STUDENT WORKBOOK

CONSOLIDATED ADVANCE SHEET

ARTILLERY SUBJECTS

5/6/22/69/70/71-580-2

5/6/22/69/70/71-581-1

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JANUARY 1969

UNITED STATES ARMY AVIATION SCHOOL

FORT RUCKER, ALABAMA

DEPARTMENT OF TACTICS
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

January 1969
File No. 5/6/22/69/70/71-580-2
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CHAPTER 1

GENERAL

1. GENERAL INFORMATION:

a. Welcome to the artillery phase of your instruction presented by Department of Tactics. During the next few days, we will present the fundamental knowledge of field artillery from the aerial observer's point of view. We do not intend to make finished artillerymen of you, yet we feel that the ability to locate and evaluate artillery targets, and to observe and adjust artillery fire is an important part of the Army aviator's repertoire.

b. All references listed are references for the entire artillery subcourse. To indicate how thoroughly you should cover the reference material, they are listed in your Student Outline and Detailed Schedule of Instruction for each study assignment as STUDY, READ, or SCAN.

c. STUDY: Read carefully; fix basic principles in mind; be prepared to apply subject matter involved without further reference to text.

d. READ: Read carefully; fix in mind the scope of the subject matter, be prepared to find reference readily in text.

e. SCAN: Read rapidly, concentrating only on paragraph headings and topic sentences to obtain a general idea of the subject matter.

f. Examinations will contain questions from material presented in the classroom. This statement should not be misconstrued to mean that the student is excluded from preparing himself prior to class for participation in classroom instruction and practical exercises.

g. This Advance Sheet is issued to assist you in making effective notes. It will help to maintain the proper organization of the material presented, and when completed, will serve as an excellent reference for preexamination study. We strongly recommend that this outline be taken with you when leaving Fort Rucker and kept for future reference.

2. REFERENCES - ARTILLERY SUBJECTS

FILE NO.	REFERENCE	PARAGRAPHS
-580-2	FM 6-40	STUDY: 1-6, 1-10 through 1-14, 2-2, 2-3, 2-5, 2-9, 9-1 through 9-10, 10-4, 10-17 through 10-30, 11-4 through 11-8, 11-10, 27-1 through 27-7, 27-10, 32-1 through 32-7.
		READ: 1-7, 2-28, 2-29, 7-1, 7-2, 7-6, 10-3, 11-1, 11-2, 27-7 c, d, e, f.
-581-1	FM 6-40	STUDY: 10-2, 10-5 through 10-11, 11-11, 12-1 through 12-4.
		READ: 10-1, 19-1 through 19-4, 19-5a, 19-18, 19-19, 19-22, Table 27-2.
-583-1	FM 6-40	STUDY: 12-5 through 12-8.
		READ: 10-1.
-586-3	FM 6-40	STUDY: 8-8, 10-11d, 11-9, 13-21 through 13-28.
Examination	All references listed.	STUDY: All previous references listed for artillery subjects.
		READ: None.
		SCAN: None.

3. INTRODUCTION TO ARTILLERY

a. Missions of the artillery. The purpose of offensive action is to destroy the effectiveness of the enemy's forces and his will to fight. To facilitate the accomplishment of this purpose, the force commander selects certain objectives. The artillery is prepared to support the ground-gaining arms in the attainment of their objectives by providing—

(1) Close and continuous fire support to the infantry or armor. This provides extra firepower necessary to permit the infantry or armor the desired freedom of movement in the face of the enemy. Important targets are neutralized and/or destroyed.

(2) Add depth to combat by fire to gain superiority over hostile artillery, fire on hostile reserves, fire to restrict movement in rear areas, and fire to disrupt enemy command and supply elements.

b. Organization of division artillery. The organization of artillery in the infantry, mechanized, and armored divisions, is the same with the exception that conventional artillery (cannon artillery) in the infantry divisions is towed artillery,

and conventional artillery in the armored and mechanized divisions is self-propelled artillery. The organization of artillery in the airborne division is similar to the organization of artillery in the infantry, mechanized, and armored divisions except all artillery in the airborne divisions is towed artillery; the airborne division does not have 8-inch and 155mm artillery. The artillery is characterized by its ability to reach deep into enemy territory, to maneuver and mass its fires without changing position, and to furnish continuous fire support. To accomplish this within the infantry, mechanized, and armored divisions, the division artillery is composed of a headquarters and headquarters battery, three 105 howitzer battalions, one 155mm/8-inch howitzer battalion, and a missile battalion.

(1) 105mm howitzer battalion(s). The 105mm howitzer battalions are organized into a headquarters, headquarters and service battery and three 105mm howitzer batteries.

