted by MSgt Robert R. Gourley
Communication/Electronics Department

A GEM FOR WIREMEN

A very common problem with wire is its susceptibility to the short circuit. An expedient way to overcome a short circuit until permanent repair can be accomplished is with a ground return.

The operator on the receiving end of the line is notified, by an alternate means of communication, to ground return the shorted circuit. He does this by placing both ends of the pair of wires in one terminal of the switchboard or telephone and by placing a wire to ground in the other terminal. This procedure, when performed on both ends of the line, should allow normal operation again.

Remember, however, that to accomplish troubleshooting and repair of the shorted wire line, the ground return must be eliminated.

—submitted by Captain Harold A. Meyers
Communication/Electronics Department

A GEM FOR THE RADIO REPAIRMAN

If the radio set control AN/GSA-7 fails to activate when the receiver-transmitter RT-67 is set in the RING position, it may be the result of an OFF-FREQUENCY condition in the ringer-oscillator in the RT-67. The ring-oscillator is preset at the factory to produce a 1600 cycles per second ringing signal.

This condition can often be overcome by "whistling down" a 1600 cps tone into the microphone. Set up the receiver-transmitter and the AN/GSA-7 for normal operation with the receiver-transmitter removed from its case. Hold the DIAL LIGHT-ON-OFF-RING switch in the RING position, and slowly adjust the potentiometer R-128 (in grid circuit V-104) until the AN/GSA-7 is activated. This should correct the deficiency. If the radio repairman cannot cause the equipment to operate by "whistling down" a 1600 cps tone, the RT-67 should be turned in to the third-echelon repair shop.

—submitted by Lt Col John Cornelius
Communication/Electronics Department

RESIDENT COURSE SCHEDULE

Listed below are the courses to be given at the US Army Artillery and Missile School during the period 1 January 1962 to 30 April 1962.

Course	Cl Nr	Report	Start	Close	Input
Field Artillery Officer Orientation (6-A-C20)	10-62	8 Jan 62	12 Jan 62	8 Mar 62	101
	11-62	22 Jan 62	26 Jan 62	22 Mar 62	96
	12-62	5 Feb 62	9 Feb 62	5 Apr 62	90
	13-62	19 Feb 62	23 Feb 62	19 Apr 62	96
	14-62	19 Mar 62	23 Mar 62	17 May 62	90
	15-62	2 Apr 62	6 Apr 62	1 Jun 62	90
	16-62	16 Apr 62	20 Apr 62	14 Jun 62	90
	17-62	30 Apr 62	4 May 62	28 Jun 62	91
Field Artillery Officer Familiarization (6-A-C21)	4-62	14 Jan 62	15 Jan 62	6 Mar 62	64
Arty Officer Career (6-A-C22)	3-62	7 Jan 62	10 Jan 62	4 Oct 62	198
	4-62	21 Mar 62	26 Mar 62	21 Dec 62	198
Associate Field Arty Officer Career (6-A-C23)	3-62	15 Jan 62	18 Jan 62	24 May 62	103
	4-62	19 Mar 62	22 Mar 62	27 Jul 62	103
Field Arty Field Grade Off Refresher (Res Comp) (6-A-C11)	2-62	4 Mar 62	5 Mar 62	16 Mar 62	56
Division Arty Staff Officer Refresher (6-A-F5)	2-62	28 Jan 62	29 Jan 62	3 Feb 62	60
	3-62	8 Apr 62	9 Apr 62	14 Apr 62	35
Field Artillery Radar Officer (6-A-0140)	2-62	8 Jan 62	10 Jan 62	1 Mar 62	17
Arty Target Acquisition Officer (6-A-1154)	2-62	4 Jan 62	8 Jan 62	19 Mar 62	14
Arty Survey Officer (6-A-1183)	2-62	14 Feb 62	19 Feb 62	12 Apr 62	39
Corporal Officer (6-A-1190A)	3-62	5 Feb 62	8 Feb 62	12 Apr 62	13
	4-62	9 Apr 62	12 Apr 62	14 Jun 62	12
LaCrosse Officer (6-A-1187)	3-62	8 Feb 62	9 Feb 62	17 Mar 62	14
Arty Communications Officer (6-A-0200)	2-62	10 Jan 62	11 Jan 62	17 Apr 62	36
Arty Motor Transport (6-B-0600/0606)	2-62	7 Mar 62	9 Mar 62	4 May 62	44
Field Artillery Officer Candidate (6-N-F1)	4-62	12 Feb 62	19 Feb 62	24 Jul 62	54
	5-62	9 Apr 62	16 Apr 62	18 Sep 62	54
Field Arty Officer Candidate (Res Comp) (6-N-F2)	1-62	11 Feb 62	14 Feb 62	28 Apr 62	110
Nuclear Projectile Assembly (6-D-142.0)	3-62	7 Jan 62	8 Jan 62	13 Jan 62	23
	3A-62	4 Mar 62	5 Mar 62	9 Mar 62	23
	4-62	8 Apr 62	9 Apr 62	14 Apr 62	24
Rocket Nuclear Warhead Assembly (6-D-147.2)	8-62	14 Jan 62	15 Jan 62	22 Jan 62	20
	*9-62	4 Feb 62	5 Feb 62	12 Feb 62	24
	10-62	18 Mar 62	19 Mar 62	26 Mar 62	19
	11-62	1 Apr 62	2 Apr 62	9 Apr 62	19
	12-62	29 Apr 62	30 Apr 62	7 May 62	16

