STUDENT WORKBOOK

CONSOLIDATED ADVANCE SHEET

ARTILLERY SUBJECTS

5/6/22/69-580-2
5/6/22/69-581-1
5/6/22/69-582-2
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JUNE 1966

DEPARTMENT OF TACTICS

UNITED STATES ARMY AVIATION SCHOOL

FORT RUCKER, ALABAMA 36360

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CHAPTER 3. GENERAL

DEPARTMENT OF TACTICS
UNITED STATES ARMY AVIATION SCHOOL
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CHAPTER 1

ARTILLERY SUBJECTS

1. PURPOSE: This consolidated Advance Sheet is designed to emphasize the knowledge and procedures that are required to conduct observed fire missions.

2. PERFORMANCE OBJECTIVES AND CHECKS:

   a. Performance Objectives, "Introduction to the Conduct of Observed Artillery Fires."

      (1) Knowledges.

      (Period one of two periods)

      Without the aid of notes or references, the student will -

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

      (b) Write the three reasons why visual target acquisition is preferred over instrumented methods.

      (c) List the five elements that are normally given to an aviator during his briefing for an artillery mission.

      (d) State the three methods of locating a target.

      (e) Given a sketch (to include target, a target number and

a straight railroad track running diagonally through the sketch) will write the location of the target by a known point shift using a convenient spotting line.

(f) State the primary criterion for selection of the projectile and fuze.

(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) When given the following list of items and their subcomponents considered under Method of Engagement, write each subcomponent assumed by the FDC if the observer omits mention of same during his call for fire:

Method of Engagement.

1. Type of fire - area, precision.
2. Trajectory - low and high angle.
3. Ammunition - shell and fuze.
4. Sheaf - normal, linear, and converged.

(j) List four elements in a "message to observer," and state the primary purpose of the "message to observer."

(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 Observed Artillery Fires."

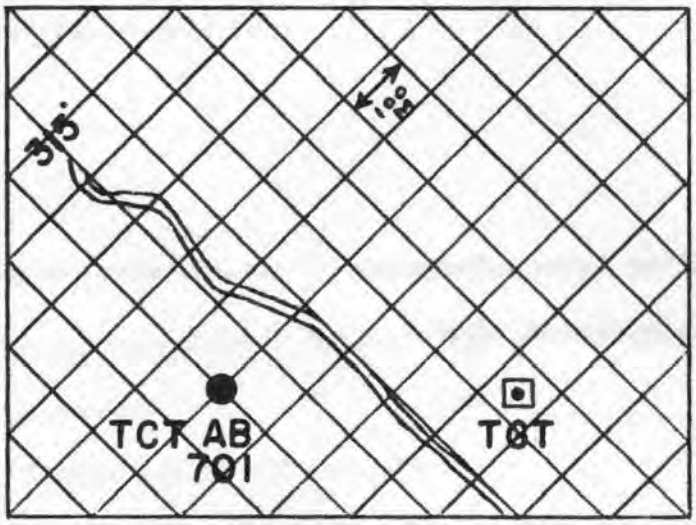
(1) List the three components of the field artillery gunnery team.

(2) List the three advantages of visual target acquisition over instrumented methods.

(3) List the five elements normally given to the aviator during the mission briefing.

(4) What are three methods used to locate targets?

(5) From the sketch below, write the target location by a known point shift using a convenient spotting line.



(6) Write the primary criterion for selection of the projectile and fuze.

(7) What are the three primary causes of dispersion?

(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 _____ fire.

(10) List the four 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.

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

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

(1) Knowledges.

(Period one of one period)

The student, without the aid of notes or references and with no errors, will write -

(a) Two types of precision fire.

(b) Two phases of a precision fire mission.

(c) Three rules of entering fire-for-effect.

(d) All of the possible spottings for deviation and range and will write at which point during a precision mission he will begin transmitting spottings to FDC.

(e) Two phases of fire-for-effect in a precision registration mission.

(f) Reason a time phase is conducted in a registration mission.

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

(2) Skills: None.

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

(1) Write the two types of precision fire.

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

(3) Write the three rules for entering fire-for-effect.

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

(5) Write the two phases of fire-for-effect in a precision registration mission.

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

(7) Who terminates a precision registration mission and a precision destruction mission?

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

(1) Knowledges: None.