(a) Headquarters, headquarters and service battery. This battery is organized to direct and coordinate operations of the battalion and to provide facilities with which the battalion commander controls the battalion. It has the responsibility to procure, break down, and distribute all classes of supplies to units of the battalion, maintain appropriate supply records, and perform battalion level organizational automotive maintenance.

(b) Howitzer battery 105mm. This battery is organized into a battery headquarters, a communications section, firing battery, and ammunition section. The firing battery consists of the firing battery headquarters and six howitzer sections.

(2) 155m/8-inch howitzer battalion. This battalion is organized into a headquarters, headquarters and service battery, three 155mm howitzer batteries, and one 8-inch howitzer battery.

(a) Headquarters, headquarters and service battery. This battery is organized to direct and coordinate operations of the battalion and to provide facilities with which the battalion commander controls the battalion. To procure, break down, and distribute all classes of supplies to units of the battalion, maintain appropriate supply records, and perform battalion level organizational automotive maintenance.

(b) Howitzer battery(ies) 155mm. The 155mm howitzer battery is organized into a battery headquarters, communications section, firing battery, and ammunition section. The firing battery consists of a firing battery headquarters and six howitzer sections.

(c) Howitzer battery 8-inch. The 8-inch howitzer battery is organized into a battery headquarters, communications section, firing battery, and ammunition section. The firing battery consists of a firing battery headquarters and four howitzer sections.

(3) Missile battalion, Honest John rocket. The Honest John (762mm) rocket battalion is organized into a headquarters and headquarters battery and two missile batteries.

(a) Headquarters and headquarters battery. This battery consists of the personnel and equipment necessary to enable the battalion commander to perform required tactical and administrative functions. It is organized into a battalion headquarters and headquarters battery. The headquarters battery consists of a battery headquarters, operations and fire direction section, survey section, administrative section, communications platoon, battalion maintenance section, medical section, and a battalion supply section.

(b) Missile battery(ies), Honest John rocket. The missile battery is organized into a battery headquarters, communications section, firing battery, and an assembly and transport section. The firing battery consists of a firing battery headquarters and two firing platoons with two launchers in each platoon.

c. Organization of airborne division artillery. The artillery in the airborne division is organized into a division artillery headquarters and headquarters battery and three 105mm howitzer battalions. 105mm howitzer battalion(s). The 105mm howitzer towed battalions in the airborne division artillery are organized the same as the 105mm howitzer battalions in the infantry, mechanized, and armored divisions described in paragraph 3b(1).

d. Tactical missions of artillery. A tactical mission is the fire support responsibility that may be assigned to an artillery unit. These missions are classified as direct support, reinforcing, general support, and general support reinforcing.

(1) Direct support. Direct support artillery has the mission of supporting a specific unit of command. When practicable, the supporting artillery unit is habitually placed in direct support of the same unit in order to facilitate teamwork. The artillery commander maneuvers his unit to conform with the plan of the supported unit commander. Direct support artillery is not attached to the supported unit; it remains under the command of the higher artillery commander, but its fires are not taken away from the supported unit except by the authority of the division or force commander. This authority is normally delegated to the division artillery or force commander.

(2) Reinforcing. Reinforcing artillery has the mission of augmenting "oncall," the fires of reinforced artillery. Artillery with a reinforcing mission remains under the command of the higher artillery commander, but priority of fires is to the reinforced artillery.

(3) General support. General support artillery has the mission of supporting the force as a whole. An artillery unit with a general support mission remains under the command of the force artillery commander and provides the force commander a reserve of firepower with which to influence the action.

(4) General support reinforcing. General support reinforcing artillery has the mission of supporting the force as a whole and of providing reinforcing fires for another artillery unit. A unit with this mission displaces only on order of the higher artillery commander. Priority of fires is to the force as a whole unless otherwise specified by the force commander.

e. Field artillery gunnery team. Since artillery normally emplaces its weapons in defilade so that they cannot be seen or easily located by the enemy, a method of fire called "indirect fire" must be used. The use of indirect fire requires the coordinated efforts of the field artillery gunnery team. This team is composed of the following individuals:

(1) Observers. Observers detect and report the locations of suitable targets to the fire direction center and request fire. They adjust this fire to obtain the desired effect and report the results.

(2) Fire direction center. Fire direction centers determine firing data from the information received from the observer and furnish firing commands to weapons crews.

(3) Weapons crews. The weapons crews apply the fire command data to the weapons and fire at the appropriate time.

f. Characteristics of divisional artillery weapons (FM 6-40, page 1-2).

(1) Field artillery cannons are classified according to caliber and maximum range capability as light, medium, and heavy.

(a) Light - 120mm and less.

(b) Medium - greater than 120mm, but not greater than 160mm.

(c) Heavy - greater than 160, but not greater than 210mm.

