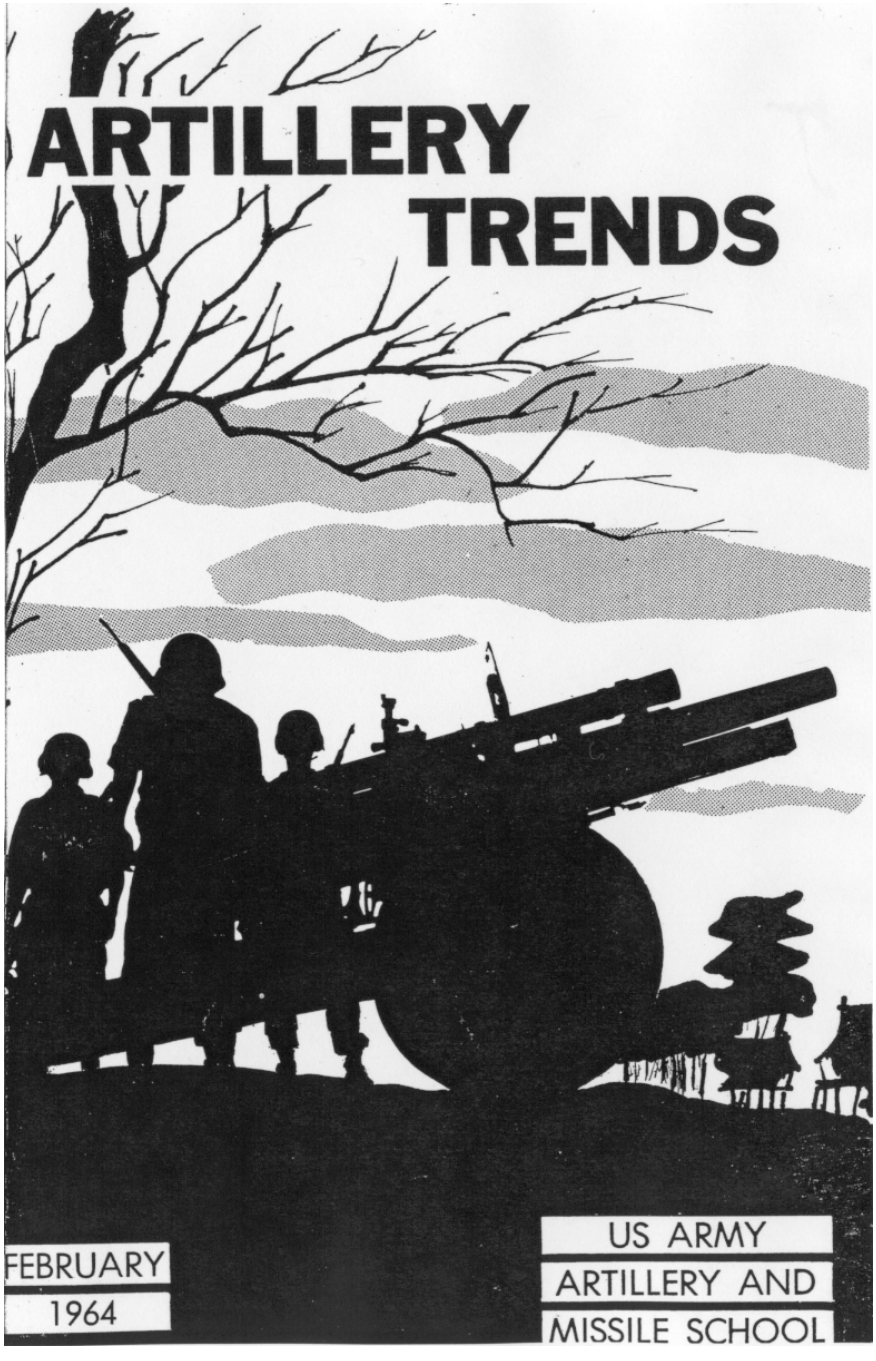
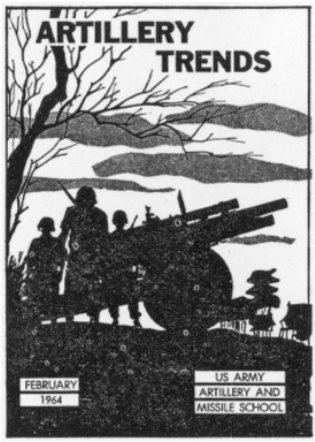
ARTILLERY TRENDS



FEBRUARY
1964

US ARMY
ARTILLERY AND
MISSILE SCHOOL



Instructional Aid Number 29

- **COVER**

The artillery with its modern weapons and techniques must conquer the challenges of everything from nuclear combat in a vast theater to guerrilla operations in a tropical jungle. The article entitled "Artillery training for COUNTERGUERRILLA WARFARE" which begins on page 11 gives an insight to the challenges of counterguerrilla activities. Old name, new weapon depicted on inside front cover—see page 3.

- **ARTICLES**

- **NEWSNOTES**

- **RESIDENT COURSE SCHEDULE**

- **STATUS OF TRAINING LITERATURE AND FILMS**

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Lance

under development . . .

LANCE

greater fire support

—designed to complement division tube artillery and to extend the division commander's capability for providing nuclear and nonnuclear supporting fires. In essence, this statement could be the foremost job of the US Army Artillery's newest developmental ballistic missile—the Lance (fig 1). To accomplish its purpose, Lance, still under development, is being designed as a simple, rugged, highly mobile, low-cost, and reliable ballistic missile system which will provide the ground-gaining arms with greater fire support.

The Lance, which is being developed to replace the Lacrosse, Honest John, and possibly Little John systems, will be developed to include the following features:

- simplicity of design, operation, and maintenance to require minimum specialized training, and to permit operation with reliability under all weather conditions.
- full mobility in all types of terrain and rugged enough to withstand the rigors of forward battle zone operations.
- single-stage, prepackaged liquid-fueled missile with a new guidance concept.
- compact propulsion system—a pressure-fed, storable liquid bipropellant system with positive expulsion of propellants—to provide a high thrust, short-duration boost phase.
- capability of firing from its own carrier with point target accuracy at a far greater range than the Honest John.

Figure 1. LANCE "on the way."

The Lance missile system (fig 2) had its beginning in 1956 when the Army established its concept of an optimum family of surface-to-surface missiles for the period of 1965 to 1970. In 1962, the Army selected

Ling-Temco-Vought, Inc. as the prime contractor for the Lance system.

Figure 2. Lance missile and launcher.

The designation "Lance", portrayed by a shield with the missile in the center of a lance head, is derived from the cultural traditions of the North American Indians. The round shield, painted symbolically, afforded the Indians both spiritual and physical protection in battle.

SUPPORT EQUIPMENT

The Lance system will require four major items of support equipment—a self-propelled launcher (SPL), a transporter-loader (TL), a lightweight

launcher (LWL), and a prefire tester (PFT). The support equipment is being designed to require little extensive retraining of crews who are familiar with the Little John, Honest John, or similar weapon systems. Lance may be maintained with tools currently used for Honest John and Little John with the exception of one special tool, a spanner wrench.

All system components will be built to meet air drop and air delivery specifications (fig 3). The lightweight launcher with the missile may be delivered by aircraft in air landing operations or by helicopter in air assault operations.

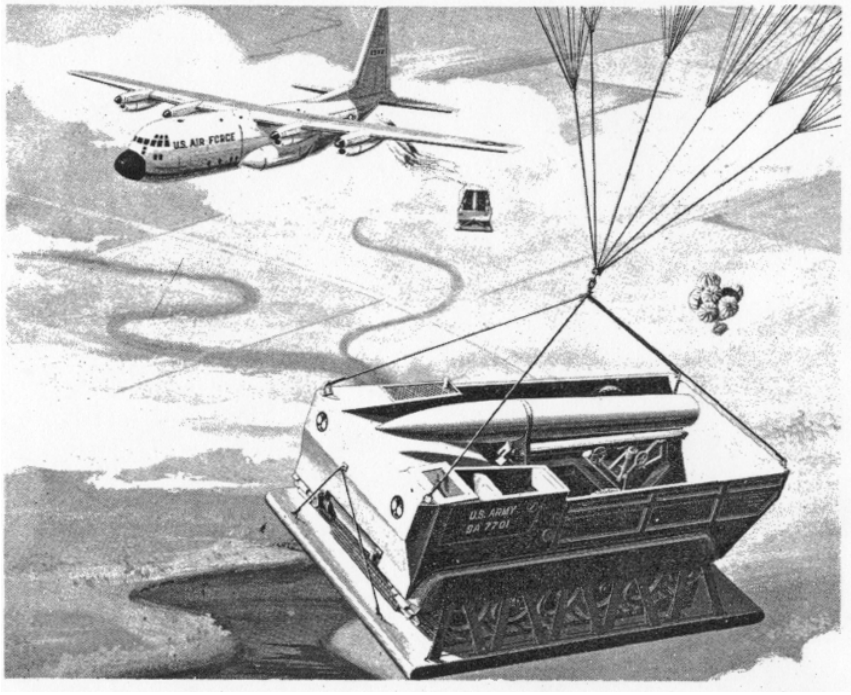


Figure 3. All support equipment meet the requirements for air delivery.

LAUNCHERS

A full track M113A1 equipped with a universal launch fixture (basic firing unit) and a full mobility adaption kit (wheels, jacks, and towbar), will be the self-propelled launcher for the Lance system. The launcher, which will probably transport the firing section, will have the capability of cross-country operations in various types of terrain, "swimming" inland waterways, and traveling at highway speeds on improved and unimproved roads.

Stabilization on the self-propelled launcher is to be achieved with a rapidly operated hydraulic suspension lockout system.

The lightweight launcher (fig 4) consists of the universal launch fixture removed from the self-propelled launcher (fig 5) and equipped with

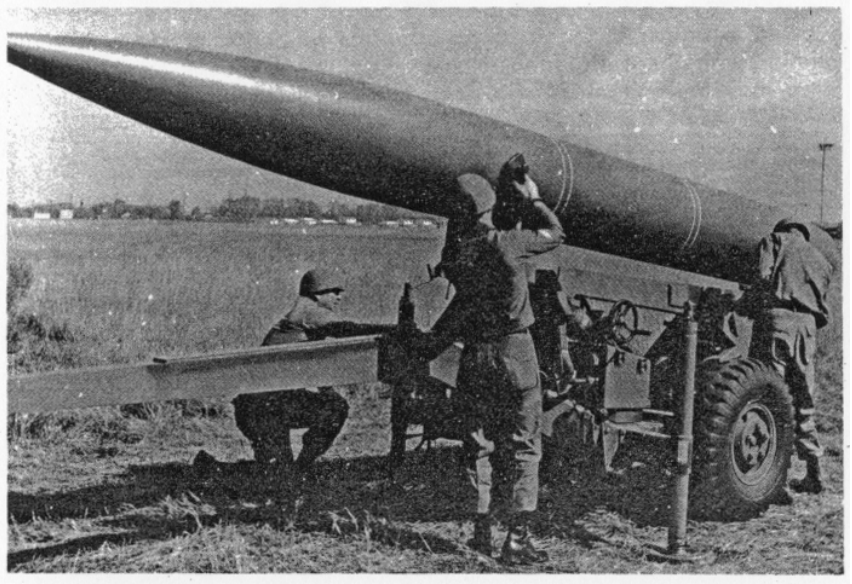


Figure 4. Preparing lightweight launcher for firing.

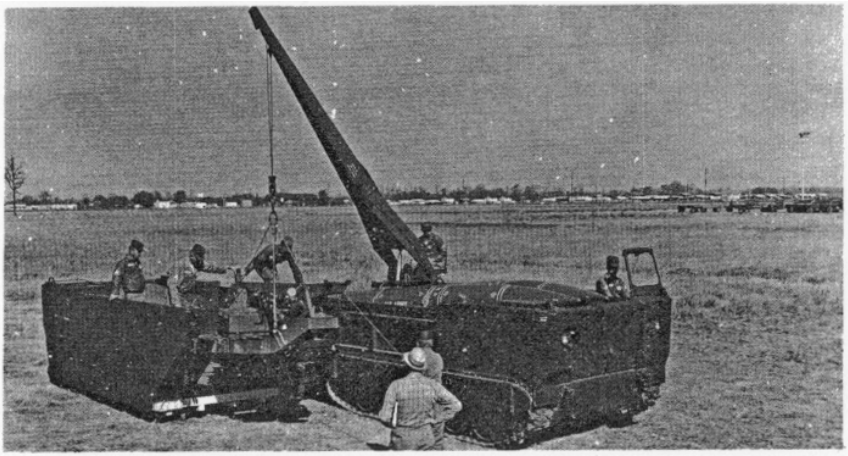


Figure 5. Firing unit is removed from self-propelled launcher.

the full mobility adaption kit. The lightweight launcher may be towed by a prime mover with a capacity of 1 ton or greater.

The launcher platform may be traversed and elevated manually.

TRANSPORTER-LOADER

The transporter-loader (fig 6), the second tracked vehicle in the Lance unit, could utilize the same type of vehicle as the self-propelled launcher,

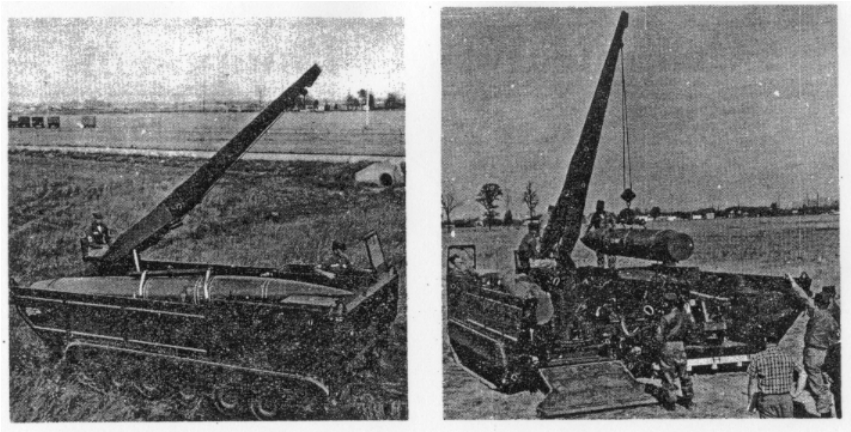


Figure 6. Transporter-loader (left). Loading operation (right).

a modified M113A1. The transporter-loader is designed with an independent, hydraulically-operated boom crane, which permits freedom in positioning of the missile during operation, and support cradles for two missiles. Controls and operator space may be provided on the boom. The crane will be used for loading and unloading the transporter-loader as well as the launcher and for performing various other missile handling functions and weight-lifting operations.

PREFIRE TESTER

The prefire tester, mounted on the missile launcher, will be used for verification of the Lance missile (GO/NO GO) and insertion of corrected range factors, all within 30 seconds.

The fire pack, connectable to a 100-meter cable, contains a guarded toggle switch for firing.

REQUIREMENTS

Standard laying procedures listed in FM 6-40 have been proposed for laying the Lance. The parallel reciprocal technique can be used for laying the missile, while the distant aiming point or aiming target method can be used for boresighting.

Lance training requirements could be incorporated into three areas—new equipment, field maintenance, and operational training. The simplicity of the Lance system could eliminate a long, involved training period and may also lessen the required time for accomplishing training objectives.

The Lance ballistic missile system is being designed to provide greater fire support by means of a rugged and reliable missile that may be transported and fired with mobile, simple, durable, and versatile support equipment.

latest status charts . . .

Graphical FDC Equipment

Mr. F. M. Varline
Gunnery Department

The following status charts contain the latest information concerning 105-mm, 155-mm, 175-mm and 8-inch graphical fire direction equipment for tabular firing and site tables.

Graphical fire direction equipment for use with FT 105-AS-1 and FT 155-AH-1 are presently being developed, and shipment of this equipment to depots is expected to begin during the first quarter of fiscal year 1965. These firing tables are for standard ammunition fired by the M108, 105-mm and M109, 155-mm self-propelled howitzers.

The requisitioning of graphical equipment through normal channels will be considerably expedited if federal stock numbers, shown in the status charts, are included with the requisition.

105-MM HOWITZER			
Range and Deflection	FT 105-H-6 M-ICAO	FT 105-H-6 C2 M-ICAO (ILLUMINATING)	FT 105-AS-1 * M-ICAO
	PROTRACTOR, FAN RG DF (Aluminum) 15,000 meters SN 1290-266-6890 (Standard)	PROTRACTOR, FAN RG DF (Aluminum) 15,000 meters SN 1290-266-6890 (Standard)	PROTRACTOR, FAN RG DF (Aluminum) 15,000 meters SN 1290-266-6890 (Standard)
Elevation	GFT FAN (Aluminum) 17,000 meters BEING DEVELOPED	GFT FAN (Aluminum) Not to be developed	GFT FAN (Aluminum) 17,000 meters To be developed
	SCALE, GRAPHICAL FIRING, M82 (GFT) Rule 1 and 2 SN 1220-815-6192 (Standard)	SCALE, GRAPHICAL FIRING, (GFT, Proj Illuminating) Rule 1 and 2 M84 SN 1220-978-9585 (Standard)	SCALE, GRAPHICAL FIRING Being Developed **
Site	SCALE, GRAPHICAL FIRING, SITE M83 (GST) SN 1220-815-6190 (Standard)		SCALE, GRAPHICAL FIRING, SITE Being developed **

* Standard ammunition fired from M108.

** Expected to be in depots in the first quarter of FY 65.

155-MM HOWITZER		
Range and Deflection	FT 155-Q-3 M-ICAO	FT 155-AH-1 *** M-ICAO
	PROTRACTOR, FAN RG DF (Aluminum) 15,000 meters SN 1290-266-6890 (Standard)	PROTRACTOR, FAN RG DF (Aluminum) 15,000 meters SN 1290-266-6890 (Standard)
Elevation	GFT FAN (Aluminum) 17,000 meters To be developed	GFT FAN (Aluminum) 17,000 meters To be developed
	SCALE, GRAPHICAL FIRING, M64 (GFT) Rule 1 and 2 SN 1220-789-2985 (Standard) SCALE, GRAPHICAL FIRING, M70 GFT Proj Illuminating) Rule 1 and 2 SN 1220-898-4212 (Standard)	SCALE, GRAPHICAL FIRING (GFT) Being developed **
Site	SCALE, GRAPHICAL FIRING, SITE, M67 (GST) SN 1220-789-2986 (Standard)	SCALE, GRAPHICAL FIRING, SITE, (GST) ** Being developed

*** Standard ammunition fired from M109. When firing the M109, based on FT 155-AH-1, Green Bag propellant should be used whenever possible.

