

ARTILLERY TRENDS



U S Army Artillery and Missile School



July 1960

ARTILLERY

TRENDS

July 1960

Instructional Aid Number 14

In This Issue

● ARTICLES

Division Staff Procedures—Nuclear Weapons Employment	3
A New Artillery Trainer for Gunnery Practice	9
How To Write A Field Message	13
Little John—The Mighty Mite	20
"Horseshoes To Iron Tracks"— The Armored Cavalry Regiment	26
Honest John Gunnery—Solution by <i>Graphic</i> Methods	38
Economic, Realistic Training—The Redstone System	42
Resident Courses— US Army Artillery and Missile School	49
The XM33—Honest John's New 'Cousin'	57
An Important Friend of The Artilleryman—Army Aviation	59
"Light and Mobile"—The Italian 105-mm Howitzer	69

● NEWSNOTES

Newsnotes for Artillerymen	71
--------------------------------------	----

● TRAINING LITERATURE

Status of Training Literature	73
---	----

● COVER

The elusive, hard-hitting, self-propelled 105-mm howitzer supports the armored cavalry squadron with indirect fire. For a full account of the "eyes and ears of the battlefield," see the Armored Cavalry Regiment article beginning on page 26.

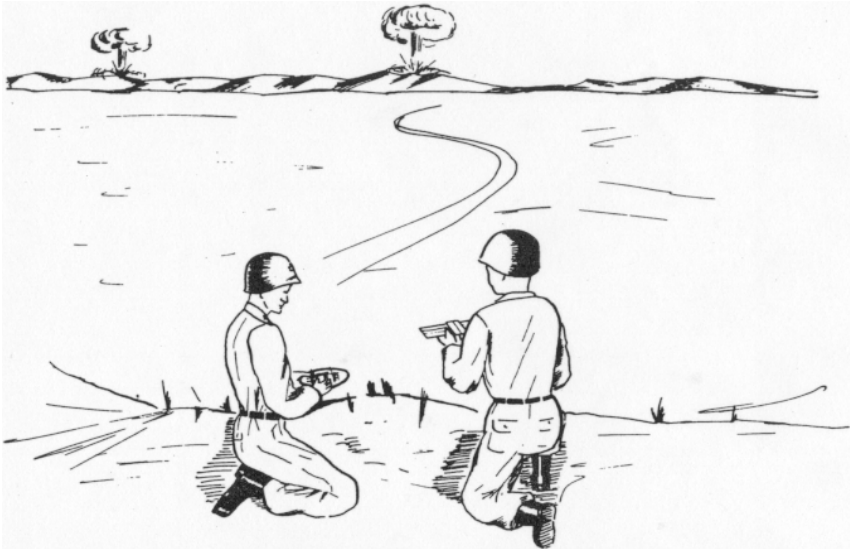
ARTILLERY

TREN



... ARTILLERY TRENDS is put together with YOU in mind ... keep YOUR men informed by circulating this copy of TRENDS throughout YOUR unit...

Division Staff Procedures - -



NUCLEAR WEAPONS EMPLOYMENT

Lieutenant Colonel David E. Wright, Jr.
Department of Tactics and Combined Arms

An H-13 helicopter lifted itself swiftly from the field near the 20th Infantry Division Artillery command post (CP). Lieutenant Colonel Black, commander of the division artillery rocket-howitzer battalion until 3 days ago, was departing for his new assignment as assistant fire support coordinator of the 20th Division.

"Things have certainly moved fast," thought the Colonel as he glimpsed fleetingly into his past. Just 6 years ago he had graduated from the Artillery Officer Advanced Course at Fort Sill. From there he had gone to duty in a newly organized missile unit, and, upon completion of an overseas tour, he was enroute to the United States to attend the Command and General Staff College when "the balloon went up."

In rapid succession he was a battalion S3, a battalion executive officer, a battalion commander for 4 months during a violent fighting period, and now he was the assistant fire support coordinator.

The former assistant fire support coordinator, now the division artillery executive officer, and General White, the division artillery commander, had briefed him thoroughly on his new responsibilities. It was

particularly important that he know the duties of the other members of the division staff, too.

As he glanced through his notes, one of the General's comments remained fresh in his mind. "It has been stated that a nuclear weapon is just another weapon in our arsenal. Adherence to this viewpoint without closer examination could be disastrous to a field command. The proper employment of nuclear weapons requires a full appreciation of *blast*, *thermal* and *nuclear radiation* effects. Whereas nonnuclear weapons cause a selective effect on a target, nuclear weapons provide a package of effects—whether desired or not. That these effects are used to our advantage is the responsibility of the division commander and his staff."

Colonel Black quickly browsed over a written discussion given him by the former assistant fire support coordinator concerning his new field of interest.

HOW NUCLEAR WEAPONS ARE EMPLOYED

With full realization of the factors of time, composition of the target, target permanence, weapons available, and status of firing units, nuclear weapons may be employed as planned, scheduled and on-call or on targets-of-opportunity. The following discussion applies in varying degrees to all types of employment, but it will concentrate on the planned employment of nuclear weapons.

The commander has the overall responsibility for nuclear weapons employment. As a minimum, he should announce the—

- (1) General plan for employment.
- (2) Results desired.
- (3) Effects not desired.
- (4) Risks to be accepted for troop safety.
- (5) Decision to fire or not to fire.

Guidance can be expected in other areas but the requirements above are of utmost importance.

All areas of staff interest are influenced by the employment of nuclear weapons. However, in this discussion of the tactical employment of nuclear weapons, reference is not made to the G1 and personnel problems, the G4 and logistic problems, the problems incident to the civilian population and military government, and to the engineer and atomic demolitions.

THE TACTICAL EMPLOYMENT TEAM

Attention is focused on the division commander, on two members of his general staff—the assistant chief of staff (G3), operations, and the assistant chief of staff (G2), intelligence—and on two members of his special staff—the fire support coordinator (FSC) and the chemical officer (CmlO).

The successful employment of nuclear weapons, on receipt of the division commander's guidance, is largely dependent on the closely coordinated actions of these staff officers. Their general responsibilities for nuclear weapons employment are as follows:

THE TACTICAL EMPLOYMENT TEAM

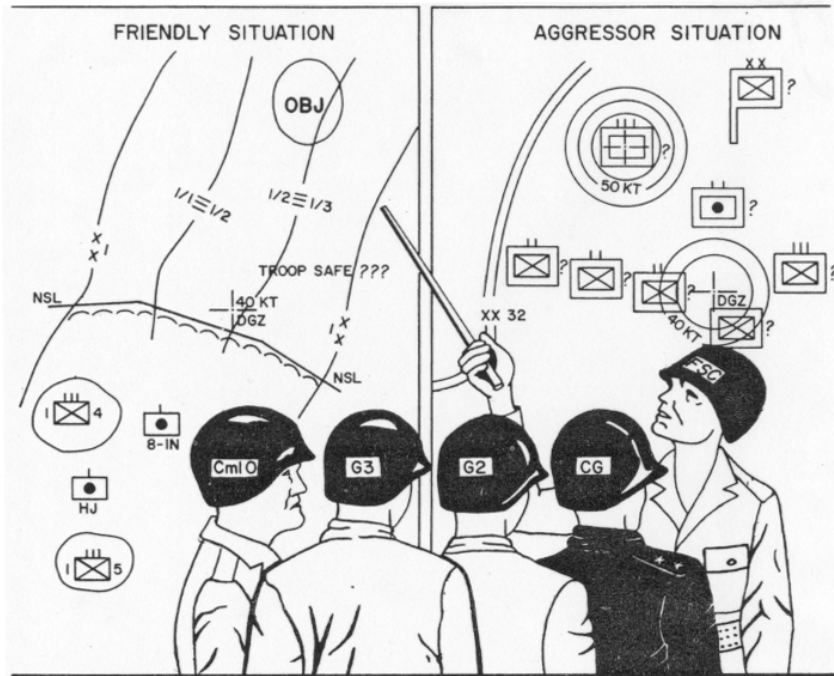


Figure 1. Include engineer officer when atomic demolitions are to be used.

G3.

- (1) Formulates operations estimate.
- (2) Integrates maneuver with fire support plan.
- (3) Selects nuclear target areas; makes *general* target analyses.
- (4) Advises commander on required nuclear allocation and on troop safety.
- (5) Interprets commander's general criteria into specific guidance for nuclear weapons analyses.
- (6) Predicts fallout from nuclear weapons fired by *friendly* force.
- (7) Assures troop safety, to include warning troops.
- (8) Prepares operations order.

G2.

- (1) Analyzes area of operations to determine potential target areas for nuclear weapons employment.
- (2) Directs attention to intelligence agencies toward complete nuclear target intelligence with special attention to general areas designated by the G3.
- (3) Prepares intelligence estimate.

- (4) Predicts contamination from *enemy* fired nuclear weapons.
- (5) Directs survey and monitoring of contamination from *all* nuclear weapons.

Fire support coordinator.

- (1) Establishes the fire support coordination center (FSCC) at the division command post.
- (2) Continually plans for requirements, allocation, coordination and integration of all means of fire support.
- (3) Makes *detailed* analyses of nuclear targets. Advises commander on results and makes recommendations when criteria is in conflict or has not been met.
- (4) Keeps commander and staff informed of fire support capabilities and support rendered.
- (5) Assists in direct damage assessment for the G3.
- (6) Is responsible to the G3 to pass all information of nuclear weapons fired by friendly forces to the chemical officer for fallout prediction.
- (7) Prepares the nuclear fire plan—a part of the fire support plan—which normally includes tab A, scheduled fires; tab B, on-call fires; tab C, target overlay.
- (8) Prepares the fire support plan.

Chemical Officer.

- (1) Establishes radiological center—in close proximity to FSCC.
- (2) Predicts fallout for G2 for all nuclear weapons fired by the enemy.
- (3) Maintains fallout and radiological contamination maps; directs and supervises all radiological survey operations for G2.
- (4) Prepares fallout prediction for G3 of nuclear weapons fired by friendly forces.

COORDINATED STAFF EFFORT

It is during the preparation or the revision of staff estimates that most of the detailed staff planning for nuclear weapons employment takes place. A sequence of workable staff planning steps and procedures as outlined below indicates the concurrent planning necessary when employing nuclear weapons to support tactical operations.

Step	Nuclear aspects
A. Preliminary planning—prior to receipt of missions:	<ul style="list-style-type: none"> G3: Studies general tactical situation. G2: Studies terrain and enemy dispositions to select potential target areas. FSC: Makes continuing estimate of weapons and delivery unit requirements. CmlO: Analyzes effect of radiological contamination on friendly dispositions.
B. Mission received:	<ul style="list-style-type: none"> Comd: Issues general guidance; announces weapons available or requires an estimate of weapons needed.

- C. Staff planning based on the mission:
- G3: Interprets commander's guidance into more specific terms, develops several courses of action to employ combat power (maneuver elements and fire support), and selects general nuclear target areas. Selects best plan to recommend to commander.
 - G2: Directs intelligence effort into general target areas selected by G3.
 - FSC: Considers fire support required, advises on the fire support available, advises if targets are appropriate for nuclear attack, makes detailed nuclear analyses, advises on the effect of the commander's criteria, and recommends corrective action where appropriate.
 - CmlO: Advises on the extent and effect of radiological contamination.
- D. Staff recommendation (to commander):
- G3: Plan of attack; planned use of nuclear weapons.
 - G2: Intelligence estimate.
 - *FSC: Effects to be obtained from nuclear weapons attack; advises where criteria is in conflict (for example, when damage desired cannot be obtained because of troop safety requirements); recommends corrective action.
 - *CmlO: Advises on effect of fallout.
- *May be presented by the G3 after FSC and CmlO advise the G3.
- E. Commander's decision:
- Comd: Announces approval of the plan and decision on targets to be attacked; revises criteria as desired; elaborates on concept of the operation.
- F. Completion of the plan; preparation of the order:
- G3: Prepares operations order.
 - G2: Prepares the intelligence estimate.
 - FSC: Prepares the fire support plan (FSP) (the integrated and coordinated plan for all fire support available to the division). As a part of the FSP, prepares the nuclear fire plan.
- G. Supervision:
- **Comd: Upon receipt of direct and/or indirect damage assessment, makes decisions as required.
 - G3: Warns troops, follows action, and issues necessary orders for commander.

G2: Directs and supervises technical damage assessment; studies results of nuclear- attack.

FSC: Receives firing reports; conducts damage assessment; directs firing of backup rounds or conventional fires as required. (A backup round is prearranged to be fired if results desired have not been substantially met on first round or if first round failed in firing for any cause.)

**Usually he does this in the FSCC.

FIRE SUPPORT COORDINATION CENTER PROCEDURES

The battlefield management of nuclear weapons includes all of the above actions and, in addition, the following procedures in the FSCC. All are of extreme importance.

(1) Suitably designed charts must be available and up to date to show the current status of all nuclear weapons and nuclear firing units.

(2) Target information must be complete and continually reviewed.

(3) Troop dispositions must be shown accurately and changes posted promptly.

The division commander has a powerful new weapon at his disposal with which he can apply measured force to carry out his mission. A well-trained, coordinated staff will assure timely use of this new and greater firepower in support of his operations or, conceivably, to accomplish his mission with substantially less fighting by his infantry and tank units.

As the H-13 settled on the division CP landing area, Colonel Black thought to himself, "This is a whale of a job; I hope I make it."



A GEM FOR THE FIRING BATTERY

Don't let a hard surface in your gun park limit cannoner training. You can overcome the problem of emplacing aiming stakes by filling two 5-gallon buckets with sand and emplacing the stakes in the buckets. Thus, cannoner training is not restricted.

—Submitted by Capt Edward R. Coleman
Dept of C & E, USAAMS



Don't be a victim of the "summer slump." Remain active in Artillery Extension Courses.

A NEW ARTILLERY TRAINER FOR GUNNERY PRACTICE

Second Lieutenant Thomas J. Hughes
United States Army Artillery Board

Lack of space for live gunnery practice is an age old problem for artillery units. Artillery ranges, when available, usually are far from the garrison. The ranges are overcrowded and an individual unit may be limited to as little as two weeks of firing a year. This is particularly true in overseas areas; however, similar conditions, although not as acute, exist within the United States. Moreover, the cost of using live ammunition prohibits extensive practice.

Today, only the artillery schools are able to provide sufficient live ammunition for gunnery training. Therefore, many improvised devices as well as standard classroom observer training techniques, none of which consist of live firing, are being used for gunnery training.

Gustav Genschow and Company in Germany has developed a new artillery trainer which fires a harmless round having all the ballistic properties of an artillery projectile. The 14.5-mm device (fig 2) has been demonstrated to high ranking US Army officials in Germany. The German Army now uses the trainer.

This 14.5-mm firing device is easily transportable and has a maximum range of 1,000 meters. It permits practice in firing at fixed and moving ground targets from reduced distances. The trainer consists of a tripod, a rotating mount, a rifled tube, and standard fire control equipment (fig 3).

The tripod legs are fitted with screw housings for leveling, and one leg can be extended about 15 inches. The mount pivots on the tripod, supports the fire control equipment, and houses trunnion bearings which support the tube. The caliber 14.5-mm tube is 400 millimeters long and has a bolt action. The tube is traversed by means of an elevating arc and worm gear; rapid elevation is accomplished by disengaging the worm gear from the elevating arc. The sight mount uses the M12 series panoramic telescope. The barrel can be traversed 6,400 mils. The elevation quadrant is graduated in 10-mil increments from 0 to 1,600 mils, and has a vernier scale for reading elevation to the nearest mil.

TRAINER FIRES AT REDUCED TARGETS

Firing the trainer can be compared to a reduced reproduction of an artillery piece firing at a ratio from 1:5 to 1:10. Targets should be represented at about this same rate of reduction. Reducing the distances between the artillery trainers in battery position and between the batteries in the battalion position likewise at the ratio of 1:5 and 1:10 conveys the impression of firing at normal distances.

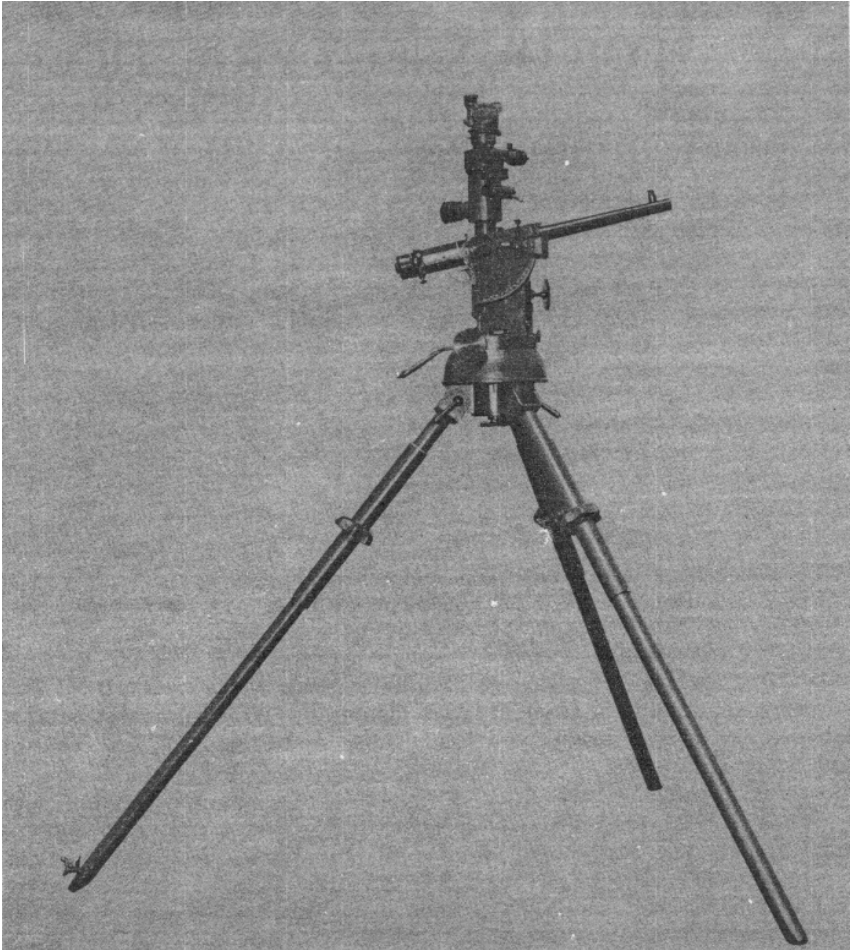


Figure 2. The 14.5-mm firing device on a tripod.

Neither the trainer nor its ammunition will cause damage to crops; therefore, its use is not restricted to the garrison training area. It is suitable for flat-trajectory firing below 45° elevation and for high-angle firing above 45° elevation. The trainer permits measurement of vertical fire and continuous practice of spotting teams in measuring air bursts, both day and night.

The ammunition used is the 14.5-mm cartridge. It has all the ballistic properties of the normal artillery projectile. There are big and reduced propellants to provide different trajectories for the same range. The maximum range of the 14.5-mm firing device with the big charge

is 1,000 meters, and the maximum target firing range is about 800 meters. In consideration of certain safety requirements there is only a slight burst effect.

The following types of ammunition are available:

(1) The percussion fuze projectile has an impact smoke producer with a slight detonation. The cloud can be seen with the naked eye at a distance of up to 1,000 meters.

(2) The time fuze projectile makes an air burst which is traceable and measurable for several miles, by smoke during the day and by flash at night.

(3) The rim fire cartridge (5.6-mm or caliber .22) is commercial ammunition fired from 50 meters with a dispersion barrel. It can be fired at vertical targets or targets on a sand slope inclined 25° to 40° . Impact is traceable by a dark spot forming on the sand.

A dispersion barrel (fig 4) which fires the 5.6-mm cartridge can be inserted for firing at short distances (50 meters) at vertical targets or targets on sand slopes. Its targets are represented at a ratio of 1:50 to 1:100 of natural size.

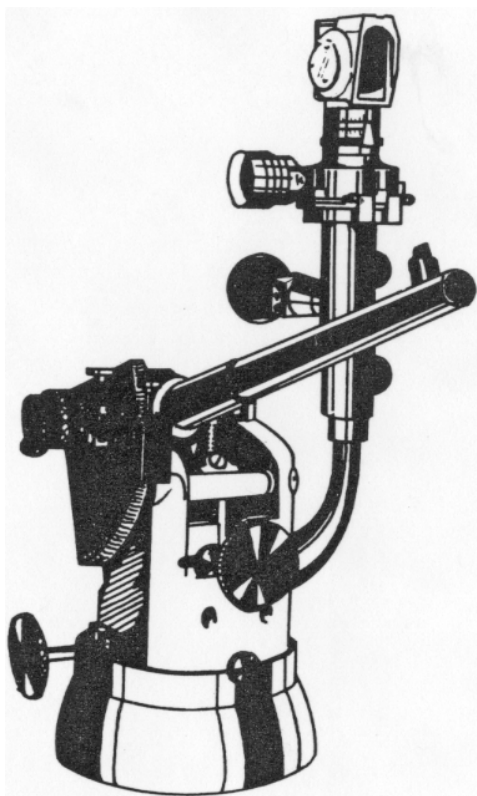


Figure 3. The firing device with panoramic telescope mounted.