*Class reserved for National Guard personnel.

Arty Ballistic Meteorology (6-N-103.1)	**4-62	5 Jan 62	9 Jan 62	30 Mar 62	14
	5-62	23 Feb 62	28 Feb 62	11 May 62	43
	6-62	13 Apr 62	19 Apr 62	29 Jun 62	42
Weather Equipment Maint (6-N-8219/205.1)	5-62	4 Feb 62	6 Feb 62	11 May 62	16
	**6-62	1 Apr 62	3 Apr 62	12 Jul 62	13

**All non-US students.

FA Radar Maintenance (6-N-1121/211.3)	2B-62	14	Mar	62	19	Mar	62	29	Oct	62	25
Cpl Electronic Materiel Maint (6-N-1192A/214.1)	2-62	1	Feb	62	5	Feb	62	28	Aug	62	13
Corporal Fire Control System Maint (6-N-1186/215.1)	2-62	12	Apr	62	16	Apr	62	21	Nov	62	13
Redstone Electronic Materiel Maintenance (6-N-1192B/218.1)	3-62	4	Jan	62	8	Jan	62	25	May	62	14
Corporal Nuclear Warhead Assembly (6-D-F13)	3-62	29	Jan	62	30	Jan	62	8	Feb	62	12
Artillery Survey Advanced (6-R-153.1)	5-62	4	Jan	62	9	Jan	62	2	Mar	62	68
	6-62	18	Jan	62	23	Jan	62	16	Mar	62	68
	6A-62	1	Feb	62	6	Feb	62	30	Mar	62	29
	7-62	22	Mar	62	27	Mar	62	18	May	62	68
	8-62	4	Apr	62	9	Apr	62	1	Jun	62	68
Arty Flash Ranging (Advanced) (6-R-154.1)	1-62	9	Jan	62	11	Jan	62	20	Feb	62	30
Arty Sound Ranging (Advanced) (6-R-155.2)	2-62	19	Mar	62	21	Mar	62	15	May	62	30
Field Artillery Radar Operation (6-R-156.1)	5-62	4	Jan	62	5	Jan	62	16	Mar	62	38
	6-62	13	Feb	62	15	Feb	62	26	Apr	62	38
	7-62	20	Mar	62	22	Mar	62	29	May	62	38
	8-62	23	Apr	62	25	Apr	62	3	Jul	62	38
Cpl Mechanical Materiel Maintenance (6-R-164.3)	2A-62	10	Jan	62	11	Jan	62	9	Mar	62	14
	3-62	7	Mar	62	8	Mar	62	2	May	62	14
Artillery Radio Maintenance (6-R-313.1)	12-62	7	Jan	62	9	Jan	62	16	Apr	62	40
	13-62	21	Jan	62	23	Jan	62	30	Apr	62	40
	14-62	4	Feb	62	6	Feb	62	14	May	62	40
	15-62	18	Feb	62	20	Feb	62	28	May	62	40
	16-62	4	Mar	62	6	Mar	62	11	Jun	62	40
	17-62	18	Mar	62	20	Mar	62	25	Jun	62	40
	18-62	1	Apr	62	3	Apr	62	10	Jul	62	40
	19-62	15	Apr	62	17	Apr	62	24	Jul	62	40
	20-62	29	Apr	62	1	May	62	7	Aug	62	40
Artillery Communication Supervisors (6-R-313.6)	2-62	19	Feb	62	21	Feb	62	6	Jun	62	40
Artillery Vehicle Maintenance Supervisors (6-R-631.7/632.7)	2-62	28	Feb	62	2	Mar	62	20	Apr	62	25
Artillery Track Vehicle Maintenance (6-R-632.1)	11-62	7	Jan	62	9	Jan	62	22	Mar	62	40
	12-62	21	Jan	62	23	Jan	62	5	Apr	62	40
	13-62	4	Feb	62	6	Feb	62	19	Apr	62	40
	14-62	18	Mar	62	20	Mar	62	31	May	62	40
	15-62	1	Apr	62	3	Apr	62	14	Jun	62	40
	16-62	15	Apr	62	17	Apr	62	28	Jun	62	39
	17-62	29	Apr	62	1	May	62	12	Jul	62	39
Corporal Handling Equipment Maint (6-H-F8)	4-62	25	Feb	62	26	Feb	62	23	Mar	62	8
Senior Field Artillery Officer (Non-US) (6-A-F6X)	1-62	8	Apr	62	9	Apr	62	20	Apr	62	50