175-MM GUN		
Range and Deflection	FT 175-A-O (Rev) M-ICAO	FT 175-A-1 M-ICAO
	PROTRACTOR, FAN RG DF (Aluminum) 50,000 meters Scale 1:50,000 To be developed	PROTRACTOR, FAN RG DF (Aluminum) 50,000 meters Scale 1:50,000 To be developed
	PROTRACTOR, FAN RG DF (Aluminum) 25,000 meters	PROTRACTOR, FAN RG DF (Aluminum) 25,000 meters
Elevation	SCALE, GRAPHICAL FIRING (GFT) ****	SCALE, GRAPHICAL FIRING (GFT) To be developed Awaiting BRL Data
Site	SCALE, GRAPHICAL FIRING, SITE (GST) ****	SCALE, GRAPHICAL FIRING, SITE (GST) To be developed Awaiting BRL Data

**** Provisional firing table, gratuitous issue to 175-mm Gun units.

8-INCH HOWITZER		
Range and Deflection	FT 8-J-3 M-ICAO	FT 8-O-3 M-ICAO
	PROTRACTOR, FAN RG DF (Aluminum) 25,000 meters SN 1290-266-6891 (Standard)	PROTRACTOR, FAN RG DF (Aluminum) 25,000 meters SN 1290-266-6891 (Standard)
Elevation	GFT FAN (Aluminum) 17,000 meters To be developed	GFT FAN (Aluminum) 17,000 meters To be developed
	SCALE, GRAPHICAL FIRING, M71 (GFT) Rule 1 and 2 SN 1220-898-4213 (Standard)	SCALE, GRAPHICAL FIRING, M85 (GFT) Rule 1 SN 1220-876-8572 (Standard)
Site	SCALE, GRAPHICAL FIRING, SITE M72 (GST) SN 1220-898-6786 (Standard)	SCALE, GRAPHICAL FIRING, SITE M86 (GST) SN 1220-876-8573 (Standard)

COUNTERGUERRILLA WARFARE

Major Patrick J. Lindsay
Artillery Advisor
Republic of Vietnam

In recent years, guerrilla warfare not only has created headlines in the world news media but also has become a common topic of conversation for individuals. The reason? Guerrilla warfare is more than known conventional-type warfare. It is a "hit and run" war which involves an enemy—the guerrilla—who rarely exposes himself. The guerrilla may or, more likely, may not wear a uniform, and he can and will operate in any terrain and under all weather conditions. To cope with this unconventional enemy, the artillery has had to depart from conventional techniques to successfully deliver effective fire on the enemy. Any artillery unit may suddenly find itself committed to fighting guerrillas in jungle, swamp, mountainous or desert areas; therefore, a unit must be trained for counterguerrilla warfare to survive.

Note. The August and November 1961 issues of ARTILLERY TRENDS contained four articles concerning special (guerrilla) warfare which stressed the facts and techniques of counterguerrilla operations. This article reemphasizes these facts and techniques and presents considerations for a training period aimed at improving the capability of a unit to support friendly maneuver forces in counterguerrilla operations.

What is so different in the requirements for a towed or self-propelled howitzer battalion engaged in counterguerrilla operations? Compared to conventional warfare as known in the past, quite a bit. The objective is the same—to place rapid, responsive fires on the enemy whenever, wherever, and in the amount desired by the supported force commander. In counterguerrilla warfare, obstacles to effective artillery employment in terms of massed fires, maintenance of flexibility, rapid movement, and target observation are often more difficult to overcome than they were in World War II and Korea.

Before a conventionally trained howitzer unit steps into a counterguerrilla operation, a certain amount of **additional** training is highly desirable. Note the absence of the word "retraining." The artillery unit well trained in the fundamentals of rendering accurate and timely fire support does not need to be retrained in the fundamentals of artillery; for example, a "red hot" fire direction center needs no retraining—it needs only additional training to prepare for the differences to be encountered in counterguerrilla operations.

WEAPON EMPLOYMENT

The single, most prominent feature of artillery in counterguerrilla operations is that weapons will usually be employed at the **battery** and **platoon** level, with platoon employment being predominant (fig 1). Every artilleryman knows that artillery is a greater destructive force and is better able to influence the battle when massed; this implies the target warrants such massed fires. However, seldom, if ever, will the air or ground artillery observer spot a guerrilla force requiring the fires of more than one battery. Suppose it is decided to group available artillery into large size forces, battalion or higher level, waiting for that grand but rare opportunity. While the artillery is waiting for that opportunity, the guerrilla force will strike boldly and often in areas left void of artillery.

Figure 1. A 155-mm howitzer platoon position.

Greater than the need to mass batteries and battalions is the need to cover all vital areas with the greatest amount of artillery available. This means that the smallest fire unit which generally matches the firepower of the average size guerrilla force is the correct level of artillery employment—usually the platoon; occasionally, the battery.

In organizing and training units for combat, independent operations of sections, platoons, and batteries should be evaluated. It may be considered normal to attach platoons and battery firing units to maneuver headquarters. A unit of this type would be equipped with its own weapon system—an observer team (and perhaps a liaison section), a fire direction center (FDC), communications, transportation, and logistical elements. This attachment is based on the artillery mission of supporting maneuver forces performing concurrent, multiple, independent operations in widely separated areas. Sections and platoons should receive increased command attention and priority during the training period to prepare for fragmented and independent operations in which they "go it alone on their own" for periods of a few days to several weeks.

Single-piece employment may be dictated under conditions of limited available artillery and large areas of operation. A single piece has only marginal firepower and is difficult to adjust from the air, but, in areas where guerrilla forces are strong, the presence of even a single artillery piece, poised to fire in support of friendly villages and outposts, has a psychological value and a definite suppressing effect on guerrilla actions.

Single-piece employment should be used as a last resort, since the platoon is, under present TOE's, the lowest echelon capable of operating with all elements of a weapon system. It is recognized that with single-piece employment, the battalion will be hard pressed to fill all personnel and equipment needs.

Counterguerrilla operations will place increased responsibility on the small unit leader—the section chiefs and platoon leaders—similar to that envisioned on the nuclear battlefield. Throughout basic and advanced unit training phases, section chiefs and platoon leaders should be given missions which require them to assume responsibility for all aspects of command and control with a minimum of reliance on higher headquarters. Effective small unit leadership is critical to the success of artillery in support of counterguerrilla forces.

FIRING BATTERY

Firing battery commanders will encounter the additional problems normally associated with semi-independent or independent operations, plus those problems, peculiar to counterguerrilla operations, involving position-area occupation, reconnaissance, and security of march columns and artillery locations.

Guerrilla hit-and-run tactics place added responsibility on artillery commanders to provide continuous, effective security throughout the area traversed and occupied by artillery units. This security may be furnished by maneuver forces attached to the artillery units or by positioning artillery inside operational bases (fig 2) and built-up areas. Therefore,

perimeter defense training should include use of fragmentation mines, barbed wire, trip flares, noise alarm systems, and booby traps. Listening post operations should receive close attention since any weaknesses here could become an "Achilles' heel." Unscheduled day and night alerts should be conducted to develop quick and panicless reaction to guerrilla attacks.

Figure 2. A combat outpost serving as a forward operational base.

Frequently, artillery units moving with maneuver forces will be required to provide their own security; therefore, **practical** training in security planning and march column security should be extensive. March column security training should stress the need for aggressive action by advance and rear guard elements and flank security forces to minimize the possibility of ambush. Immediate-action drills during training to combat these possibilities are vital to the survival of a unit, for immediate action robs the ambushing force of its advantage of initiative.

The importance of continuous aggressive reconnaissance for suitable roads, stream crossings, and position areas when an artillery unit is accompanying maneuver forces should be instilled in the minds of all commanders. The terrain over which artillery units must move will frequently be extremely rough, marginally trafficable, and hazardous. Most areas used by guerrillas are earmarked by a lack of roads. Trails must be blazed, roads hewed and widened, streams and canals forded, and areas cleared.

In terrain where positions are extremely limited, many areas will be occupied repeatedly, thus posing a difficult problem—mine and booby trap detection and neutralization. Any area occupied repeatedly must be assumed to be mined, and special teams should be trained to use mine detectors and other probing techniques, and to mark, neutralize, or destroy those mines found. All positions to be occupied should be secured from infiltrators by sending out foot patrols to search for guerrillas.

Alternate firing positions, if available, should be used in random order to avoid repetitious patterns and to gain greater artillery flexibility.

The artillery unit should be trained to habitually coordinate with the engineer support units to insure greater probability of undelayed movement and rapid occupation of position areas. As a minimum, the engineers can offer practical guidance and advice for operations requiring emergency bridging, construction of culverts, and leveling of howitzer positions. Experts trained in all aspects of field expedients will be critically needed; therefore, a training program should include realistic problems which test the ability of a unit to maneuver and occupy positions under the most strenuous conditions possible.

Guerrilla forces, because of weaknesses in number, firepower, and sophistication of arms, are forced to fight extensively at night. Training in night marches, night reconnaissance, and night occupation of position should be extensive, realistic, and practical. Artillery units should be trained so that they can perform all essential tasks at night with the same degree of organization and orderliness as in daylight.

Since the guerrilla is keenly interested in knowing artillery locations and the number and type weapons therein, the training program should incorporate "hide-and-seek" or "cat-and-mouse" tactics. These tactics include, for example, bringing howitzers secretively into an area in covered trucks or inside aircraft or helicopters, being careful to insure that the howitzers are not seen by local civilians. After these newly arrived weapons are prepared to fire, the howitzers already in position, the locations of which are probably known by the guerrillas, are withdrawn openly. This ruse frequently proves successful, since the guerrilla forces, believing the artillery is gone, will launch attacks against heretofore artillery-protected outposts and villages and will be unpleasantly surprised when driven off or killed by the unexpected artillery fires.

FIRE PLANNING

Fire planning requirements to support the many concurrent operations on the counterguerrilla battlefield demand that every potential liaison representative within the battalion receive instruction in serving as a fire support coordinator, fire planner, artillery advisor to the manuever force commander, forward observer controller and coordinator, and forward observer. In addition to the current conventional liaison subject areas, each assigned or "backup" liaison officer should receive training in—

- Guerrilla and counterguerrilla tactics.
- Effects of terrain on friendly forces and guerrilla tactics.
- Methods of maximizing area observation coverage in jungles, swamps, and mountains.
- Methods of gaining, maintaining, and extending reliable communication in such terrain.
- Planning large numbers of on-call concentrations in the zone of operation but away from populated areas.
- Establishing fire support procedures and plans to augment village defenses (fig 3).

Also of prime importance is the training of liaison personnel in planning artillery fires in support of heliborne operations, to include marking landing zones and executing suppressive fires and fires to support the plan of maneuver. Artillery officers with the supported force should be intimately familiar with airstrike procedures, forms, and communications.

Figure 3. Artillery positioned in a strategic hamlet.

For an airstrike to be successful, it must be delivered as soon as possible, preferably within 30 minutes, after the first contact with the guerrilla force because a delay in obtaining immediate airstrikes will give the enemy a chance to "melt away." An air/ground operations training program also should include exercises in panel marking of friendly elements and landing zones and laying out target direction arrows.

A counterguerrilla force maneuver commander is deluged with many command and control problems. In recognition of this, the artillery liaison officer and forward observer should not wait for the supported force commander and his staff to seek artillery advice but should offer guidance and assistance continually. The liaison officer should be trained to think in terms of "selling" artillery support and to be aggressive in his dealings with the supported commander and staff and convince them that the artillery is vital to an operation. The responsibility to derive full use of the artillery rests with the supporting artillery commander through his liaison officers.

Training in fire planning should emphasize the need to establish fire control measures, such as no-fire lines, fire coordination lines, zones of fire, limits of advance, and boundaries. Friendly forces will frequently maneuver in complex, irregular formations requiring establishment of multiple complex fire control lines. Conversely, coordination lines, if possible, should be simple to be practicable.

Precision destruction and time-on-target missions will be extremely rare. Artillery fires will be predominantly—

- Flushing and blocking fires to force guerrillas into areas favorable for destruction.
- Deception fires to mislead the guerrilla force as to friendly maneuver plans, thus enhancing the element of surprise.

● Orientation fires including smoke and illuminating high bursts to aid friendly forces in gaining and maintaining direction orientation by the sight or sound of the burst.

● Counterambush fires planned along routes of advance and communication lines to assist friendly forces in case of ambush.

● Harassment and interdiction (H and I) fires which serve the same purpose on the counterguerrilla battlefield as on the so called conventional battlefield.

An immediate followup of unobserved artillery fires to determine their effects should be accomplished. Guerrillas habitually seek to carry off their dead to prevent friendly forces from knowing the extent of their losses, but the guerrillas will not carry the dead very far—usually no farther than 200 to 300 meters from the concentration location, where they hastily dig a grave. The friendly followup force moves to the concentration area and begins a "corkscrew-type" search out to approximately 500 meters. This search can raise the prestige and desire to increase the use of artillery by maneuver force commanders, since the guerrilla casualties will be credited to artillery fires.

GROUND FORWARD OBSERVERS

Ground forward observer teams will face both physical and psychological stresses and obstacles; the training program should prepare them to withstand and overcome these problems. Principally, they are—

● **Lack of targets.** Forward observers should be trained to look with suspicion on any individual or group of people observed in his area of operation, uniformed or not, since guerrilla forces rarely expose themselves for long periods of time or in large numbers. However, because of the important civic aspect of counterguerrilla operations, extreme caution should be exercised in selecting and attacking targets, for artillery firepower is a double-edged weapon. Indiscriminate firing of artillery could cause local civilians to turn against the government the friendly forces are supporting. Conversely, well-placed fires help increase the confidence of the people in the ability of the government to protect them from guerrilla intimidations and domination.

● **Mobility.** Forward observer sections should train to move on foot cross-country and in mountains, swamps, and jungles. Land navigation exercises should be conducted over the roughest terrain available. The sections should condition and train to keep pace with maneuver units so as to maintain their tactical position with the forward combat elements. Training also should include the use of "beefed-up" observer teams, for it is sometimes necessary to increase the size of dismounted FO teams operating in rough terrain. To gain experience, FO sections should participate with infantry units during company and battalion level training, even if the artillery unit, as a whole, is not involved.

● **Limited visibility.** With the fields of observation severely restricted in jungles, swamps, and mountains, FO teams should be trained to adjust fires by sound when necessary. "Creeping" adjustments will

often be justifiable for close-in, well-concealed targets, and the firing of initial high airbursts with HE, smoke, or WP shells will be commonplace. To extend the field of observation, FO teams should be trained in rope and tree climbing and construction of tree platforms, FO parties should be mobile and not tied to their vehicles and existing roads or trails. Forward observers must realize the importance of establishing OP's which afford the best observation, regardless of difficulty in occupying vantage points.

- **Limited map coverage.** In many cases, forward observers will have to use 1/100,000-scale maps containing no terrain detail. Some maps will show only stream and ridge lines in their approximate locations. Since identification of a concentration on the ground may be exceedingly difficult, observers should be required to use the **poorest** maps of a maneuver area during training exercises.
- **Maintenance of communications.** Jungle and mountainous terrain greatly reduce the normal range of artillery communication equipment. This reduction necessitates the use of imaginative field expedient communication equipment, such as improvised RC-292 antennas for the AN/PRC-9 and AN/GRC-5 (ARTILLERY TRENDS, January 1963, page 23 and November 1963, page 25), half-wave antennas for the AN/VRC-34, and long-wire and half-rhombic antennas for the AN/PRC-9. Training in obtaining maximum range from TOE radio equipment is critical; the proper adjustment and operation of radios, use of aerial radio relays, positioning of vehicles and antennas, and remoting of radios should be stressed. Wire communications will often be impracticable, if not impossible, because of terrain conditions, the ease with which guerrilla forces can cut wire lines, and the distances between observers and fire direction centers. Wire will be used primarily in the headquarters area and the firing platoon and battery positions.
- **Special missions.** FO teams will operate with maneuver elements conducting deep-penetration and stay-behind patrols in guerrilla dominated areas. In the deep-penetration patrol, the FO team moves with maneuver elements by land or air to establish ground observation deep in guerrilla controlled country and, normally, within artillery range. If beyond artillery support, the FO should be prepared to conduct airstrikes in the area of operation.

In the stay-behind patrol, maneuver forces conduct sweeping or clearing and holding type operations. FO sections may be left behind to operate with a squad or platoon, bringing fires against unsuspecting guerrillas moving back into the area assumed to be clear of counterguerrilla forces. These two types of patrols require the most realistic, well-planned, counterguerrilla-oriented training possible. To be successful, FO team members should master all techniques of indirect fire adjustment, land navigation, escape and evasion, night vision, radio communications, and first aid, and, above all, should acquire the highest degree of individual and group discipline.

Staff planning for these special missions should consider coordination with other friendly forces in the area and the use of multiple courses

of action, to include alternate routes, positions, stay times, codes, and drop zones for resupply or evacuation. Field exercises should be designed to test availability of the staffs and FO parties to consider and plan for every eventuality—leaving nothing to chance.

Training also should include the initiation of numerous fire requests from nonartillery observers. Commanders of artillery units can assist in the future success of artillery under actual counterguerrilla conditions by training infantry officers and noncommissioned officers in basic FO procedures and during field training exercises.

Artillery units should be prepared to train local civilians within supporting range to call for and adjust artillery fires by using rudimentary fire control devices, such as the artillery target indicator (ARTI) (fig 4). A friendly civilian could be issued the ARTI and assisted in the orientation of the device by using an aiming circle or M2 compass.

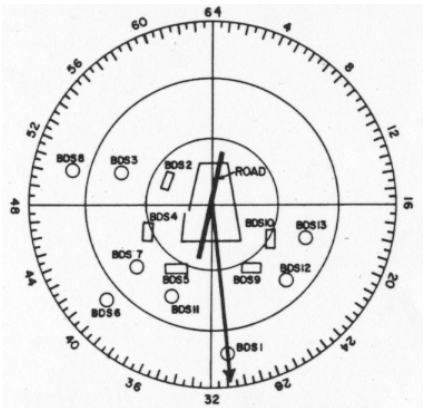


Figure 4. Artillery target indicator.