(Periods one and two of two periods)

(2) Skills.

(a) Given a specific target on the terrain board, the student without the aid of notes 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 each of the three types of spotting lines.

(b) 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. Also, he must transmit the proper response to the "message to observer."

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

(d) The student will properly enter fire-for-effect using the method appropriate to his mission. Once fire-for-effect is begun, he will demonstrate his knowledge of FFE procedures by properly spotting each round.

(e) When told to do so, the student will properly end his mission. His transmission must include both elements of the termination of mission.

(f) Given a lost round, the student will transmit the

proper correction to the FDC using the appropriate method for locating a lost round.

f. Performance Objectives, "Area Fire."

(1) Knowledges.

Without the aid of notes or reference material, the student will -

(a) State the major difference between area and precision fire.

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

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

(d) List the three possible results from the initial rounds in fire-for-effect, and give the proper observer response in each case.

(e) Write the two elements sent by the observer to the fire direction center (FDC) in terminating the mission.

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

(2) Skills: None.

g. Performance Check, "Area Fire."

(1) What is the major difference 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 four instances when the observer may request fire-for-effect in the 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.

(Periods one and two of two periods)

(2) Skills.

(a) 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 each of the three types of spotting lines.

(b) 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. Also, he must transmit the proper response to the "message to observer."

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

(d) The student will properly enter fire-for-effect using the method appropriate to his mission. Once fire-for-effect is begun, he will properly adjust each round to the target.

(e) When told to do so, the student will properly end his mission. His transmission must include both elements of the termination of mission.

(f) Given a lost round, the student will transmit the proper subsequent corrections to the FDC using the appropriate method of locating a lost round.

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

(1) Knowledges.

(Period one of two periods)

Without the aid of notes, the student will, without error, be able to list in writing the mandatory elements to -

(a) Effectively engage targets utilizing mark center of sector techniques.

(b) The statement necessary to determine the gun-target line by requesting ranging rounds.

(c) The proper projectile and fuze based upon the nature of the target.

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

(2) Skills.

(Period two of two periods)

(a) The student, 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.

i. Performance Check, "Aerial Artillery Adjustment in Special Situations."

(1) What is the call for fire to attack four zero troops digging in utilizing a mark center of sector location?

(2) After locating your target (8 man patrol) by coordinates, what is the call for fire? Establish spotting line by utilizing ranging rounds.

(3) What type projectile and fuze would be requested for troops digging in?

(4) What type of projectile and fuze would be requested for troops in dense woods?

(5) What is the call for fire necessary to attack a target of 3 trucks moving toward target number AB 401 which is one mile ahead of the convoy at a road junction?

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CHAPTER 2

STUDENT OUTLINE

INTRODUCTION TO THE CONDUCT OF OBSERVED ARTILLERY FIRE

Period One

1. Field artillery gunnery team.

   a. Observer.

   eyes

   b. Fire direction center.

   brain F.D.C.

   c. Gun section. weapons crew

   muscle

2. Mission briefing information.

a. Tactical situation.

(1)

(2)

(3)

b. Mission.

(1) ~~[illegible]~~

re con

(2) surveillance

c. Locations.

(1) known points

(a)

(b)

(2) registration points

d. Communications. frequencies, call signs, special nets

e. Miscellaneous.

3. Flight techniques.

a. Rotary wing - fixed wing,

b. Flight path. anything to give contact visible / target.

c. Altitude. just stay clear of flight / rounds.

4. Target acquisition. fly different route each time

a. Detection. find the target

b. Analysis. send off call for F.D.C.

1 nature
2 location
3 capability

5. Location of target.

a. Methods of locating target.

(1) (Grid) call coordinates

(2) prearranged code

(3) known point left.

example. (from point X go Right 200 up 400)

b. Spotting line. base direction

(1) gun - target line (G-T line)

(2) line of known direction

(3) convenient reference line.
(a railroad or a road etc)

6. Projectile and fuze terminal effects.

a. Type projectile and effects.

(1) W.P. white phosphorus

(2) H.E. high explosive

(3) smoke used for marking

(4) illumination

(5) Last never used for the air

(6)

b. Type fuze and effects.

(1) quick fuze

(2) delay fuze 2 (100 th) delay.

C.P. concrete piercing

W P white phosphorus. H E High explosive

T + VT

(3) Time & variable time

(4)

(5)

c. Criteria for selection.