"Map and Aerial Photograph Reading for Artillery" is an extension subcourse especially designed for artillerymen.

Subcourse 470, "Employment of Nuclear Weapons," is an excellent preparatory extension subcourse for the prospective career course student.

NEWS NOTES FOR ARTILLERYMEN

OPERATION SWAMPFOX

The Army is conducting an extended test of jungle applicability of present and projected equipment with an expedition into the tropical jungles of Panama. Entitled OPERATION SWAMPFOX, the expedition is being conducted by the Technical Services in coordination.

Beginning at Chepo and ending several hundred tough miles later in El Real, various types of Army and commercial vehicular and communications equipment will be put through the unusual paces of jungle existence.

In addition to army trucks quite familiar to artillerymen, some new vehicles will be tested, and new methods for aircraft to locate surface elements will be evaluated.

RADAR ERRORS STUDIED

The University of New Mexico will conduct a series of tests designed to study the conditions under which radar signals fail.

By emplacing a radio transmitter-receiver on top of a mountain to "bounce" signals to the radar, it will be possible to measure any error in the radar scale reading accurately. In this way, the relationship between radar errors and atmospheric conditions can be more fully understood. Advance calculations of radar behavior and resulting errors is the goal of the mountain research. The system, when tested, will be very analogous to the study of meteorology in gunnery, and the use of metro forms to determine, in advance of shooting, the corrections necessary to make up for errors caused by weather conditions deviating from standard.

155-mm ILLUMINATING SHELL, T72E1

The United States Army Artillery and Missile School recently witnessed a combined engineering/user test on a new illuminating shell for the 155-mm howitzer, which far surpasses the current M118A2 shell in all categories of performance. The school has recommended that upon successful completion of remaining engineering tests, the T72E1 be classified Standard A, and the M118A2, Standard B.

The new projectile, weighing 95 lbs., is a ballistic match to the HE shell, whereas the M118A2 (103 lbs) is not. Other comparisons with the revealing percentages of improvement are:

	M118A2	T72E1	Percent Improvement
candlepower	400,000*	1,000,000	150%
burning time	60 sec.	120 sec.	100%
rate of descent	45 ft/sec	15 ft/sec	200%
area of illumination	0.4 sq. mi.	0.9 sq. mi.	125%

* The M118A2 is rated at 1,000,000 candlepower, but in actuality, only

about 400,000 cp is attained. This reduction in candlepower is the result of loss of molten magnesium through centrifugal rotation.