The target indicator can be any size; it can be mounted on a board and nailed on top of a post, placed on high ground or in a watch tower. This mil-graduated, board-mounted indicator shows the village boundary, roads in the area, and planned artillery concentrations and barrages. This gives the civilian the capability of calling for artillery fires reasonably close to the point desired. When attacked, the observer, usually a member of the local police or militia, simply points the arrow toward the sight or sound of the guerrilla force and notes the azimuth to the target, selects the nearest concentration or barrage under the arrow at the approximate range of the guerrilla force, and calls for artillery fire on that concentration or barrage. The local observer may call for fires simply by giving an azimuth and a distance (polar plot). Subsequent adjustments can be made in the normal manner, based on the known location of the ARTI board and observer and the observer-target azimuth. This unique but practical defense system illustrates the fact that effective artillery employment against the guerrilla demands imagination and innovation.

AERIAL OBSERVERS

Air observation by artillery forward observers constitutes the most effective method of bringing indirect fires against guerrilla forces except for operations in thickly canopied jungles. Every assigned and potential air observer within the battalion should receive sufficient practical training to become an expert in aerial adjustment and radio operation, since air observers will habitually be used by ground elements to attack a wide variety of targets and to relay radio messages.

The ability to quickly and accurately read a map or aerial photograph is highly important to the air observer flying over jungles, swamps, and mountains (fig 5). Training scheduled for air observers should include many periods of practical map and aerial photograph reading, integrated into all phases of training.

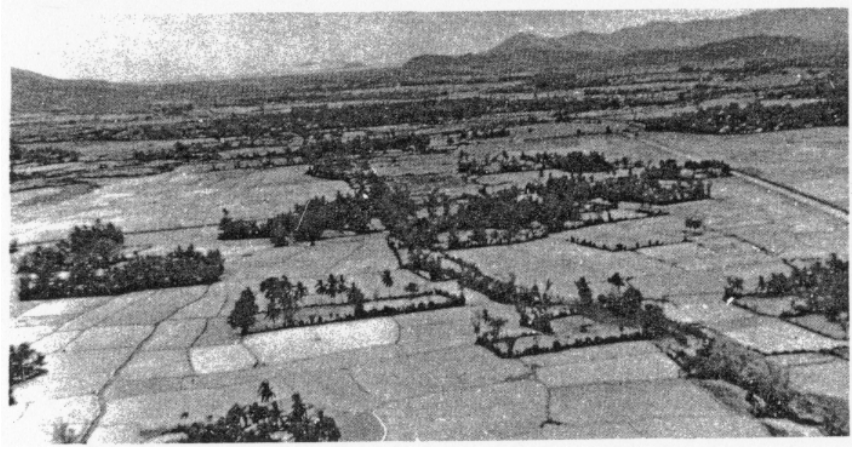


Figure 5. Aerial photograph depicting typical terrain in southeast Asia.

The extreme importance of air observation should be a strong selling point in obtaining observation aircraft for the purpose of providing the maneuver forces with the maximum number of air observers. In areas of limited visibility, air and ground observers working together and providing each other with information of the enemy, as seen from their respective vantage points, can succeed where one observer, ground or air, may fail.

Air observers operating over guerrilla areas should receive intensified survival training to withstand the physical and psychological challenges involved should they be forced down in guerrilla infested territory.

FIRE DIRECTION

It may be necessary to fragment artillery firing units for counterguerrilla operations; thus, great demands may be placed on the battalion S3 to furnish fire direction center augmentation to firing batteries and platoons. Survey sections and howitzer crews should receive training in

FDC operations to support platoon-level artillery employment when required. These backup crews should be trained to perform rudimentary FDC functions but do not require training in the more complex FDC tasks, such as determination of VE and transfer from observed to surveyed firing charts.

As in the case of liaison and FO sections, FDC members require special training in obtaining maximum range from TOE radios. Obtaining and maintaining effective communications could be the most difficult task facing a fire direction section operating with counterguerrilla forces.

FDC training should stress illumination and combined HE-illumination missions; these missions take on increased importance because of the predominance of night actions in guerrilla wars. Frequently, each howitzer may be laid in a different direction within the firing position; therefore, FDC members should be able to establish 6,400-mil firing charts to combat the omnipresent guerrilla. Also, fire direction center personnel require thorough training in the use of fire control lines and the selection of the proper fuze and shell for missions fired in unusual terrain.

SURVEY AND METEOROLOGY

Survey operations may be limited because of the terrain conditions, widely separated firing unit positions, nature of enemy targets, and probable lack of control points in the area. However, since unobserved fires are used extensively against guerrillas, use of survey data is important as a means of improving accuracy, and every attempt should be made to obtain survey data. Survey team members will often need the protection of security forces. Field exercises should include training under threat of ambush. Accurate direction and a reliable map plot provide the basis for an adequate platoon firing chart.

Timely dissemination of meteorology data will be difficult because of the extended manner in which firing units will be normally deployed. In tropical climates the temperatures, densities, and wind directions vary little from day to day. Therefore, a correction factor, based on experience, although not a substitute for current meteorological data, can be applied by well trained fire direction personnel to the elevation and time settings and deflection correction scales to improve fires.

INTELLIGENCE

The single most critical and difficult task facing counterguerrilla force commanders can be the problem of obtaining timely, accurate, and reliable information and intelligence. Where is the guerrilla? What are his plans?

The artillery with its "trained eyes" (observers), extensive communication system, and target detection means is a prime agency for collecting combat information and intelligence. The artillery forward observers, ground or air, can often provide the critical details of guerrilla actions on which to base a successful maneuver. As an agent for collecting information, the air observer is high on the list of the "most productive" in counterguerrilla actions. A single air observer can frequently see more of the guerrilla and his actions than can a large force of ground troops.

Training in combat intelligence within a battalion must stress the need for reporting all bits and pieces of information and intelligence gained of the enemy, weather, and terrain by the fastest means available. Every artilleryman should be taught that the greatest problem for the artillery is finding the guerrilla—distinguishing friend from foe. The night-fighting guerrilla may be a daytime plantation worker or a farmer; therefore, artillerymen should be trained to be alert to the activities of civilians in or near an area of operation.

The intelligence training phase also should emphasize rapid processing of prisoners of war (PW) to prevent escapes in terrain affording excellent opportunities for PW's to "fade out of sight"; the PW is often the sole source of information concerning present guerrilla dispositions, future plans, secret bases, supply points and caches, training areas, crop locations, and locations and activities of enemy leaders. Shell reports can also be extremely valuable sources of information when guerrillas employ mortars (fig 6) or artillery.

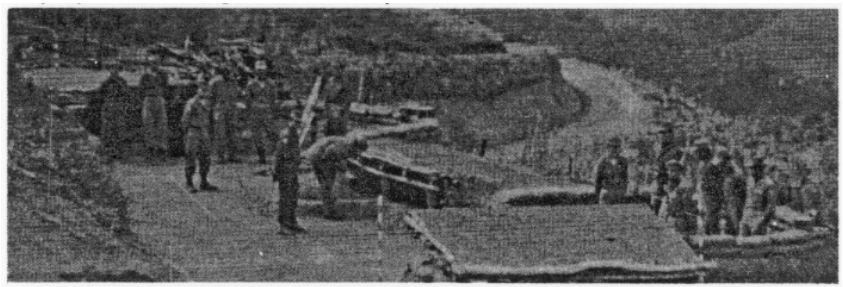


Figure 6. A 4.2-inch mortar platoon positioned in a forward operational base in support of friendly forces.

HELICOPTER OPERATIONS

The necessity to move artillery units into marginally trafficable or untrafficable areas, together with rapid advances in cargo helicopter capability, dictates that artillery units should receive extensive training in airmobile operations (fig 7). Artillery, having been positioned inside a

Figure 7. Airmobile artillery enhances the element of surprise.

strategic hamlet, village or operational base for a period of time, can be moved by helicopter to place surprise fire into surrounding "safe areas" before guerrilla forces can react.

Commanders and staff officers who are airmobile conscious will be amply rewarded for the time and effort spent in training their units in helicopter operations when, and if, committed in a counterguerrilla support role.

ADMINISTRATIVE AND LOGISTICAL SUPPORT

A training program should stress the need for timely and adequate administrative and logistical support. In these areas, vital training subjects include resupply operations, maintenance of supplies and equipment in unusual climates, replacement processing to include orientations and acclimatization and issuance of equipment, evacuation of personnel and equipment through difficult and hazardous terrain, and provision of special services to maintain high troop morale.

These tasks not only require that an individual possess a high degree of skill and initiative but also demand that he receive considerable training to attain the skills to meet the need of administrative and logistical operations. Specialized training should be required in airdrop packaging; aircraft and helicopter loading; map reconnaissance for, and marking of, suitable loading and drop zones; and weight and space calculations.

COMBINED ARMS TRAINING

The combined arms team will be subject to much stress and many problems while operating against the guerrilla. Almost every operation is a movement to contact with the guerrilla, and coordination is difficult to maintain. Since the precise whereabouts of guerrillas is generally unknown, maneuver movements cannot always be precisely preplanned; this aggravates planning for positioning artillery in support of maneuver forces. When contact is made, combat elements orient their attack on the guerrilla force, not on terrain features. This means that the direction of attack can quickly change, even 180°. To effectively operate under such conditions, a combined arms team must be thoroughly trained, capably led, and highly flexible.

In recognition of these facts, the combined arms team training phase should require considerable planning to gain realism approaching the conditions of actual counterguerrilla warfare. The goal for artillery units in combined arms training should be the perfection of standard operating procedures (SOP) which facilitate execution of responsive, accurate, and effective fires in support of maneuver forces. Effective artillery support during this training can "sell" artillery, thus paving the way to the successful combat employment of artillery.

GENERAL SUBJECTS

In addition to the preceding subjects, a counterguerrilla training program should stress physical conditioning, first aid, camouflage and concealment, survival training, quick-reaction firing, immediate action drill, field sanitation, tropical hygiene, and civic action.

Civic action is extremely important; to the artilleryman, it means being friendly toward, helpful to, and respectful of local civilians by personal conduct and judicious execution of artillery fires to win the support and confidence of local civilians.

Counterguerrilla warfare may well be the pattern of combat in which US Army artillery battalions will someday fight. Units should be trained to deliver effective fire on guerrilla units and to survive in counterguerrilla warfare.

GLOSSARY OF COMPUTER TERMS

The following glossary is provided for use as a training aid for familiarizing unit personnel with computer terms:

A-Register. A temporary information storage device in the arithmetic unit, in which data and arithmetic results are stored.

Arithmetic Unit. That portion of a digital computer which performs the actual arithmetic and logic operations involved in a problem solution.

Binary Information. Problem-oriented data, such as range, azimuth, etc., encoded in the binary number system.

Bit. A binary digit.

Central Processor. That portion of a digital computer which consists of the arithmetic, control, and memory units.

Command. An instruction to the computer to perform a specific operation, such as addition, subtraction, etc.

Computer. A problem-solving machine.

Computer Word. An arbitrary number of bits, treated as a unit and unique to a specific computer.

Control Unit. That portion of a digital computer which exercises overall guidance and direction of a computer's operations.

Data Word. A computer word which contains information in the form of magnitude bits.

Digital Computer. A computer which solves problems by performing arithmetic operations on numerically represented information.

Flexowriter. An electric typewriter, capable of being operated manually by an operator or automatically by a computer.

Instruction Word. A computer word consisting of a command which specifies a particular operation to be performed, and a data address which defines the location in memory of the operand involved in the operation.

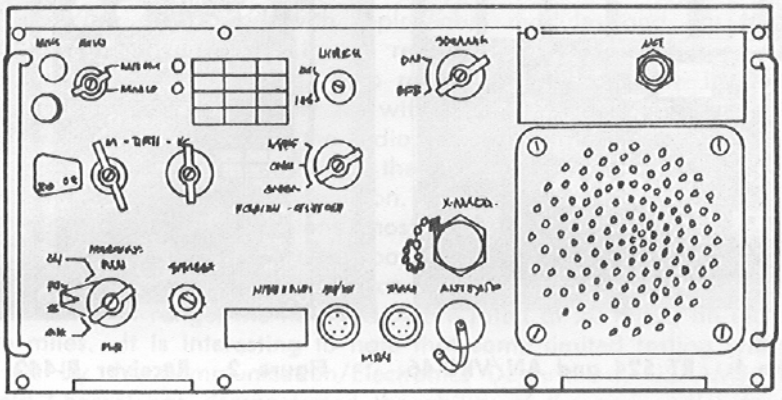
MA-register. A temporary information storage device in the memory unit, which holds the address of the location in memory which is being used.

Program. A sequence of instructions which directs the computer in step by step manner through a problem solving computation.

Register. A device for temporarily storing binary information. A register is usually employed to store one computer word at a time.

—submitted by Mr. Michael Moss

FM radios . . .



Speak and Be Heard

Part I–Familiarization

Major Henry E. Callaghan
Communication/Electronics Department

"Well, here we go again! I just get to the point where I am completely familiar with the nomenclature and capabilities of the FM radios used by the artillery and here comes a whole new series of radios. I am right back where I started." This comment is not unusual in units which are informed that they are to receive the new series of FM radios. Since these new radios are part of the equipment authorized for ROAD division TOE's, artillerymen should be familiar with their components and capabilities.

GENERAL CHARACTERISTICS

All the radios in the new series operate in the same frequency range of 30.00 to 75.95 mc. This means that new FM radios issued to all arms and services will have the same frequency range. The artilleryman will no longer have to select frequencies in a crowded overlap band or procure an infantry or armor radio to communicate with the supported unit.

The new, medium power radios consist of two types of receiver-transmitters and one type of auxiliary receiver. The only difference between the two types of receiver-transmitters is that one has push-button tuning and no built-in loudspeaker, and the other has manual tuning and a built-in loudspeaker. The principal components of the artillery FM sets are the manually tuned receiver-transmitter RT 524 (fig 1) and the auxiliary receiver R-442 (fig 2).

MEDIUM POWER RADIOS

Of the new medium power radio sets, the most commonly authorized on artillery TOE's is radio set AN/VRC-46 (fig 1). This set consists of

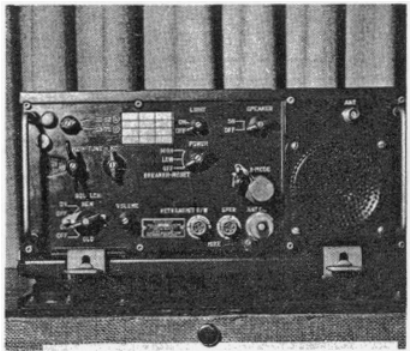


Figure 1. RT 524 and AN/VRC-46.

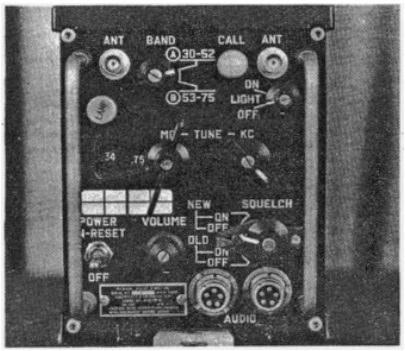


Figure 2. Receiver R-442.

one receiver-transmitter and replaces the AN/VRC-9. Another radio set to be issued to artillery units is the AN/VRC-47 (fig 3) which consists of a receiver-transmitter and one auxiliary receiver. This set replaces the AN/VRC-17 and is for use of commanders and others who must operate in one radio net while monitoring another. The third medium power radio is the AN/VRC-49 (fig 4) which consists of two receiver-transmitters with an automatic retransmission capability. The AN/VRC-49, which replaces the AN/VRQ-2, is issued to communication officers and liaison officers of direct support battalions.

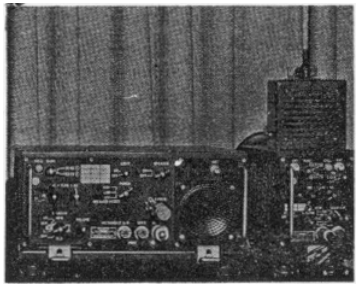


Figure 3. AN/VRC-47.

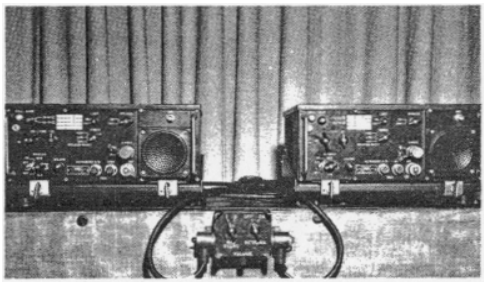


Figure 4. AN/VRC-49.

In addition to the frequency compatibility of all the new FM radios, the sets are more powerful than the sets they replace, are easier to maintain, and provide more operating channels. The sets are designed to operate with a 50-kc channel spacing which provides 920 channels. Channel frequencies for the new sets have four digits whereas those for the old sets have three digits. For example, 32.25 mc, 32.30 mc, and 32.35 mc are typical frequency assignments (50-kc spacing) for the new sets; 32.2 mc, 32.3 mc, and 32.4 mc are typical frequency assignments (100-kc spacing) for the old sets.

Maintenance is easier to perform on the new FM radio sets, because they are constructed with replaceable modules and are transistorized except for five tubes in the receiver-transmitter and three tubes in the auxiliary receiver. The radio repairmen at battalion level and higher are provided a new test set with which they can rapidly and effectively isolate the trouble in the radio set to a particular module. Most of the modules are replaceable by the unit repairman, although a few must be replaced at a higher echelon.

Another advantage—the one most likely to bring joy to the heart of all artillerymen—is the greater power of the medium power radios. The new FM sets radiate 35 watts, as compared to 15 watts for the old sets. In terms of range, the new radios are rated at 20 miles, an increase of five miles. It is interesting to note that some limited testing with the new sets by the Communication/Electronics Department, USAAMS, (Part II—Field Checks) has demonstrated the ability of the new radios to consistently achieve ranges of 30 miles, using the vehicular whip antenna, over rolling terrain and has established several 60-mile retransmission shots.

In addition to these advantages, there are several unusual features about the new sets. One of these features is the antenna matching unit, which is a component of all the new medium power sets. It is installed as part of the antenna base and has the function of electrically matching the length of the antenna to the operating frequency. When the operator changes frequency, a noise similar to that of a pinball machine can be heard in the matching unit as the antenna automatically adjusts itself to the new frequency. This antenna matching unit accounts for part of the greater range of the new FM radios.