(d) Very heavy - greater than 210mm.

(2) Field artillery cannons are also classified according to their method of organic transportation.

(a) Towed. Cannon designed for movement as trailed loads behind prime movers. This includes weapons transported in single or multiple loads, and weapons transported in a single load by multiple prime movers.

(b) Self-propelled. Cannon permanently installed on vehicles which provide motive power for the piece and from which the weapon is fired.

(c) Aeropack. Cannon designed for transport, assembled or in sections, by Army aircraft. The weapon and carriage are partially disassembled for transport and reassembled for firing on the ground.

(3) Field artillery missiles. Missiles constitute a general category of nuclear delivery means which includes both free rockets and guided missiles. Missiles can be further subdivided or classified as to their means of propulsion, the type trajectory followed, type(s) of guidance system(s) employed, and the relative location of the launcher and target.

(4) Description of field artillery weapons organic to divisions.

105mm Howitzer (Towed)

(This photo depicts the airlift capability of the CH-47 in support of artillery.)

Range of weapon: M102 - 11,500 meters.
M101A1 - 11,000 meters.

Classification: Light artillery.

Width of lethal bursting area: 30 meters (high explosive projectile).

M108 - 105mm Howitzer (Self-Propelled)

Range of weapon: 11,500 meters.

Classification: Light artillery.

Width of lethal bursting area: 30 meters (high explosive projectile).

4. ARTILLERY PROJECTILES AND FUZES

The following information is of a need-to-know nature. So that the aerial observer may provide the most effective fire on the target, it is important that he be thoroughly familiar with the common projectiles and fuzes. For additional information, refer to FM 6-40, paragraphs 1-13 and 1-14.

a. Projectiles.

(1) Shell HE (high explosive). This is the most commonly used projectile in the artillery. The HE filler within the projectile, usually TNT, detonates and causes the steel jacket of the projectile to break up into many small jagged fragments. The effects desired from an HE round are fragmentation and blast.

(2) Burster type chemical shell. This type of projectile is filled with either white phosphorous or a war gas of some type. The projectile also contains a small burster charge, large enough only to break open the

relatively light shell jacket and expose the chemical to the air. An impact fuze is normally used with this projectile. The burning of the white phosphorous as it comes in contact with the air is the primary effect desired from a WP round. White phosphorous can also be used for screening and signaling.

(3) Base ejection shell. The two most commonly used types of projectiles utilizing the base ejection principle are shell smoke and shell illuminating. The smoke projectile is always fuzed with a time fuze set to detonate the round at 100 meters above the ground. At this point, an expelling charge within the projectile ignites the three smoke-producing canisters and forces them out the base of the projectile. Smoke rounds are used for marking, signaling, and screening.

(4) Illuminating projectile. The illuminating projectile also utilizes a time fuze, but with this projectile, the fuze is set to detonate the round at from 700 meters to 800 meters above the ground. The candle and parachute are base-ejected just as the smoke canisters are ejected from the smoke round. A 105mm illuminating round produces 450,000 candlepower for 60 seconds.

b. Fuzes.

(1) Impact fuze. An impact fuze, commonly referred to as fuze-quick, causes the projectile to burst upon contact with any solid object. This fuze is always used with the burster-type chemical rounds and may be used with HE rounds. Some models of the impact fuze can be set for .05 of a second delay. This means that .05 of a second after striking a solid object, the projectile will explode. Such a burst is particularly effective against buildings, bunkers, pillboxes, or whenever a ricochet burst is desired.

(2) Time fuze. Time fuzes employ a graduated time element in the form of either a black powder train or a gear train (as in a clock). Prior to firing, the desired time of flight is placed on the fuze. As soon as this time has elapsed, the fuze functions. Time fuzes are always used with base-ejection rounds and may be used with HE rounds.

(3) Proximity fuze. A proximity fuze, commonly referred to as a fuze CVT (controlled variable time), uses the principle of radar. After firing, a small radio transmitter sends out a constant radio wave. As the projectile approaches the ground, these radio signals are reflected back to the fuze and picked up by the receiving unit. When this reflected signal reaches a predetermined intensity, the fuze will detonate the projectile. All VT fuzes are factory-set to produce a burst at 20 meters above the ground; however, a metal desensitizing cone has been developed which, when used in conjunction with the fuze, will produce an airburst 5 meters to 7 meters above the ground. The proximity fuze is used with the HE projectile. A CVT-fuzed projectile is most effectively used against troops in the open or dug-in with light overhead cover. The primary advantage for the aerial observer in using the CVT fuze verses the time fuze is its automatic airburst at the optimum height.