RADIO—AN/GRC-50

Having completed development and testing, a new radio, the AN/GRC-50, will soon be produced. The radio doubles the traffic capacity of its predecessor with only half the size, containing 24 voice channels or 384 teletypewriter channels, and being transported in a 3/4-ton truck (as opposed to the present radio's requirement for a 2 1/2-ton truck).

It is designed to provide line-of-sight communications for corps or division with a frequency range of 600 to 1,000 megacycles, and 1350 to 1850 megacycles. If relay stations are set 30 miles apart, the radio can operate at ranges of 240 miles without serious signal loss. The AN/GRC-50 will operate with the AB-577 horn-type, 48-foot collapsible mast antenna.

With an operational set-up time of only 15 minutes, the AN/GRC-50 promises to offer a significant improvement to Army communications.

PERSHING PROGRESS

Department of the Army recently awarded $80 million for completion of the Pershing test program and for procurement of components for the missile's guidance system.

The solid-propellant, internally-guided, nuclear-capable Pershing can operate with clear weather accuracy under any condition of the elements or visibility. It is transported completely on tracked vehicles at speeds of 40 miles per hour, and carries its own communications system, which permits it to operate independently on the battlefield.

The Pershing system has achieved the highest flight test record of successes of any research and development missile fired at Cape Canaveral. When ready for field use, the Pershing will be integrated with an eye to replacement of Redstone.

FADAC OPERATIONAL

An improved Field Artillery Data Computer should be in the hands of troops in one year (see fig 15). The "improvements" include an 8,192-word memory, storage capacity for 88 targets, and ability to handle five batteries.

The Research and Development model, forerunner of the issued FADAC, achieved consistent accuracy in firing demonstrations of delivery of predicted fires without registration. This accuracy is dependent only on the input of valid weapon-weather-ammunition data.

Two other pieces of equipment possible for inclusion in an automated system are soon to begin a series of qualifying tests. They are the Gunnery Officer's Console (GOC) and the Battery Display Unit (BDU). These items of equipment will allow the Fire Direction Officer to control the fires of his batteries electronically, over standard wire lines and radios.

The FADAC was recently airdropped successfully at Fort Bragg, N. C. Operation immediately after airdrop was fault-free.

105-MM HOWITZER, SELF-PROPELLED, XM104

The development of the lightweight, self-propelled 105-mm howitzer, XM104 (ARTILLERY TRENDS, August 1961, p. 3) is progressing on schedule. Test Rig Nr 1 (Fig 41, see also fig 10) has been driven approximately 3,000 miles and has performed satisfactorily. Test Rig Nr 2 is being fired at Erie Ordnance Depot and proves to be stable.

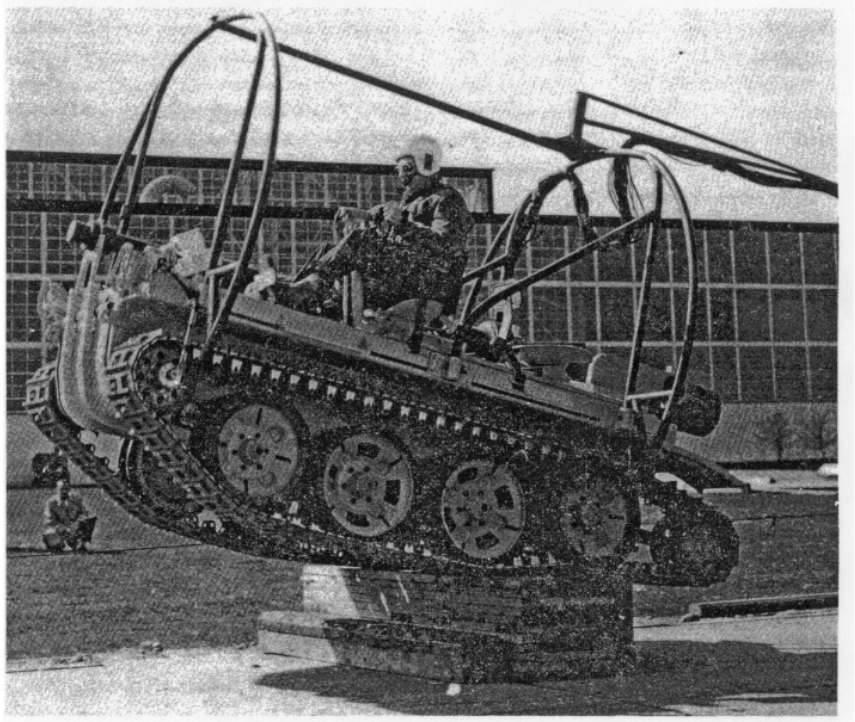

Figure 41. The XM104 testing.