INSERT BARREL DEMONSTRATES DISPERSION

The insert barrel also can be used to demonstrate dispersion as a fundamental element of artillery firing. In firing from 50 meters at sand slopes or vertical targets, it gives the effect of a measurable diagram of gunfire dispersion which is useful in explaining the laws of dispersion, the evidence of their influence on the hit, the deduction of gun firing rules, and training in fire control.

The artillery trainer with its insert barrel does not replace training with live artillery ammunition, but it does permit the transfer of live firing practice from a restricted firing range to garrison training areas. The trainer will allow the unit to devote more time to live firing



Figure 4. The artillery trainer with the dispersion or insert barrel.

training, and, it is more economical. A medium caliber battery normally is allotted some 300 live projectiles for training purposes. For the same price they can fire 2,000 to 3,000 much smaller projectiles.

The trainer is a simple, rugged, and relatively precise weapon. It surpasses the field artillery trainer M3 (Bishop Trainer) in realism, simplicity of operation, and ease of range preparation. A conclusion from the US Army Artillery Board through field testing is that the trainer is a suitable training aid for teaching artillery fire techniques, particularly for National Guard and Reserve units that may not have adequate firing ranges to conduct service practices like those held at Fort Sill.

" . . . Field Artillery entered the . . . War with a strong sense of mission—not only to support, but to live and die with its infantry."

Major General H. G. Bishop
"Field Artillery" 1935

"Formerly to win a victory, the fighting force needed only courage and strength; today it must have artillery."

Frederick the Great

How To Write A Field Message

Captain William L. Melvin
Department of Communication and Electronics

Do you know how to write a field message?

Suppose your commanding officer has departed hurriedly from headquarters, having jotted down the following facts for a field message for you to write and send immediately.

Put the plan we devised last week, plan Sierra, into operation on June 22 at 1:30 a.m. . . . give this message an emergency precedence. Send it to the commanding officer of the 1st Howitzer Battalion of 17th Artillery . . . deliver to the S3.

Test yourself by filling out the message on the blank Message Book Form M-210-A below.

THESE SPACES FOR MESSAGE CENTER ONLY		
TIME FILED	MSG CEN NO.	HOW SENT
MESSAGE		PRECEDENCE
(SUBMIT TO MESSAGE CENTER IN DUPLICATE)		
No. _____	Date _____	
To _____		
OFFICIAL DESIGNATION OF SENDER		TIME SIGNED
SIGNATURE AND GRADE OF WRITER		

Figure 5. Sample Message Book Form M-210-A.

How does your message compare with the accepted, correct version on page 19? Is it as brief, clear, and accurate? If not, the following pages should clarify in your mind the facets of writing a field message. Remember, all military personnel, regardless of grade or position, are authorized and should know how to write a field message.

Basically, a message contains three parts—the heading, text, and ending. Consider yourself as the message writer and let us discuss step-by-step the components within the three parts of the example message. For illustrative purposes, the form used in this article is a message blank from the Message Book M-210-A.

KNOW THE MESSAGE RULES

To learn a game properly, you must first know the rules and how to apply them. The same is true for message writing. Several rules that must be carried out in writing the field message are:

- (1) Each word, except signatures, must be printed in block letters.
- (2) Authorized abbreviations should be used to conserve space wherever possible but clarity should never be sacrificed for brevity. Joint Army-Navy-Air Force Publication (JANAP) 169 gives abbreviations for joint use, and Army Regulation (AR) 320-50 contains intra-Army abbreviations. Avoid using abbreviations appearing on the back cover of the M-210-A Message Book; about one-fourth of them are incorrect or obsolete.
- (3) Punctuation should not be used unless it is necessary for clarity, then the punctuation symbol is used. The asterisk (*), number mark (#), and commercial (@), are not used. The letter "x" may be used when exact punctuation is not essential but the text should be separated for clarity.
- (4) Numbers are written as numerals or the digits may be spelled out individually. For example, 227 is written as 227 or as TWO TWO SEVEN. But 200, if spelled out, would be TWO HUNDRED. The number 17,000 would appear as ONE SEVEN THOUSAND.
- (5) A word may be repeated to prevent an error but not solely for emphasis. A legitimate example of repetition to minimize the possibility of mistaken identity or incorrect spelling is: MIYAZAKI REPEAT MIYAZAKI.
- (6) The phonetic alphabet is used for each isolated letter. Route A, for example, must appear as ROUTE ALFA. The initials of a person's name are never printed phonetically.
- (7) The text should be written on every other line of the message form if possible.

COMPONENTS OF THE FIELD MESSAGE

Now, let us consider the components of the field message in their respective order.

First, precedence. The originator is responsible for assigning one of the six precedence designations (fig 6) to a message; however, you as the writer must determine it, too. Precedence is *not* taken for granted.

Precedence Designation	Example of Use	Order of Handling
FLASH (Z)	A report of initial enemy contact.	Ahead of all other messages; messages of lower precedence will be interrupted.
EMERGENCY (Y)	Amplifying a report of initial enemy contact.	Ahead of all messages of lower precedence; messages of lower precedence will be interrupted.
OPERATIONAL IMMEDIATE (O)	An operations order affecting current operations.	Ahead of all messages of lower precedence; messages of lower precedence will be interrupted.
PRIORITY (P)	Troop movements; normally the highest precedence assigned to administrative traffic.	Ahead of all messages of lower precedence, except that routine messages being transmitted will not be interrupted unless they are exceptionally long.
ROUTINE (R)	Messages not of sufficient urgency to justify a higher precedence which must be delivered without delay.	After all messages of higher precedence.
DEFERRED (M)	Messages justifying transmission by rapid means but which admit the delay necessary for prior transmission of higher precedence messages.	After all messages of higher precedence.

Figure 6. Precedence designations.

To you, precedence is the required speed of delivery to the addressee. You should determine the lowest adequate precedence on the basis of the message content and the time factor involved. In our example (fig 7A) "Emergency" was deemed appropriate. When in the hands of communication personnel, precedence means the relative order of handling and delivery. The addressee may have many messages to read, but your message with "Emergency" on it may determine the order in which he reads them.

Your message number is entered in the space provided after the abbreviated word "number" (fig 7B). Each command specifies its own procedures concerning the assignment of this number. The date, month (abbreviated), and year, are entered in that order in the space provided after the word "Date" (fig 7C).

The official designation of the addressee is entered in the space after the word "To" (fig 7D). The addressee is the commander of the organization to which you are sending the message.

The proper security classification—TOP SECRET, SECRET, CONFIDENTIAL, CONFIDENTIAL-MODIFIED HANDLING AUTHORIZED, OR UNCLASSIFIED—will be entered above and below the text of the message. The classification is circled to separate it from other elements of the message (fig 7E).

ORIGINATOR RESPONSIBLE FOR SECURITY

The originator is responsible for the security classification of the message. In the M-210-A message form he is identified as the sender. As the writer, you are responsible for determining the proper security classification of the message in the originator's name. No assumptions are made concerning security. You must separately and independently identify *each* message as to its security classification.

The message center will not accept a message that has not been identified and marked with its security classification. This applies to both tactical and administrative messages.

Now, the meat of the message—the text. Make the text brief, clear, and accurate. Eliminate as many words as possible without making the text vague or misleading. Conjunctions, prepositions, and articles, such as *a, and, but, for, in, on,* and *the,* will not be included unless essential to the meaning. The text (fig 7F) contains two parts, the internal instructions and the body:

(1) The internal instructions consist of any required additional addressee and originator designations, and will begin on the first line of the body of the message form. The word "for" will be used to indicate that the message should be delivered to a specific office or individual at the location addressed. It is followed by an abbreviated title of the person or office within the agency, command, or installation for whom the message is intended; in our example, the S3 (fig 7F1).

(2) The body of the text will begin on the line below the internal instructions (fig 7F2).

The official designation of the originator is entered in the appropriate block. He is identified as the sender in the M-210-A message form. The originator is the commander (designated by title and organization) by whose authority the message is sent (fig 8G). He must be distinguished from you, the writer and composer of the text. Sometimes, the writer and originator may be the same person.

ENTER TIME MESSAGE SIGNED

You must enter the time you signed the message. If the message is signed on the same day shown in the date block, only the hour,

THESE SPACES FOR MESSAGE CENTER ONLY		
TIME FILED	MSG CEN NO	HOW SENT
		EMERGENCY A
MESSAGE (SUBMIT TO MESSAGE CENTER IN DUPLICATE) PRECEDENCE		
No. 5	Date 21 JUN 58 C	
To Co 1 HOW BN 17 ARTY		
(CLASSIFICATION)		
①	FOR S3	
②	PLAN SIERRA EFFECTIVE 220130Z	
(CLASSIFICATION)		
OFFICIAL DESIGNATION OF SENDER		TIME SIGNED
SIGNATURE AND GRADE OF WRITER		

Labels:
 B: MESSAGE heading
 C: Date
 D: To
 E: Security classification
 F: Text

Figure 7. The letters A, B, C, and D show the parts of the field message heading. Letter E shows the security classification and F designates the text.

minute, and zone suffix will be entered. If the two dates differ, enter the complete date-time group to show the day of the month, the hour, and the zone suffix (fig 8H).

A sample date-time group is 211415Z. The first two digits (21) indicate the 21st day of the current month. Two digits are always shown, even for days prior to the 10th, by using a zero before the digit. For example, the seventh day would be 07. The second pair of digits (14) indicate the hour, and the last pair (15) indicate the minutes after the hour. A suffix Z indicates the time zone.

The time signed block should bear a time zone suffix to indicate the time zone used. The theatre commander may authorize the local zone suffix for messages that will not leave the time zone in which the theatre is located. In other instances, the theatre commander may require the use of Greenwich mean time.

A block is provided for you to sign your name and grade (fig 8I).

	AUTHORIZED TO BE SENT IN THE CLEAR <i>John Doe Capt.</i>	
G	CG 1 INF DIV ARTY <small>OFFICIAL DESIGNATION OF SENDER</small>	1415 Z <small>TIME SIGNED</small>
I	<i>John Blue Lt. Col. S3</i> <small>SIGNATURE AND GRADE OF WRITER</small>	

Figure 8. Letters G, H, and I show components of the message ending. Letter J shows "authorized to be sent in the clear."

If speed is so essential that the time cannot be taken for encryption and decryption, and the transmitted information cannot be acted on by the enemy in time to influence current operations, a message of any classification except TOP SECRET may be sent in the clear. However, only the commanding officer or his authorized representative can authorize transmission in the clear. The authorization is indicated by the statement "Authorized to be sent in the clear," followed by the signature and grade of the authorizing person (fig 8J). This statement is circled to separate it from the other elements of the message. If no signature appears, the message will be encrypted prior to transmission by electrical means.

The forms contained in the M-210-A Message Book are arranged in sets of three, interleaved with carbon paper, permitting every message to be prepared in triplicate. In writing a message which is to be routed through message center, one more copy than the number of addressees will be sent. A copy of each message written should be retained by the writer. The message form is used whether the message is transmitted by electrical means or carried by messenger.

Figure 9 shows a final, correct version of the message we have discussed in this article. The basic rules of message preparation and the description of elements to be entered on a message will apply to any message form. Remember, the key for writing a field message is to be . . . *brief, clear, and accurate.*

THESE SPACES FOR MESSAGE CENTER ONLY		
TIME FILED	MSG CEN NO.	HOW SENT
MESSAGE (SUBMIT TO MESSAGE CENTER IN DUPLICATE)		EMERGENCY PRECEDENCE
No. 5	Date 21 JUN 58	
To CO 1 HOW BN 17 ARTY		
(CLASSIFICATION)		
FOR S3		
PLAN SIERRA EFFECTIVE 220130Z		
<div style="border: 1px solid black; border-radius: 15px; padding: 5px; display: inline-block;"> AUTHORIZED TO BE SENT IN THE CLEAR <i>John Doe Capt</i> </div>		
(CLASSIFICATION)		
CGI INF DIV ARTY OFFICIAL DESIGNATION OF SENDER	1415Z TIME SIGNED	
<i>John Blue Lt Col S3</i> SIGNATURE AND GRADE OF WRITER		

Figure 9. The completed field message.

A GEM FOR THE COMMUNICATION SECTION

When the receiver-transmitter RT-70/GRC does not emit a rushing noise, a good first check is to measure the filament voltage at Pin 7 of V-7. An indication of 1.5 volts DC should be given when tubes V-7, V-8, V-9, V-10, V-11, V-101, V-107 and V-108 have filaments that are not burned out. If the voltage is lower than 1.5 volts DC, the probable trouble is a burned out filament in V-7, V-8, V-9 or V-10. Should the voltage be over 1.5 volts DC, a filament has probably burned out in V-101, V-107 or V-108.

—Submitted by Mr. Lowell E. Collins
 Dept of C & E. USAAMS

"I do not have to tell you who won the war. You know. The Artillery did."

General George S. Patton
 Artillery Conference, 1945

Little John --

THE MIGHTY MITE



Captain Morris J. Keller
Department of Materiel

Picture for a moment—two helicopters skimming the tree tops in a contour flight with what appears to be a tiny rocket and launcher carried in a sling under one of the giant birds. They hover momentarily and then settle down. From one of the helicopters, nine crewmen quickly unload the fire control and lightweight wind measuring equipment. Five of the men position the launcher and rocket, which have been set down by the second helicopter; the other four men erect the wind set.

In a few minutes, after the data for laying and wind correction have been set, the crew withdraws from the launcher toward the helicopter. As the chief of section pulls the lanyard to fire the missile we see a peculiar sight—*the rocket begins to spin on the rail!* When it reaches a speed of three revolutions per second, it fires automatically and flashes on its way to render destruction on an enemy installation. The time from touchdown to departure? Only 10 minutes!

This rapid fire and quick displacement concept is no longer a "future" hope, but is a reality with the Little John rocket, now in production for use by US Army artillery units.

The Little John is not new, but rather a final development of a project which started in 1957. As it exists today, the Little John is a supersonic, free-flight rocket, with a nuclear and nonnuclear capability. The lightweight launcher and ground equipment are adaptable to a high

degree of ground mobility, transport by helicopter, air transportability, and parachute delivery. The Little John will be used in airborne divisions.

LITTLE JOHN COMPONENTS

The major components of the Little John system are the rocket, launcher, and the wind set. The rocket XM51 is 14.5 feet long, 318 millimeters in diameter, and weighs approximately 780 pounds. It is a fin-stabilized field artillery rocket that follows a ballistic trajectory to ground targets.

The rocket launcher XM34 weighs approximately 1,200 pounds and can be towed with sufficient ground mobility to maintain pace with an infantry division. Figure 10A shows the Little John rocket, launcher, and trailer XM449, with a sling attached for a helicopter lift. Figure 10B shows the bars for rocket handling, rocket with blanket, and the launcher and trailer.

The launcher may be elevated from 0 to 1,155 mils and traversed 266 mils right and left of center. It can be leveled on slopes up to 5°. Figure 11 shows the launcher at a high quadrant elevation.

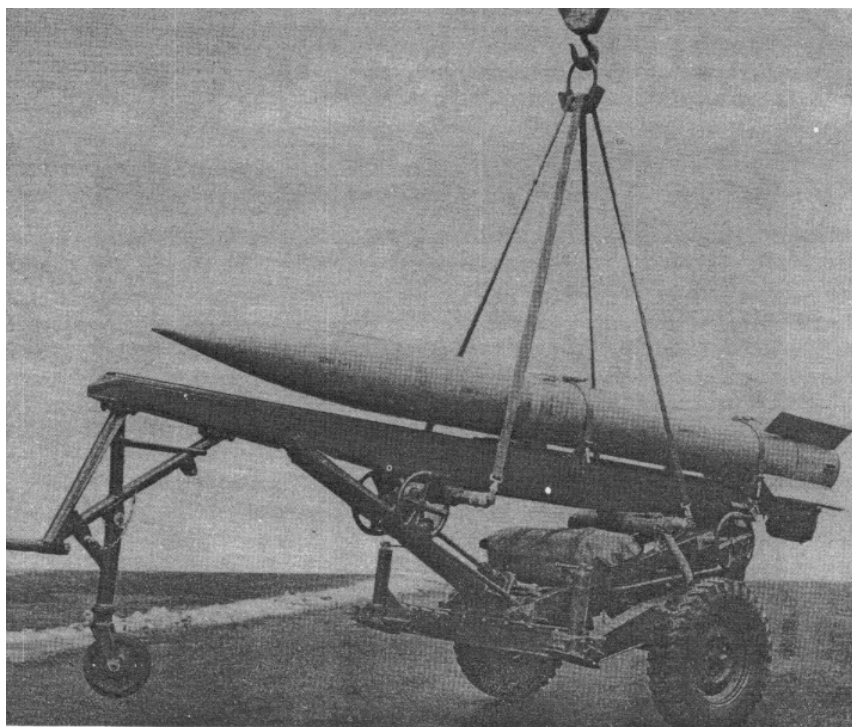


Figure 10A. Little John rocket, launcher XM34, and trailer XM449, with sling attached for helicopter lift.

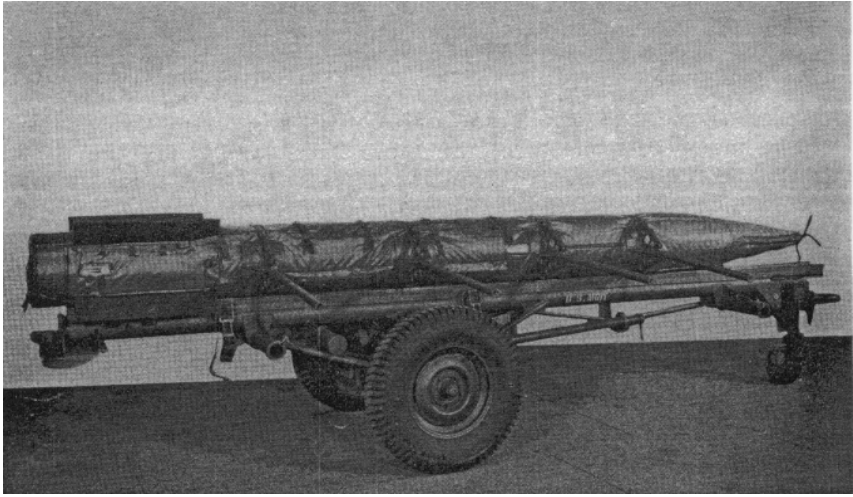


Figure 10B. Rocket with blanket, and handling bars positioned to manually remove rocket from trailer.

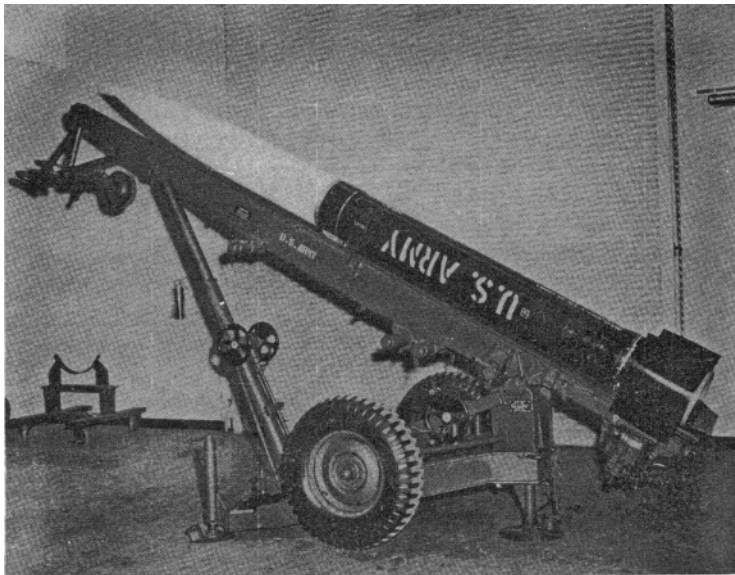


Figure 11. Little John launcher at high quadrant elevation.

The wind measuring set AN/MPQ-6 (fig 12) is a lightweight, portable unit used to measure wind velocity and wind direction which, when applied as corrections, will compensate for the effects of low-level winds on the flight of the rocket.

The rocket XM51 consists of a warhead, a rocket motor assembly, and an igniter assembly. The rocket motor and the warhead are shipped in separate containers (fig 13) and may be assembled into one unit when issued to the user. The igniter assembly is assembled to the rocket by the user.

The rocket may be placed on the XM34 launcher by means of a tripod and hoist (fig 14). The hoist may be used to lift the Little John on or off a 2½-ton truck to load the rocket on the trailer, the vehicle used to carry other rounds of the basic load to the firing position. However, a removable platform is under development for rocket handling which can be utilized with the 2½-ton truck and will simplify loading the rocket on the launcher or trailer.

Insulating blankets issued with the rounds are placed on the rocket until it is ready to fire. The blanket maintains the rocket temperature within firing temperature range for a limited period of time and protects the rocket during transportation.