5. ADJUSTMENT OF ARTILLERY

a. The indirect fire of the artillery is adjusted onto the target by the observer telling the FDC which way to "shift" the fires. These shifts are called "corrections" and are made with reference to a "spotting line." A "spotting line" is an imaginary line of specified direction extending through the target. The three spotting lines which can be used by the observer are—

- Gun-target line.
- Line of known direction (formulated prior to flight).
- Convenient spotting line (formulated during flight).

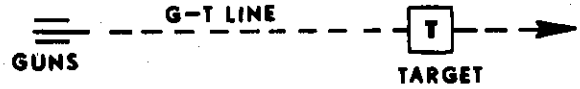
The "gun-target line" is automatically assumed by the FDC unless otherwise specified by the observer. If the observer desires to use a spotting line other than the "gun-target line," he informs the FDC which line he is going to use to keep the FDC and himself oriented on a common reference. All corrections are made by the observer with reference to the target and the spotting line using the following terminology.

PROCEDURE WORD	DEFINITION
LEFT	Shift fire to the left.
RIGHT	Shift fire to the right.
ADD	Increase range of fire.
DROP	Decrease range of fire.

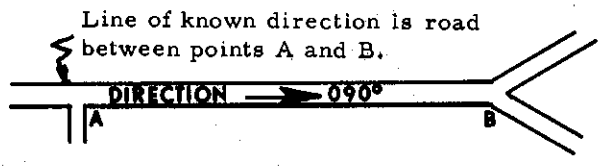
The artillery fire is continually adjusted toward the target until effective fire can be delivered onto the target, at which time the observer enters "fire-for-effect."

b. The use of spotting lines is indicated by the following diagrams:

(1) Gun-target line - this is an imaginary line extending from the gun position through the target.

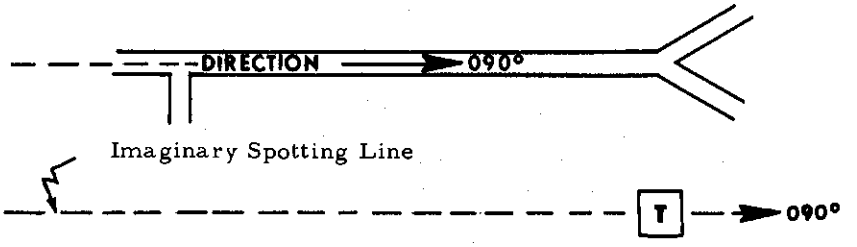


(2) Line of known direction - this may be a visual line formed by a terrain feature such as a road or stream; or it may be an imaginary line between two designated points, i.e., two terrain features. In either case, it must be coordinated between the observer and FDC prior to the flight.



(3) Convenient spotting line - the same type of line as the line of known direction, except it is established by the observer and described to the FDC during flight.

(4) When the target being engaged is not located on the designated "line of known direction," an imaginary line parallel to the line of known direction and running through the target is established by the observer as the spotting line.



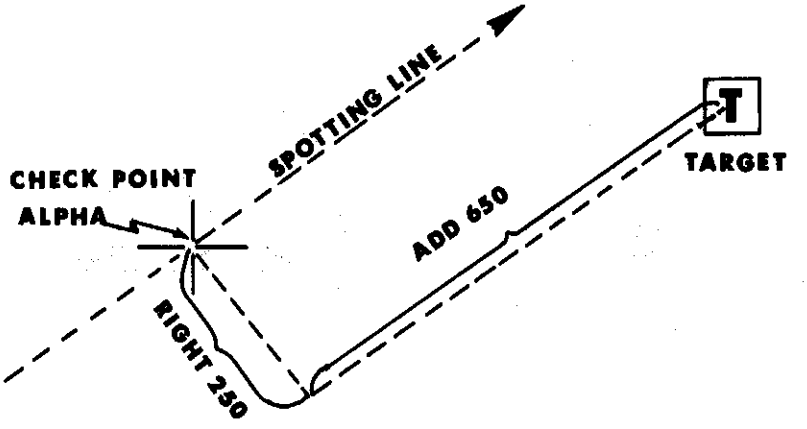
6. TARGET LOCATION

The target selected for an artillery mission may be "located" (observer informing the FDC as to its location) by any of three methods.

a. Grid coordinates - grid coordinates (called "grid") read from a tactical map.

b. Known point (prearranged code) - locating by reference to geographical or grid locations which have been coordinated with FDC and designated with a code name, i.e., checkpoint ALPHA.

c. Shift from a known point - a shift in both direction and distance from a known point with reference to the spotting line. Example: "From checkpoint ALPHA, right (left) 250 meters, add (drop) 650 meters."