A wooden mockup is currently being built with design changes in mind. Some of the changes include clearing of the top deck to facilitate firing and access to ammunition; constructing collapsible accessories (seats, headlights, steering column, etc.); foot wells in the deck to afford more comfort for personnel.

Progress on the XM102 towed weapon is also satisfactory.

NATIONAL GUARD SHOOTS FIRST HONEST JOHN

The 1st howitzer battalion, 108th artillery, 28th division was the first National Guard unit to conduct a "live" Honest John launching. The event occurred this summer at Camp A. P. Hill, Virginia, site of the 108th's summer training.

M113 ARMORED PERSONNEL CARRIER

The M113 armored personnel carrier (fig 42) was developed by the Ordnance Corps and service tested by both the US Army Armor Board and the US Army Artillery Board, and issue to troops began recently. It is air transportable, amphibious, and carries 13 personnel, including the driver and vehicle commander.

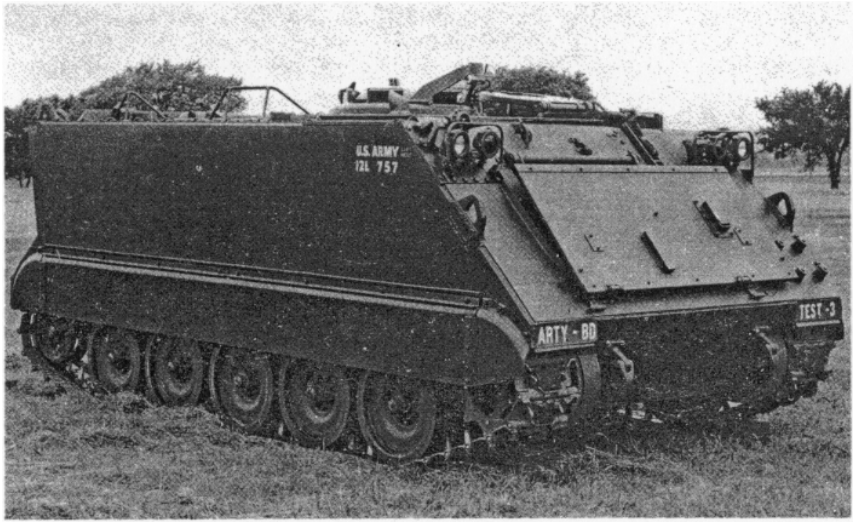

Figure 42. The M113 armored personnel carrier.

The Artillery Board is considering the carrier for further artillery uses, such as radio vehicle, mobile message center, wire section, and survey section vehicle.

MALLEABLE IRON SHELL

The Army Ordnance Special Weapons-Ammunition Command disclosed recently that a revolutionary method has been developed for the casting of artillery and mortar shells for the US Army. The new process permits the casting of shells from malleable iron instead of forged steel.

A contract for the production of 173,800 rounds of 81-mm mortar shells has been awarded to the Albion Malleable Iron Company, developers of the process. In addition to more effective fragmentation, the new process permits production with a nonessential material, thus making steel available for other defense work.

To assure complete safety of the shell, a specially designed ultrasonic inspection device which detects and rejects unsound castings has been developed by Albion and the Sperry-Rand Corporation. The lack of a reliable and rapid method of inspection previously had been a major stumbling block in efforts to develop an efficient production process.

HONEST JOHN CAMOUFLAGE

The US Army Artillery Board is service testing a method of camouflaging the Honest John launcher (762-mm rocket, truck mounted, M386). When the protective cover is emplaced over its ribs, the launcher closely resembles a standard 5-ton truck, particularly from the air (fig 43).

Figure 43. Comparing the covered M386 with standard 5-ton truck.