The medium power sets have a connection for a speech security device. The X-MODE connection on the face of the set is used to attach speech security equipment which provides secure voice traffic between two radio sets equipped with the device. The security equipment is a separate item and is not issued as part of the radio set.

Another feature of the FM sets is the squelch arrangement which differs from that of the old FM sets. The medium power radios are equipped with two types of squelch, whereas there is only an adjustable noise-operated squelch on the old radios. One position of the squelch switch offers the same type of squelch control as the old radio set, but the squelch is adjusted automatically. The second position of the squelch switch provides an automatically adjusted tone-operated squelch. The radio operator also has the option of operating with both types of squelch turned off. The noise-operated squelch enables the new radios to be operated in the same net with the old radios. The tone-operated squelch will not respond to a signal sent by the old FM radios or any other signal unless a 150-cycle tone is transmitted with the signal. This feature makes it impossible to net the new and old radios when the tone-operated squelch is used; however, it has the advantage of enabling a net consisting of only new radios to operate without interference from radios outside the net.

PACK RADIO

The new radio family provides the artillery forward observer with a lightweight pack set, the AN/PRC-25 (fig 5).

The AN/PRC-25 weighs about the same as the AN/PRC-9 it replaces and is rated at the same five-mile range. The AN/PRC-25, however, has the advantage of the same broad frequency coverage and channel capacity (920) of the new medium power sets. The pack radio has only a tone-operated squelch; therefore, it cannot be operated in a net with the old FM radios unless the squelch is turned off.

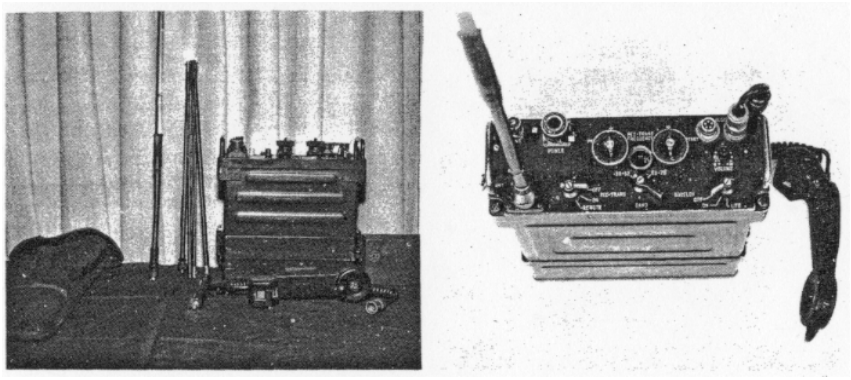


Figure 5. Components of the AN/PRC-25. (left) Top view of AN/PRC-25. (right)

For the radio operator, there are three outstanding advantages to the new pack set:

- The AN/PRC-25 does not have to be calibrated. The old pack radio requires the operator to perform a series of procedures when he changes frequency to insure that the frequency dial shows a correct reading. With the new set, the dial accurately indicates the frequency at any setting with no effort on the part of the operator other than turning the dial to the desired frequency.
- The new pack radio has detent tuning. The present radio is continuously tuned and can be easily "knocked-off" the frequency. The AN/PRC-25 is set on the desired frequency by a detent which makes it unlikely that it can be accidentally changed.
- The radio is designed with channel preset, which permits the operator to preset two channels on the radio. This makes it possible for the operator to tune rapidly to one of two channels without having to read the dial settings.

The AN/PRC-25 will be issued in three models. The first model is the pack model, described above, and is operated from a dry cell battery. The second model, the AN/GRC-125, is issued with all the components necessary for pack operation and, in addition, with the equipment necessary for operation in a vehicle from the vehicular power supply.

The third model is the AN/VRC-53, which is the same as the other two except it is issued with only the equipment necessary for vehicular operation.

For more information concerning these new FM radios, see ARTILLERY TRENDS, July 1963, page 15, and the following TM's; 11-5820-401-10, 11-5820-398-10, 11-5820-498-10, 11-6625-514-12, and 11-6625-502-10.

Familiarization with the new medium power and pack FM radios for artillerymen is a must, for these radios will be vital to a unit's success in any operation. These radios will provide a commander with more communication "punch" because of their greater range, simplicity of operation, and easier maintenance.

Part II–Field Checks

Captain Robert E. Ladebush
Communication/Electronics Department

Limited testing of the new FM series of radios has produced encouraging results. The Communication/Electronics Department, USAAMS, has completed a series of field checks at Fort Sill, Oklahoma, on the AN/VRC-12 series FM radios. The purpose of these checks was to determine the performance of the new radio sets under existing field conditions. The results have been very encouraging from both the standpoint of performance and ease of operation. The following sketches (fig 6 to 10) present a graphical explanation of the situations and results obtained during the field checks. (The rated range is 15 to 20 miles for the AN/VRC-12 series radios and 5 miles for the AN/PRC-25).

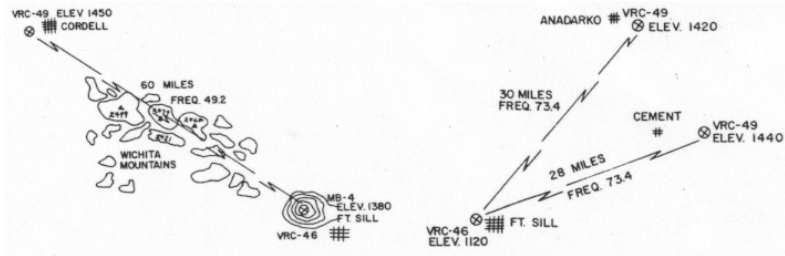


Figure 6. (left) High-power distance check. Reception was loud and clear on frequency 49.2 mc, but communication could not be established on frequency 33.9 mc. New tone squelch was on. There was no noticeable variation in reception when both vehicles were placed 180° out of orientation.

Figure 7. (right) Low-power distance check. Reception was loud and clear up to the distant range indicated. Reception was better when new tone squelch was used than when old noise squelch was used.

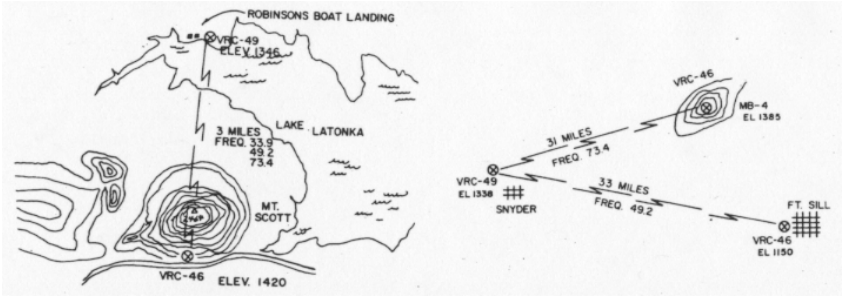


Figure 8. **(left) Line of sight check. Reception varied from loud and clear to weak and distorted. When the AN/VRC-49 was positioned with the entire mass directly between the two stations, the communications faded out completely.**

Figure 9. **(right) Automatic retransmission. Reception was loud and clear at maximum range. Communication could not be established when the sets had old squelch turned on but did operate with new squelch turned on.**

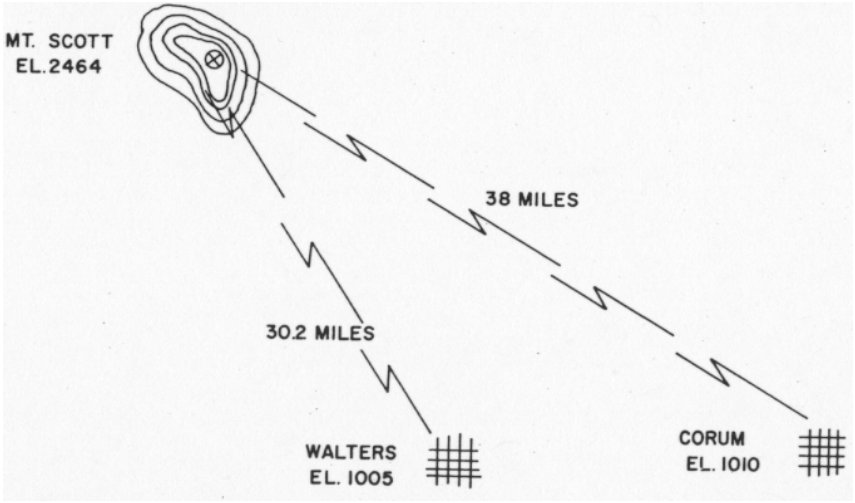


Figure 10. AN/PRC-25. Reception was weak but clear between the stations 30.2 miles apart. Communication between the stations 38 miles apart was weak and distorted but information was transmitted and understood.

The Responsibility Is Yours

Lt Col Charles W. Montgomery
Tactics/Combined Arms Department

IN THE ATTACK

Private Joe Fuller, Company A, 1st Battalion, 10th Infantry, crouched low in his foxhole. In about 30 minutes, he would be moving out as the infantry division commenced its attack. This was to be Fuller's first taste of offensive combat. Suddenly the pre-dawn darkness was illuminated by the many flashes from friendly artillery as it commenced firing from positions in the rear. The flashes were quickly followed by the sounds of artillery shells passing overhead on their way to previously selected targets. As the sounds of the artillery fire reached Fuller's ears, he raised up in his foxhole, and out in front of him, he could see artillery rounds bursting on enemy targets. Sergeant Smith, the squad leader, said that the artillery was going to "soften up" the enemy before the attack by firing a preparation. After the 30-minute preparation, the infantry moved out toward their objective. Once again, coordinated fire planning was providing effective artillery support for an operation.

Who is responsible for planning artillery support? In a general sense, every artilleryman as well as every combined arms team member is responsible, because artillery fire can only be planned and delivered on targets located and reported by persons at every echelon of command. But, the final responsibility for artillery fire planning belongs to the artilleryman, for his knowledge and training provide him the capability of planning effective artillery fire support for an infantry division operation (Note). This fire planning, which requires continuous, detailed,

and concurrent planning and coordination by all levels of command, commences with the development of the initial fire plan, which is kept "up to date" throughout an operation. Artillery fire planning must be responsive to, and consistent with, the changing requirements of the infantry division. New targets will develop while others already planned will no longer require artillery fires.

To prepare the initial artillery fire plan and to keep it consistent with ever-changing maneuvers in an operation, artillerymen are present at all echelons:

- Infantry company. At the company level, the commander is his own fire support coordinator (FSC). The direct support (DS) artillery battalion provides the infantry company an artillery forward observer who is an artillery advisor to the company commander as well as the eyes and ears of the artillery.
- Infantry battalion. A liaison officer (LO), provided by the DS battalion, is the FSC for the infantry battalion.
- Infantry brigade. The DS artillery battalion commander is the FSC for the infantry brigade. Since the artillery commander cannot stay at the infantry brigade headquarters all of the time, he assigns an artillery liaison officer to serve at brigade headquarters as assistant FSC. (The DS battalion establishes a fire direction center (FDC) at the artillery battalion command post.)
- Infantry division. The division artillery commander is the division fire support coordinator. As in the case of the DS battalion commander, other duties preclude his remaining full time at the infantry division headquarters. Therefore, the artillery commander's staff includes personnel for assistant FSC's. (The division artillery FDC is located at the division artillery command post, and a fire support coordination element is established at the division tactical command post in the tactical operations center.)

FIRE PLANNING PROCEDURES

Fire planning procedures (fig 1), which require close coordination between artillerymen and supported commanders, begin with the artillery forward observer at the infantry company and forward observers of the mortar platoon organic to the infantry battalion. For example, the company commander is notified that his company will take part in the division attack. During the briefing, the commander is informed that the artillery will fire a 30-minute preparation commencing at H-hour minus 30 minutes. After the briefing, the commander meets with his artillery and mortar forward observers, outlines the company's mission, and indicates to each observer the supporting fires required of each.

Using the company commander's briefing as a basis, the observers prepare their target lists (fig 2) which reflect the fires needed to support the infantry company. The artillery observer forwards his target list to the artillery liaison officer at the infantry battalion command post. The

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Note: The procedures covered apply to all types of divisions in the Army.

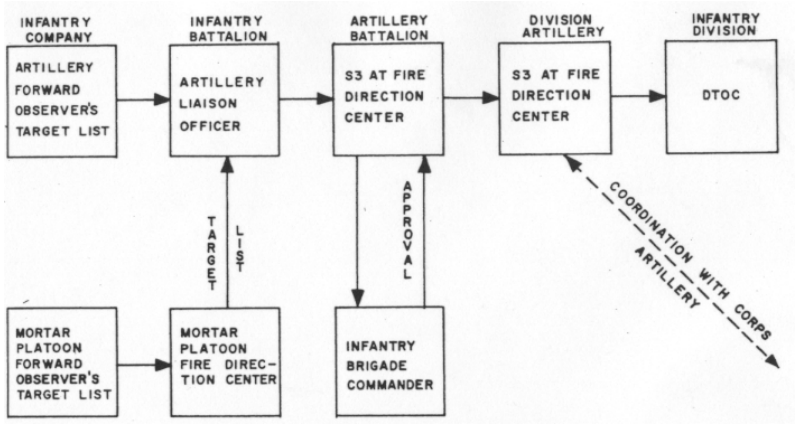


Figure 1. Artillery fire plan flow chart.

4.2-inch mortar platoon observer sends his list to the mortar platoon FDC, where the targets are recorded and then forwarded to the artillery liaison officer at the infantry battalion. The 81-mm mortar observer is not required to submit his target list to higher levels.

Conc No	Description	Location	Remarks
	Def Pos	928105	Scd in preparation
	Hvy MG Pos	928090	Scd in preparation
	Mortar Pos	938072	Scd in preparation
	Mortar Pos	945081	Scd in preparation
	Protective Conc	925135	On Call
	Protective Conc	920128	On Call
	OP	921096	Smoke, On Call
	OP	930116	Smoke, On Call

Figure 2. Artillery forward observer's target list.

INFANTRY BATTALION LEVEL

Target lists consolidated at the infantry battalion level become artillery fire plans. The artillery liaison officer at this level receives all target lists from the artillery forward observers and the heavy (4.2) mortar platoon FDC. The liaison officer consolidates the lists, plots the targets on his map, and eliminates any duplication. In addition to the targets on the submitted lists, the liaison officer adds any targets which he planned, based on information provided him by the infantry battalion S3. Each artillery target is assigned a concentration designation number, and each artillery forward observer is notified of the designation numbers for the targets which he submitted.

This consolidated plot of all the targets represents, in a rough form, the artillery fire plan for the infantry battalion. The plan is submitted

to the infantry battalion commander for his approval, and after receiving the commander's approval, the liaison officer prepares the fire plan in final form on an overlay and submits it to the DS artillery battalion S3.

ARTILLERY BATTALION LEVEL

The direct support artillery battalion fire direction center is the focal point for artillery fire planning at the infantry brigade level, as the artillery battalion S3 prepares the fire plan for the infantry brigade. Long before receiving the infantry battalion fire plans, the S3 began work on the brigade's plan. The S3 received fire support requirements, fire plans, and target information from several other sources. Target information for the S3 is derived from the infantry brigade, division artillery, and artillery battalion target acquisition agencies.

After receiving the infantry battalions' fire plans, the S3 consolidates them, plots the targets, eliminates duplicate targets, and then determines which batteries will attack each target. In addition to assigning targets to batteries, the S3 forwards requests to the division artillery FDC for fires on targets beyond the capabilities of available firing units.

After the consolidation of targets is complete, the infantry brigade fire plan is prepared on an overlay (fig 3) which consists of three mandatory items—the marginal information, the target list, and the graphic portion which shows target locations, objectives, and boundaries. When sufficient time is available for planning, this overlay may also include a schedule of fires and a table of groups of fires, if appropriate. The table of fires is not shown in figure 3.

One of the most important portions of the overlay is the schedule of fires. To prepare this schedule, the S3 must determine which targets are to be included in the preparation and which are to be placed on call. The schedule of fires (fig 4) includes a column on the left which reflects the units participating in the firing of the preparation. The center portion is graduated in time increments and shows the targets at which each unit will fire, the time of firing, and the amount of ammunition to be expended on each target. Time is provided between targets to allow the firing elements to shift to a new target. The right column of the schedule is a remarks column in which the S3 enters information.

The fire plan, prepared by the artillery battalion S3, is forwarded to the infantry brigade headquarters. The artillery fire plan, when approved by the brigade commander, is forwarded to division artillery.

ARTILLERY DIVISION LEVEL

The division artillery S3 receives the fire plans from all the direct support battalions, consolidates them, adds targets which he has planned, and plots targets for the division's artillery fire plan. The division artillery S3, using the same procedures as the direct support battalion S3, schedules fires for general support units and general support-reinforcing units and coordinates with corps artillery for fires on targets beyond the capabilities of the division artillery. He exchanges target information with the artillery representatives at the division tactical operations

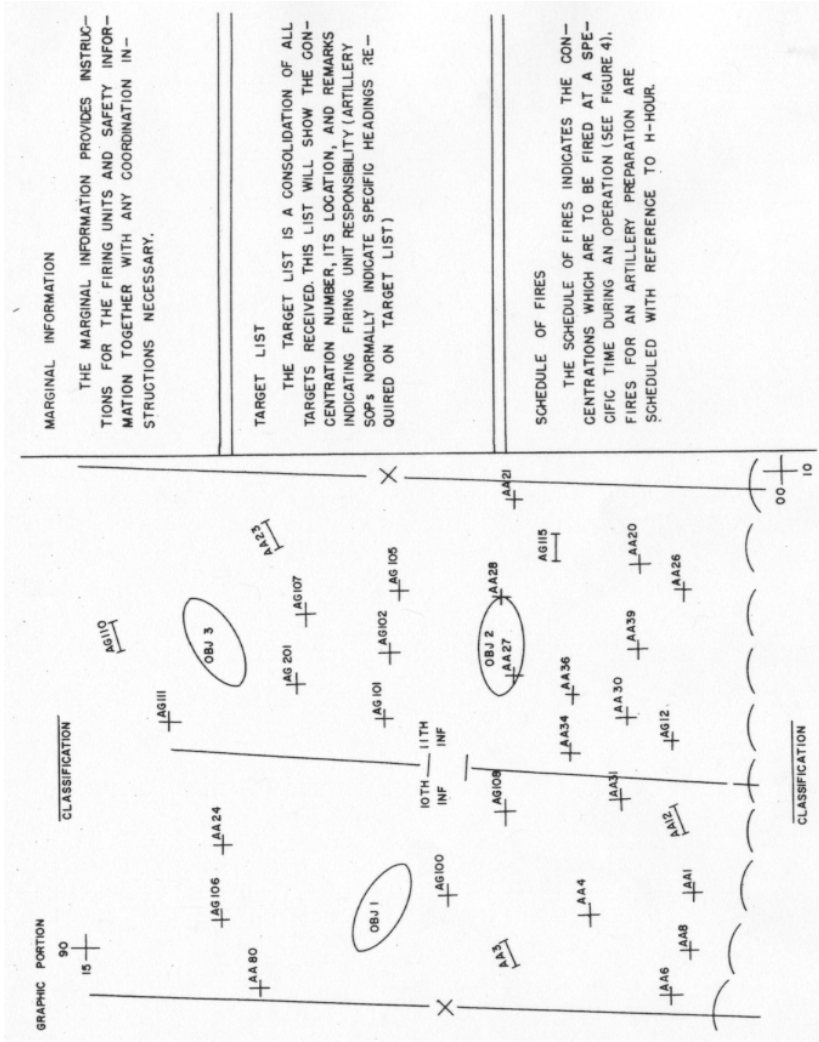


Figure 3. Placement of components of the infantry brigade fire plan.

center (DTOC) to insure that there is no duplication of fires. The division artillery fire plan, when completed, is submitted to DTOC. Upon approval, it becomes an appendix to the division fire support plan.