7. CALL FOR FIRE

a.	Identification.	Flag Staff 20, this is Flag Staff 62,
b.	Warning (volume of FFE).	Fire mission, request battalion, over.
c.	Location of target (spotting line).	62, from Target AB 701 spotting line ALPHA, left 150mm, drop 400mm.
d.	Description of target.	150 troops in open.
*e.	Method of engagement.	
(1)	Type of adjustment - classification of fire.	Danger close.
(2)	Trajectory.	High angle.
(3)	Type of projectile (omitted for HE).	
(4)	Fuze action.	Variable time in effect.
(5)	Distribution of fire (omitted for normal).	
f.	Method of fire and control.	FFE, over.

*Not always mandatory. If omitted, the FDC assumes the observer desires area fire, low angle, HE projectiles, quick fuze, and normal sheaf.

Subsequent Corrections

(1) Spotting line

(2) Trajectory.

(3) Method of fire.

(4) Distribution.

(5) Shell.

(6) Fuze.

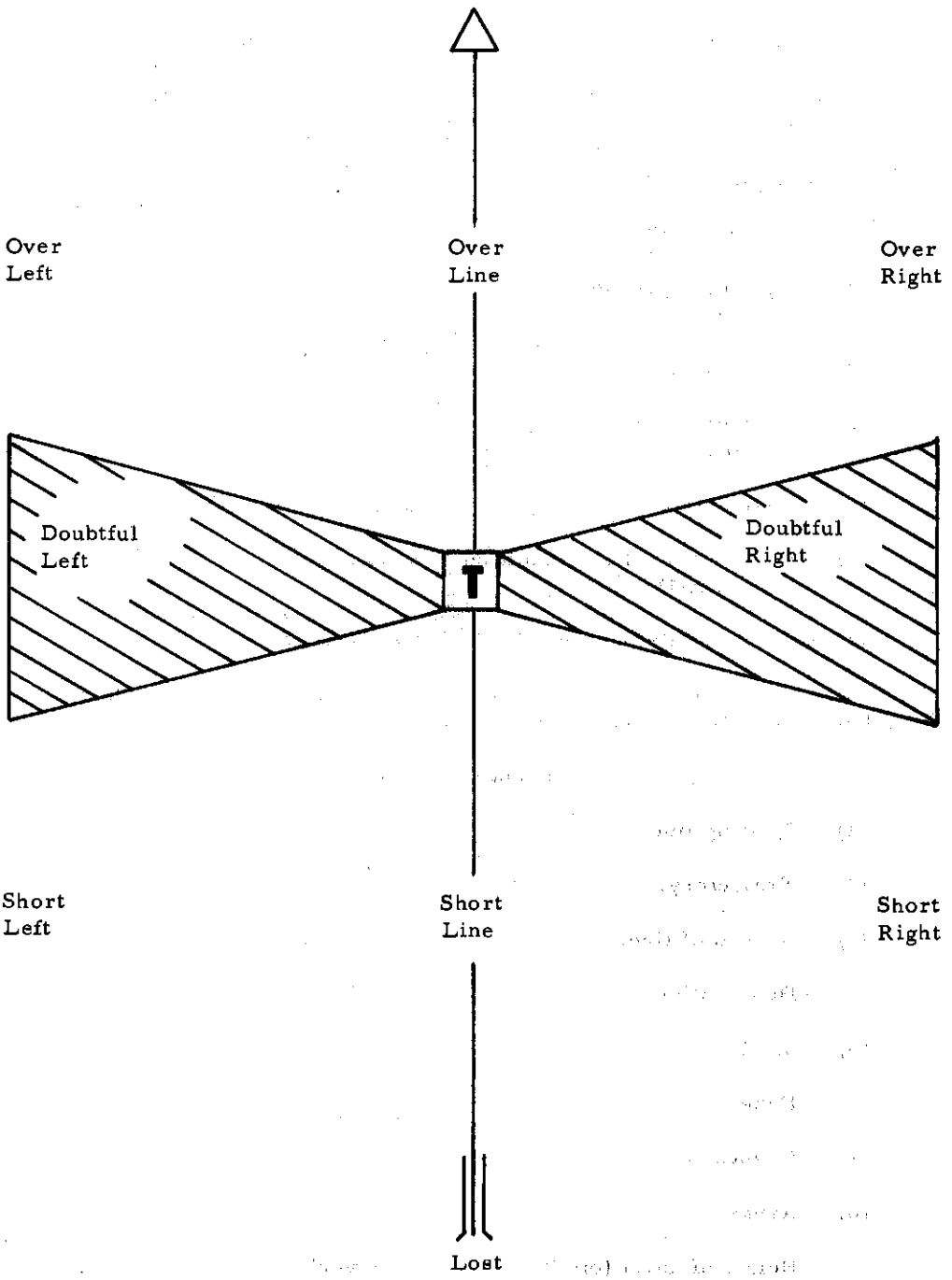
(7) Deviation.

(8) Range.