There are several means by which the 780-pound rocket can be placed on the launcher. For example, when the trailer is mated to the

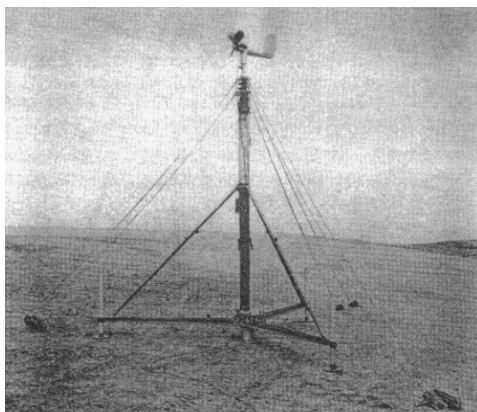


Figure 12. Lightweight, portable wind measuring set AN/MPQ-6.

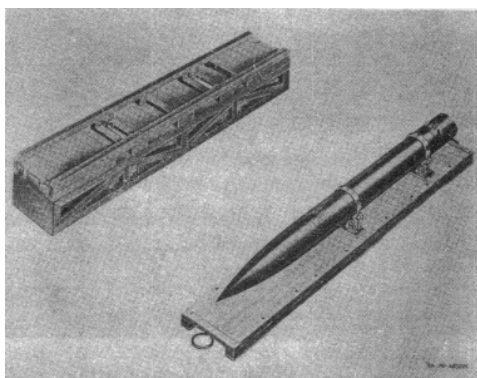


Figure 13. Packing crate with rocket installed.

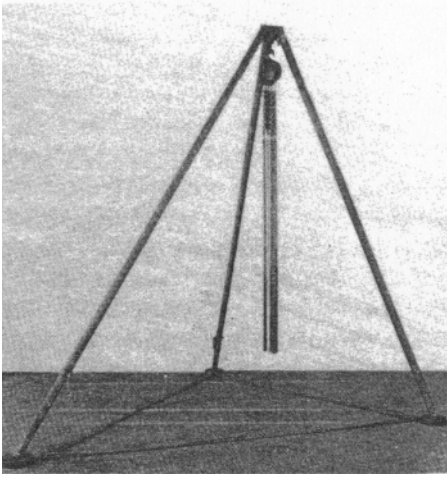


Figure 14. Hoist with tripod; tripod in erected position.

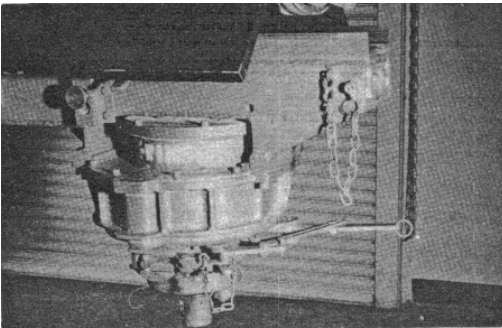


Figure 15. Flat coil spring mounted under rear of launching rail.

rear of the launcher, a continuous rail is formed and the rocket may be moved forward onto the launcher; or eight men using the handling bars can manually lift and position the rocket on the launcher.

LITTLE JOHN SPINS ON THE RAIL

Once the launcher is loaded, the remaining action is to travel to the firing position either by helicopter, by 1/4-ton truck, or manhandle the launcher into position. Prior to firing, a unique action occurs which distinguishes the Little John from other free-flight rocket systems—it spins on the rail.

Unlike the Honest John rocket system, where the spin is initiated by the spin rockets *after* the round leaves the launcher, the Little John rocket is stabilized by imparting spin to the rocket while on

the launcher, just prior to firing. This method of stabilization is known as the saucer concept, "spin-on-straight-rail" (SOSR).

Prior to firing, a flat coil spring mounted under the rear of the launching rail (fig 15) is wound $8\frac{1}{2}$ complete turns. The spring is released when the lanyard is pulled, turning a drive shaft which rotates a pinion gear meshed with teeth of a ring gear attached to the rocket nozzle. When the rocket reaches a spin rate of $3\frac{1}{2}$ revolutions per second (rps), inertial switches attached to two thermocell batteries close a relay and provide power for activating the igniter for firing.

As the spinning rocket clears the rail, the front shoe is ejected and the rear shoe retracts up within the fin barrel on the rear of the rocket. The fins are canted to maintain this initial spin.

VERSATILE AND RUGGED

The Little John, modern, rugged, and reliable, will soon be available to artillery units. The combined weight of a complete round and the launcher is only 2,000 pounds, which is less than half the weight of a 105-mm howitzer. The Little John becomes a versatile weapon in the hands of a commander.

Though miniature in appearance, this rugged weapon can assert itself with destructive authority as it joins the artillery arsenal in providing immediate response to requests for fire, and still maintain that important artillery characteristic of—Surprise!

Little John has earned its place as the newest member of the Army's arsenal of effective mobile weapons. It is fully capable of participating in any encounter which might arise.



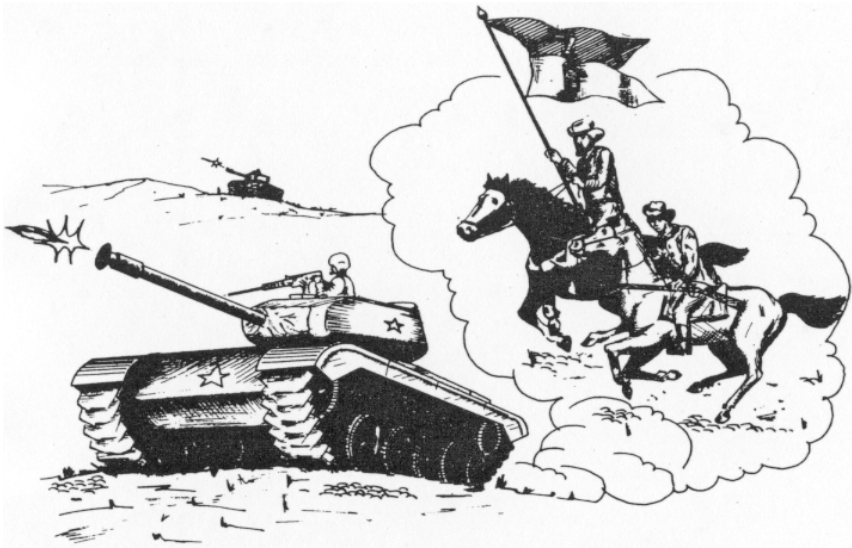
A GEM FOR THE SAFETY OFFICER

Before leaving for the field, the firing battery safety officer can reduce his safety diagram information to a handy 3" x 5" card. The form shown below will lessen the chance of error in verifying safety information since each charge to be fired is listed on a separate card. When the charge is announced to the guns, the safety officer selects the card to correspond to the charge to be fired. When the deflection is announced, he refers to the card and insures if the announced deflection is within the safety deflection bracket. When this has been established, all required safety information is available.

<u>CHARGE 5</u>			
Deflection	2018	2400	2765
Max Quad Elev	475	596	
Min Quad Elev	133	115	
Min Time Setting (Sec)	10.6	9.4	

—Submitted by 1st Lt Billy G. Coleman
1st How Bn, 13th Arty
APO 112, New York, N. Y.

"Horseshoes To Iron Tracks"- -



THE ARMORED CAVALRY REGIMENT

Major J. C. Burney, Jr.
Department of Tactics and Combined Arms

"Cavalry is the arm of shock and firepower; it is the screen of time and information. It denies the enemy that talisman of success—surprise—while it provides our own forces with the means to achieve that very thing, surprise, and with it the destruction of the enemy."

—Maj Gen James M. Gavin

You have just been assigned as the commander of a 105-mm howitzer battery. In examining your mission, you find that your unit is the only artillery organic to an organization that is covering a 50-mile front.

Incredible? Not at all! For almost 15 years the mammoth task of providing a shield between Soviet-controlled Europe and the United States zone of West Germany has been entrusted to three armored cavalry regiments. Today, these three regiments cover a 450-mile front, much of which is mountainous and heavily forested. The average frontage assigned to each regiment then is 150 miles. (As we will see when we

examine the structure of the regiment, this situation provides one howitzer battery for each 50 miles of frontage.)

How could one regiment possibly cover 150 miles? This question is frequently asked by those not familiar with the armored cavalry regiment. What gives the regiment the ability to cover this frontage? And how is the regiment employed to accomplish this imposing, vital task? To answer these questions, let us examine the characteristics, organization, and employment of the armored cavalry regiment.

A study of the armored cavalry regiment should be of particular interest to artillerymen, as no other unit in our Army features the type of artillery organization found in the armored cavalry regiment. Furthermore, additional indirect fire support for the regiment is provided by corps artillery. To provide this fire support effectively, artillerymen must understand the employment of the regiment.

THREE CLASSIC CAVALRY MISSIONS

In each type corps there is one armored cavalry regiment. The corps commander uses the regiment to perform the three classic cavalry missions—reconnaissance, security, and light combat or economy force missions.

Armored cavalry is ideally suited to perform these tasks because of its unique capabilities and characteristics. The most outstanding characteristic of the regiment is its great mobility. The regiment is completely mounted. A preponderance of light, fast, full-tracked vehicles provides excellent cross-country mobility.

The regiment also features a tremendous volume of firepower. It is equipped with 76-mm tank guns, 90-mm tank guns, 4.2-inch mortars, 105-mm howitzers, and machineguns. This one regiment has just three fewer tanks than an entire infantry division. The firepower is armor protected, although some armor protection has been sacrificed to achieve the greatest possible mobility.

Shock action is achieved by surprise, which, in turn, is attained by exploiting the regiment's great speed and mobility.

Any fast-moving unit must depend on radio as its principal means of communication. All elements of the armored cavalry regiment are tied into an extensive communication net which includes both FM and AM radios.

CHARACTERISTICS AID THE REGIMENT

These characteristics—mobility, firepower, shock action, and extensive communication—enable the regiment to travel great distances, cover broad frontages, and accomplish its reconnaissance and security missions with force and aggressiveness. However, the relatively light armor protection limits its employment in operations such as attacks against strongly fortified positions or a "slugging" match with heavy enemy tanks.

To better understand the characteristics of the armored cavalry regiment, let us examine its organization.

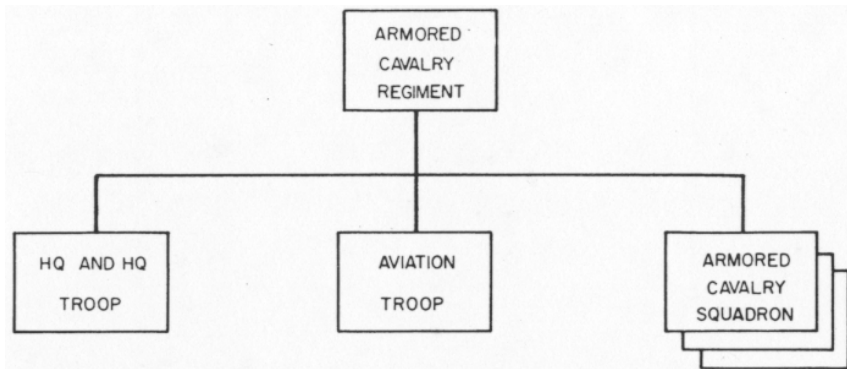


Figure 16. The armored cavalry regiment.

The regiment is tactically and administratively self-sufficient. Its organic elements are a headquarters and headquarters troop, an aviation troop, and three armored cavalry squadrons (fig 16). In addition to these elements, it may include attached combat, combat support, and service elements, such as tank battalions, engineer companies, and ordnance companies.

The headquarters and headquarters troop provides command, staff planning, control, and supervision of operations and administration of the regiment. To accomplish these tasks, it has the elements shown in

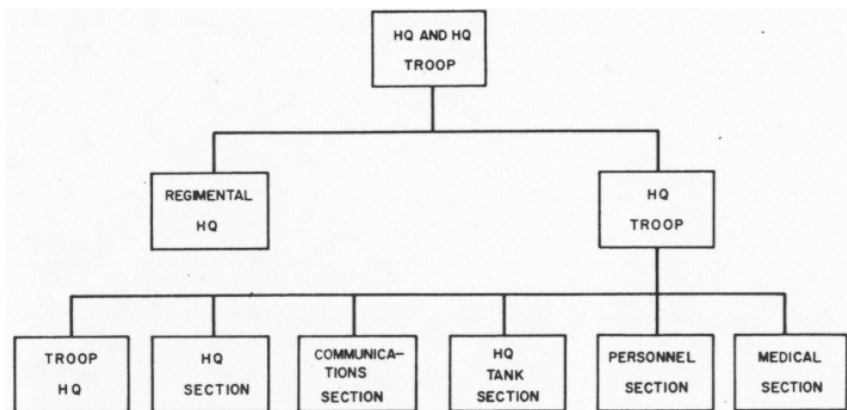


Figure 17. The headquarters and headquarters troop (armored cavalry regiment).

figure 17. Especially important to the commander is the headquarters tank section, which includes three light gun tanks. These tanks are used by the commander and his staff in controlling combat operations.

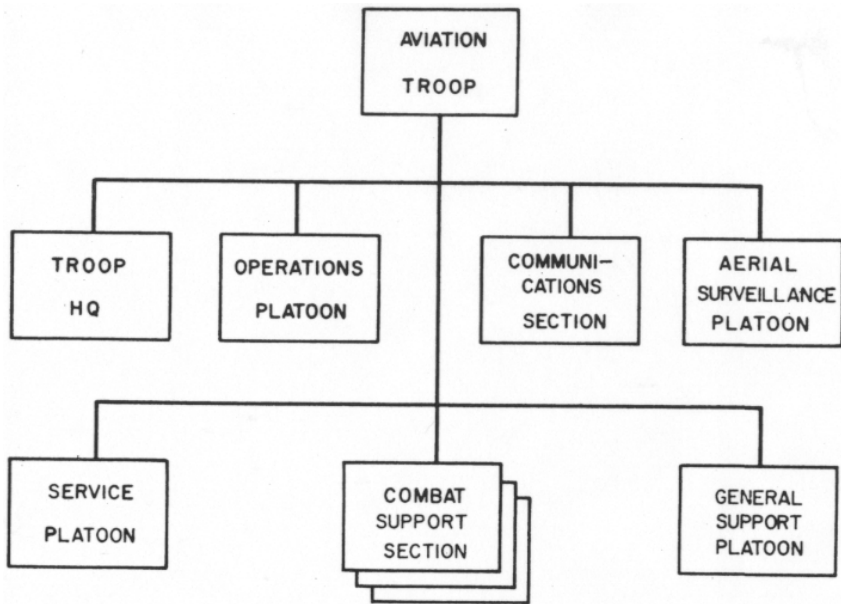


Figure 18. The aviation troop.

Aircraft are invaluable in conducting fast-moving, widely dispersed operations. Therefore, the regiment has an aviation troop, which is capable of continuous day and night operations during visual weather conditions. This troop is organized as shown in figure 18. Note that there is a combat support section for each of the three armored cavalry squadrons. When necessary, these sections are augmented with aircraft of the general support platoon. The aerial cameras and airborne radar of the aerial surveillance platoon enhance the regiment's ability to cover wide frontage.

BASIC FIGHTING ELEMENT

The basic fighting element of the regiment is the armored cavalry squadron. Each squadron is a combined arms team; it has a headquarters and headquarters troop, three armored cavalry troops, a tank troop, and a howitzer battery (fig 19). This separate howitzer battery is a unique feature of the armored cavalry regiment. This battery is the only artillery unit organic to a squadron which today, in Germany, covers a 50-mile front. The aforementioned elements make the squadron, like the regiment, both tactically and administratively self-sufficient and capable of independent operations.

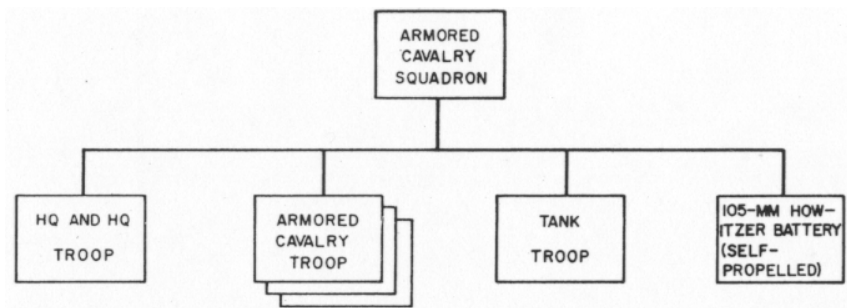


Figure 19. The armored cavalry squadron.

Administrative self-sufficiency is provided by the headquarters and headquarters troop, organized as shown in figure 20. Resupply is provided by the support platoon. Other service elements are the maintenance platoon and the medical section. The communications platoon includes one AN/TPS-21 radar set. The squadron commander and his staff use the two M41 light gun tanks, popularly known as "Walker Bulldogs," of the tank section to control operations.

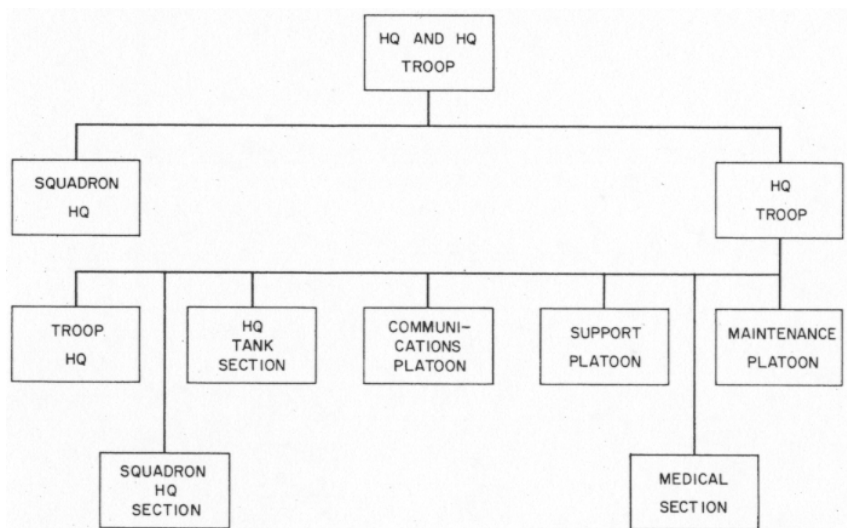


Figure 20. The headquarters and headquarters troop (armored cavalry squadron).

The squadron's basic reconnaissance and security element is the armored cavalry troop (fig 21). This troop is organized in the same manner as the troop of the armored cavalry squadron of the armored division (ARTILLERY TRENDS, February 1960). It has three armored cavalry platoons, each of which is a combined arms team. The scout

section is mounted in four jeeps, each equipped with a machinegun and a radio. The tank section has two M41 light gun tanks. This tank (fig 22) is the basic fighting vehicle of the armored cavalry regiment. Its light weight (25 tons) gives it great speed and agility in moving about the battlefield to accomplish its reconnaissance and security missions. Its main armament is a 76-mm high velocity tank gun; mounted coaxially with this gun is a caliber .30 machinegun. A caliber .50 machinegun surmounts the turret. The 12-man rifle squad is mounted in an armored personnel carrier (APC). The newest APC is the M113 (fig 23), which weighs only 10 tons. Fire support for the armored cavalry platoon is provided by a support squad equipped with a 4.2-inch mortar mounted in and fired from an M84 armored mortar carrier. Carrying the combined arms feature down to platoon level facilitates highly mobile, dispersed operations.

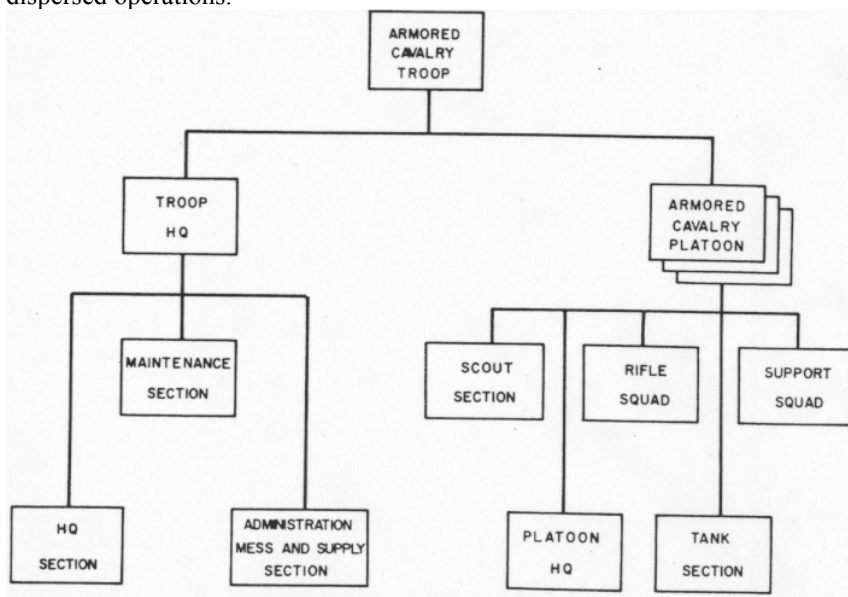


Figure 21. The armored cavalry troop.