CONSIDERATIONS AND REQUIREMENTS

During the fire planning process outlined in this article, several factors must be considered by the artilleryman to insure effective artillery support for an operation—the mission of the maneuver element the artillery

FIRING UNIT	-30	-27	-24	-21	-18	-15	-12	-9	-6	-3	H HOUR REMARKS
BTRY A 1/3 ARTY	AG100 30		AG101 24		AG102 30	AG105 36		AG106 36		AG107 24	FZ VT ON AG101 AND AG 106
BTRY B 1/3 ARTY	AG100 30		AG108 48		AA23 23	AG110 24		AG111 36		AA24 20	PREP TO REFIRE AG110 WITH SMK AFTER H-HOUR
BTRY C 1/3 ARTY	AG100 30		AG101 24		AG102 30	AG201 24		AG106 36		AA80 36	FZ DELAY ON AG 201
HVY MORTAR PLAT 1/10 INF	AA1 40	AA12 40		AA3 24	AA4 36	AA6 40		AA8 40			
HVY MORTAR PLAT 1/11 INF	AA20 40		AA21 40	AA28 36		AG115 40		AA27 40		AA26 40	
HEAVY MORTAR PLAT 1/12 INF	AA39 40		AA30 24	AA31 40		AA36 40		AG12 36		AA34 40	

Figure 4. Schedule of fires.

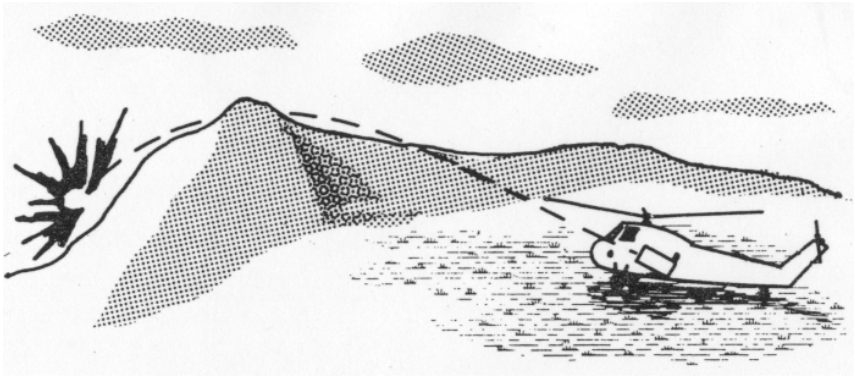
is supporting, the concept of the operation received from the force commander, fire support requirements of higher headquarters, time and ammunition available, weapons capabilities, and other considerations.

The artillery fire plan also must fulfill certain requirements:

- Provide adequate support for the supported unit. For example, a forward observer remains with an infantry company throughout an operation to call for artillery fires where needed on planned targets as well as targets of opportunity.
- Use of available weapons according to their best capabilities. If DS artillery battalions are unable to adequately attack a target, then general support weapons at division, corps, and army levels are available and may be requested.
- Furnish massed fires where required. The forward observer has tremendous fire power available for supporting the maneuver element.
- Facilitate future operations. Once the infantry has reached their objective, and a halt is made for reorganization, the forward observer can call for already planned protective concentrations. If the enemy attempts a counterattack, these protective fires can be used to assist in repelling him.

The fire planning procedures in this article should always be followed when time permits. If the time available precludes the preparation of a written fire plan, the same principles of planning and coordination are applied at all levels, and the fire plan is announced orally. Whether the fire plan is written or verbal, coordination between the artillery and the supported force is extremely necessary to insure effective artillery support. The fire planning responsibility is yours.

air-propelled artillery . . .



A New Challenge

Captain E. C. Riley
Gunnery Department

"The burden of proof it would seem, therefore, rests on the supporters of the motorization principle to prove, by fair and satisfactory tests under all circumstances, that the tractor and truck are a superior motive power to the horse for the uses of field artillery." This quotation from the November-December 1924 issue of the "Field Artillery Journal" was typical of many opposing articles concerning the advent of motorized artillery; but with large armies fighting on a large and fluid battlefield, the demand for an increase in the mobility of the artillery had to be supplied. Thus, the truck replaced the horse, and the self-propelled howitzer eventually proved itself to be a reliable mobile weapon.

On the modern battlefield, the artillery has again met the challenge of a new concept, airmobility, and is conquering it. This concept imposes a far greater mobility requirement than has previously existed. Air assault operations often move beyond the indirect fire range of supporting ground artillery; therefore, an aerial weapons system with an indirect fire capability is required to support air assault units. Adequate fire support could be supplied by a weapons system which can move, shoot, and communicate at a pace equal to that of the supported unit.

In the November 1963 issue of ARTILLERY TRENDS, page 5, readers were introduced to the aerial artillery battery, its tests, and the Committee for Aerial Artillery Test and Evaluation (CAATE), which is comprised of representatives from each department of the US Army Artillery and Missile School, the US Army Artillery Board, and the US Army Combat Developments Command Artillery Agency. Since the November ARTILLERY TRENDS was issued, CAATE's efforts for developing an air-propelled artillery piece with an indirect fire capability have been rewarding.

EQUIPMENT

The CH-34/4.5-inch rocket aerial artillery weapon system was developed by adapting existing launchers to the standard CH-34 cargo helicopters, modified to mount twenty 4.5-inch rocket tubes in pods of 10 on each side of the aircraft (fig 1).

Figure 1. Front view of CH-34 with pods.

Sight unit M34A2C (4.2-inch mortar or Little John), sight mount XM7 (Little John) attached to the left rocket pod, and the gunner's quadrant M1, comprise the on-board indirect fire control equipment (fig 2).

INDIRECT FIRE EMPLOYMENT

CAATE's tests to date are strictly experimental, and the whole problem

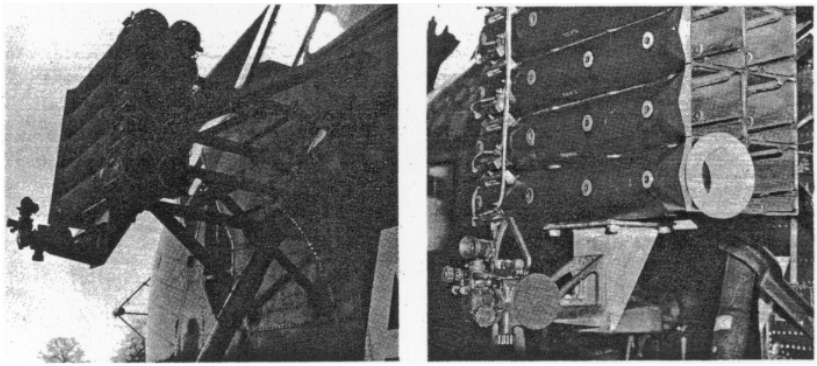


Figure 2. Rocket pod with sight attached (left). Close view of sight and mount. White object is boresighting device for rocket tubes (right).

of indirect fire with an air-propelled artillery piece is being viewed with a cold and calculating eye. The committee is not married to any specific line of thought, as all aspects of the indirect fire role are being investigated.

When a position is occupied by a helicopter, the aircraft is alined as closely as possible to the initial azimuth of lay. This is accomplished in two ways:

- The aircraft can be roughly laid for direction (± 10 mils) by reference to the J-2 gyromagnetic direction indicator mounted on the instrument panel of the aircraft.
- The position area can be prepared in a manner similar to that used with the Honest John or Little John by placing a marker along the azimuth of lay from the launcher position and alining the aircraft on it.

Final laying to zero mils is accomplished with the M2 aiming circle. The CH-34/4.5-inch rocket system can be laid and ready to fire in approximately 2 minutes after landing. Aiming stakes are placed out at the desired deflection, and the rocket system is ready to fire.

During firing, several innovations are employed. For example, a track-roller device (fig 3) is used for deflection changes. The tail wheel of the CH-34 is placed in the track-roller, and the tail of the aircraft is traversed by alternately loosening and tightening the roller cables until the proper aiming post sight picture appears in the panoramic telescope. An elevating rod (fig 4) attached to each pod provides the elevating mechanism for the system. Each pod is elevated or depressed independently.

The rockets are fired electrically from the cockpit by the pilot.

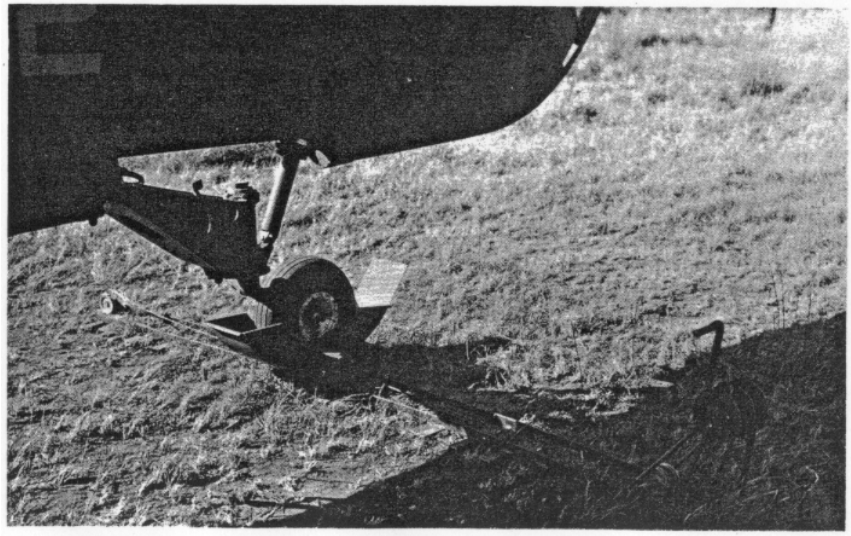


Figure 3. Track-roller device.

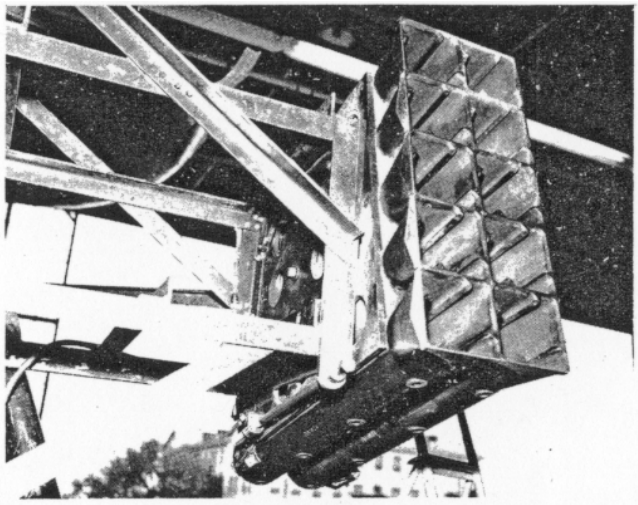


Figure 4. Elevating rod is located at bottom of rocket pod.

Testing of the CH-34/4.5-inch rocket system indicates that standard cannon fire direction procedures are applicable to this system. Numerous successful missions have been fired by using Firing Table 4.5-0-1, which has been proved reliable. Impact registrations have yielded corrections which allow transfers to be fired well within firing table dispersion values. Normal fire for effect on transfer missions has been within 50 meters of the adjusting point, and all 20 rounds remained inside a 200-(deflection) by 500- (range) meter rectangle.

FIRE POWER

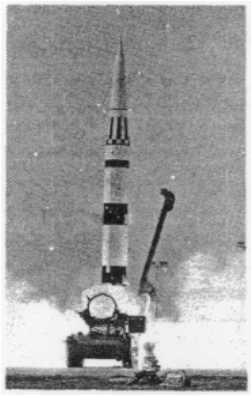
Although the CH-34/4.5-inch aerial artillery piece is not as accurate as cannon artillery and has little application to destruction missions, it is capable of delivering large volumes of surprise area fire. The 4.5-inch aerial artillery system can deliver the same firepower as one volley of a battalion of 105-mm howitzers. When properly resupplied with ammunition, an aerial artillery battery consisting of 12 CH-34/4.5-inch rocket systems can deliver a significant amount of timely fire support (240 rounds in less than 1 minute) from positions, and into target areas, heretofore inaccessible to ground bound artillery.

The CH-34/4.5-inch rocket is proving its effectiveness as an interim weapon; however, it is not the optimum one. Requirements for a weapons system specifically designed to fulfill the aerial artillery functions are being formulated at the present time.

Air-propelled artillery is not meant to replace conventional cannon and rocket artillery. It is being developed to fill a specific mission—to provide fire support to highly mobile units which advance beyond the range of their ground artillery. It is intended that air-propelled artillery be used in situations where the more accurate and better positioned ground units cannot satisfy the fire support requirements of the ground-gaining units.

Pershing . . .

New Artillery Sunday Punch



Lt Col William T. Hatter

Guided Missile Department

Solid propellants, automatic checkout, and new concepts in ground handling equipment and procedures have resulted in a new missile system with a firing range twice that of the Redstone missile—Pershing, the long nuclear arm of the field artillery (fig 1). The Pershing system, manufactured by the Martin Company, can be moved by ground or air. The communication system is capable of operation up to 100 miles with more than a 99 per cent path reliability; in addition, it is practically jamproof. In six years, 1958 to 1964, the Pershing missile system has moved from the drawing boards to operational status; Pershing units will be deployed overseas within a few months, gradually replacing Redstone units.

PERSHING TESTING

The test program for the Pershing missile system has been the most extensive and demanding program ever conducted on an Army weapons system. Tests included research and development firings, mobility tests, local weapons system tests, controlled and uncontrolled environmental tests, and the service test recently completed by the US Army Artillery Board.

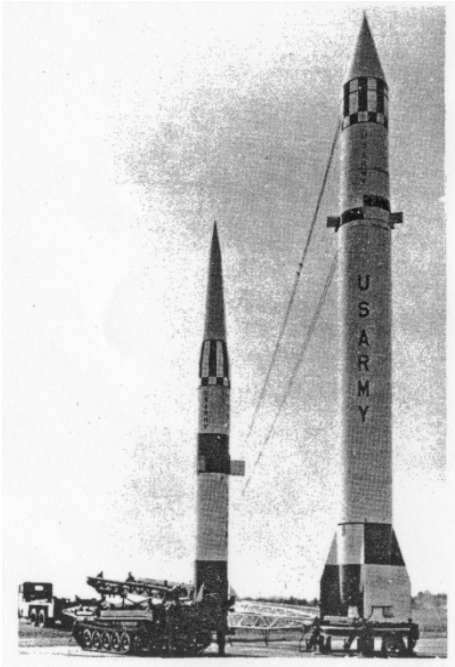


Figure 1. Although smaller than Redstone, the Pershing delivers its warhead to a greater range.

The service test was conducted in three major phases:

- a transition firing phase at Cape Kennedy (formerly Cape Canaveral) which terminated the research and development firing program and allowed the service test unit to make early use of the latest equipment during actual firings.
- a nonfiring phase at Fort Sill to establish reliability of the equipment under field conditions.
- a firing phase at the White Sands Missile Range with firing positions at White Sands; Blanding, Utah; and Fort Wingate, New Mexico.

During the tests, the Pershing system was operated under field conditions at altitudes of 4,000 feet to 8,056 feet, with temperatures ranging from below freezing to above 100° F.

MISSILE CHARACTERISTICS

The Pershing missile measures 34.5 feet (10.38 meters) in length and 40 inches (1.02 meters) in diameter and weighs 10,275 pounds. A solid propellant two-stage motor and inertial guidance provide the thrust and guidance for the Pershing to deliver its nuclear warhead. The missile is constructed in four sections (fig 2)—a warhead section, a guidance and control section, and two motor sections. The two solid propellant rocket motor sections each contain two sets of hydraulically powered control surfaces—air fins mounted externally and jet vanes mounted in the rocket exhaust nozzle.

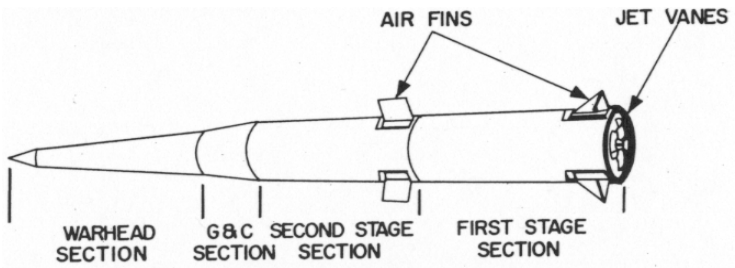


Figure 2. Missile structure.

The third section of the missile, the guidance and control section, contains a completely inertial guidance system which receives no commands from the ground after liftoff; hence, it is immune to all known electronic countermeasures.

The fourth section, the warhead, is the reentry vehicle and contains the nuclear warhead and adaption kit.

During flight, the first stage motor section provides the initial thrust (liftoff) for the missile. The second stage motor section propels the Pershing to the desired point in flight, where the guidance and control section terminates thrust (the guidance and control section solves the motor cutoff equation). When this cutoff equation is solved, three thrust-termination ports, located at the forward end of the second motor section, are blown open, thus reducing chamber pressure and neutralizing thrust. At this

point, the warhead section separates from the remainder of the missile and follows a ballistic path to the target.