(9) Height of burst (omitted by air observer).

(10) Control.

8. PATTERN OF SPOTTINGS



9. SUGGESTED METHODS OF ATTACK

TYPE OF TARGET	WEAPON	SHELL	FUZE	TYPE OF FIRE	REMARKS
Armor	All (pref 155mm or larger)	HE, WP HEAT	Q	Neutralization, destruction, assault	
Boats	All	HE	VT, Q, Ti	Neutralization, direct	
Bridge	All (pref 155mm or larger)	HE	Q, CP, delay	Destruction, harrassing, interdiction	Fire at long axis if possible. Knock out bridge supports. Fuze Q for wooden or pontoon bridges.
Buildings (frame)	All	HE, WP	Q	Neutralization	Combine WP and HE if smoke does not obscure the target.
(masonry)	All (pref 155mm or larger)	HE	CP, delay, Q	Destruction, neutralization of larger areas	Several weapons can be converged on one building

Typical targets and suggested methods of attack.

TYPE OF TARGET	WEAPON	SHELL	FUZE	TYPE OF FIRE	REMARKS
Fortifications (armored)	All	HEAT, HE (large calibers)	Q, delay	Destruction, assault, direct	Use highest charge, aim at apertures.
(Concrete)	All (pref 155mm or larger)	HE	CP, delay, Q	Destruction, assault	Use high charges. Fire occasional HE-Q to clear away rubble.
(Earth, logs, etc.)	All	HE	Delay, Q	Destruction	
Personnel (in open)	All	HE	VT, Ti, Q delay - ricochet	Neutralization, harassing	TOT most effective.
(dug in)	All	HE, WP	VT, Ti, Q delay - ricochet	Neutralization, harassing	
Roads and railroads	All (pref 155mm or larger)	HE	Delay, CP	Destruction	Attack critical points, direction of fire should coincide with road.
Supply installations	All	HE, WP	Q, VT, Ti	Neutralization, destruction	
Vehicles (rendezvous)	All	HE, WP	Q, VT, Ti	Neutralization, destruction	

Typical targets and suggested methods of attack.

TYPE OF TARGET	WEAPON	SHELL	FUZE	TYPE OF FIRE	REMARKS
Vehicles (moving)	All	HE, WP	Q, VT, Ti	Neutralization, destruction	Use a deep bracket to stop movement. Speed in the adjustment is essential. Attack a vehicle where it will block road if possible. You may use at my command to good effect.
Weapons (fortified)	All (pref 155mm or larger)	HE	Q, CP, delay	Neutralization, destruction	Neutralize, then destroy.
(in open)	All	HE, WP	VT, Ti, Q delay - ricochet	Neutralization, destruction	

Typical targets and suggested methods of attack.

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CHAPTER 2

PERFORMANCE OBJECTIVES AND CHECKS FOR ARTILLERY SUBJECTS

1. PURPOSE: Performance Objectives acquaint the student with the major teaching points to be presented during the class and indicate specific areas within reference material to be studied. Performance Checks should be worked after the class presentation as indicated by the instructor.

2. PERFORMANCE OBJECTIVES AND CHECKS:

a. Performance Objectives, "Introduction to the Conduct of Aerial Adjustment of Artillery Fire."

(1) KNOWLEDGES:

(Period one of two periods)

(a) List the three elements of the field artillery gunnery team.

(b) List the five major elements of information that are normally presented to an aviator during his briefing for an artillery aerial observation mission.

(c) State the three methods used by the aerial observer to indicate target locations.

(d) Write the location of a target using a known point shift and a convenient spotting time.

(e) List the three types of spotting line with a descriptlon of each.

(f) When given a list of typical targets, select the projectile and fuze that will best neutralize the targets.

(g) List the three primary causes of dispersion.

(Period two of two periods)

(h) List the six elements of a call-for-fire and identify the five mandatory elements.

(i) List the four subelements of information assumed by the FDC if nothing is requested under "Method of Engagement."

(j) List the elements normally given in a "message to observer" and state the meaning of each element.

(k) Properly rearrange a jumbled call-for-fire.

(l) Properly rearrange a jumbled subsequent corrections.

(2) SKILLS: None.

b. Performance Check, "Introduction to the Conduct of Aerial Adjustment of Artillery Fires."

(1) List the three elements of the field artillery gunnery team.

observer
FDC fire direction center.
Gun section

(2) List the five major elements of information that are normally presented to an aviator during his briefing for an artillery aerial observation mission.