THE SQUADRON COMMANDER'S "SUNDAY PUNCH"

The squadron's tank troop is also identical to its counterpart in the armored division, the tank company (ARTILLERY TRENDS, February 1960). The squadron commander's "Sunday Punch," this troop has three tank platoons of five tanks each (fig 24). The current medium gun tank is the M60, which boasts a 105-mm gun and is powered by a diesel engine (fig 25). The large volume of long range firepower and tremendous shock action afforded by the tank troop provides the squadron commander with a powerful force capable of decisive commitment at critical times.



Figure 22. The M41 light gun tank, popularly known as the "Walker Bulldog," is the basic fighting vehicle of the armored cavalry regiment.

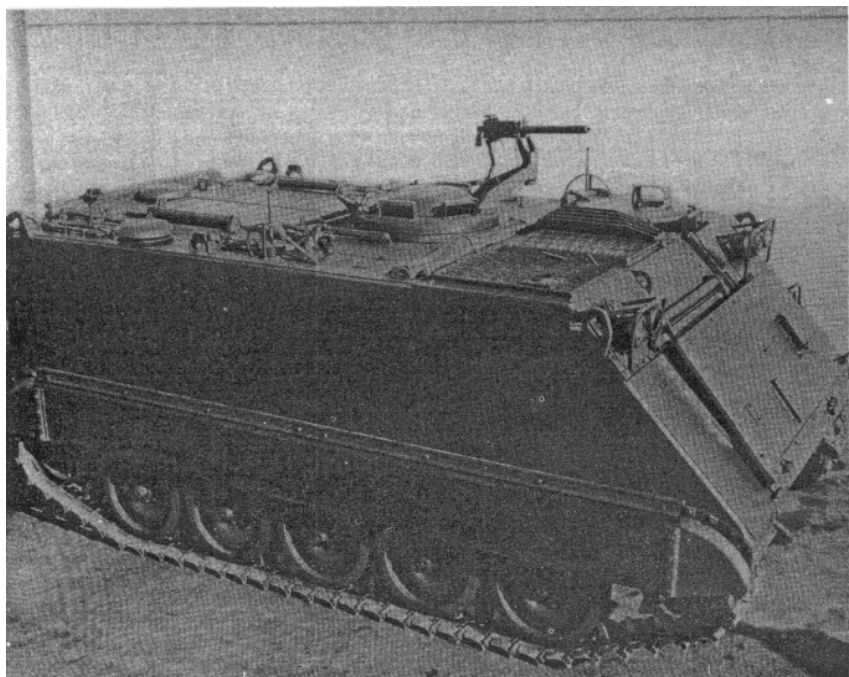


Figure 23. The M113 armored personnel carrier weighs 10 tons.

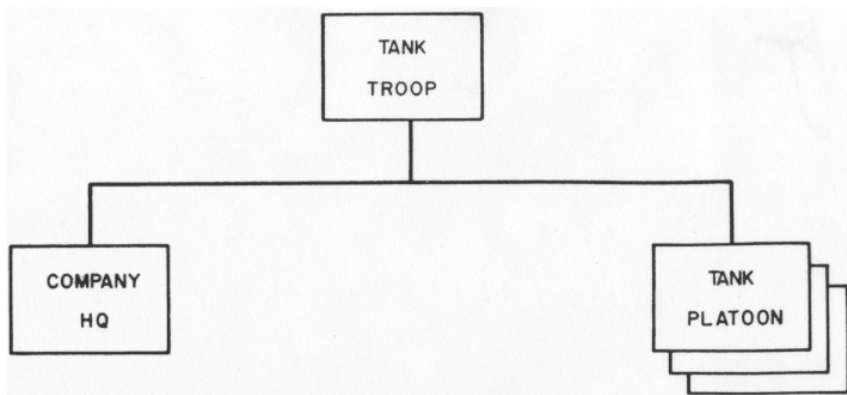


Figure 24. The tank troop.



Figure 25. The M60 medium gun tank boasts a 105-mm gun and diesel power.

To provide indirect fire support for the armored cavalry squadron, there is a 105-mm self-propelled howitzer (M52) battery. This battery is organized similar to a howitzer battery (fig 26) of the separate 105-mm howitzer battalion. The battery includes six howitzer sections, which will be equipped with the new T195 self-propelled 105-mm howitzer in the future (fig 27). With full-tracked, armor protected, self-propelled howitzers, the battery has speed and cross-country mobility characteristic of the other members of the armored cavalry team.

The howitzer battery is versatile. It is normally employed intact, as a complete unit. However, when the need arises, it may be employed by platoon; or operational control of the three batteries of the regiment

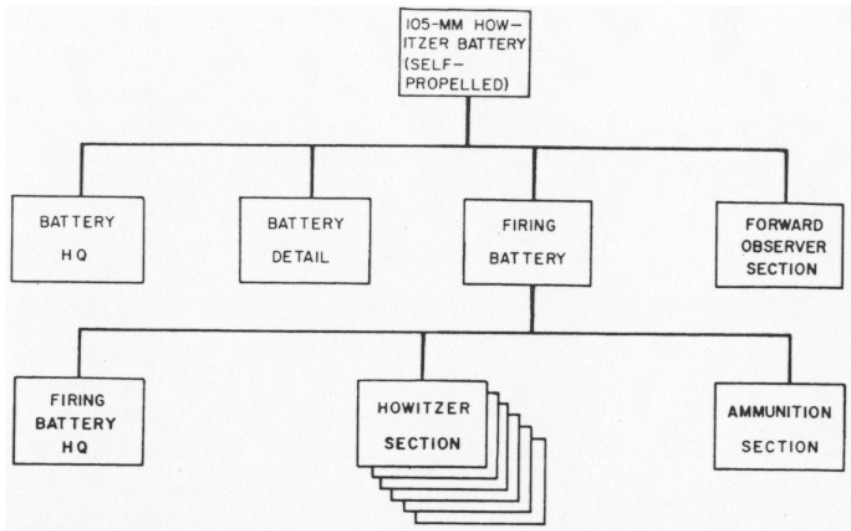


Figure 26. The 105-mm self-propelled howitzer battery.



Figure 27. The T195 self-propelled 105-mm howitzer is an armor protected, full-tracked vehicle.

may be centralized by forming a provisional 105-mm howitzer battalion.

Now that we have considered the organization of the armored cavalry regiment, we will see how it performs its challenging task of providing reconnaissance, security, and economy of force missions for entire corps.

Reconnaissance is a directed effort in the field to collect information about the enemy and terrain. Examples of such information include the strength, organization, and dispositions of the enemy; nature of the roads; trafficability of terrain; and fields of fire.

THREE TYPES OF RECONNAISSANCE

To gather information, armored cavalry uses three types of reconnaissance—route, zone, and area.

A route reconnaissance is employed when information is needed concerning a specific route and the terrain that dominates that route. When conducting a route reconnaissance, units move on the designated route and send out elements to reconnoiter roads that lead into the designated route. Each armored cavalry troop can effectively reconnoiter three routes.

A zone reconnaissance is conducted when information is desired of the enemy and terrain between definitely defined boundaries. This type of reconnaissance would be appropriate when the location of the enemy is in doubt or when it is desired to locate a suitable route within a zone containing several routes. In conducting a zone reconnaissance, the commander assigns sectors of the zone to his subordinate elements. Because of the area that must be covered, a zone reconnaissance is more time-consuming than any other type of reconnaissance.

An area reconnaissance is conducted when information is desired of a specific area, such as a town or city, a wooded area, or a bridge. When conducting an area reconnaissance, the commander dispatches a unit directly to the area to be reconnoitered.

The provision of security is another vital mission performed by the armored cavalry regiment. Security embraces all measures taken by a command to protect itself from observation, sabotage, annoyance, or surprise. To provide security, the regiment may be employed in several different roles.

REGIMENT FREQUENTLY A COVERING FORCE

The regiment is frequently employed as a covering force. A covering force provides security by operating as the advance, flank, or rear covering force for the main body (normally one or more divisions). It operates at a greater distance from the force being covered than the advance, flank, or rear guards of the main body. The specific missions of the covering force are to detect the approach of the enemy, delay and disorganize the enemy, deceive the enemy as to the true location of the force being covered, and defeat the enemy within its capability. In the offense, the corps commander frequently employs the armored cavalry regiment to protect a flank of the armored division as it strikes for the corps objective in the exploitation. In the defense, the regiment is normally employed as part of the covering force to delay the enemy so that the forces organizing defensive positions along the forward edge of the battle area (FEBA) will have time to properly prepare their defenses.

Another common security measure is to fill a gap between two divisions of the corps in either the offense or the defense. In this type of operation, the regiment maintains contact with both divisions and, in doing so, insures that the flanks of the divisions are secure.

The regiment may be effectively employed to secure a designated area. A common mission is to secure an assembly area for a corps or a division. Such a mission requires that the regiment cover a broad front; therefore, it frequently employs the techniques of a covering force.

Because of its ability to cover extensive areas, the armored cavalry regiment is effective in providing antiairborne defense. When the regiment is employed in this role, the armored cavalry troops of one or more of the squadrons are used to establish a system of observation posts and mobile patrols. The remainder of the regiment is held as a reserve, centrally located, to counterattack the enemy or defend critical localities.

REAR AREA SECURITY IS VITAL

In this age of highly mobile, dispersed operations, rear area security is a vital consideration. The armored cavalry regiment is frequently assigned a mission of rear area security after its employment as a covering force in the defense. After acting as a covering force, the regiment withdraws directly through the forward defensive positions to the rear area. Here they defend against enemy guerrillas and partisans by organizing a system of observation posts and mobile patrols. A strong reserve is held as a highly mobile striking force.

The final mission for armored cavalry is to fulfill light combat roles as an economy force element. Further elaboration of this terminology is appropriate because many underestimate the combat potential of the armored cavalry regiment. The term "light combat" refers to engagements in which the destruction of large numbers of hostile tanks or the assault of heavily fortified enemy defenses is not completed. Do not consider the regiment as a light screening force. With its great mobility and tremendous firepower, the regiment could well serve as the corps commander's decisive striking force.

The regiment is ideally suited for fluid, dispersed operations because of its mobility and extensive communications. Therefore, it is especially effective in the exploitation and pursuit. In this role, its striking power can be increased by attaching additional tanks from the armor group normally a part of each corps.

In the defense, the regiment is particularly useful in its economy force role. Its mobility and long range firepower enable it to cover broad frontages, permitting the concentration of the infantry divisions on the most likely enemy avenues of approach. This defensive capability can be enlarged by attaching additional infantry and engineers to the regiment. Armored cavalry capitalizes on its mobility by employing a mobile defense rather than a position defense. This mobility enables the regiment to cover a broader front than can an infantry unit of comparable size.

The techniques employed by the armored cavalry regiment in performing offensive, defensive, and retrograde operations are identical to

those described in the article about the armored division in the February 1960 issue of ARTILLERY TRENDS.

ARMORED CAVALRY REGIMENT MOST VERSATILE

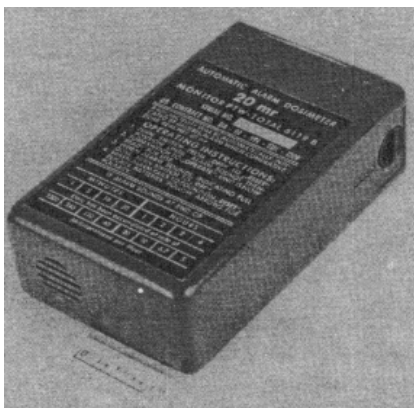
In summary the armored cavalry regiment is one of the most versatile organizations in our Army today. Its great mobility, diversified firepower, and superior communications system make it suitable for a wide variety of combat missions—reconnaissance, protecting the flank of an armored division in the exploitation, covering the corps front in the defense, antiairborne defense, exploitation, and many others. This versatility is provided by an organization which features the integration of combined arms teams all the way down to platoon level, where we find tanks, infantry, scouts, and mortars. Each armored cavalry squadron has its own artillery—a 105-mm self-propelled howitzer battery.

In such an organization, close teamwork between all members of the combined arms team is mandatory. To insure effective fire support for this fast-moving, wide ranging team, the artillery teammate must understand the organization and functioning of the team. In this way, he will insure compliance with the roughly expressed maxim expounded by General Nathan Bedford Forrest, a famous cavalry leader, when he said, "Get there fustest with the mostest."



AUTOMATIC RADIATION ALARM BEING TESTED

The threat of residual radiation from surface bursts of nuclear weapons has created a requirement for automatic radiological monitoring equipment. An automatic alarm dosimeter monitor TTW-Total 6119B is under test by the US Army Armor Board, Fort Knox, Kentucky. It is an "off the shelf" commercial instrument designed to measure and accumulate radiation until a total dose of 20 milliroentgens has been accumulated, at which time an audible signal sounds.



Radiological monitoring is a normal function and should be within the capabilities of each military unit; it is envisioned that the device, shown at left, will be carried in the pockets of key unit personnel and by individuals or teams operating separately. The survey operations needed require special techniques developed through training. The automatic radiation alarm weighs 12 ounces, has a length of 4 5/8 inches, a width of 2 11/16 inches, a depth of 1 1/2 inches, and is powered by two BA58 1 1/2 volt DC batteries.

Honest John Gunnery-- Solution by *Graphic* Methods

Capt Bartley E. Day
Department of Gunnery

Can the solution to the Honest John gunnery problem be expedited? Can the computation of the low-level wind corrections be simplified? These are some of the questions being asked by commanders. The present gunnery solution is involved and time consuming—it must be streamlined as far as possible.

In a cannon artillery fire direction center, a chart operator can plot and measure ranges and angles between points consistently with accuracy that closely approximates that of computation. This should be possible for Honest John rocket gunnery as well as for cannon artillery gunnery. However, the difference in the ranges of the Honest John rocket and cannon artillery and the size of the chart that may be required must be considered. Even in this respect, the chart should not be so much larger than the one used by longer range cannon that there is any apparent decrease in accuracy.

Let us then build a proposed chart for the Honest John fire direction center. In appearance, the chart will be similar to the grid sheet chart used for cannon fire direction. The scale of the chart will be 1:50,000 meters. The equipment used will include an aluminum range-deflection protractor scaled to 1:50,000, with a range arm graduated in meters and an arc 1,000 mils in width, and other equipment, such as a plotting scale, coordinate scale, protractor, colored pencils, and 4H and 6H pencils. All points to be plotted will have been surveyed; they will be plotted using the plotting scale. A color code will be used to identify each launcher position plot. The use of the color code will be discussed later.

Target range will be measured to the nearest 10 meters and the orienting angle measured to the nearest mil. Deflection is not required since the chart is used only for initial data.

STEPS IN PREPARING THE CHART

A line may be drawn on the chart from the launcher position to indicate the azimuth of the orienting line for that position. For multiple launcher positions, a line is drawn from each position from which the orienting angle can be measured to any point on the chart. Figure 28 shows a constructed plotted firing chart. Steps 1 through 7 are used to prepare the chart.

- (1) Place a map pin in the plotted launcher position.
- (2) Place a needle on the line representing the azimuth of the orienting line.
- (3) Place the vertex of the range-deflection protractor against the pin and the left edge of the range arm against the needle.

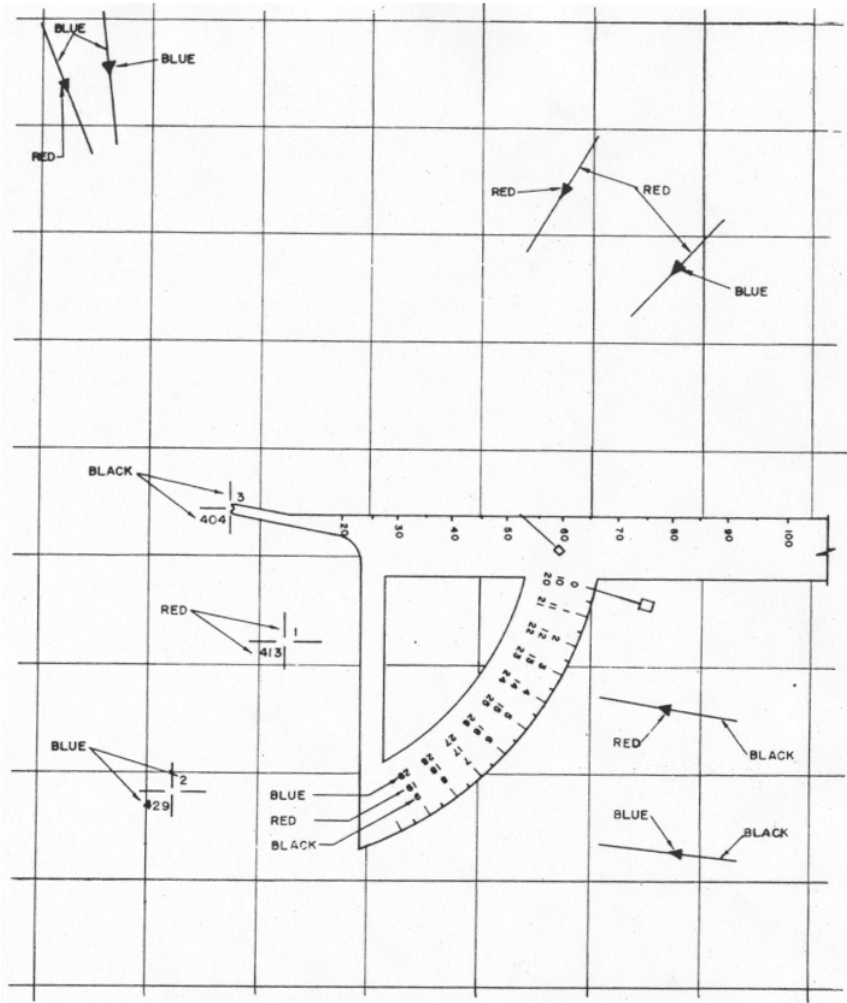


Figure 28. An Honest John firing chart.

(4) Place a second needle at the leftmost measurement mark on the arc of the range-deflection protractor.

(5) Construct an orienting line index mark through the location of the second needle by moving the range-deflection protractor until the left edge of the range arm rests against the needle. Label the arc of the fan to match the index by labeling the leftmost mark "0" and each successive 100-mil mark to the right, 1 through 9. The rightmost mark is not labeled since measurement cannot be made from it.

(6) Color code the index mark to match the launcher position code by placing the arrowhead on the index one-eighth inch above the edge

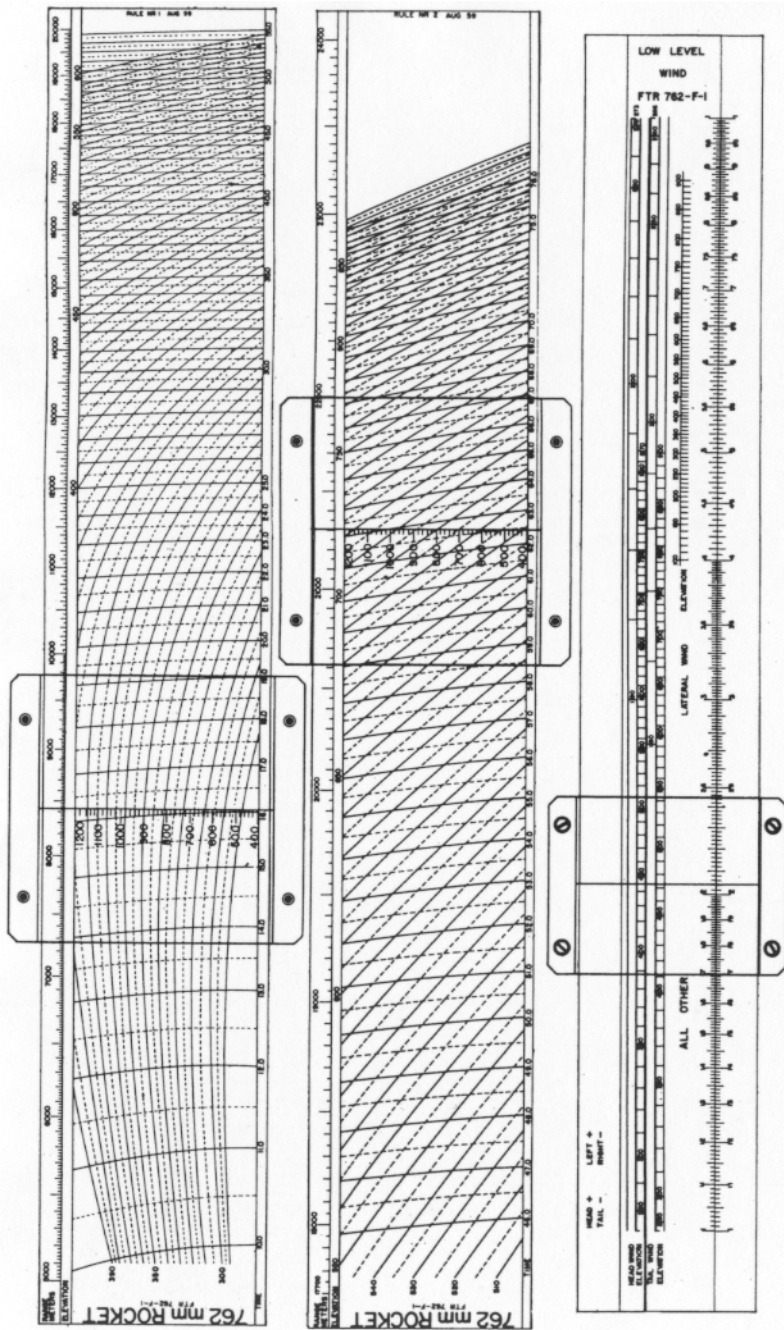


Figure 29. (Upper) graphical firing table, FTR 762-F-1 showing rules number 1 and 2. (Lower) graphical low-level wind table, FTR 762-F-1.

of the arc in the color code of the launcher position. The indexes are colored so that they can be easily identified.