SUPPORT EQUIPMENT

For normal ground operations, the Pershing ground support equipment (fig 3)—the erector-launcher, the power station, the programmer-test station, and the radio terminal set AN/TRC-80—are mounted and transported on a single type of vehicle, the XM474 missile equipment carrier. The XM474, similar to the M113 armored personnel carrier, is equipped with mounting kits for mounting each piece of support equipment on the carrier. These kits are interchangeable from one carrier to another, thus eliminating the requirement for a particular type of vehicle for each load. Each Pershing firing battery is authorized four XM474's.

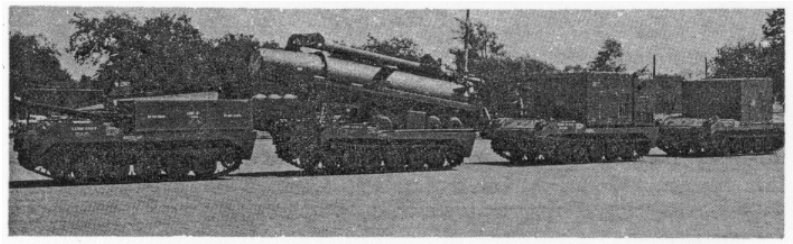


Figure 3. Pershing system components.

The XM474 carrier is full-tracked and unarmored, presents a low silhouette, weighs 11,000 pounds, can travel at a maximum speed of 40 miles per hour, and has a cruising range of 200 miles. The carrier can cross streams to a depth of 42 inches and can traverse 60° slopes.

The erector-launcher (fig 4), mounted on an XM474 carrier, provides a platform for loading, mating, transporting, laying, erecting, leveling, and firing the missile. The missile, less warhead, is normally loaded

Figure 4. Erector-launcher on XM474 carrier.

on the erector-launcher in the assembly area for movement to the firing position. Equipment for the erector-launcher includes a cable mast, which routes the electrical power and the conditioned air and high-pressure air and provides a path for signals to and from the missile guidance and control section. Most of the mechanisms on the erector-launcher are designed for operation by electric motors; however, they may be operated manually in the event of electrical failure.

The power station is a gas-turbine-operated power source, equipped with electrical, high-pressure air, and conditioned-air outputs. These outputs are used at the firing position to operate the missile and its ground support equipment. The high-pressure air is used for the air-bearing gyros on the ST-120 inertial platform. The conditioned air is used to heat or cool the guidance and control section as required.

The programmer-test station (fig 5) is a completely automatic, transistorized, self-verifying system, equipped with a computer. The purpose of the programmer-test station is to detect and isolate malfunctions in the missile, test the flightworthiness of the guidance and control section, determine the desired trajectory for the Pershing, and insert this trajectory program into the guidance and control section of the missile. The programmer-test station and power station, which are transported on the same XM474 carrier, remain in the firing position during firing operations (fig 5).

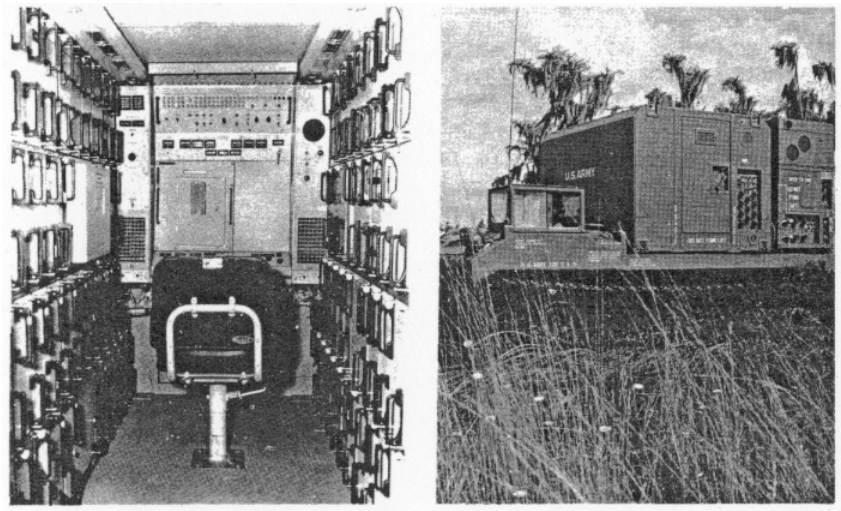


Figure 5. Inside of programmer test station (left). Programmer test station and power station are transported on the same carrier (right).

The radio terminal set AN/TRC-80 (fig 6), mounted on the third XM474 carrier, is completely self-contained and receives its power from a 10-kilowatt generator located in a compartment at the rear of the pack. An 8-foot inflatable, parabolic dish antenna is used with the AN/TRC-80

to furnish point-to-point communications over one duplex voice channel and one-half duplex teletype channel at ranges up to 100 miles. The radio set is normally emplaced in the vicinity of the tactical firing position; however, it may be employed to a maximum distance of 2 miles. A three-man crew can prepare the AN/TRC-80 for operation within 10 minutes after moving into position. The radio terminal set uses the tropospheric scatter principle, which is a process whereby UHF radio waves are bounced off the troposphere. This process is very directional and, as such, provides a high degree of immunity to jamming and interception.

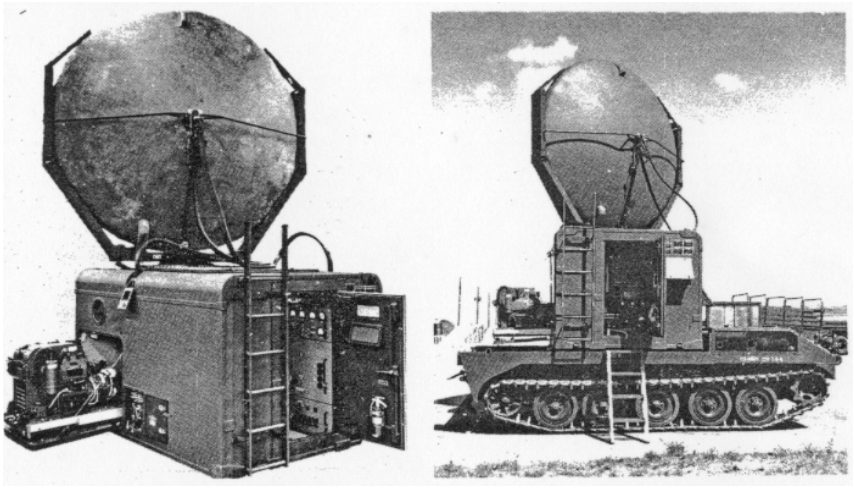


Figure 6. Components of AN/TRC-80 (left). AN/TRC-80 mounted on carrier (right).

The warhead section (fig 7), mounted on a pallet, and two chests containing the azimuth laying equipment are transported on the fourth XM474 carrier. The warhead vehicle also mounts a davit and hoist assembly, which is used to position the warhead section for mating to the missile at the firing positions.

All Pershing equipment is air transportable in CH-47A Chinook helicopters or in fixed-wing aircraft. The Pershing ground support equipment, when transported by the Chinook, is dismounted from the XM474 and mobilized on dolly sets, which are wheel and axle arrangements. The equipment is transported by helicopter to the firing position, off loaded, and fired in the dismounted configuration.

When transported by other aircraft, the Pershing equipment is dismounted from the tracked carriers. The equipment and carriers are then transported by aircraft to the vicinity of the firing position where they are off loaded. The equipment is then remounted on the XM474's for movement to the firing position. Body section lift trucks are used to move the missile equipment when Pershing firing elements are transported by air.

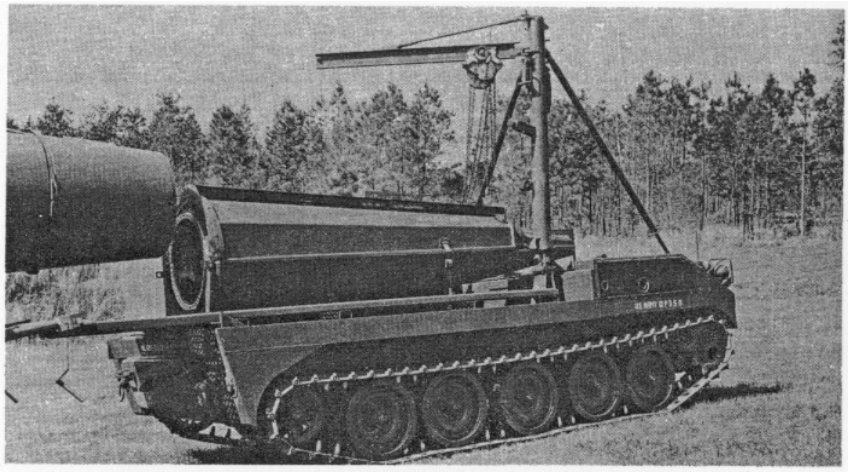


Figure 7. Warhead section mounted on XM474.

ORGANIZATION AND MAINTENANCE

The Pershing missile unit is organized as a battalion consisting of a headquarters and headquarters battery, a service battery, and four firing batteries. In addition to normal firing battery procedures, the Pershing firing battery is capable of completely checking a missile and operating and firing almost anywhere within a 100-mile radius of the battalion headquarters.

The firing battery performs first- and second-echelon maintenance on the missile system, but, in most instances, missile malfunctions are corrected by replacement of complete missile sections. Defective missile sections and ground support components are returned to the ordnance platoon for repair.

The headquarters and headquarters battery provides normal command control, communications, and survey information to the missile batteries. The signal maintenance section of the headquarters battery provides third-echelon repair for the AN/TRC-80.

The service battery provides supply, administrative, and maintenance support for the battalion, and in addition, carries a portion of the basic load of missiles. An ordnance platoon and an engineer maintenance section, organic to service battery, provide third-echelon support for all Pershing equipment in the battalion. An augmentation security platoon is responsible for the security requirements imposed by the storage of nuclear warheads.

PERSHING EMPLOYMENT

The Pershing battalion is assigned to the field army. The field army commander will usually retain control of the Pershing battalion, assigning it a general support mission for the field army and occasionally a reinforcing mission for a corps. Also, authority to fire the missile is retained by the field army commander.

In a nuclear war, the Pershing battalion will be primarily concerned with obtaining nuclear superiority of the battlefield by destroying the enemy's nuclear capabilities and the means associated with those capabilities. After attaining nuclear superiority, the Pershing batteries will divert their fires to the attack of other targets.

The Pershing firing battery is small in terms of personnel and equipment, its position area requirements are easily satisfied, and it is easily maneuvered on the battlefield; therefore, the problems of tactical employment are few in number. Although the basic principles of reconnaissance, selection, and occupation of position (RSOP) apply to the Pershing unit, certain pieces of equipment, such as the tracked XM474 carriers, are easily recognized as Pershing peculiar equipment; therefore, a battery should take precaution to avoid detection by enemy intelligence (move during periods of limited visibility).

Although a Pershing battery can be placed in a "goose egg" 300 to 400 meters in diameter, dependent on concealment, any position area that permits the battery to accomplish its mission is acceptable. Generally, Pershing battalions will first be positioned where they can attack targets beyond the capabilities of the Sergeant missile system.

The capabilities of the Army have advanced another significant step forward with the addition of the mobile, fast-reacting, long-range Pershing missile system to the artillery's array of weapons. Pershing—the "commander" of the artillery missiles—will deliver timely and destructive firepower on the battlefield of the future.

NEW SP FLAME THROWER

A new self-propelled flame thrower (fig 1), designated M132, is scheduled to be issued to troops. The flame thrower, mounted on the M113 armored personnel carrier, will provide the troops with a flame thrower which is more mobile, has greater speed, and a greater range than its predecessors. The equipment is designed in kit form which permits it to be transferred from one personnel carrier to another in the field in a relatively short time.

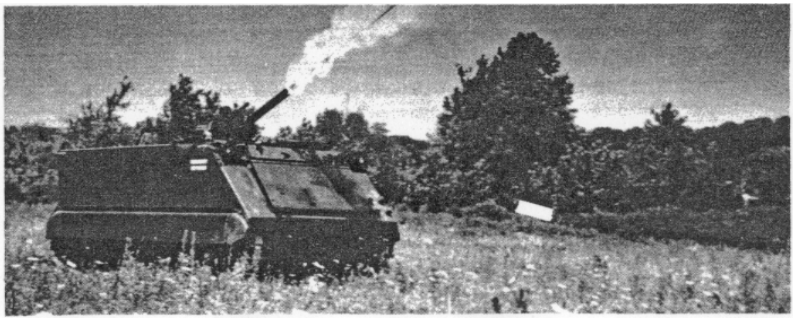


Figure 1. M132 self-propelled flame thrower.

a method . . .

Observed Fire Chart Modification

Captain Phillips Eliot

When a battalion occupies a position not previously prepared with survey control, it should take all steps possible to achieve the capability of massing fires. The best system would be to complete survey control in both position and target areas, but lack of time or the tactical situation may often prohibit this ideal solution. The effectiveness of enemy counterbattery fire, tactical restrictions, or ammunition shortages may limit registrations. Employment of a single registration and a hasty position area survey, which can usually be accomplished in about an hour, will allow construction of a battalion firing chart from which the unit can mass fires.

METHOD AND CONSTRUCTION

This article offers a method for fast and accurate delivery of massed fires from a battalion after a hasty occupation, improved by a hasty position area survey. The method is based on a modification in the approach to the problem—the base or reference establishing both common locations and direction is taken as the hasty survey.

To illustrate this method, assume that the least known data are available to a unit; that is, the hasty occupation and registration are conducted without maps. The survey officer has completed a hasty survey started on assumed coordinates with direction taken from an aiming circle. This survey data has been given to the battalion FDC. An observer has registered one of the batteries on a convenient point. To construct a battalion firing chart, the FDC takes the following steps:

1. On a new firing chart, all batteries are plotted at the coordinates and altitudes furnished by survey.
2. Each battery reports the measured orienting angle (for the base azimuth of fire or the initial lay of the battery). The FDC computes the actual azimuth of fire for each battery, using the reported orienting angle and the azimuths of the orienting lines provided by survey.
3. The deflection index for each battery is placed at the base deflection with the range deflection protractor on the actual azimuth of fire.
4. The registration point is plotted at the appropriate range from the registering battery with the range deflection protractor on the registration adjusted deflection.

5. GFT settings are established in the normal observed firing chart manner.

The steps outlined are simple, fast, and accurate.

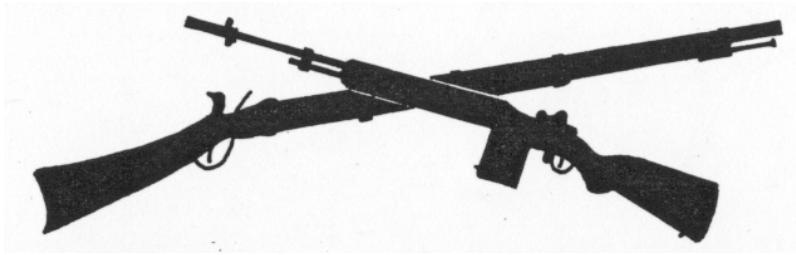
CORRECTIONS

Two points should be covered in the discussion of this method for modifying the observed fire chart. In the method presented, the FDC computes the actual azimuth of fire for each battery as it appears on the common grid. A quick comparison of these computed azimuths with the initial or desired azimuths indicates whether the common control is generally close to the battery azimuths or uniformly shows common azimuths left (less than) or right (greater than) of battery directions. If a significant error is evident, a rapid graphic swinging of the hasty survey may be made on the firing chart. It should be noted that a correction for significant azimuth error need be made only at the discretion of the gunnery officer. If no correction is made, the result may be loss of time and ammunition in adjustments and loss of accuracy in shifts from the registration point. The resultant positions of the batteries would be plotted and the actual azimuths of fire would be those computed in step two of the method as appropriately increased or decreased by the amount of azimuth swing used.

On the second point, it is a frequent practice in artillery units to start the hasty survey at the battery center of the registering battery by using the coordinates furnished by the battery commander and the battery aiming circle direction for starting data. When this occurs, it merely simplifies the procedures slightly; for example, the registering battery may be plotted on the battalion firing chart, prior to completion of the survey, at the location and the azimuth initially reported by the battery.

SUMMARY

This article has presented a method for construction of a battalion firing chart after a hasty occupation and a hasty position area survey. The method is based on the use of the hasty survey for relative locations and common direction. Once all information is provided to the battalion FDC, the firing chart may be made in less than five minutes. In addition to saving time, the method is simple and uses standard plotting procedures. Since the batteries remain as initially laid, no convergence of the sectors of fire results. A check of the accuracy of the magnetic azimuths of each of the batteries and the hasty survey may be possible. A significant common azimuth error could be detected and corrected.



Small Arms Developments

The number and variety of weapons in the Army's current small-arms family is being reduced to provide the infantryman as well as the artilleryman a smaller but more capable group of weapons.

The main weapon of the small-arms family is the Army's standard rifle, the M14 (fig 1), which combines the long-range accuracy of the M1, the selective automatic or semiautomatic fire of the carbine, the burst fire of the submachinegun, and the long-range, sustained automatic fire of the Browning automatic rifle. The M14 replaces all four of these weapons. The time saved in training a soldier to use one weapon rather than four is an obvious advantage of the M14.

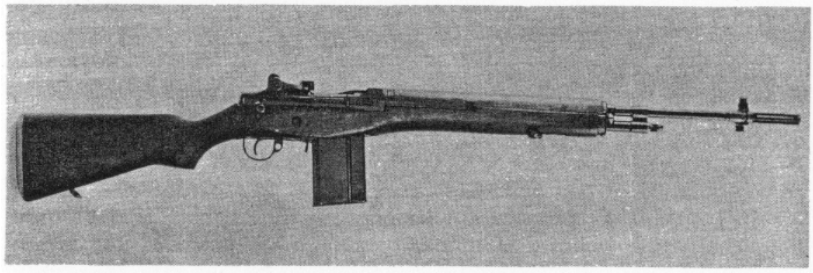


Figure 1. M14 rifle.

Another advantage of the M14 is the use of one type of ammunition, the 7.62-mm NATO cartridge, which reduces the former supply problem of providing three different types of ammunition for four weapons. Allies of the United States also use the 7.62-mm cartridge as standard ammunition. Four types of the cartridge—ball, armor-piercing, tracer, and dummy—are available to the rifleman. These rounds are 10 percent lighter and one-half inch shorter than the .30-caliber round. The 7.62-mm trajectory is flatter than the .30 caliber; otherwise, it has the same ballistic characteristics.