The frame assemblies will be aluminum and stored in rubberized fabricated bags on the right rear fender of the launcher when not in use. The cover will be stowed on the left rear fender; its installation will be possible with or without rockets mounted. Time involved to install or remove the cover by the crew is minimal.

T195E1, T196E1 SELF-PROPELLED HOWITZERS

The T195E1, 105-mm, self-propelled, armored howitzer, and its 155-mm counterpart, the T196E1, are modifications of the original T195 and T196. Their chief reason for development is to provide a howitzer with mobility to support a division with combat teams transported in armored personnel carriers and tanks.

The "E1" suffix resulted when the vehicles were redesigned with diesel-powered engines, and other modifications were incorporated.

The T196E1 (fig 12) differs from the present M44 self-propelled, 155-mm howitzer in that it has lightweight aluminum armor, is capable of 360 degrees of traverse, has a bore evacuator on the tube, a semiautomatic breech mechanism, a muzzle brake, and the M35 firing lock. The tube of this weapon is designed to fire current standard ammunition as well as developmental rounds. The carriage features a lockout suspension system which stabilizes the platform for firing.

The T195E1 (fig 11) has essentially the same background of development as the T196E1. Its carriage is identical to the T196E1, except for the lockout suspension system. The T195E1 will mount the XM103 cannon tube (as will the XM104 and XM102 lightweight 105-mm howitzers), which increases the range of the 105-mm howitzer. The XM103 employs a semiautomatic breech mechanism with a bore evacuator.

Both weapons are scheduled for service testing by the US Army Artillery Board in November 1961.

SURVEY INSTRUMENT PROGRESS

The *artillery surveying instrument, Gyro-Azimuth,* variously nicknamed "Orienter" or "Able," is in production with unit deliveries to begin late in fiscal year 1962. This instrument, which provides an independent means of obtaining accurate azimuths in the field, is being joined by lighter weight orientors. Two such instruments are in late stages of research and development, and will soon undergo engineering and service tests. Weighing only about 25 pounds, these instruments will provide a rapid independent azimuth with a standard deviation of one mil suitable for battalion and battery rapid survey.

The militarized *tellurometer MRA-1* is being transistorized and made lighter. Two instruments are being service tested, and are scheduled for arctic tests this winter. Only one will be standardized.

Artillery and Engineer survey computations are now being programed for prototype FADAC. The computational techniques will be evaluated by the US Army Artillery Board later in FY 1962. As modified, the solving of the survey problem will then be reprogramed for the production FADAC, and program tapes will be produced for issue to the field.

AUXILIARY 155-mm HOWITZER, M1A2

The US Army Artillery Board is preparing to conduct an evaluation of an auxiliary propulsion system for the standard towed 155-mm howitzer, M1A2 (ARTILLERY TRENDS, November 1960, p 50). The propulsion system is a kit composed of driver controls in the form of hand-operated laterals, trail caster wheels, a hydrostatic transmission system, and two standard Engineer spark ignition engines, each of which is mounted on a howitzer trail. Its purpose is to give a 155-mm howitzer the ability to assist the prime mover when traversing soils and slopes of varying types and degrees, and to act independently as an auxiliary-propelled weapon with a degree of maneuverability comparable to its prime mover.

A GEM FOR COMMUNICATIONS PERSONNEL

An annoying problem with the AN/GRC-46 radio-teletypewriter set, particularly when mobile, is its tendency to develop a short circuit in the antenna system. The result is an intermittent noise and loss of signal in the receiver of the set.

The most common reason for a short circuit is improper installation of the cable CG-1127/U which connects the transmitter RECEIVER ANTENNA receptacle with the ANT receptacle on the receiver. One way to prevent this condition is to insure that the cable is looped up over the transmitter and receiver case. This will prevent the connector UG-913/U from shorting on the ANT binding post, which is used for connecting an auxiliary antenna to the receiver.