(7) Additional indexes are then constructed at 1,000 mils and 2,000 mils to the left of the original index. At 1,000 mils, the top half of the index can be marked in red, still retaining the color code for the arrowhead. At 2,000 mils, the top half of the index can be marked in blue. The arc of the fan should now be marked with two more scales in the same colors used for the top half of the respective indexes; i.e., red for numbers 1,000 to 1,900 on a second scale, and blue for numbers 2,000 to 2,900 on a third scale.

CHART CAREFULLY CHECKED FOR ACCURACY

Now, both the range and the orienting angle can be read directly from the chart. The chart has served its purpose but still must be carefully checked for accuracy.

To obtain the trial quadrant and trial time of flight, new graphical firing tables are being developed which will permit reading both the quadrant elevation (QE) and time of flight (TF) to the required accuracy of 0.1 mil and 0.01 second respectively. Figure 29 shows two graphical firing tables. Rule number 1 (upper) is graduated in range from 5,000 to 20,000 meters, and rule number 2 is graduated in range from 17,700 to 24,000 meters. The cursor of the GFT permits reading the particular height of burst relative to the launcher required. The trial QE and TF has now been obtained, and no pencil computation has been necessary.

Since every round must be prepared for predicted fire, it is important that consideration be given to the accurate solution of the meteorological (met) message.

The next problem is that of low-level winds. At present, this problem involves the hand multiplication of the wind correction component (measured by the windset), a unit correction factor from the firing table, and a wind profile correction factor based on *nighttime* or *all other than nighttime* conditions (from a profile graph). This problem also lends itself to the graphic solution. A new slide rule has been developed which scales the product of the unit correction factor and the profile correction factor to the "C" scale of the slide. A single movement of the slide permits rapid determination of the correction for deflection or elevation. Tests thus far have indicated that the slide rule is more accurate than hand computations since it is based on more accurate tables.

The graphical devices discussed herein will be made available to field users as soon as they have been fully tested. These devices will expedite the solutions to Honest John rocket gunnery.

"One gun on land is worth ten at sea."

French Military Maxim

ECONOMIC, REALISTIC TRAINING - - THE REDSTONE SYSTEM

Captain Frank E. Robinson
Redstone Division, Department of Materiel

The development of the Redstone missile system presented new problems to artillerymen. In cannon artillery, it had been the practice to train a unit with the use of actual equipment and to explain nomenclature operation with cutaway models. However, the Redstone missile's precision-built components could not stand the stress of everyday operation without damage and missile malfunction. To have cutaway models built or to have units learn by shooting was economically unfeasible. So, Department of the Army issued directives that no tactical missile would be used for training purposes, except at the US Army Artillery and Missile School, Fort Sill, Oklahoma, and at the Ordnance Guided Missile School at Redstone Arsenal, Alabama.

Testing of the Redstone operator and maintenance personnel in their job proficiency also posed a problem. It was difficult to determine whether a man knew his duties well by having him sit by a panel reading meters and operating switches.

Then the Redstone trainer was designed. Initially, the trainer was developed to overcome the problems that proficiency testing introduced; the trainer enabled the operation of the entire Redstone fire unit to be analyzed. Soon, it was discovered that the Redstone trainer could also be used for training the Redstone operators and maintenance men—eliminating the risk of damaging a tactical missile. The trainer is produced at a fraction of the price of the tactical missile.

All the actual tactical equipment except the missile is used with the Redstone trainer, which allows a complete prefiring sequence to be accomplished when the trainer is inserted into the tactical system. Facilities for the mating, erecting, checkout, and propellant loading operations have been provided which are as realistic as possible. No provisions are made to train ordnance personnel in pre-issue checkout procedures.

BASIC ITEMS IN THE TRAINER SYSTEM

The basic items (fig 30) in the trainer system are a training missile, trainer test station, two junction boxes, a dummy load box, a dummy relay box, and necessary cables. Radios are provided for use by umpires if desired.

The trainer test station can be considered the headquarters for training operations. All operations are monitored and recorded at the test station by a Clary data printer; the printer prints code numbers showing the times when various switches were thrown and whether

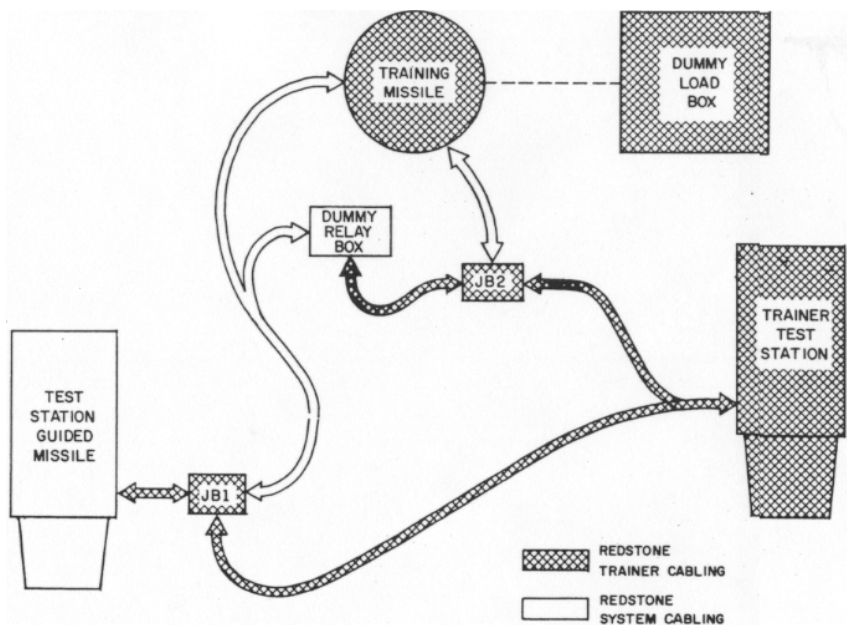


Figure 30. The Redstone trainer system.

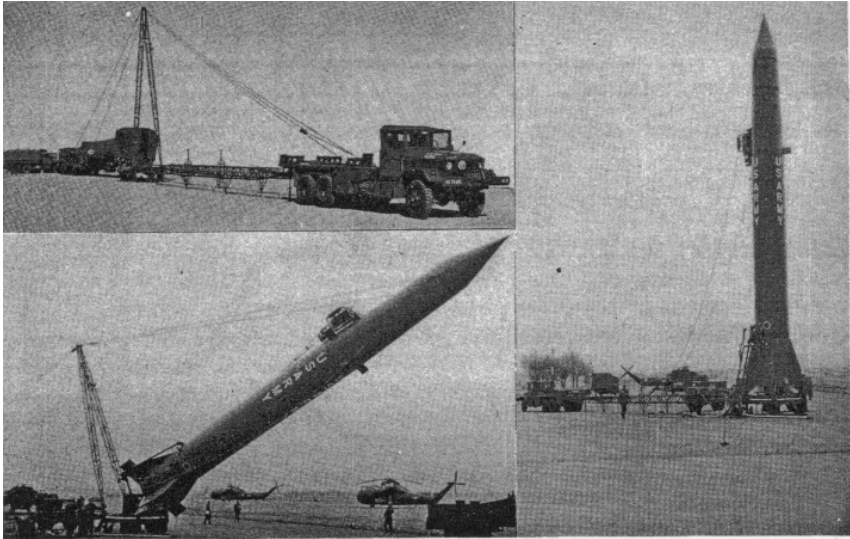
these operations were in error. The circuitry within this station can be modified to reflect changes in operation, so that the latest procedure may be used as a basis for evaluation. A magnetic tape recorder records all telephone conversations in the tactical net and umpires radio conversations. Thus, the unit commander has an excellent opportunity to review the entire operation and to eliminate failures or weak points in planning future training.

The trainer test station can also generate signals into the system and cause various meters and indicator lamps to operate as though a tactical missile were being used. Wrong indications can be made to appear so that operators will have a chance to recognize them. In addition, actual malfunctions can be set into the system, enabling maintenance personnel to use schematic and test equipment in tracing the trouble to its source.

The two junction boxes channel the electrical signals to the correct places. Junction box 1 directs signals going to the missile into the trainer test station. Junction box 2 permits the signals generated by the trainer test station to be inserted in the overall system.

TRAINER MISSILE IS A REALISTIC COPY

The trainer missile is a realistic copy of the actual tactical round so that maximum benefit may be obtained in training. The components of the trainer missile are of identical size and shape and are located as



Figures 31, 32, and 33. The upper left photo shows the Redstone trainer missile in the pre-erection position. Lower left, the trainer missile is in the process of being erected. Right, the missile trainer in the erected position.

nearly as possible in the same position as their counterparts in the tactical missile. All cables, plugs, and electrical connections are numbered the same. The trainer missile can be separated into three units and be transported exactly like the tactical round.

However, there are some differences between the two missiles. Although the positions of the center of gravity are the same, the weight of the trainer missile is about one-third that of the tactical missile. Actual components, such as valves and relays, are used where needed; otherwise, functional dummy components are installed which emit realistic sounds during checkout procedure. The entire trainer missile skin and framework is made of aluminum and is riveted rather than welded. The air systems of the two missiles are almost identical, but the trainer has aluminum airlines instead of steel and operates on a pressure of 1,000 pounds per square inch (psi) instead of 3,000 psi.

Training in propellant loading is done by using a few procedures peculiar to the trainer. There is no alcohol tank on the missile. Training in alcohol loading is accomplished by the use of a return line from the alcohol fill valve to the alcohol trailer, so that the fuel is pumped back into the trailer. A small belt-type liquid oxygen (LOX) tank in the trainer missile has a 250-gallon capacity. All necessary liquid oxygen connections are present to allow precooling, LOX loading, and replenishing (fig 34).

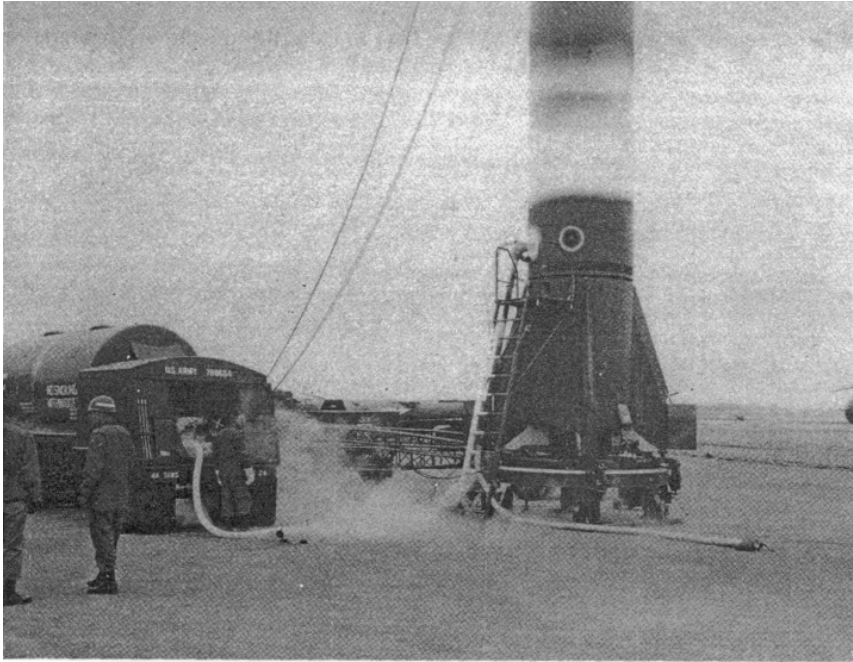


Figure 34. The LOX loading operation of the Redstone trainer missile.

A hydrogen peroxide tank is aboard the missile but because ordinary water would contaminate the tactical ground equipment, demineralized water is used.

The Redstone trainer enables training to be conducted in two unrelated areas at the same time. The missile and launcher can be disconnected from the system electrically and the dummy load box installed in their place. The dummy load box causes the same panel indications to appear as if the missile was connected. Thus, for example, training in electrical checkout and missile mating can be conducted simultaneously. In this way, the unit commander can insure that his personnel are being trained in a minimum of time.

The current authorization for the Redstone trainer is one per Redstone group. The trainer is allocated to the group's ordnance company, but the group commander uses it as he sees fit. The trainer is made by Aircraft Armaments, Inc., Cockeysville, Maryland.

REDSTONE SYSTEM TRAINERS

To show the functioning of the missile electrical and mechanical components more graphically, two system trainers in use at the US Army Artillery and Missile School—one for the propulsion system and

one for the guidance and control system—are mounted on panels so that the overall functioning of the system can be readily seen. All the advantages of a cutaway model are there—perhaps even more—since the system layout shows all components with little difficulty. Both system trainers are designed for the latest tactical missile.

The propulsion system trainer consists of four carts (fig 35) and two consoles. The complete missile propulsion system is on three of these carts. The airlines and valves found on the ground-support equipment are on the fourth cart.

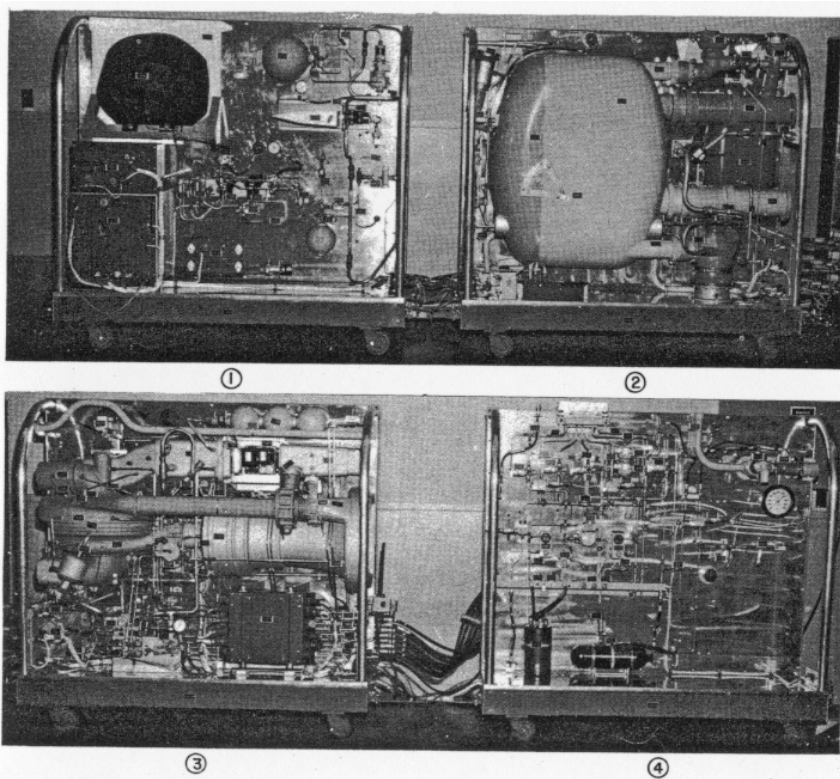


Figure 35. The four carts in the propulsion system trainer. Cart 1 shows the items in the guidance unit. Cart 2 shows items of the thrust unit (e.g., propellant tanks). Cart 3 pictures items in the tail section of the thrust unit (e.g., turbine, motor). Cart 4 shows exterior items on the launcher.

One console represents the propulsion panel in the missile test station, and the other is a malfunction panel for training purposes (fig 36).

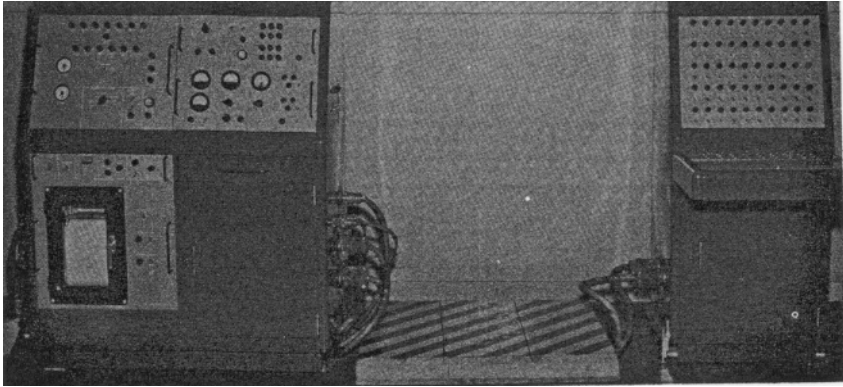


Figure 36. The left console is the propulsion panel found in the test station truck of the propulsion system trainer. The right console is the malfunction panel.

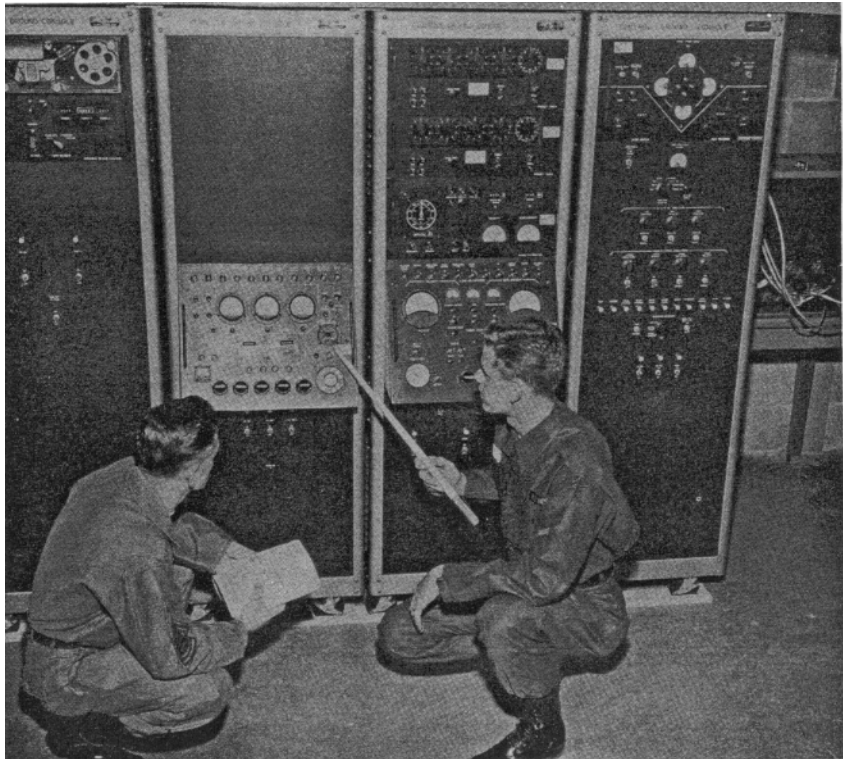


Figure 37. The four panels shown represent the four panels in the missile test station of the guidance and control system trainer.

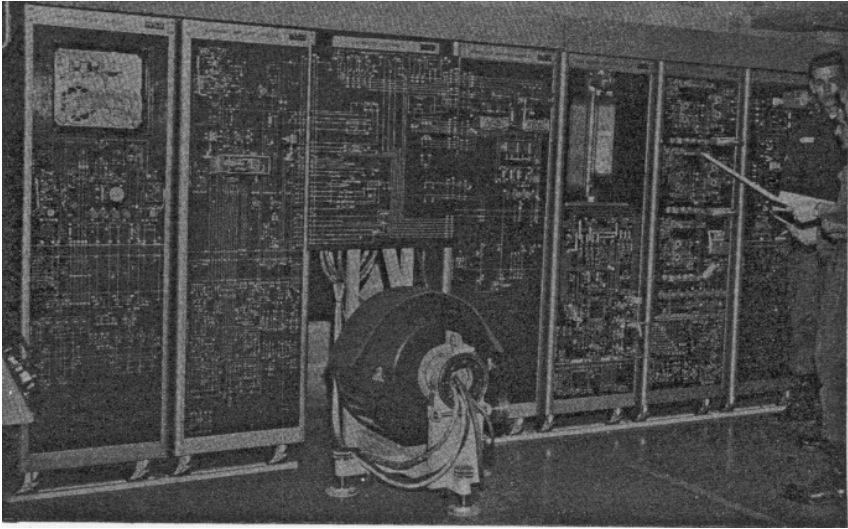


Figure 38. The guidance system aboard the missile is represented by the above panels of the guidance and control system trainer. The actuator panel is not shown.