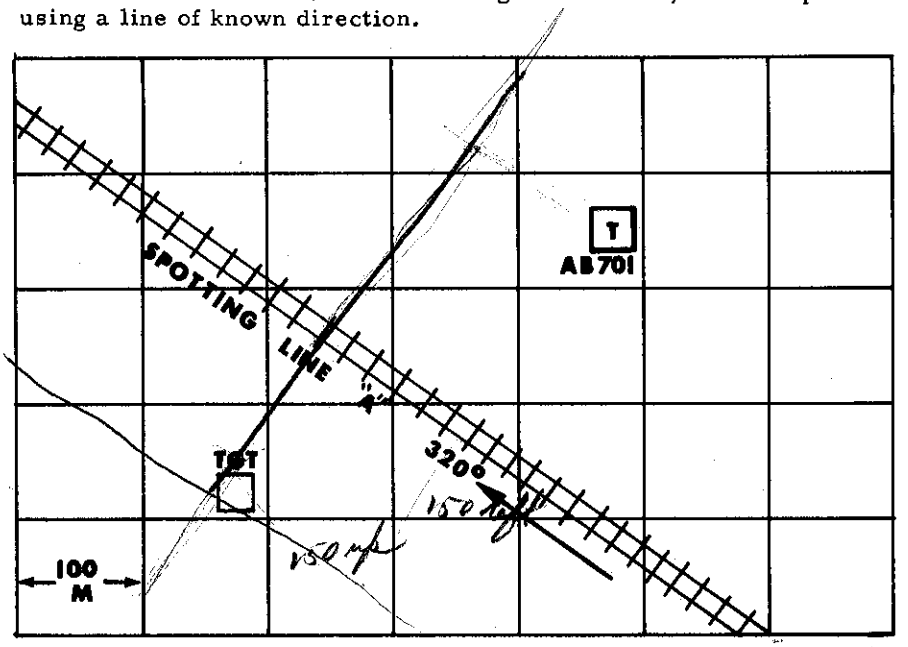
I.O.
FIRE Mission
Grid Coordinate
Target
method of fire and control

(3) What are three methods normally used to indicate target locations?

smoke
spotting line
known points

(4) From the sketch below, write the target location by a known point shift, using a line of known direction.

left 300
ADD 150



(5) List three types of spotting lines with a description of each.

spotting line
line of known direction
convenient spotting line

(6) Select the best fuze and projectile to neutralize the following targets:

(a) Troops in open. HE with VT

(b) Concrete fortifications. HE ~~VT~~ CP

(c) Wooden buildings. HE QUICK

(d) Troops in dense jungle. HE-VT + HE QUICK

(e) Artillery weapons firing. HE VT

(7) List the three primary causes of dispersion.

1. weather + wind
2. the gun bore
3. the gun turret

(8) What are the six elements of a call-for-fire and asterisk those elements which are mandatory?

(9) In a call-for-fire, if the observer omits type of fire, FDC will assume it to be normal fire.

(10) List the elements of a normal "message to observer," and state the primary purpose of the "message to observer."

(11) Arrange the following call-for-fire elements in their proper sequence: from tgt AB 418 left 80, add 350; destruction; Fireball 9; This is Fireball 82; adjust fire; at my command; fire mission; stalled tank, over, over, 82.

F 9 F 82
call for fi in ova
82
adjust fire
at my command

(12) Arrange the following subsequent correction elements in their proper sequence: fuze-quick; left 60; at my command; shell HE; add 200, adjust fire; 82, over.

82 ~~left 20~~
HE Quick
left 60 add 200
adjust fire
at my command

c. Performance Objectives, "Conduct of Precision Fire."

(1) KNOWLEDGES: The student, without the aid of notes or references and with no errors, will write—

(Period one of one period)

(a) The two types of precision fire and the reasons for conducting each.

(b) The two phases of a precision fire mission.

(c) The three rules for entering fire-for-effect.

(d) The 10 possible impact spottings and at which point during a precision mission the observer will begin transmitting these spottings to FDC.

(e) The two portions of the fire-for-effect phase in a precision registration mission, and the reason for conducting each portion.

(f) Who terminates a precision registration mission and who terminates a precision destruction mission.

(2) SKILLS: None.

d. Performance Check, "Conduct of Precision Fire."

(1) List the two types of precision fire with a definition of each.

(2) Write the two phases of a precision fire mission.

(3) Write the three rules for entering fire-for-effect in a precision fire mission.

(4) Given the diagram below, write the spottings that will be transmitted to FDC for the four bursts shown.

(5) List the two portions of the fire-for-effect phase in a registration mission.

(6) Write the reason a time portion is conducted in a registration mission.

(7) Who terminates a registration mission; a destruction mission?

e. Performance Objectives, "Terrain Board Exercise, Precision Fire."

(1) KNOWLEDGES: None.

(2) SKILLS:

(Periods one and two of two periods)

(a) When given a specific target on the terrain board, the student will transmit a call-for-fire to the FDC (the instructor) to include, as a minimum, the mandatory elements in the proper order. He must be able to locate the target using each of the three methods and be able to use each of the three types of spotting lines during adjustment.