—submitted by Mr. C. E. Scott
Communication/Electronics Department

STATUS OF TRAINING LITERATURE

1. The following training literature is under preparation or revision by the US Army Artillery and Missile School:

A. FIELD MANUALS (FM):

6-25	FA Missile Battalion, Redstone (U)
6-35	FA Missile, Redstone
6-36	FA Missile, Redstone Firing Procedures
6-40	Change 1, Field Artillery Gunnery
6-56A	FA Missile Battalion (Battery), Little John Rocket (U)
6-61	Change 2, FA Missile Battalion, Honest John Rocket
6-61A	FA Missile Battalion, Honest John Rocket (U)
6-75	Change 1, 105-mm Howitzer, M2 Series, Towed
6-81	155-mm Howitzer, M1, Towed
6-92	155-mm Howitzer, M44, SP
6-121	Field Artillery Target Acquisition
6-140	The Field Artillery Battery
6-( )	8-inch Howitzer, M( ), SP
6-( )	175-mm Gun, Motor Carriage, M( )
6-( )	Operation and Maintenance of Field Artillery Data Automatic Computer (FADAC)
6-( )	Radar Set, AN/TPS-25
6-( )	115-mm Multiple Rocket Launcher M91, and Toxic Rocket M55
6-( )	FA Missile Battalion, Sergeant (U)
6-( )	FA Missile, Sergeant (U)

B. TECHNICAL MANUALS (TM):

None

C. ARMY TRAINING PROGRAMS (ATP):

6-100	Field Artillery Unit
6-302	FA Rocket Units (Honest John, Little John)
6-545	Field Artillery Missile Battalion, Corporal
6-555	FA Missile Battalion, Sergeant
6-585	FA Missile Battalion, Lacrosse
6-630	FA Missile Battalion, Redstone

D. ARMY TRAINING TESTS (ATT):

6-4	Field Artillery Target Acquisition Battalion and Battery
6-116	Change 2, Field Artillery Howitzer Battalion, 105-mm and 155-mm, Towed and Self-Propelled
6-117	Change 1, Field Artillery Howitzer Battery, 105-mm or 155-mm
6-135	FA Rocket/Howitzer Battalion (Infantry Division)
6-137	FA Howitzer Battery, 8-inch (Infantry Division)

2. Training literature submitted to USCONARC:

FM 6-10	Field Artillery Communications
FM 6-15	Artillery Meteorology

FM 6-20-2	FA Techniques
FM 6-120	FA Target Acquisition Battalion and Batteries
FM 6-( )	Field Artillery Graphic Firing Equipment
ATP 6-558	Searchlight Batteries
ATP 6-575	FA Target Acquisition Battalion

3. Training literature at the Government Printing Office:

FM 6-20-1	Field Artillery Tactics
FM 6-59	Change 1, FA Rocket, Honest John, with Launcher M386
FM 6-60	Change 1, FA Rocket, Honest John, with Launcher M289
FM 21-13	The Soldiers Guide
TM 6-300-62	Army Ephemeris for 1962
TM 6-( )	Logarithmic and Mathematical Tables

4. Training literature recently printed:

FM 6-2	Artillery Survey
FM 6-45A	FA Missile Battalion, Lacrosse, Gunnery
FM 6-56	FA Missile Battalion (Battery), Little John Rocket
ATT 6-565	Field Artillery Missile Battalion (Battery), Little John Rocket
ATP	Training Program for non-unit obligors

5. Artillery training films currently under production and scheduled for release during calendar year 1961:

Ground Surveillance Radar, AN/TPS-25
- Part I. Theory, installation and operation
- Part II. Moving target detection

Countermortar Radar AN/MPQ-4A
- Part II. Preparation and performance checks

6. Artillery training films currently under production and scheduled for release during calendar year 1962:

Laying the Field Artillery Battery

The 762-mm Rocket
- Part I. Introduction to the system
- Part II. Mechanical assembly and electrical checkout
- Part III. Loading, preparation for action, firing, and march order

318-mm Rocket
- Part I. Introduction to the system
- Part II. Description of equipment
- Part III. Loading, preparation for action, firing, and march order

Field Artillery, RSOP
- Part I. Deliberate
- Part II. Rapid

Field Artillery Target Acquisition Battalion

7. Artillery training films production completed and scheduled for release in calendar year 1961:

Lacrosse Battalion Assembly Section—Crew duties in prepare for action, checkout and assembly, and march order (25 minutes)