All valves used in this system trainer are actual components, but the airlines are of stainless steel and the propellant tanks and rocket motor are mockups. A complete firing sequence which shows the operation of all propulsion components can be performed. Malfunctions can be inserted, and training in troubleshooting procedures can be given. The various valves and airlines can actually be seen. In this way excellent training on the propulsion system can be given prior to working with an actual missile.

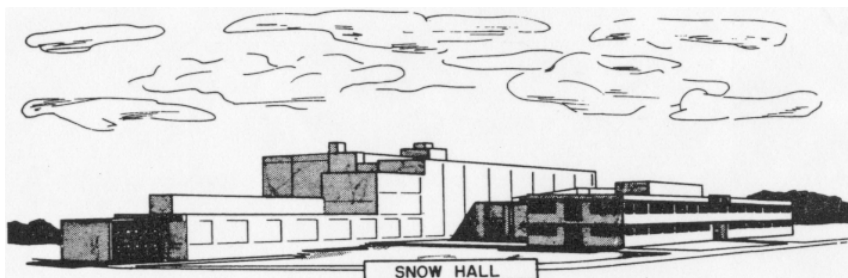
The guidance and control system trainer is similar to the propulsion system trainer in layout. Four panels (fig 37) represent the panels in the missile test station, and eight panels represent the guidance and control system (fig 38) aboard the missile.

The guidance and control system is drawn schematically on eight panels, and actual electronic components are exposed to view where appropriate. Then, for an example, the operation of the range accelerometer and ball and disk integrator can be easily seen and the functioning of these components can be better understood. In addition, test points are provided and malfunction switches are located behind each panel to enable troubleshooting operations to be performed.

By use of the Redstone training devices in the School and the field, the Redstone unit commander can be assured that his unit is adequately trained to render effective fire support.

RESIDENT COURSES - -

U S ARMY ARTILLERY & MISSILE SCHOOL



The recommendations of the Department of the Army (DA) Officer Education and Training Review Board are being implemented in fiscal year (FY) 1961 officer courses at the US Army Artillery and Missile School. The principal features of the new system of officer education are a short orientation course upon entering active duty, the elimination of battery level instruction, and an integrated branch career course for all active duty officers. This article consolidates the latest information of these and other changes in courses taught at the School. Complete details of school courses, including prerequisites, are listed in Department of the Army Pamphlet 20-21, The Army School Catalog, and changes 1 through 117.

A significant change has been made in the basic education of newly commissioned artillery lieutenants. On 1 July 1960, the 12-week Field Artillery Officer Basic Course (FAOBC) was replaced by the Field Artillery Officer Orientation Course (FAOOC). The 8-week FAOOC (fig 39) trains USAR and National Guard officers to become forward observers and assistant battery executive officers. Non-Regular Army officers entering active duty are automatically scheduled to attend this course. Graduates will have been taught the fundamentals of field artillery (FA) tactics and techniques at battery level. Only after field experience, however, can these officers be considered fully trained artillerymen.

The 17-week Associate Field Artillery Battery Officer Course (AFABOC) and the 2-week Field Artillery Battery Officer Refresher Course (FABORC) have been eliminated from the FY 1961 curriculum. A 6-week and 4-day Field Artillery Officer Familiarization Course (FAOFC) (fig 40) will provide a familiarization with field artillery tactics and techniques for battery grade officers transferred from other branches to artillery or assigned to field artillery duties without prior formal artillery training. The course serves the needs of officers whose training and experience have been exclusively in air defense artillery, as well as officers transferred from other branches to artillery.

FIELD ARTILLERY OFFICER ORIENTATION COURSE	
Subject	* Periods
Artillery transport	12
Communication and electronics	22
Gunnery	167
Materiel	21
Tactics and combined arms	126
Target acquisition	22
	—
	TOTAL
	370
Processing, commandant's time, demonstrations, etc.	66
	—
	GRAND TOTAL
	436
* Each period includes 40 minutes of instruction	

Figure 39. Periods of instruction by subject for the 8-week Field Artillery Officer Orientation Course.

FIELD ARTILLERY OFFICER FAMILIARIZATION COURSE	
Subject	* Periods
Artillery transport	9
Communication and electronics	13
Gunnery	170
Materiel	25
Tactics and combined arms	79
Target acquisition	22
	—
	TOTAL
	318
Processing, commandant's time, demonstrations, etc.	37
	—
	GRAND TOTAL
	355
* Each period includes 40 minutes of instruction	

Figure 40. Periods of instruction by subject for the 6-week and 4-day Field Artillery Officer Familiarization Course.

Another significant change is the replacement of the 38-week Artillery Officer Advanced Course (AOAC) with a 42-week Artillery Officer Career Course (AOCC). The Career Course (fig 41) is designed to provide branch training for active Army artillery officers in preparation for command duties at battery and battalion levels and for staff duties at all artillery echelons of command. The digit 5 is prefixed to the primary MOS of officers who successfully complete the nuclear weapons employment phase of the course. All Active Army artillery officers are eligible to attend the course between their third and eighth year of commissioned service. A prerequisite course would include the artillery officer candidate, basic, battery, or familiarization course. Nearly 500 officers will attend two classes during FY 1961, spending 29 weeks at Fort Sill and 13 weeks at the US Army Air Defense School, Fort Bliss, Texas.

The former Associate Field Artillery Officer Advanced Course (AFAOAC) has been redesignated the Associate Field Artillery Officer Career Course (AFAOCC). The length remains 18 weeks. Completion of a field artillery battery level course is no longer a prerequisite to attendance.

ARTILLERY OFFICER CAREER COURSE	
Subject	* Periods
Artillery transport	37
Communication and electronics	39
Gunnery	293
Materiel	61
Tactics and combined arms	697
Target acquisition	85
	<hr/>
TOTAL	1,212
Processing, commandant's time, demonstrations, etc.	145
	<hr/>
GRAND TOTAL	1,357
* Each period includes 40. minutes of instruction	

Figure 41. Periods of instruction by subject for the 29-week phase of the Artillery Officer Career Course at Fort Sill.

Other increases in the lengths of courses include: Senior Field Artillery Officer Course is extended from 2 weeks to 2 weeks and 3 days, and Radar Officer Course from 6 to 7 weeks. Officer courses shortened for FY 1961 are: Communication Officer Course from 14 to 12 weeks, and Artillery Motor Transport Course from 13 to 8 weeks. Enlisted course changes include lengthening the radar operation and maintenance courses and shortening the track vehicle maintenance and maintenance supervisor courses.

SCHEDULE OF CLASSES

The US Continental Army Command publishes a detailed schedule of classes taught at all USCONARC schools entitled "Detailed Schedule of Classes, Army Service Schools." The latest edition is dated 1 April 1960 and contains the course titles, class numbers, reporting dates, starting dates, closing dates, and class capacities. The "Detailed Schedule of Classes" is distributed throughout the Army.

Career artillery officers are selected to attend the Artillery Officer Career Course by the Artillery Section, Officer Assignment Division, the Adjutant General's Office, Department of the Army. Officers of the Active Army who desire to attend any resident course at the School except the orientation and career courses may apply through channels. Reserve component officers not on extended active duty may apply for admission to a resident course under provisions of AR 140-220. Applications for admission to resident courses should *not* be sent to the School. National

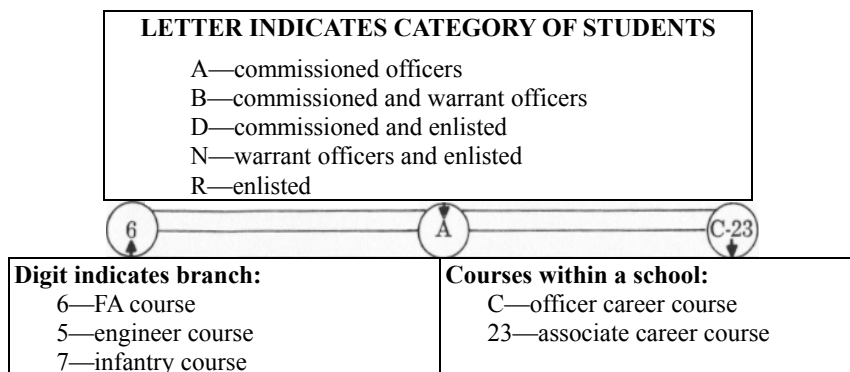


Figure 42. Explanation of the digits and letters comprising a typical course number. The example shown is the Associate Field Artillery Officer Career Course.

Guard officers not on active duty should submit applications (NGB Form 64) for admission to a US Army Artillery and Missile School resident course to the Chief, Army National Guard Bureau, Washington 25, D. C., ATTN: School Section. All applications should be sent through the Adjutant General of the state or territory concerned.

DESIGNATION OF COURSES

Courses conducted at US Army service schools are designated by a series of numbers and letters. Field artillery officer and enlisted courses taught at the US Army Artillery and Missile School are identified by the initial digit 6 (fig 42). The School courses which train personnel in a specific military occupational specialty (MOS) have the MOS number in the course designation. For example, graduates of course 6-A-0140, Field Artillery Radar Officer, will receive MOS 0140. Enlisted men successfully completing course 6-R-166.6, Lacrosse Firing Battery, will receive MOS 166.6.

Listed below are all of the officer and enlisted resident courses scheduled to be taught at the US Army Artillery and Missile School during FY 1961. Of the 42 courses listed, seven are attended in a permanent change of station status and the remaining 35 are attended in a temporary duty status. A brief summary of each course is given.

OFFICER CAREER COURSES

1. **FA Officer Orientation (FAOOC)** (6-A-C20), 8 weeks. To provide basic field artillery (FA) training to newly commissioned USAR and National Guard lieutenants. Class capacity: 100; FY 61 classes: 20.
2. **Artillery Officer Basic (AOBC)** (6-A-CIC/44-A-CIC), 20 weeks. To train newly commissioned RA lieutenants (USMA and ROTC DMG's) in FA and air defense (AD) weapons systems. Class capacity: 160; FY 61 classes: 3.
3. **Artillery Officer Career (AOCC)** (6-A-C22), 42 weeks. To train RA and career reserve officers (with 3 to 8 years' commissioned service) in FA and ADA command and staff duties and responsibilities. Officers are selected for attendance at DA. Class capacity: 330; FY 61 classes: 2.

4. **Associate FA Officer Career (AFAOCC)** (6-A-C23), 18 weeks. To train active duty and Reserve component officers in the duties and responsibilities of a field grade FA officer. Attendance by application. Class capacity: 100; FY 61 classes: 5.

5. **FA Officer Familiarization Course (FAOFC)** (6-A-C21), 6 weeks and 4 days. To provide familiarization with field artillery tactics and techniques for officers transferred from other branches to field artillery or assigned to field artillery duties without prior formal field artillery training. Class capacity: 75; FY 61 classes: 4.

6. **FA Field Grade Officer Refresher (Reserve Components) (FAFGORC)** (6-A-C11), 2 weeks. To provide refresher training in tactics, techniques, and materiel appropriate to FA field grade reserve component officers not on active duty. Class capacity: 90; FY 61 classes: 2.

OFFICER FUNCTIONAL COURSES

7. **Division Artillery Staff Officer Refresher (DASORC)** (6-A-F5), 1 week. To provide refresher training as a team (minimum of 6 officers) to National Guard and USAR division artillery or artillery group commanders and principal staff officers. Class capacity: 60; FY 61 classes: 2.

8. **Senior Field Artillery Officer (SFAOC)** (6-A-F6), 2 weeks and 3 days. To provide refresher training for Active Army senior artillery officers on field artillery tactics, techniques, organization, and equipment in current employment and to provide orientation on trends proposed for the future. Class capacity: 50; FY 61 classes: 3.

OFFICER MOS COURSES

9. **FA Radar Officer (FAROC)** (6-A-0140), 7 weeks. To train Active Army and Reserve component captains and lieutenants in the tactical employment of FA radar. Class capacity: 25; FY 61 classes: 2.

10. **Artillery Observation (AOC)** (6-A-1154), 9 weeks. To train Active Army and Reserve component captains and lieutenants in sound and flash ranging and target acquisition battalion survey. Class capacity: 35; FY 61 classes: 2.

11. **Artillery Survey Officer (ASOC)** (6-A-1183), 8 weeks. To train Active Army and Reserve component captains and lieutenants in artillery survey. Class capacity: 35; FY 61 classes: 3.

12. **Corporal Officer (COC)** (6-A-1190A), 9 weeks and 3 days. To train Active Army officers in the characteristics, operating principles, and capabilities of the Corporal missile system. Class capacity: 15; FY 61 classes: 3.

13. **Redstone Officer (ROC)** (6-A-1190B), 7 weeks and 1 day. To train Active Army officers in the characteristics, operating principles, and capabilities of the Redstone missile system. Class capacity: 20; FY 61 classes: 1.

14. **Lacrosse Officer (LOC)** (6-A-1190C), 4 weeks and 3 days. To train Active Army officers in the characteristics, operating principles, and capabilities of the Lacrosse missile system. Class capacity: 20; FY 61 classes: 3.

15. **Corporal Maintenance Officer (CMOC)** (6-A-1191), 33 weeks. To train Active Army captains and lieutenants in the functions, technical operations, characteristics, and maintenance of the Corporal missile system. Class capacity: 18; FY 61 classes: 0.

16. **Artillery Communication Officer (ACOC)** (6-B-0200), 12 weeks and 1 day. To train Active Army and Reserve component majors and company grade officers in the installation, operation, and maintenance of artillery communication systems. Class capacity: 40; FY 61 classes: 3.

17. **Artillery Motor Transport (AMTC)** (6-B-0600/0606), 8 weeks and 2 days. To train Active Army and Reserve component captains and lieutenants in the supervision of organizational vehicular maintenance (including SP turrets). Class capacity: 40; FY 61 classes: 3.

OFFICER/ENLISTED COURSES

18. **FA Officer Candidate (FAOCC)** (6-N-F1), 23 weeks. To train selected WO's and EM to be Reserve 2d lieutenants. Class capacity: 100; FY 61 classes: 7.

19. **FA Officer Candidate (Reserve Component) (FAOCC (R))** (6-N-F2), 11 weeks. To train National Guard and USAR personnel to be 2d lieutenants. ARNG personnel are selected by the State Adjutant General for attendance. USAR personnel must meet requirements of AR 140-50. Class capacity: 100; FY 61 classes: 2.

20. **Nuclear Projectile Assembly (NPAC)** (6-D-142.0), 1 week. To train Active Army officers and EM in the mechanical assembly of nuclear projectiles. Class capacity: 30; FY 61 classes: 10.

21. **Honest John Nuclear Warhead Assembly (HJNWAC)** (6-D-147.2), 1 week and 3 days. To train Active Army officers and EM in the assembly of Honest John nuclear warheads. EM receive MOS 147.2. Class capacity: 15; FY 61 classes: 14.

22. **Corporal Nuclear Warhead Assembly (CNWAC)** (6-D-F13), 1 week and 3 days. To train Active Army officers and EM in the mechanical and electrical assembly of the Corporal nuclear warhead. Class capacity: 15; FY 61 classes: 4.

23. **Corporal Handling Equipment Maintenance (CHEMC)** (6-H-F8), 3 weeks. To train officer and enlisted personnel of Corporal units to maintain Corporal missile handling equipment. Class capacity: 15; FY 61 classes: 3.

24. **FA Radar Maintenance (FARMC)** (6-N-1121/211.1), 26 weeks and 3 days. To train WO's and EM to operate, adjust, and maintain FA radar equipment. WO's receive MOS 1121; EM receive MOS 211.1. Class capacity: 25; FY 61 classes: 3.

25. **Artillery Ballistic Meteorology (ABMC)** (6-N-103.1), 11 weeks. To train WO's and EM in the operation of a meteorological station. EM receive MOS 103.1. Class capacity: 32; FY 61 classes: 8.

26. **Weather Equipment Maintenance (WEMC)** (6-N-8219/205.1), 13 weeks and 3 days. To train WO's and EM to maintain meteorological equipment. WO's receive MOS 8219; EM receive MOS 205.1. Class capacity: 15; FY 61 classes: 6.

27. **Corporal Fire Control System Maintenance (CFCSMC)** (6-N-1186/215.1), 19 weeks and 2 days. To train WO's and EM to operate and maintain Corporal fire control equipment. WO's receive MOS 1186; EM receive MOS 215.1. Class capacity: 15; FY 61 classes: 4.

28. **Corporal Electronic Materiel Maintenance (CEMMC)** (6-N-1192A/214.1), 23 weeks. To train WO's and EM to install and maintain Corporal guidance control components. WO's receive MOS 1192; EM receive MOS 214.1. Class capacity: 18; FY 61 classes: 4.

29. **Lacrosse Fire Control System Maintenance (LFCSMC)** (6-N-217.1), 12 weeks and 3 days. To train WO's and EM possessing a previous background in electronics to adjust and maintain Lacrosse ground guidance equipment and target survey unit. EM receive MOS 217.1. Class capacity: 12; FY 61 classes: 4.

30. **Redstone Electronic Materiel Maintenance (REMMC)** (6-N-218.1), 20 weeks. To train WO's and EM to install and maintain Redstone guidance control components. EM receive MOS 218.1. Class capacity: 12; FY 61 classes: 1.

ENLISTED MOS COURSES

31. **Artillery Survey Advanced (ASAC)** (6-R-153.1), 8 weeks. To train qualified artillery surveyors (MOS 153.0) to supervise and coordinate survey operations. Class capacity: 68; FY 61 classes: 9.

32. **Artillery Flash Ranging Advanced (AFRAC)** (6-R-154.1), 6 weeks. To train qualified flash ranging crewmen to install, operate, and maintain flash ranging equipment. Class capacity: 30; FY 61 classes: 3.

33. **Artillery Sound Ranging Advanced (ASRAC)** (6-R-155.2), 8 weeks. To train qualified sound ranging crewmen to install, operate, and maintain sound ranging equipment. Class capacity: 30; FY 61 classes: 3.

34. **FA Radar Operations (FAROC)** (6-R-156.1), 10 weeks. To train personnel in the operation and tactical employment of FA radar. Class capacity: 50; FY 61 classes: 6.

35. **Corporal Mechanical Materiel Maintenance (CMMMMC)** (6-R-164.3), 8 weeks. To train E6's and below to install and maintain Corporal on-missile guidance equipment and propulsion and mechanical systems. Class capacity: 16; FY 61 classes: 6.

36. **Lacrosse Firing Battery (LFBC)** (6-R-166.6), 4 weeks and 2 days. To train personnel to assemble, test, adjust, operate, and maintain the Lacrosse missile and launcher. Class capacity: 20; FY 61 classes: 3.

37. **Lacrosse Fire Control Operation (LFCOC)** (6-R-167.6), 3 weeks and 2 days. To train E6's or below to adjust, operate, and maintain the Lacrosse forward guidance station and target survey unit. Class capacity: 15; FY 61 classes: 3.

38. **Redstone Mechanical Materiel Maintenance (RMMMMC)** (6-R-169.1), 8 weeks. To train personnel to install and maintain Redstone on-missile guidance and control systems, assemble missiles, and perform mechanical and pneumatic checks. Class capacity: 20; FY 61 classes: 1.

39. **Artillery Radio Maintenance (ARMC)** (6-R-313.1), 14 weeks. To train E5's and below to perform organizational maintenance on artillery radio equipment. Class capacity: 36; FY 61 classes: 22.

40. **Artillery Communication Supervisors (ACSC)** (6-R-313.6), 15 weeks. To train E4's and above to supervise the communications section of an artillery unit. Class capacity: 40; FY 61 classes: 3.

41. **Artillery Vehicle Maintenance Supervision (AVMSC)** (6-R-631.7/632.7), 6 weeks and 4 days. To train qualified motor mechanics (E4 and above) in the supervision of organizational maintenance. Class capacity: 30; FY 61 classes: 3.

42. **Artillery Track Vehicle Maintenance (ATVMC)** (6-R-632.1), 11 weeks and 3 days. To train personnel to perform organizational maintenance of artillery track vehicles including turret. Class capacity: 60; FY 61 classes: 18.

●

A GEM FOR COMMUNICATION PERSONNEL

Most vacuum tubes look alike and some have identical characteristics and may serve as direct replacements. Also, many common tubes have more than one identifying system; a number and a number-letter combination. Technical manuals (TM's) use the standard combination number-letter system of identifying vacuum tubes. However, possible direct replacement vacuum tubes, and alternate identifying numbers which frequently confuse the unit radio repairman are not listed. Many of the alternate identifying numbers refer to the more rugged versions designed for field use (e.g. the 5749 is the ruggedized version of the 6BA6W).

The handy interchangeability directory below includes a substitute column which lists suitable replacements (with performance ratings of E (excellent), G (good), P (poor)) for tubes designated for the set by the appropriate TM. The interchangeable tubes are used in the AN/GRC-46, AN/GRC-3-8, AN/GRC-8, 9 and 10, and R-109.