The M14 rifle, which weighs about 9 pounds, empty, and has an overall length of 44 inches, is a gas-operated, semiautomatic or automatic rifle that uses a 20-round magazine. A loaded magazine weighs

1 pound. The capabilities of the rifle include a maximum range of 3,725 meters, a maximum effective range of 460 meters, and a maximum effective rate of fire of 20 to 40 rounds per minute using semiautomatic fire and 40 to 60 rounds per minute using automatic fire. (Maximum effective rate of fire is the maximum number of rounds that the average rifleman can fire and still get a reasonable number of hits on the target). A bipod may be added to the rifle for use in the M14's automatic role.

The M14, equipped with the M76 grenade launcher, can fire all the rifle grenades formerly fired by the M1.

M16 (AR 15) RIFLE

Another weapon, the M16 (AR 15) rifle (fig 2), has been developed to further reduce the rifleman's load. The M16, which has been added to the Army's inventory, fires a 5.56-mm round, is light and lethal, and has less recoil than standard rifles. These characteristics add to the ease of training new riflemen as well as the handling of the rifle when fired.

Figure 2. M16 (AR 15) rifle.

The M16 is a gas-operated rifle, chambered for the 5.56-mm cartridge and equipped with a 20-round detachable magazine. The rifle weighs 6.40 pounds, empty and 6.90 pounds, loaded. It has an overall length (with flash suppressor) of 38.8 inches. The muzzle velocity of the M16 is 3,250 feet per second. The rifle has an in-line (straight) plastic stock and is capable of both automatic and semiautomatic fire. Sling swivels and a carrying handle are provided. The M16, which has been battle tested, will be issued to specialized units, such as airborne and air assault test units and Special Forces units.

M79 GRENADE LAUNCHER

The rifle squad has been provided a new, lightweight, versatile weapon, the M79 grenade launcher (fig 3), which delivers a lethal concentration of fire into the gap between the impact range of the hand grenade and that of close support artillery and mortar fire. The two grenadiers in a rifle squad are equipped with the M79.

The M79 is a single-round, break-open, shoulder weapon which weighs about 6 pounds, empty. The launcher is loaded in nearly the same manner as a single-round, breech-loading shotgun. Although primarily an area fire weapon, the M79 may be fired effectively against

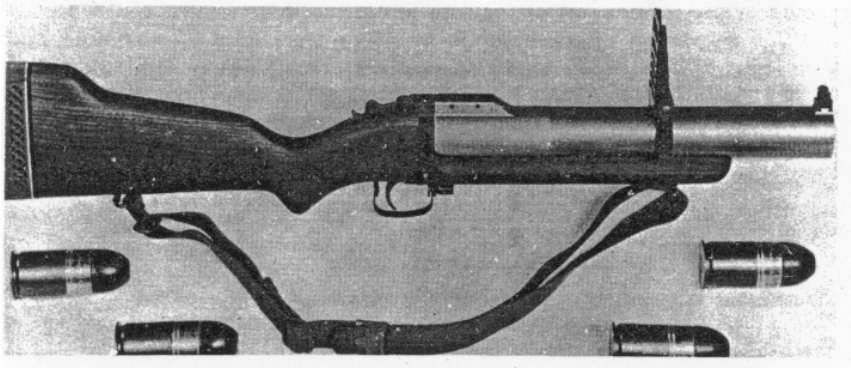


Figure 3. M79 grenade launcher with projectiles.

point targets, such as window openings, foxholes, and bunkers, up to a range of 150 meters.

The weapon fires an 8-ounce, 40-mm antipersonnel, fragmentation-type projectile to a range of approximately 350 meters. Both high explosive and practice ammunition are used with the grenade launcher. The high-explosive round, upon detonation, distributes approximately 325 small fragments over the target area to an effective casualty radius of 5 meters.

Marksmanship training with the M79 grenade launcher is similar to training with other small arms.

SPIW

The Army's newest small-arms weapon, the Special Purpose Individual Weapon (SPIW) that is currently undergoing tests, will give the individual soldier a greater combat potential. This weapon combines the features of a grenade launcher and a rifle, using the over-and-under principle. The SPIW can be used against both point and area targets.

MINIATURE RADIO SET

A miniature pocket/helmet radio receiver and hand-held transmitter (fig 1) has been developed for use by infantry squads in forward battle areas. The radio set, which will replace the seven-pound AN/PRC-6, provides high performance, is extremely rugged and weatherproof, and is designed to operate dependably in any kind of climate. The receiver weighs about nine ounces and the transmitter about 15 ounces. Power is supplied by dry cell batteries smaller than the kind used in pen-size flashlights.

Figure 1. Miniature radio.

ALPHABETICAL INDEX
ARTILLERY TRENDS 1963

(JANUARY, APRIL, JULY, NOVEMBER)

Section I—Articles

Section II—Subjects and Newsnotes

Section III—Gems

1963 ISSUES OF ARTILLERY TRENDS

Varying numbers of copies of the 1963 issues of ARTILLERY TRENDS must be disposed of by 1 June 1964. Units or individual members of the Armed Services who desire any or all of the January, April, July, and November 1963 issues may obtain them by request to the following address on or before 15 May 1964:

Commandant
US Army Artillery and Missile School
ATTN: AKPSIPL-ARTILLERY TRENDS
Fort Sill, Oklahoma 73504

THE ARTILLERY WORLD

155-MM HOWITZER DEVELOPMENTS

The self-propelled 155-mm howitzer used in a direct support (DS) role is to be a reality in the division artillery of Armored and Mechanized Divisions and the Armored Cavalry Regiment. The United States Army Combat Developments Command (USACDC) Artillery Agency is currently preparing draft TOE for a 155-mm SP direct support battalion. The 155-mm DS battalion will resemble the 105-mm DS battalion in organization except for the basic weapon, vehicles, and personnel changes required to man the heavier howitzer.

The organization of the new 155-mm DS battalion TOE includes a service battery as well as headquarters and headquarters battery and three firing batteries. The service battery consists of sections previously contained in the battalion maintenance and supply platoon of the headquarters, headquarters and service battery of the 105-mm battalion. Conversion to the 155-mm howitzer organization will cause an approximate increase of 117 men and 20 vehicles over the current requirements of a direct support 105-mm battalion.

The USACDC Artillery Agency is preparing draft TOE for a 155-mm SP direct support battalion, containing a special headquarters and headquarters battery, for the Separate Brigade.

The 155-mm DS battalions are not planned for the Infantry Division Artillery, since the towed 105-mm howitzer enhances helicopter operations of the Infantry DS artillery battalions.

According to the USACDC Artillery Agency, when compared to the 105-mm battalion, the 155-mm DS battalions will produce more effect on the targets per pound of ammunition fired, have a greater range, possess a greater ability to mass fires, and are more accurate.

NUCLEAR PROJECTILE

With the introduction of nuclear ammunition for the 155-mm howitzer, the supported forces will have a direct support unit with capabilities heretofore unmatched for range and destructive power.

According to the Defense Department, the actual nuclear ammunition will be available in the near future for Army and Marine troops who already have received nuclear assembly and firing techniques training.

XV-4A AND XV-5A

The XV-4A Hummingbird (fig 1), a 2-man, small, lightweight VTOL jet, is being designed as a medium performance surveillance and target acquisition aircraft. Two evaluation and test Hummingbirds, developed by the Lockheed-Georgia Aircraft Company, are being built for US Army performance tests.

The XV-4A is capable of forward as well as vertical takeoff and landing (VTOL) and hovering. The vertical lift is accomplished by opening the fuselage doors over and under the fuselage, and a high velocity exhaust is ejected downward from the two turbojet engines.

Target acquisition equipment being considered for the XV-4A includes the standard varieties of camera, IR, and SLAR.

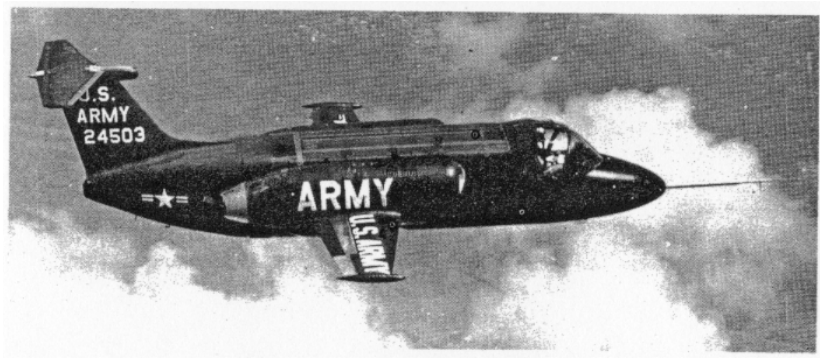


Figure 1. XV-4A Hummingbird.

The XV-5A (fig 2), which blends the mobility of the helicopter with the high performance and survivability of jet aircraft, is designed to accomplish

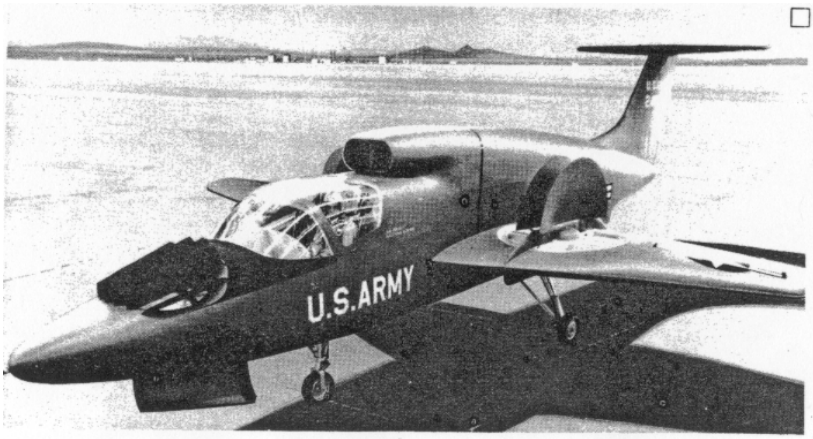


Figure 2. XV-5A

the same surveillance and target acquisition missions as the Hummingbird. The VTOL capability of the XV-5A is based on a different principle than the XV-4A. In the XV-5A, two lift fans are mounted in the wings, and a smaller fan is located in the nose of the aircraft. Two turbojet engines provide the exhaust power for starting and rotating the lift fans, which, in turn, create a column of cool, low-speed air for lift.

The XV-5A is being developed by the Ryan Aeronautical Company in conjunction with the General Electric Company.

NEW SURVIVAL KIT

A new, lightweight, compact survival kit (fig 3), developed by the US Army, consists of two separate containers. The kit, which includes the latest in packaging techniques, is incased in polyethylene plastic and weighs 1 pound and is 5 inches by 3 1/4 inches by 2 3/4 inches. The kit's first container, the operational kit, is composed of a signal mirror,

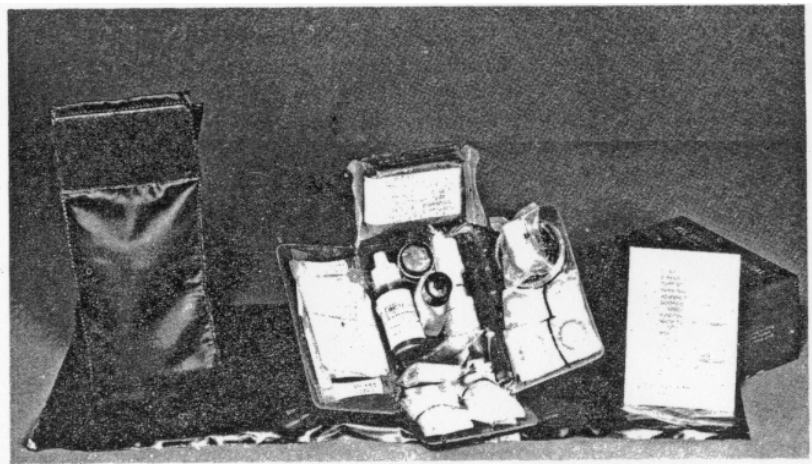


Figure 3. New Army survival kit.

flexible saw, flare gun with two white flares, gauze, adhesive plaster, absorbent adhesive bandages, bouillon cubes, water purification and salt tablets, and other selected medical items.

The reserve component, the second container, includes the same items as the first container but with additional features, such as fishing lines and hooks, sewing kit, tablets for malaria, and a fire starter.

S-64 FLYING CRANE

The S-64 all purpose transport helicopter, also known as the flying crane, combines the maneuverability and vertical lift characteristics of the helicopter with a new concept—detachable pods. These pods (fig 4), tailored to meet the requirements of a tactical mission, are attached to the underside of the S-64 (fig 5). The series of pods designed for

the S-64 include a troop carrier, which holds up to 60 troops, and a cargo carrier.

Figure 4. S-64 flying crane with troop pod.

Without the pod, the S-64 can transport missiles and missile launchers, such as Honest John and Little John. In addition, the flying crane has a tow capability which provides a helping hand to disabled vehicles.

The characteristics of the S-64 helicopter, designed by the Sikorsky Aircraft Company, include a 2-man crew, accommodations for 3 passengers, a gross weight of 38,000 pounds, and a maximum range of 600 nautical miles with two engine cruise and 800 nautical miles with one engine cruise.

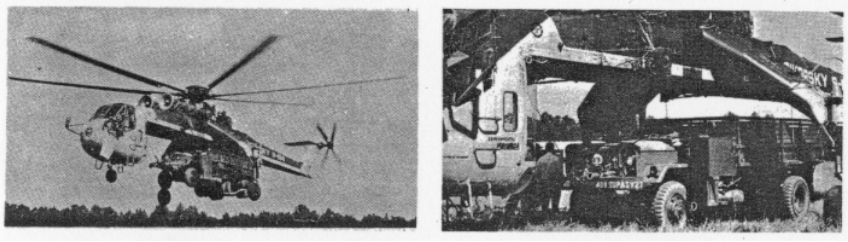


Figure 5. S-64 with truck in carrying position.

Readers' Comments

ARTILLERY TRENDS welcomes all comments from readers concerning any information published in ARTILLERY TRENDS that would be informative or instructional to all artillerymen. Comments should be forwarded to: Commandant, US Army Artillery and Missile School, ATTN: AKPSIPL-ARTILLERY TRENDS, Fort Sill, Oklahoma 73504. The following letters concern two articles which appeared in the November 1963 issue of TRENDS.

Artillery Antennas Revisited, page 25.

At the request of the Assistant Division Commander of the 25th Infantry Division, Brigadier General Forsyth, I fabricated an antenna such as the one described in your November issue. It worked quite well but was extremely heavy and looked rather poor to put on a general's jeep. So, I tried something a little different.

My service section made one exactly like Captain Talley's but used thin wall steel electrical conduit. We used 1/2-inch, 3/4-inch, 1-inch, 1 1/4-inch, and 1 1/2-inch inside diameter pipe. The final assembly weighed about 15 pounds and the pipe cost $3.10 locally purchased.

I also made a larger one for my shop office van (M109). We used 1 1/2-inch, 1 1/4-inch, 1-inch, and 3/4-inch cut in 8-foot lengths. It extends to 40 feet and requires no guying.

I thought you might be interested in these improvements to Captain Talley's excellent idea.

—Captain Cosmo M. Barone
725th Maintenance Battalion
Schofield Barracks, Hawaii

GEM FOR THE SURVEY SECTION, page 60.

The verbal and pictorial description of the expedient for locating the position of a distant range pole is quite similar to the description of the marker used to show the boundary of an area contaminated with a CBR agent (FM 21-41, paragraph 8c). The similarity is so close that erroneous information could be injected into the intelligence collection effort if the expedient as described is used where CBR is actual or played.

Consider a wire team laying field wire through the same unfamiliar general area being surveyed by surveyors of the same or any other unit. The expedient is being used by the surveyors. Communication personnel notoriously are not aware of survey techniques. They more often are acutely oriented in CBR techniques and procedures. Members of the wire team see the upside-down triangle in the distance. Being well indoctrinated in the importance of reporting all information of any significance, they pass on to the intelligence sergeant the location of the "contaminated area." Visualization of the ramifications to which dissemination of information could extend is limited only by the imagination.

If an expedient of this nature is beneficial, suggest considering a less significant shape for the panels. A vertically oriented diamond might serve the purpose as well. A metal sleeve mounted on the lower point of the diamond could serve as a collar to slip down on the range pole and a pipe cap fastened on the upper point could fit over the top of the pole. Attached thus, the panel would not only draw attention to the location of the range pole but an imaginary line through the upper and lower points of the diamond would more accurately mark the exact center of the pole.

—Major David H. Northrip
Fifth USA ADGRU (ARNG)
Lincoln, Nebraska

* * * * * * * * * *

Concerning Major Northrip's comments, the Target Acquisition Department of the USAAMS said the possibility of erroneous information resulting from procedures described in the November issue of TRENDS is extremely remote. The survey marking equipment is not permanent but emplaced only while an angle or distance is being measured. In addition, the color and marking of this equipment is distinctly different than any CBR marking devices.

GEM FOR THE BATTERY COMMANDER

Does your unit use protective measures for the receptacles on AN/VRC-12 radios? To prevent entry of foreign matter and moisture into the receptacles when the radio is removed from the mount, the US Army Electronics Materiel Support Agency suggests that the receptacles be protected by use of self-sealing plastic tape FSN 5970-296-1175 or an equal type tape. Action has been initiated to provide discardable plastic covers FSN 5935-958-4869 to protect unused round type receptacles, such as J-11, J-12, and J-13 or J-21, J-22, and J-23, located underneath the mountings. The availability of this item will be announced in appropriate supply bulletins.

Users of the AN/VRC-12 radios should tape up connectors of temporarily disconnected cables and secure these cables to the mountings with tape, if necessary, to keep them out of the way.

* * * * * * * * * *

Note: The Communication/Electronics Department recently submitted an equipment improvement recommendation to provide protective covers for the large, oval-shaped, multipin receptacles J-14 and J-24 on mountings MT-1898/VRC and MT-1029/VRC used with the AN/VRC-12 radios.