(b) When given a "message to observer" from the FDC, the student will, without the use of notes, orally explain to the instructor the meaning of each element. Also, he must transmit the proper response to the "message to observer" without error.

(c) When given bursts in his target area, the student will adjust each round toward the target using correct adjusting procedures.

(d) After satisfying one of the three rules for entering fire-for-effect, the student will enter fire-for-effect using correct procedures appropriate for his mission. Once fire-for-effect is begun, he will correctly spot each round.

(e) During a destruction mission, the student will correctly end his mission when the desired result has been achieved. His transmission must include both elements of the termination of the mission.

(f) During registration missions, the student must make the correct response when FDC terminates the mission.

(g) When given a lost round during the adjustment phase of a precision mission, the student will transmit the proper subsequent correction to the FDC using the correct procedure for locating a lost round.

f. Performance Objectives, "Conduct of Area Fire."

(1) KNOWLEDGES: Without the aid of notes or reference material and with no errors, the student will be able to—

(Period one of one period)

(a) State three major differences between area and precision fire.

(b) List the five cases which satisfy the "range correct" rule for entering fire-for-effect.

(c) List five instances when the observer may request fire-for-effect in the initial call-for-fire.

(d) Write the proper observer response for each of the three possible results from the initial fire-for-effect in an area fire mission.

(e) Write the two elements sent by the observer in terminating the mission.

(f) State the major advantage for the aerial observer in using the variable time (VT) fuze to obtain airbursts in fire-for-effect.

(2) SKILLS: None.

g. Performance Check, "Conduct of Area Fire."

(1) What are three major differences between area and precision fire?

(2) What are the five cases which satisfy the "range correct" rule for entering fire-for-effect?

(3) What are five instances when the observer may request fire-for-effect in the initial call-for-fire?

(4) What are the three possible results from the initial rounds in fire-for-effect, and what is the proper response in each case?

(5) What two elements are sent to the FDC when terminating the mission?

(6) What is the major advantage for the aerial observer in using the VT fuze in lieu of the time fuze?

h. Performance Objectives, "Terrain Board Exercise, Area Fire."

(1) KNOWLEDGES: None.

(2) SKILLS:

(Periods one, two, and three of three periods)

(a) When given a specific target on the terrain board, the student will transmit a call-for-fire to the FDC (the instructor) to include, as a minimum, the five mandatory elements in the proper order. He must be able to locate the target, using each of the three methods, and adjust fire, using each of the three types of spotting lines.

(b) When given a "message to observer" transmitted from the FDC, the student will, without the use of notes, orally explain to the instructor the meaning of each element. He must also transmit the proper response to the "message to observer" without error.

(c) When given bursts in the target area, the student will adjust each round toward the target, using correct adjusting procedures.

(d) After satisfying one of the two rules for entering fire-for-effect, the student will correctly enter fire-for-effect, using correct procedures appropriate for his mission. Once fire-for-effect is begun, he will insure that accurate and sufficient fire is delivered on the target before ending the mission.

(e) When the target has been neutralized, the student will correctly end his mission. His transmission must include both elements of the termination of mission.

(f) When given a lost round, the student will transmit the proper subsequent corrections to the FDC, using the correct procedure for locating a lost round.

i. Performance Objectives, "Aerial Adjustment of Artillery in Special Situations."

(1) KNOWLEDGES: Without the aid of notes or references and without error, the student will be able to write—

(Period one of three periods)

(a) The procedure that may be used to effectively engage targets when the observer does not have a map or any known points to locate the target.

(b) The procedure used to determine the gun-target line if the firing location is unknown to the observer.

(c) The adjustment procedure used when friendly elements are in close proximity to the target.

(d) The procedures to be employed when engaging moving targets.

(2) SKILLS:

(Periods two and three of three periods)

(a) The students, using available material and being assigned a target and a special situation on the terrain board, will transmit a call-for-fire to include all necessary elements for the special situation.

(b) When bursts appear in the target area, the student will adjust the burst to the target using correct adjusting procedures.

(c) The student will properly enter fire-for-effect using the appropriate method.

j. Performance Check, "Aerial Adjustment of Artillery in Special Situations."

(1) What special procedure should be used to engage a target if you do not have a map or any known points to locate the target?

(2) After locating a target by grid, what phrase should be in the initial call-for-fire if you do not know the location of the firing battery and desire to establish the gun-target line?

(3) What type of adjustment procedure should be used if friendly elements are in close proximity to the target?

(4) What special procedure should be used to attack a target of three trucks moving toward target No. AB 401 which is 1 mile ahead of the convoy at a road junction?