O	S	R	O	S	R	O	S	R
0A2	- 0B2	- P	6AU6	- 6BD6	- P	12AU7	- 12AT7	- G
1L4	- 1AF4	- G	6AU6	- 6AU6WA	- E	12AU7	- 12AX7	- G
1S5	- 1AF5	- E	6AU6	- 5749	- E	12AU7	- 12AY7	- G
1U4	- 1AF4	- G	6AU6	- 6136	- E	12AU7	- 12AU7WA	- E
6AJ5	- 6AU6	- P	6BA6W	- 6AU6	- G	12AU7	- 5814	- E
6AK5	- 6AK5W	- E	6BA6W	- 6BD6	- G	12AU7	- 5963	- G
6AK5	- 6AG5	- G	6BA6W	- 5749	- E	12AU7	- 6067	- E
6AK5	- 5591	- E	6BA6W	- 6136	- E	12AU7	- 6189	- E
6AK5	- 5654	- E	12AT7	- 12AU7WA	- G	12AU7	- 6680	- E
6AK5	- 6096	- E	12AT7	- 12AX7	- G	26C6	- 26BK6	- P
6AL5	- 6AL5W	- E	1U4	- 1L4	- G	5672	- 5678	- G
6AL5	- 5726	- E	1U4	- 5910	- E	5676	- 5677	- P
6AL5	- 6058	- E	6AJ5	- 6AG5	- P	5678	- 5672	- G
6AL5	- 6097	- E	6AJ5	- 6AK5	- P	5751	- 12AX7	- G
6AL5	- 6663	- G	12AT7	- 12AY7	- G	5751	- 5751WA	- E
6AU6	- 6AG5	- P	12AT7	- 12BH7	- G	5751	- 6057	- G
6AU6	- 6AJ5	- P	12AT7	- 6060	- E	5814	- 5814WA	- E
6AU6	- 6AK6	- P	12AT7	- 6201	- E	5814	- 12AU7	- G
6AU6	- 6BA6	- P	12AT7	- 6679	- E			

O--Original S--Substitute R--Rating

—Submitted by CWO James E. Mulrain
Dept of C & E, USAAMS

The XM33 - -

Honest John's New 'Cousin'

Ready for the blastoff . . . there it goes, a streak of gray cloud, an orange-red flame . . . and another Honest John rocket has been fired. Most eyes will be fixed on the rocket during its firing but let us examine more closely a junior member of the Honest John family—the XM33 rocket launcher.

The XM33 launcher (fig 43) is designed to supplement the standard Honest John system when lightweight air transport is required. Primarily helicopter-transportable, the weapon weighs just 4,375 pounds and may be carried internally or externally by the H-37 helicopter. However, the launcher may be airdropped from a cargo plane, carried in assault aircraft, towed by a 1/4-ton truck, or moved manually for short distances.

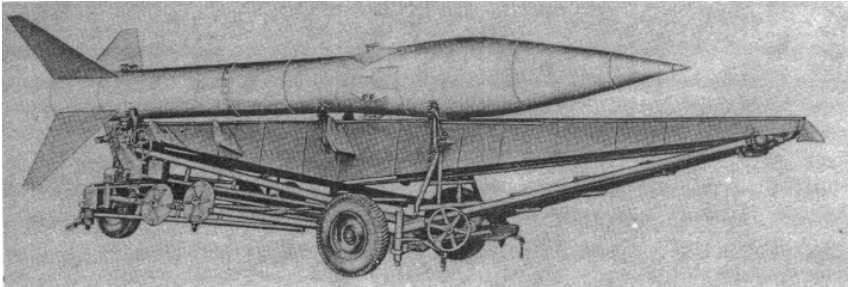


Figure 43. The XM33 rocket launcher in the traveling position carrying an Honest John Rocket.

Without a rocket the launcher stands 5 feet 1 inch high and is 28 feet 10 inches in length. It extends to 32 feet with a rocket. The launcher with a rocket and without fins is 7 feet 7 inches high but increases to 10 feet with fins added.

The launcher has three wheels that are the size of those on a 1/4-ton truck. All the wheels are removed before firing and are placed in an area free from rocket blast.

A rocket positioning jack is provided for assembly to the rear of the beam and is used in positioning the rocket on the beam. This device also holds the M31 rocket against the rear set of pawls. Two sets of pawls (stops) at the rear of the launching beam position the rocket for firing and prevent it from moving rearward during elevation. A restraining device consisting of a puller of 2-ton capacity, with attachments, is used in loading the rocket on the beam. A second restraining device fastened to the top of the elevating beam restrains rearward movement of the XM50 rocket on the beam during road travel.

PREPARATION FOR FIRING

Upon reaching a firing position, the XM33 rocket launcher provides a base for firing rockets at angles of elevation from 180 to 1,066 mils (12° to 52°). The launcher can be traversed right or left from center 177.77 mils (10°).

Rough traverse of the launcher may be accomplished manually with the rocket loaded on the beam. The beam is elevated by the A-frame elevating mechanism, and the final precision adjustment is obtained using the beam elevating mechanism. A power elevating mechanism, powered by the generator, permits quick elevation of the launching beam. Elevation quadrant pads provide a mounting for a gunner's quadrant to obtain accurate elevation readings.

Ground stakes, tiedown assemblies, and blast deflectors attached to both sides of the beam are used to stabilize the launcher during firing. The launching beam gives the rocket 15 feet of controlled guidance. Range and accuracy achieved with the XM33 are almost identical to that obtained with the M289 and M386 launchers.

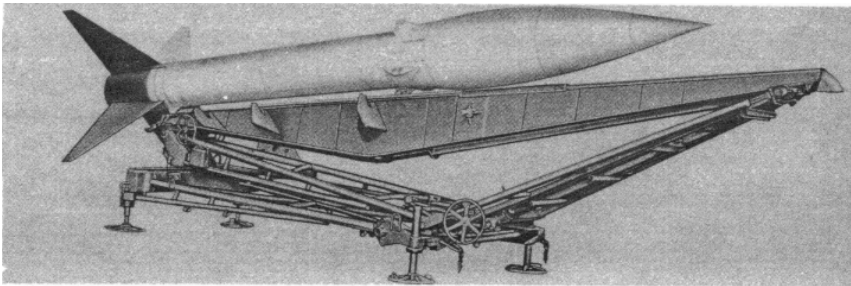


Figure 44. The launcher in the firing position; note the four leveling jacks that serve as a stable base during firing.

Four leveling jacks with floats provide for cross-leveling of the launcher and serve as a stable base during firing (fig 44). When the launcher is being towed, the floats are removed and stowed in clips located on either side of the carriage.

ANCILLARY EQUIPMENT

The rocket is fired using the M35 firing panel box. Adequacy of the power source can be checked by using the voltmeter built in the M35 firing panel box.

The wind measuring set may be the same wind set used with self-propelled Honest John units but is normally the lightweight AN/PMQ-6 wind measuring set. The XM43 sight unit, a modification of the 4.2-inch mortar sight unit, is provided with the launcher.

The XM33's entry in the Honest John family gives the Army a reliable, lightweight weapon that will get the Honest John's devastating punch to the right place—at the most critical time—by land or air.

An Important Friend of Artillerymen - - ARMY AVIATION

As concepts of the future battlefield move more and more to the idea of widely separated units, fluid situations, nuclear weapons, and long-range targets, Army aviation has come to the fore as an increasingly important member of the Army team. Artillerymen in particular are concerned with Army aviation. A testimony to this fact is the article in the MAY 1960 issue of ARTILLERY TRENDS, which covers the important facets of a helicopter reconnaissance, selection, and occupation of position by a field artillery 105-mm howitzer battery.

The following article is presented to give a thumbnail sketch of the aircraft in operation today in the US Army. The aircraft in figures 45 through 55 are reprinted with permission of the *Military Review*, the official publication of the US Army Command and General Staff College, Fort Leavenworth, Kansas.

ARMY AVIATION

The US Army presently has about 7,000 qualified pilots trained to fly more than 5,000 aircraft now in the Army inventory. This inventory currently includes 14 types of fixed- and rotary-wing operational aircraft plus numerous versions of prototype and developmental aircraft. The subsequent paragraphs constitute a review of the standard operational aircraft.

L-19A, Bird Dog

An observation airplane used primarily by infantry, artillery and armored units, this is the Army's standard fixed-wing light observation class aircraft. It is equipped with flaps, fixed landing gear, and steerable tail wheel to permit maximum efficient operation from small, unimproved landing fields in the immediate vicinity of troops engaged in combat. The Bird Dog has a speed of 86 knots and a range of 400 miles. Powered by a 6-cylinder horizontally opposed piston engine, it has a wingspan of 36 feet, is 25 feet long, and 9.2 feet high. The L-19A carries a pilot and one passenger.

L-20, Beaver

A utility airplane employed at division and higher headquarters to expedite and improve ground combat, this is the Army's standard fixed-wing utility class aircraft. The rugged Beaver has extremely large wing surfaces and incorporates flaps, fixed landing gear, and a steerable tail wheel to permit operation from short unimproved landing fields. It can accommodate a pilot and five passengers; or a pilot, three litter patients, and a medical attendant; or a pilot and approximately 1,000 pounds of cargo. The speed of the Beaver is 97 knots and its range is 500 miles. Powered by a 9-cylinder radial piston engine, the aircraft has a wingspan of 48 feet, is 30.3 feet long, and 10.4 feet high.

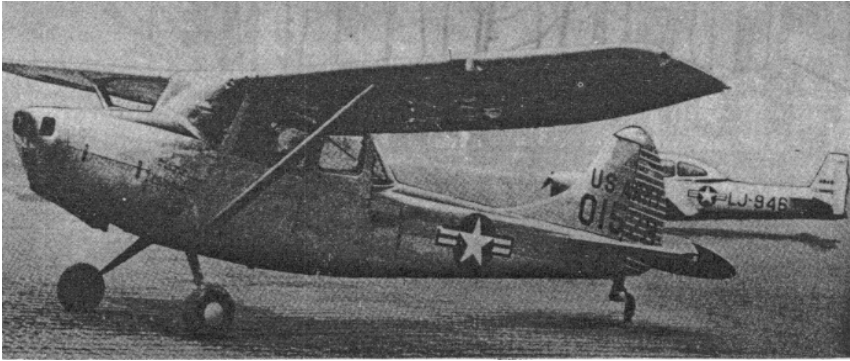


Figure 45. The L-19A, Bird Dog, has a range of 400 miles.

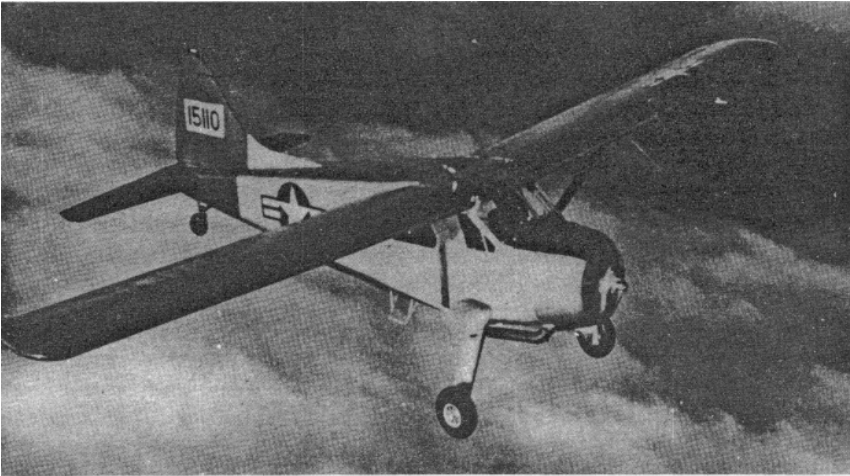


Figure 46. The L-20, Beaver, has a speed of 97 knots.

L-23, Seminole

The Seminole is a command twin-engine airplane employed at corps or higher headquarters for the accomplishment of command, liaison, and courier missions pertinent to combat zone operations and training. It is the Army's standard fixed-wing command class aircraft. This reliable twin-engine aircraft, equipped with flaps and retractable tricycle landing gear, is a remarkable performer from relatively short, improved landing fields. The airplane carries a pilot and five passengers, is capable of long-range all-weather flying, and can be flown safely on one engine in case of emergency. Its speed is 139 knots and its range is 800 miles.



Figure 47. The L-23, Seminole, is employed at corps or higher headquarters.

U-1A, Otter

Assigned to Army engineer units to assist in the conduct of topographic operations, the U-1A is also assigned to fixed-wing tactical transportation companies in quantities of 16 per company to support ground operations in the combat zone. A rugged airplane, it has extremely large wing surfaces, fixed landing gear, and a steerable tail wheel to permit maximum efficient operation from short unimproved fields. It carries a pilot and 10 fully equipped troops; or pilot and approximately 2,000 pounds of cargo; or pilot and six litter patients. The Otter is powered by a 9-cylinder radial piston engine, has a wingspan of 58 feet, is 41 feet 10 inches long and stands 12 feet 7 inches high.

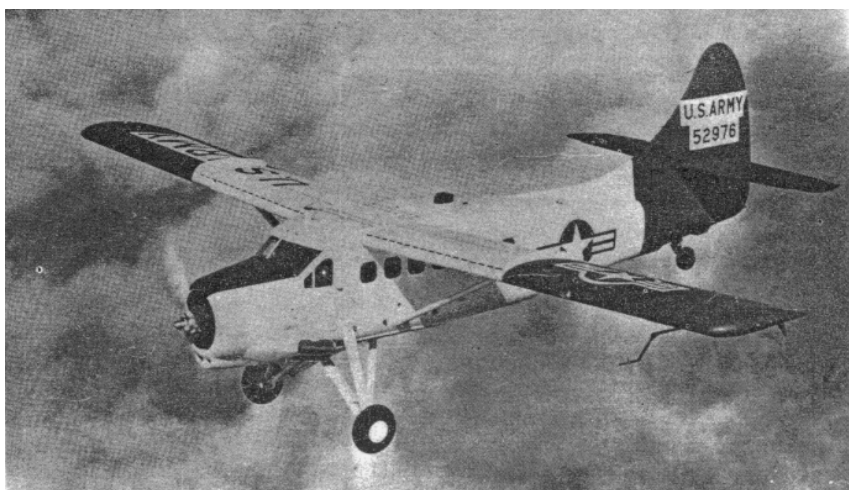


Figure 48. The U-1A, Otter, can carry a pilot and 10 fully equipped troops.

H-13, Sioux

A single-engine helicopter incorporating a 2-blade main rotor and 2-blade tail rotor with conventional control system, the H-13 is the Army's standard observation class helicopter. It is used extensively at the Army Aviation School, Fort Rucker, Alabama, as a primary helicopter flight trainer, and by combat units for reconnaissance, emergency medical evacuation, command liaison, wire laying, and resupply in the combat zone and in training. It has an open configuration fuselage with a bubble cockpit, skid landing gear with ground handling wheels installed, and provisions for attaching two litter pods on the landing gear cross tubes outside the aircraft. This helicopter carries a pilot and passenger inside or a pilot and two litter patients. Its speed is 59 knots and it has a range of 125 miles. It is powered by a vertically mounted 6-cylinder horizontally opposed piston engine. The H-13 has a rotor diameter of 35.1 feet, is 41.4 feet long, 9.5 feet high, and 8.6 feet wide.



Figure 49. The H-13, Sioux, is the Army's standard observation class helicopter.

H-19, Chickasaw

The Chickasaw is the Army's standard utility class helicopter. It is a single-engine air vehicle incorporating a 3-blade main rotor and a 2-blade tail rotor. Used extensively by combat units to transport supplies, equipment, personnel, small units, and for aeromedical evacuation in the combat zone, the H-19 carries a pilot, copilot, and seven passengers; or a pilot, copilot, and six litter patients; or about 1,800 pounds of cargo. Its speed is 80 knots and range is 200 miles. Power is provided by a 9-cylinder radial piston engine mounted in the nose and inclined aft 35 degrees. The main rotor diameter is 53 feet. It is 62.3 feet long, 46.1 feet wide, and 15.3 feet high.



Figure 50. The H-19, Chickasaw, has a range of 200 miles.

H-21, Shawnee

A large single-engine helicopter, the H-21, like the H-34, is one of the Army's two standard light transport class helicopters. It is assigned primarily to transportation helicopter companies and is used to transport supplies, equipment, and personnel, and for aeromedical evacuation within the combat zone. The H-21 has won acclaim with the Army in unprecedented accomplishments while participating in civil disaster operations and world recordbreaking endurance flights. Powered by a 9-cylinder radial piston engine, it is equipped with two main loading doors, has a rotor diameter of 44 feet, is 86.3 feet long, 39 feet wide, and 15.4 feet high overall. The Shawnee carries a pilot, copilot, and from 10 to 20 troops, depending upon the equipment they carry and distance to be hauled; pilot, copilot, and 12 litter patients; or pilot, copilot, and about 3,000 pounds of cargo. Its maximum speed is over 100 knots and its range is 200 miles.

H-23, Raven

A single-engine helicopter, the H-23 is an observation class helicopter. Used extensively by the Army as a helicopter pilot primary flight trainer, the aircraft is also assigned to some engineer units as well as reserve component and noncombatant units of the Army in the Continental United States. It is powered by a vertically mounted 6-cylinder horizontally opposed piston engine and has a rotor diameter of 35 feet, is 40.5 feet long, 9.8 feet high, and 10 feet wide. Used for reconnaissance, evacuation of wounded, command liaison, wire laying and resupply, the Raven carries a pilot and passenger inside, or pilot and two litter patients in pods attached to cross tubes outside of the aircraft. Its speed is 59 knots and its range is 125 miles.

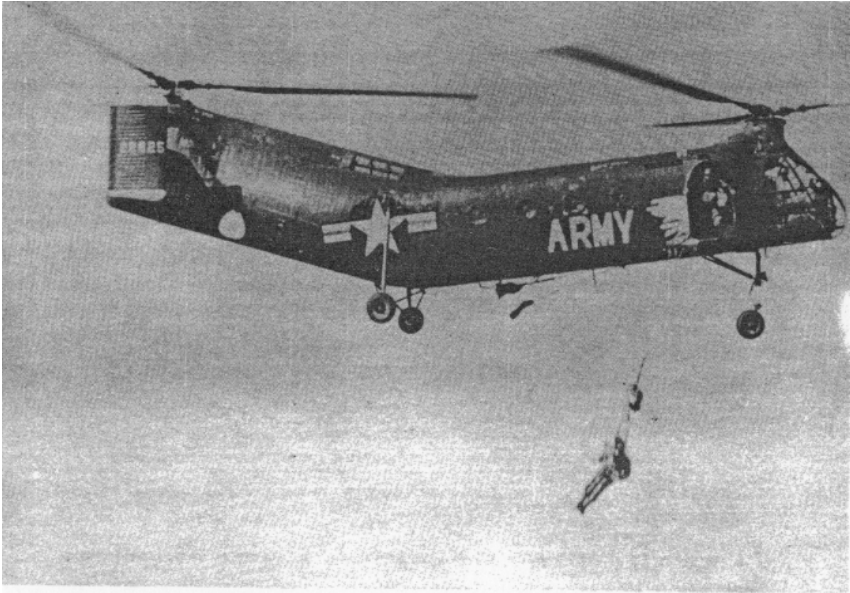


Figure 51. The H-21, Shawnee, is assigned primarily to transportation helicopter companies.



Figure 52. The H-23, Raven, is an observation class helicopter.

H-34, Choctaw

The H-34 is one of the Army's two standard light transport class helicopters. It is assigned primarily to transportation helicopter companies and is used to transport supplies, equipment, and personnel, and for aeromedical evacuation within the combat zone. It is a large single-engine, all metal helicopter. The Choctaw won acclaim in 1956 when Army aviators established three world helicopter speed records over a closed course at Bridgeport, Connecticut. Powered by a 9-cylinder radial piston engine mounted in the nose, facing aft, and inclined 35 degrees from horizontal, the H-34 incorporates a single cabin door for loading, has a rotor diameter of 56 feet, is 65.8 feet long, 40 feet wide, and 15.9 feet high overall. The helicopter carries a pilot, copilot, and from 10 to 18



Figure 53. The H-34, Choctaw, is powered by a 9-cylinder radial piston engine.

troops depending upon the equipment they carry and distance to be hauled; or pilot, copilot, and about 3,000 pounds of cargo. Its maximum speed is over 100 knots and its range is 200 miles.

H-37, Mojave

A giant twin all metal helicopter, incorporating a 5-blade main rotor and 4-blade tail rotor, the H-37 is the Army's standard medium transport helicopter. This machine is designed for tactical transport and cargo operation, and is used by transportation helicopter companies. Powered by two 18-cylinder twinrow radial piston engines mounted in nacelles at the tips of a short high wing, the H-37 is the largest helicopter in the Army inventory. Fuel is carried in wing and nacelle tanks. The lower portion of the nose of the fuselage consists of "clamshell" cargo

loading doors and a cargo loading ramp. It can accommodate 36 fully equipped troops, 24 litters, or equipment as large as a 105-mm howitzer, plus a 1/4-ton trailer inside its fuselage. Instead of these internal loads,



Figure 54. The H-37, Mojave, is the largest helicopter in the Army.

it can carry up to 10,000 pounds of cargo in an external sling which may be attached to the floor of the fuselage.