8. Artillery training films scheduled for production and release during calendar year 1962:

Field Artillery Sound Ranging

The Infantry Division Artillery Forward Observer

9. Artillery training films recently released:

Lacrosse Battalion—Firing Section—Crew duties in prepare for action, firing, and march order. (TF 6-3123) (30 minutes)

Lacrosse Battalion—RSOP (TF 6-3134) (25 minutes)

10. Status of Army Subject Schedules (MOS):

A. UNDER PREPARATION OR REVISION BY THE US ARMY ARTILLERY AND MISSILE SCHOOL:

ASubjScd 6-104	MOS Technical Training of the Field Illumination Crewman
ASubjScd 6-156	MOS Technical Training of the Radar Crewman
ASubjScd 6-166	MOS Technical Training of the FA Missile Crewman (Lacrosse)
ASubjScd 6-167	MOS Technical Training of the FA Missile Fire Control Crewman (Lacrosse)

B. SUBMITTED TO USCONARC:

None

C. AT GOVERNMENT PRINTING OFFICE:

None

D. RECENTLY PUBLISHED:

ASubjScd 6-103	MOS Technical Training of the Ballistic Meteorology Crewman
ASubjScd 6-154	MOS Technical Training of the FA Flash Ranging Crewman
ASubjScd 6-155	MOS Technical Training of the Sound Ranging Crewman
ASubjScd 6-164	MOS Technical Training of the FA Missile Crewman (Corporal)
ASubjScd 6-168	MOS Technical Training of the FA Missile Crewman (Redstone)

11. Status of Army Subject Schedules (Non-MOS):

A. UNDER PREPARATION OR REVISION BY THE US ARMY ARTILLERY AND MISSILE SCHOOL:

ASubjScd 6-8	Counterbattery Operations
ASubjScd 6-9	Countermortar Operations
ASubjScd 6-10	Field Artillery Radar Operations
ASubjScd 6-11	Defense of Artillery Position Areas
ASubjScd 6-17	Liaison

B. SUBMITTED TO USCONARC:
None
C. RECENTLY PUBLISHED:
ASubjScd 6-3 Cannoneer and Rocketeer Instruction
ASubjScd 6-21 Operation of Meteorological Section

ARTILLERY INFORMATION LETTERS

The following artillery information letters containing items of technical nature have been published by the US Army Artillery and Missile School since the AUGUST 1961 issue of ARTILLERY TRENDS. Distribution is made *only* to the units and their controlling headquarters which are authorized the equipment discussed in these letters:

CORPORAL INFORMATION LETTER NUMBER 25
dated 19 October 1961
LACROSSE INFORMATION LETTER NUMBER 16 (S)
dated 3 August 1961

REORGANIZATION INSTRUCTION CHANGEOVER

The US Army Artillery and Missile School has directed that individual departments prepare and present orientations on the reorganization with the advent of fiscal year 1962.

After 1 January 1962, both organizations will be taught in appropriate courses in the school. All instruction subsequent to 1 May 1962 will be based solely on the reorganization.

REFLECTIONS
Artillery in WWI

The Germans and French usually traveled with three complements—the cavalry, the supporting artillery, and bicyclists, who acted in the capacity of a reconnaissance element . . . German artillery proved to be particularly effective in its ability to knock down French forts, so that the infantry need not even attack the walls . . . an Austrian scientist adapted the seismograph (detection of earthquakes) into a reliable machine for locating enemy heavy artillery . . . a new military capability was keeping scientists occupied with trajectories and formulas—"bomb throwing" from aeroplanes—considered to be interesting, but never a replacement for artillery . . . a plan to replace horse cavalry with motorcycle cavalry was voted down as impossible to implement for training reasons, and because no commander could conceive of leading as many as 60,000 soldiers—on 60,000 motorcycles—into battle . . . the "armored automobile" soon grew into the fantastic weapon—the tank; large, powerful, awe-inspiring, and cumbersome, the unbelievable machines stirred up much controversy over their capabilities on the battlefield, for though they were unstoppable by anything known to military men, they were capable only of speeds of 1,000 yards per hour or less . . .

L 1136 ARMY–FT. SILL, OKLA.