DISTRIBUTION OF FIRING TABLES

Firing Tables FT-155-AH-1 have been distributed. These tables will be used when firing the ammunition listed in FT 155-Q-3 from the M109, 155-mm self-propelled howitzer. Firing tables FT 105-AS-1 have also been distributed and will be used when firing ammunition listed in FT 105-H-6 from the M108, 105-mm self propelled howitzer.

Resident Courses

U.S. Army Artillery and Missile School

Mr. Harold E. Earley
Office of Director of Instruction

Career active duty artillery officers are selected to attend the officer career courses by the Artillery Section, Officers Assignment Division, DCSPGRS, Department of the Army. Applications for admission to resident courses should not be sent to the School. Officers of the Active Army who desire to attend specialist (MOS) resident courses at the USAAMS may apply through channels. Army Reserve officers not on active duty may make application for attendance for any course (providing they meet all prerequisites) in accordance with the provisions of AR 140-220. Only active status members of the Army Reserve are eligible for selection. National Guard officers not on active duty should make application on National Guard Bureau Form 64 for admission to US Army Artillery and Missile School resident courses to the Chief, Army National Guard Bureau, ATTN: Schools Division, Washington 25, D.C.

CURRENT RESIDENT COURSE SCHEDULE

A complete summary of the purposes and prerequisites for all courses conducted at the USAAMS was published in the April 1963 issue of ARTILLERY TRENDS and in the fiscal year 1964 "Catalog of Instructional Material" for USAAMS.

Listed are the officer and enlisted resident courses scheduled to be taught at the USAAMS during the period 1 March 1964 to 30 June 1964.

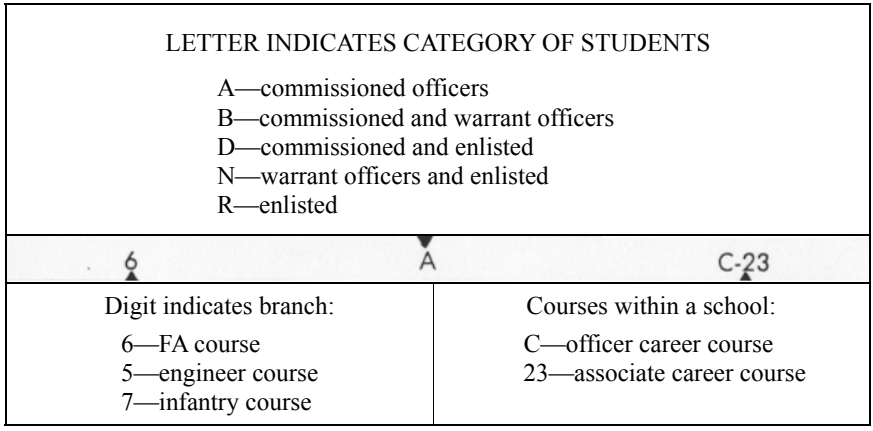


Figure 1. Explanation of the digits and letters comprising a typical course number. The example shown is the Associate Field Artillery Officer Career Course.

Course	Cl No.	Report	Start	Close	Input
Field Artillery Officer	14-64	4 Mar 64	9 Mar 64	7 May 64	99
Basic (6-A-C20)	15-64	18 Mar 64	23 Mar 64	21 May 64	99
	16-64	1 Apr 64	6 Apr 64	4 Jun 64	99
	17-64	30 Apr 64	5 May 64	2 Jul 64	99
	18-64	9 Jun 64	12 Jun 64	13 Aug 64	99
Artillery Officer Career	4-64	3 May 64	8 May 64	18 Dec 64	165
(6-A-C22)					
Associate Field Artillery Officer	4-64	4 May 64	6 May 64	11 Sep 64	118
Career (6-A-C23)					
Field Artillery Officer	2-64	12 Apr 64	13 Apr 64	24 Apr 64	50
Refresher (6-A-C6)					
Senior Field Artillery	2-64	26 Apr 64	27 Apr 64	8 May 64	22
Officer (6-A-F6)					
Nuclear Weapons Employment	3-64	26 Apr 64	27 Apr 64	8 May 64	26
(Res Comp) (6-A-F20)	4-64	14 Jun 64	15 Jun 64	26 Jun 64	25
Nuclear Weapons Employment	3-64	8 Mar 64	9 Mar 64	11 Apr 64	40
(6-A-F26)					
Field Artillery Radar	2-64	2 Apr 64	6 Apr 64	25 May 64	14
Officer (6-A-0140)					
Artillery Target Acquisition	3-64	22 May 64	26 May 64	11 Aug 64	11
Officer (6-A-1154)					
Sergeant Officer	3-64	2 Mar 64	4 Mar 64	10 Apr 64	25
(6-A-1190D)	4-64	27 Apr 64	29 Apr 64	8 Jun 64	25
Pershing Officer	1-64	29 Mar 64	30 Mar 64	22 May 64	28
(6-A-1190E)	2-64	26 May 64	27 May 64	24 Jul 64	27
Artillery Communications	3-64	9 Mar 64	10 Mar 64	1 Jun 64	26
Officer (6-A-0200)					
Artillery Motor Transport	3-64	27 Mar 64	30 Mar 64	28 May 64	15
(6-B-0600/6-B-631A)					
Field Artillery Officer	9-64	8 Mar 64	16 Mar 64	18 Aug 64	95
Candidate (6-N-F1)	10-64	5 Apr 64	13 Apr 64	15 Sep 64	95
	11-64	3 May 64	11 May 64	13 Oct 64	95
	12-64	31 May 64	8 Jun 64	10 Nov 64	95
	13-64	28 Jun 64	6 Jul 64	8 Dec 64	95
Field Artillery Officer	1-64	12 Jun 64	17 Jun 64	29 Aug 64	140
Candidate (Res Comp)					
(6-N-F2)					
Nuclear Projectile Assembly	7A-64	8 Mar 64	9 Mar 64	13 Mar 64	30
(6-D-142.1)	8-64	15 Mar 64	16 Mar 64	20 Mar 64	30
	8A-64	29 Mar 64	30 Mar 64	3 Apr 64	30
	8B-64	5 Apr 64	6 Apr 64	10 Apr 64	30
	9-64	19 Apr 64	20 Apr 64	24 Apr 64	30
	9A-64	26 Apr 64	27 Apr 64	1 May 64	30
	9B-64	10 May 64	11 May 64	15 May 64	30
	10-64	17 May 64	18 May 64	22 May 64	30
	11-64	31 May 64	1 Jun 64	5 Jun 64	30
	12-64	7 Jun 64	8 Jun 64	12 Jun 64	30
	13-64	21 Jun 64	22 Jun 64	26 Jun 64	30
Rocket Nuclear Warhead	8-64	3 Mar 64	4 Mar 64	11 Mar 64	20
Assembly (6-D-147.2)	9-64	7 Apr 64	8 Apr 64	15 Apr 64	20
	10-64	5 May 64	6 May 64	13 May 64	18
Artillery Ballistic	6A-64	3 Apr 64	6 Apr 64	12 Jun 64	36
Meteorology (6-H-103.1)	8-64	15 May 64	18 May 64	27 Jul 64	37
Weather Equipment	4-64	3 Apr 64	6 Apr 64	10 Jul 64	10
Maintenance	5-64	29 May 64	1 Jun 64	4 Sep 64	10
(6-N-201A/6N-205.1)					
Field Artillery Radar	4-64	29 Apr 64	4 May 64	18 Dec 64	14
Maintenance (6-N-211A/211.3)					

Course	Cl No.	Report	Start	Close	Input
AN/TRC-80 Transition Pershing (6-D-F21)	2-64	11 Jun 64	12 Jun 64	19 Jun 64	8
Field Artillery Operations and Intelligence Assistant (6-R-152.6)	4-64	30 Mar 64	31 Mar 64	17 Jun 64	50
Artillery Survey Advanced (6-R-153.1)	7-64	19 Mar 64	24 Mar 64	14 Ma 64	64
	8-64	2 Apr 64	7 Apr 64	28 Ma 64	63
	9-64	27 May 64	2 Jun 64	24 Jul 64	63
Artillery Flash Ranging (Advanced) (6-R-154.1)	3-64	5 May 64	7 May 64	17 Jun 64	23
Field Artillery Radar Operation (6-R-156.1)	7-64	20 Mar 64	24 Mar 64	1 Jun 64	35
	8-64	24 Apr 64	28 Apr 64	7 Jul 64	35
	9-64	26 Jun 64	30 Jun 64	8 Sep 64	35
Sergeant Missile Battery (6-N-161.2)	4-64	12 Apr 64	14 Apr 64	26 May 64	32
Pershing Specialist (6-N-163.2/214E)	2-64	29 Apr 64	1 May 64	28 Aug 64	33
Pershing Missile Battery (6-R-163.6)	1-64	23 Mar 64	25 Mar 64	22 Ma 64	33
	2-64	21 May 64	25 May 64	24 Jul 64	33
AN/TRC-80 Operations (Pershing) (6-R-F24)	3-64	3 Apr 64	6 Apr 64	8 Jun 64	15
	4-64	24 Apr 64	27 Apr 64	29 Jun 64	15
	5-64	5 Jun 64	8 Jun 64	10 Aug 64	15
	6-64	26 Jun 64	29 Jun 64	31 Aug 64	15
Artillery Radio Maintenance (6-R-313.1)	18-64	20 Mar 64	23 Mar 64	29 Jun 64	41
	19-64	3 Apr 64	6 Apr 64	14 Jul 64	41
	20-64	17 Apr 64	20 Apr 64	28 Jul 64	41
	21-64	1 May 64	4 May 64	11 Aug 64	41
	22-64	15 May 64	18 May 64	25 Aug 64	41
	23-64	29 May 64	1 Jun 64	8 Sep 64	41
Artillery Vehicle Maintenance Supervisors (6-R-631.7/632.7)	3-64	29 May 64	1 Jun 64	31 Jul 64	16
Artillery Track Vehicle Maintenance (6-R-632.1)	12-64	6 Mar 64	10 Mar 64	28 Ma 64	64
	13-64	27 Mar 64	31 Mar 64	19 Jun 64	64
	14-64	17 Apr 64	21 Apr 64	10 Jul 64	64
	15-64	8 May 64	12 May 64	31 Jul 64	64
	16-64	29 May 64	2 Jun 64	21 Aug 64	64
	17-64	19 Jun 64	23 Jun 64	11 Sep 64	64
Refresher Training in the Tactical Employment of Nuclear Weapons	6-64	8 Mar 64	9 Mar 64	13 Mar 64	34
	7-64	12 Apr 64	13 Apr 64	17 Apr 64	34
	8-64	10 May 64	11 May 64	15 May 64	34
	9-64	31 May 64	1 Jun 64	5 Jun 64	34
Field Artillery Data Computer (FADAC) Operators (6-D-F28)	5-64	8 Mar 64	9 Mar 64	13 Mar 64	15
	6-64	29 Mar 64	30 Mar 64	3 Apr 64	15
Field Artillery Data Computer (FADAC) Maintenance (6-D-F29)	5-64	12 Mar 64	13 Mar 64	27 Mar 64	21
	6-64	2 Apr 64	3 Apr 64	17 Apr 64	21

REVISION OF ARTILLERY RADIO MAINTENANCE COURSE

Recognizing the inability of many students to quickly understand mathematical formulas and theories, the US Army Artillery and Missile School has revised the Artillery Radio Maintenance Course, a course designed for radio specialists, MOS 313.1. More emphasis has been placed on practical work and troubleshooting methods, with a corresponding decrease in written work and mathematics.

STATUS OF TRAINING LITERATURE AND FILMS

TRAINING LITERATURE

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

A. FIELD MANUALS (FM):

FM 6-3-1	Gun Direction Computer M18, Cannon Application.
FM 6-3-2	Operations of Gun Direction Computer M18 (FADAC), Free Rocket.
FM 6-10	Field Artillery Communications.
FM 6-40-2 (Changes 1)	Field Artillery Missile Gunnery (Pershing).
FM 6-70	105mm Howitzer M102.
FM 6-71	Howitzer XM104.
FM 105-6-3	Aggressor Nuclear Play Calculator.

B. ARMY TRAINING PROGRAMS (ATP):

ATP 6-100	Field Artillery Units.
ATP 6-302	Field Artillery Missile Units, Honest John and Little John.
ATP 6-555	Field Artillery Missile Battalion, Sergeant.
ATP 6-575	Field Artillery Target Acquisition Battalion.
ATP 6-615	Field Artillery Missile Battalion, Pershing.

C. ARMY SUBJECT SCHEDULES (ASUBJSCD):

ASubjScd 6-6	Communication Exercises for Artillery Units.
ASubjScd 6-14	Fire Support Coordination.
ASubjScd 6-29	Artillery Survey.
ASubjScd 6-32	Field Artillery Command Post Exercises.
ASubjScd 6-42	Difficult Traction and Field Expedients.
ASubjScd 6-141	Light and Medium Field Artillery Crewman, MOS 141.1.
ASubjScd 6-142	Heavy and Very Heavy FA Crewman, MOS 142.1, .2.
ASubjScd 6-147	Field Artillery Rocket Crewman, MOS 147.1.
ASubjScd 6-152	FA Operations and Intelligence Assistant, MOS 152.1.
ASubjScd 6-153	Artillery Surveyor, MOS 153.0.
ASubjScd 6-153-1	Artillery Surveyor, MOS 153.1.
ASubjScd 6-154	Flash Ranging Crewman, MOS 154.0.
ASubjScd 6-154-1	Flash Ranging Crewman, MOS 154.1.
ASubjScd 6-155	Sound Ranging Crewman, MOS 155.0.

ASubjScd 6-155-1	Sound Ranging Crewman, MOS 155.1.
ASubjScd 6-161	FA Missile Crewman (Sergeant).
ASubjScd 6-162	FA Missile Operations and Intelligence Assistant.
ASubjScd 6-163	FA Missile Crewman (Pershing).

2. Training Literature submitted for publication:

FM 6-37	Field Artillery Battalion, Sergeant.
FM 6-38	Field Artillery Battery, Sergeant.
FM 6-40-2	Field Artillery Missile Gunnery.
FM 6-54	Area Toxic Rocket.
FM 6-61 (Changes 3)	Field Artillery Battalion Honest John Rocket, SP.
FM 6-99	Employment of Selected Ammunition.
FM 105-6-1 (C)	U. S. Nuclear Play Calculator.
FM 105-6-2	U. S. Nuclear Play Calculator.
ASubjScd 6-16	Field Artillery Instruments and Duties of Instrument Operators.

3. Training Literature recently printed:

FM 6-56 (Changes 1)	Field Artillery Battalion (Battery), Little John Rocket.
FM 6-59	Field Artillery Rocket Honest John with Launchers M386 and M33.
ASubjScd 6-12	Field Exercises.
ASubjScd 6-13	Operation of Fire Direction Center.
ASubjScd 6-41	Organization, Mission, and Employment of Infantry, Mechanized, Armored and Airborne Division.
ASubjScd 6-140	Field Artillery Basic, MOS 140.0.

TRAINING FILMS

1. The following training films are currently under production and scheduled for release during calendar year 1964:

Artillery Forward Observer—Part I. In the Defense (TF 6-3385)—Part II. In the Attack (TF 6-3386). (Part I and Part II are to be released to film and equipment exchanges approximately 1 February 1964.)

Fire Direction Procedures—Part 1. Precision Fire—Part II. Area Fire—Part III. Observed Firing Chart.

The Honest John Battalion (Previously entitled "Maneuver of the Honest John Battalion")—Part I. Organization and Operations (TF 6-3436)—Part II. RSOP (TF 6-3437).

Operation of the Surveying Instrument Azimuth Gyro, Artillery.

2. Training films scheduled for production and release during calendar year 1964:

Field Artillery Target Acquisition Battalion.

Fire Support Coordination, Infantry Division.

Active and Passive Defense of the Field Artillery Battery.

The Pershing Missile System Modes of Operation.

Pershing Missile Azimuth Laying Procedures.

The Sergeant Artillery Guided Missile System.

3. Training films scheduled for production and release during calendar year 1965:

Helicopter Artillery RSOP (Other films in this category have not been approved as of publication of this issue of TRENDS.)

ARTILLERY INFORMATION LETTERS

Artillery Instructors Information Letter Number 24 (5 Dec 63).

Honest John—Little John Information Letter Number 4 (21 Oct 63).

Sergeant Information Letter Number 1 (21 Nov 63).

COMPUTER ORIENTATION TRAINER

The newest weapon in the arsenal of training aids in use at USAAMS is the Digital Computer Orientation Trainer (Device 6F4) (fig 1), which is designed specifically for use in providing basic instruction in digital computer organization, operation, and programming. The 6F4 has the capability of graphically and functionally demonstrating the internal organization

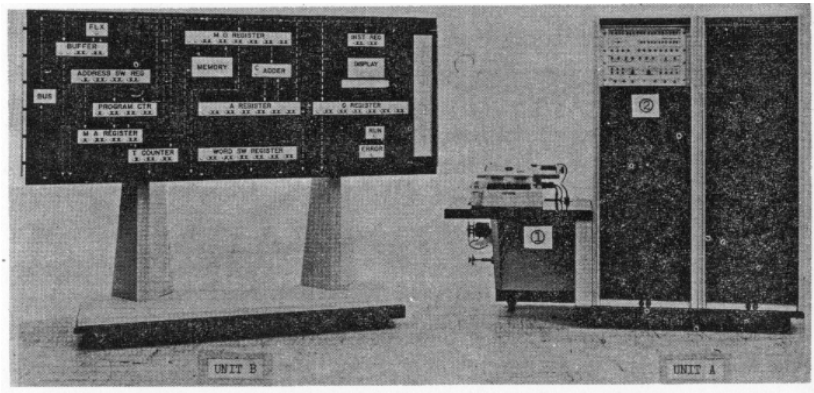


Figure 1. Digital Computer Orientation Trainer.

of a typical computer, computer operation, programming techniques, highspeed core memory utilization, machine methods of performing arithmetic operations, and machine coding. The trainer is organized into two main units—the central processor (fig 1, UNIT A) and the display panel (fig 1, UNIT B). The central processor contains the standard logic implementing elements, such as the high-speed magnetic core memory and the input-output facilities. Data and program input may be accomplished automatically in the 6F4 by feeding punched paper tape through the flexowriter (fig 1, ①), or manually by switch selection at the computer control panel (fig 1, ②). The 6F4 provides the student a fast and efficient program of instruction in specific computer systems, such as FADAC and the Pershing Fire Direction Computer.

—submitted by Mr. Michael Moss

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