HU-1A, Iroquois

The HU-1A helicopter is a utility aircraft of compact design and low silhouette. It has a wide cabin with a large cargo space which permits its use for the transportation of personnel, supplies, and equipment. It is adaptable for medical evacuation use where facilities for fixed-wing aircraft are not available. The helicopter is equipped with instruments for flights under conditions of restricted visibility and can operate from quickly prepared or unprepared landing strips. It can be equipped to employ radio navigational aids. Maximum visibility is afforded the pilot and crew by use of transparent plastic panels at the top, front, bottom, and sides of the cabin. The crew enters through two swing-hinged doors located in the forward cabin areas next to the pilot's and copilot's stations.

The crew consists of the pilot alone, or pilot and medical attendant, or pilot and copilot, depending on the mission assigned.

L-26

The L-26 is a twin engine, all metal, high wing aircraft manufactured by the Aero Design and Engineering Company. It is powered by two Lycoming engines with a total rating of 680 horsepower (HP) and is equipped with super-chargers for high altitude flight. This aircraft has a service ceiling of 24,300 feet and a cruising speed of 165 knots. The original design of the L-26 was so that it could be used for command aerial inspection and limited cargo resupply. Its maximum range, with a crew of two and four passengers, is 1,215 nautical miles. A typical load for the L-26 would be the crew, four passengers, and 1,174 pounds of cargo for a 100-nautical mile radius.



Figure 55. The HU-1A, Iroquois, can operate from unprepared landing strips.



Figure 56. The L-26 has a total rating of 680 HP.

AO-1, Mohawk

A twin engine, fixed wing aircraft manufactured by the Grumman Aircraft Corporation, the AO-1 is powered by two T-53 gas turbine engines rated at 920 HP each. It has a cruising speed in excess of 200 knots, with a service ceiling of over 25,000 feet. It is primarily an observation aircraft capable of carrying a pilot and observer, or pilot and electronic or radar equipment. The AO-1 was designed to operate from short, unimproved landing strips in the forward area and will be assigned to the division aviation company in the target acquisition flight. Because

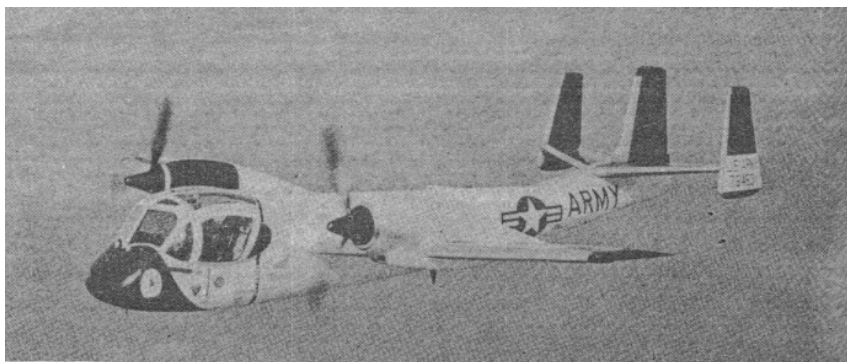


Figure 57. The AO-1, Mohawk, is primarily an observation aircraft.

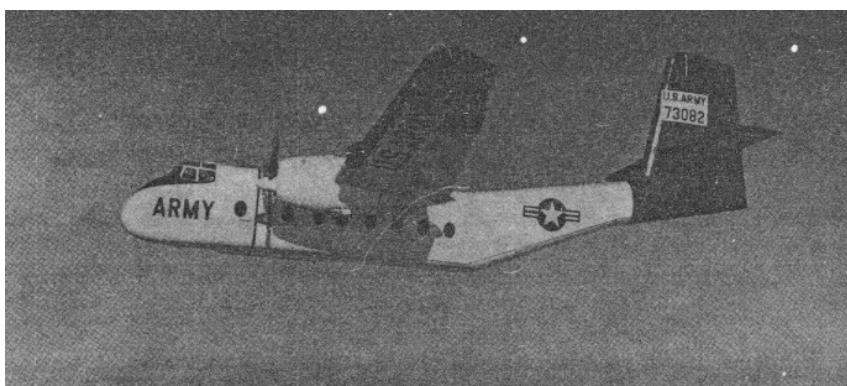


Figure 58. The AC-1, Caribou, has a cruising speed of 160 knots.

of its cabin configuration, the AO-1 is an excellent vehicle for this assignment because it affords all around observation and can be utilized at very low altitudes.

AC-1, Caribou

The AC-1 is a twin engine, all metal, high wing medium transport aircraft and is presently the Army's largest fixed-wing troop transport. It is powered by two Pratt and Whitney R-2000 engines rated at 725 HP each and has a cruising speed of 160 knots with a service ceiling of 26,000 feet. The primary missions for the Caribou are cargo resupply or medical evacuation. Its maximum allowable gross weight is 24,000 pounds; a typical load would be a crew of two and 5,000 pounds of cargo for a total distance of 1,040 nautical miles. Loads can be varied to include 6,000 pounds of cargo; 28 combat equipped troops; 22 litter patients; two jeeps; or a 105-mm howitzer for a 100-nautical mile radius.

"Light and Mobile" - - The Italian 105-mm Howitzer

Major Archibald V. Arnold, Jr.
United States Army Artillery Board

Extremely lightweight—just 2,760 pounds—a high degree of flexibility and great mobility, plus the capability of firing a standard 105-mm round about 10 kilometers—these features have brought the 105/14* Italian mountain howitzer into the limelight since the Worldwide Combat Arms Conference held at Fort Sill in December of 1959.

This flexible, Italian-made pack howitzer can be readily disassembled in the field and is man or animal transportable. It can be towed by a 1/4-ton truck. The weapon's heaviest component, the lower recoil mechanism, weighs less than 300 pounds. For these reasons, the howitzer is presently undergoing service testing and is being evaluated for use in airborne artillery units.

The Italian 105-mm howitzer can be externally transported by an H-34 helicopter and carried internally by the Caribou aircraft. Two complete howitzer sections can be transported and dropped from a C-130 aircraft.

The weapon's maximum range is about 10 kilometers when standard 105-mm ammunition is used. The maximum charge is called "charge 6 plus;" it is prepared by extracting the number 4 increment. High-angle fire is limited to charges 1 through 5 for structural stability reasons.

HOWITZER HAS SEVERAL CONFIGURATIONS

The Italian 105-mm howitzer can be prepared for firing in several different configurations. For direct (antitank) firing (fig 59) the wheels and trails are spread to the wide position. In this position, the axis of the tube is 25 inches high. In the indirect firing position, the wheels and trails are in the narrow position for greater stability (fig 60), and the axis of the tube is 40 inches high. Each trail consists of three sections which are connected by hinge pins, enabling adjustment of trail configuration for variations in the terrain. The center trail section can be left out if desired.

A six-man crew can prepare the howitzer for firing in about 2½ minutes. March order requires about 30 seconds longer.

The tube is 14 calibers long and has a five-baffle muzzle brake attached to it. Consequently, back blast is a significant fatigue factor to the crew. The howitzer has a 3/8-inch steel shield which serves primarily as protection against back blast. The rifling has a uniform right-hand twist, one turn in 20 calibers.

*—Denotes tube is 14 calibers long.



Figure 59. The Italian 105-mm howitzer in the direct fire position.

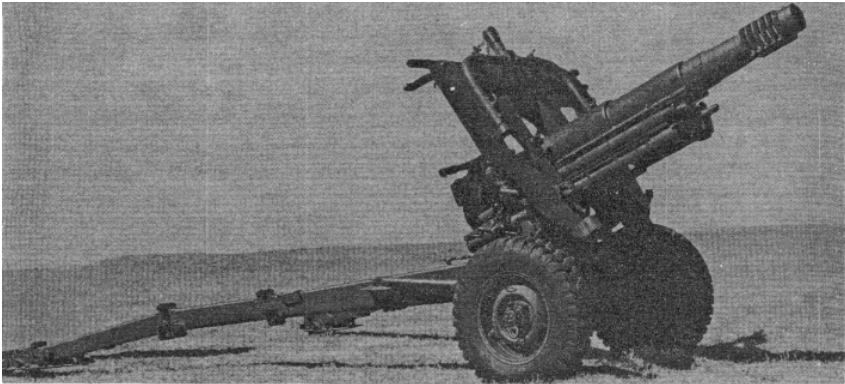


Figure 60. The axis of the tube is 40 inches high in the indirect firing position.

The breech mechanism is somewhat complicated. The breechblock slides up; the percussion firing mechanism is actuated by a firing lever on the left side of the breech ring or by a lanyard attached to the actuating arm on top of the breech ring. The howitzer has a hydrospring, double, independent, variable recoil mechanism.

Presently, the Italian, British, and German armies have added the Italian 105-mm howitzer to their array of firepower.



Are you up to date? Do you plan to attend a resident course soon? Prepare yourself by enrolling in the special extension course "FA Refresher."

NEWS NOTES FOR ARTILLERYMEN

SCHOOL HAS TWO NEW BUILDINGS

Two new buildings that provide housing for two departments of the US Army Artillery and Missile School, Fort Sill, were officially opened in May.

They are the three-million dollar addition to Knox Hall, which will provide space for the School's Department of Materiel, and Burleson Hall, headquarters for the Department of Communication and Electronics.

Knox Hall is a two-story, air-conditioned building and contains all the divisions of the Department of Materiel (Redstone, Corporal, Lacrosse, Honest John, Cannon and Special Weapons). The largest classroom in Knox Hall, known as the Redstone "bay area," serves as a Redstone laboratory. This room extends to almost the length of the building, and can be partitioned into three classrooms for individual instruction.

Burleson Hall is a three-story structure with more than 77,500 feet of floor space, and was built at a cost of more than \$1.5 million. There are 13 offices, seven general classrooms, 10 laboratories, two code rooms, two special purpose classrooms, a conference room, and a drive-in theatre classroom within the new building.

TWO LACROSSE BATTALIONS SENT TO GERMANY

Two Lacrosse guided missile battalions were sent recently to the US Army in Germany—the Fifth Missile Battalion, 42d Artillery and the Fourth Missile Battalion, 28th Artillery. The Nike, Honest John, Corporal and the Redstone are other Army missile units serving now with the US Army in Europe.

FORT SILL TO HOST ARTILLERY INSTRUCTORS CONFERENCE

The biennial Artillery Instructors Conference will be held at Fort Sill during the week of 22-26 August. The purpose of the conference is to assist in standardizing field artillery doctrine, tactics and techniques taught at service schools, to bring conferees abreast of the latest field artillery equipment, thinking, and trends in development, and to discuss problems of interest.

MISSILE-BORNE TV CAMERA

A miniature television station designed to enable a ground commander to see actual target damage inflicted by the missile was carried aloft for the first time recently by a Redstone ballistic missile fired at White Sands Missile Range, New Mexico. Housed in a small capsule, the camera is ejected from the missile, takes pictures while falling to the earth, and relays them back to the commander who may be as far as 75 miles away.

TOUGHER HELMET LINER MAY BE NEAR REALITY

A new helmet liner for combat soldiers, which would have ballistic-resistant qualities, may be near reality. The helmet would be treated by a new plastic resin blend to give ballistic-resistant nylon the stiffness needed to mold it into helmet liner shape. The new liner would be resistant to shell and grenade fragments and would replace the present cotton fabric liner.

Production tests are now being run at the Army Quartermaster Research and Engineering Command, Natick, Massachusetts, on a new catalyzed resin blend which reduces the time and cost required by previous methods.

Also under study are means to eliminate some of the difficulties inherent in nylon protective devices. For example, nylon must be cut into pinwheels with eight broad arms as the first step in preparing it for molding; this results in considerable material being wasted in cutting. An effort is being made to weave the material into pinwheels without cutting. Ways of working olive drab coloring into the nylon fabric and into the laminating plastic resin, thus eliminating the painting step in production, are being studied, too.

NEW HELICOPTER PLANNED

One helicopter that would replace three current aircraft is a goal of the Army's long-range aviation planning. To be turbine powered, the helicopter would tentatively come up for its first test in 1963. Cessna's L-19, Bell's H-13, and Hiller's H-23 would be replaced. The new helicopter would be used primarily for reconnaissance and observation.

ARMY HAS NEW TEAR GAS

Development of an improved tear gas, so effective that those who have tested it rarely are willing to try it twice, was revealed recently by the Department of the Army. The gas causes no permanent injury and its effects wear off quickly in fresh air. It has not yet been given a name.

The gas causes severe burning and watering of the eyes, irritation of the respiratory passages, a burning sensation on moist areas of the skin, painful, forced coughing, and involuntary closing of the eyes. It can be delivered in a grenade that disperses it either as a smoke cloud or in aerosol form, or it can be delivered by any of the devices used to spread conventional tear gas. For use as a training aid or to test the fit and performance of protective masks, the gas is prepared in a gelatin capsule.



The fourth edition of *Notes For The Battery Executive* is expected to be available at the Book Store, US Army Artillery and Missile School, Fort Sill, Oklahoma, in September 1960

STATUS OF TRAINING LITERATURE

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

- A. FIELD MANUALS (FM):
 - 6-20 FA Tactics and Techniques
 - 6-35 FA Missile, Redstone
 - 6-35A FA Missile, Redstone Firing Procedures
 - 6-75 105-mm Howitzer, M2 Series, Towed
 - 6-81 155-mm Howitzer, M1, Towed
 - 6-90 8-inch Howitzer, M2, Towed
 - 6-120 FA Target Acquisition Battalion and Batteries
 - 6-() Radar Set, AN/MPQ-4
 - 6-() US Army Missile Command
 - 6-() FA unit, Little John Rocket
 - B. TECHNICAL MANUALS (TM):
 - 6-200 Artillery Survey
 - 6-241 Meteorology Tables for Artillery
 - 6-242 Meteorology for Artillery
 - C. ARMY TRAINING TEST (ATT):
 - 6-630 FA Missile Group, Redstone
 - D. ARMY TRAINING PROGRAMS (ATP):
 - 6-558 FA Searchlight Battery
 - 6-630 FA Missile Battalion, Corporal
- 2. Training literature submitted to USCONARC:**
- FM 6-25 FA Missile Group, Redstone (U)
 - FM 6-40 FA Gunnery
 - FM 6-45 FA Missile Battalion, Lacrosse
 - FM 6-97 Change 1, Projectile: Atomic, M366; and Atomic Training, M369; 280-mm Gun (U)
 - FM 6-98 Change 1, Projectile: Atomic, T317E1; Atomic Training, T349E1; and T347; 8-inch Howitzer (U)
 - FM 6-140 FA Battery
 - FM 6-() The Field Artillery Rocket, Honest John w/Launcher XM33
 - TM 6-300 Army Ephemeris for 1961
 - ATT 6-10 Change 1, FA Missile Group, Redstone
 - ATT 6-585 FA Missile Battalion, Lacrosse
 - ATP 145-1-6 Program of Instruction for FA Reserve Officer Training Corps
 - ATP () Training Program for non-unit obligors
- 3. Training literature at the Government Printing Office:**
- FM 6-33 Warhead Section, M34 and M35 (Corporal) (U)
 - FM 6-156 Warhead Section, M24, M25, M26 and M29 (Honest John) (U)
 - FM 21-13 The Soldiers Guide

- FM 6-() Warhead Section, XM13, XM55 and XM16
(Lacrosse) (U)
- FM 6-() Warhead Section, XM18, XM30, XM31 and XM33
(Redstone) (U)
- ATT 6-11 Change 1, FA Missile Battalions and Batteries,
762-mm
- ATT 6-() FA Howitzer Battery, 8-inch, Infantry Division

4. Training literature recently printed:

- FM 6-59 FA Rocket, Honest John w/Launcher M386
- ATT 6-135 FA Rocket/Howitzer Battalion (Infantry Division)

5. Artillery training films currently under production and scheduled for release during calendar year 1960:

- Extension of Direction for Artillery by Simultaneous Observation
(25 minutes)
- Countermortar Radar AN/MPQ-4A (25 minutes)
- Lacrosse Battalion Guidance Section
 - Part I. Duties in prepare for action and march order (25 minutes)
- Lacrosse Battalion Assembly Section—Crew duties in prepare for
action, check-out and assembly, and march order (25 minutes)

6. Artillery training films production completed and scheduled for release in calendar year 1960:

- Artillery Battalion Survey
 - Part II. Planning and Execution (25 minutes)

7. Artillery training films scheduled for production and release during calendar year 1960:

- Field Artillery Sound Ranging
- Field Artillery Target Acquisition Battalion
- Introduction to Flash Ranging
- Lacrosse Battalion—RSOP
- Lacrosse Battalion—Guidance Section
 - Part II. Duties in Firing Lacrosse
- Lacrosse Battalion—Firing Section—Crew duties in prepare for
action, firing, and march order.

8. Artillery training films recently released:

- Artillery Battalion Survey
 - Part I. Methods (TF 6-2800) (25 minutes)

9. MOS Army Subject Schedules under preparation by the US Army Artillery and Missile School:

- ASubjScd 6-103 MOS Technical Training of the Ballistic
Meteorology Crewman
- ASubjScd 6-141 MOS Technical Training of the Light and
Medium FA Crewman

- ASubjScd 6-152 MOS Technical Training of the FA Operations and Intelligence Assistant
- ASubjScd 6-153 MOS Technical Training of the Artillery Surveyor
- ASubjScd 6-155 MOS Technical Training of the Sound Ranging Crewman
- ASubjScd 6-156 MOS Technical Training of the Radar Crewman

10. Non-MOS Army Subject Schedules:

A. UNDER PREPARATION OR REVISION:

- ASubjScd 6-2 FA Air Observer Training
- ASubjScd 6-41 Organization, Mission and Employment of Armored and Infantry units.

B. SUBMITTED TO USCONARC:

- ASubjScd 6-10 Countermortar and counterbattery radar
- ASubjScd 6-13 Operation of the Fire Direction Center
- ASubjScd 6-23 Operation, Adjustments, and Maintenance of Sound Ranging Set GR-8
- ASubjScd 6-24 Organization and duties of Operations section, Field Artillery Observation Battalion
- ASubjScd 6-32 Command Post Exercises

C. AT GOVERNMENT PRINTING OFFICE:

- ASubjScd 6-1 Care and Handling of Ammunition
- ASubjScd 6-5 Communications training for sections and platoons
- ASubjScd 6-18 Mobility Training
- ASubjScd 6-25 Construction of Sound Ranging plotting chart
- ASubjScd 6-50 Air movement

D. Recently published:

- ASubjScd 6-7 Duties of the Battery Recorder and Computer
- ASubjScd 6-31 Visibility Diagram (Charts)
- ASubjScd 6-42 Difficult traction and field expedients

Effective 3 June 1960, Ordnance was given full responsibility for preparation of special weapons user manuals. FM 6-() for Corporal, Lacrosse and Redstone missiles, the Honest John Rocket, 280-mm Gun, and the 8-inch Howitzer have been printed. These will remain field manuals until they meet revision criteria, at which time they will become Ordnance 5 part Technical Manuals; until then changes will continue to be sent to COMMANDANT, US Army Artillery and Missile School. Fort Sill, Oklahoma. ATTN: AKPSIDA-TP/PD.

ARTILLERY INFORMATION LETTERS

The following artillery information letters containing items of technical nature have been published by the US Army Artillery and Missile School since the MAY 1960 issue of ARTILLERY TRENDS. Distribution is made *only* to the units and their controlling headquarters which are authorized the equipment discussed in these letters:

- HONEST JOHN INFORMATION LETTER NUMBER 19
dated 27 April 1960
- HONEST JOHN INFORMATION LETTER NUMBER 20
dated 10 June 1960
- HONEST JOHN INFORMATION LETTER NUMBER 21
dated 13 June 1960
- METRO INFORMATION LETTER NUMBER 5
dated 5 May 1960
- REDSTONE INFORMATION LETTER NUMBER 2
dated 26 May 1960

A GEM FOR COMMUNICATION PERSONNEL

The skeptical attitude some commanders may have toward the area communication system might be traced to a lack of understanding of the system and its facilities. During a recent maneuver the radio/wire integration system was used scarcely and many commanders complained of inadequate communication.

An FM-voice radio/wire integration system is operated by the division signal battalion. A radio/wire integration station is located at each signal center to enable mobile FM radio stations to use the area system on a push-to-talk basis. This system is also used in place of FM radio relay stations.

To accomplish a link-up through the integration system, any FM radio user can contact an integration station, located at the nearest signal center. The signal center can then connect the FM radio into the wire system of any unit connected into the entire area communication system. Radio users will use standard radio procedure for this operation and reference to the standing signal instructions (SSI) will provide the special frequencies for use in the integration system.

Artillery commanders, liaison officers, forward observers, and reconnaissance parties should be aware of this facility. It is especially useful for spanning a break in a wire line, during river crossings, for displacement of command posts and similar operations. The radio/wire integration system can provide combat elements with a communication flexibility never before known.

—Submitted by Capt Daniel W. Knopp
Dept of C & E, USAAMS

L 299 ARMY-FT. SILL, OKLA.