7. Dispersion.

a. Definition. scattering of points of impact

b. Factors causing dispersion.

(1) condition of bore

(2) condition of carriage

(3) condition of air.

Period Two

1. Artillery communications.

a. Elements of short-phrase readback.

b. Radio procedure for spottings.

c. Transmission of numbers.

2. Call for fire.

a. Definition.

b. Elements.

(1) observer ID

(2) warning order.

(3) location of target

(4) description of target

OPTIONAL * METHOD OF ENGAGEMENT

(5) type of adjustment — Injecting ammunition

area, precision

(6) deep, danger close.

method of fire & control

c. Correction of errors.

3. Message to observer.

a. battery to fire

b. adjusting battery

c. number of rounds on tube

d. target number.

4. Subsequent corrections.

a. When used.

b. Elements.

(1) spotting line

(2) trajectory

(3) method of fire

(4) distribution

(5) shell

(6) type

(7) deviation

(8) range

(9) height of burst

(10) control

c. Correction of errors.

d. Summary.

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STUDENT OUTLINE

CONDUCT OF PRECISION FIRE

1. Conduct of precision fire.

a. Types of missions.

(1) Registration to obtain corrected firing data

(2) destruction to dirty point type immobile target.

b. Adjustment procedures.

(1) When adjustment is necessary. In a precision adjust the fire in the 6th item in call for fire

(2) Adjusting point. permit or semi permit terrain feature

e.g. a distroy mission adjusting point is the truck or what ever to be destroyed.

(3) Number of pieces during adjustment.

1 gun in adjustment

(4) Adjustment of deviation.

(a) spotting
3 possibles left, on line, or right.

(b) Correction: need to recount 10 meters adjust to on line position

(5) Adjustment of range.

(a) spottings
left, right or line
over left over right over line
doubtful left doubtful right on target (LOST)
short left short right short line

(b) Corrections: during adjustment phase
(10 M for deviation 50 M for range)

BRACKETING RANGE NOT DEVIATION,
USED FOR
c. Fire for effect procedures.

(1) General.
100, 200, 400, 800, 1600 correct on line & split to numbers →

(2) Number of weapons in FFE. 1 TUBE distribution or registration

(3) When to enter FFE.

(a) when split 100 meter bracket enter fire for effect.

(b) target hit enter fire for effect.

(c) Range correct zone bring on line & fire for effect.

(4) Fire for effect procedures in a registration mission.

(a) Spottings. report portion of registration fire for effect only record spottings 6 rounds for accuracy.

(b) Termination of mission. TIME REGISTRATION. BURST. AIM (GRAZE) (GROUND) F.D.C.

(5) Fire for effect procedures in a destruction mission.

(a) Spottings.

(b) Termination of mission.
observer will end mission when target is destroyed

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STUDENT OUTLINE

AREA FIRE

1. Definition of area fire.
attack of enemy targets with speed + accuracy + volume of fire as is needed to achieve the desired results.

2. Area fire compared to precision fire.
a. ~~adjustment~~ radio procedure I declared.

b. call for fire.

c. adjustment 10 division 50 range

d. termination of mission

e. nature of target

f.

3. Adjustment procedures.

a. When to adjust. when initial data not sufficient for hit on first shot.

b. Adjusting point. adjust to the center of mass

c. Number of pieces. 1 piece in percussion mission
2 pieces in area fire

d. Adjustment of deviation. 10 deviation way 50 M.

e. Adjustment of range. split 100 M bracket then allowed to fire for effect.

4. Fire for effect after adjustment.

a.

b. Rules for fire for effect in all cases K

(1) bracket in range

(2) bracket in deviation

(3) bracket in range slightly off in deviation

(4) one round hits target

(5) 2 rounds one side of target & closest one is a burst radius of target

5. Fire for effect without adjustment.

a. surveyed location

b. recently fired location

c. small accurate shifts.

d. prominent terrain feature,

e. large target area,

6. Surveillance of fire for effect.

a. fire has been accurate & sufficient

b. accurate & not sufficient,

c. not centered on target.

7. Termination of mission.

a. end of mission

b. reporting effects observed.

8. Area fire with fuze VT.

a. General comments.

Troops in open

& under cover not over head type.

20 81

b. Type of targets.

c. Effects desired.

d. How to call for.

NOTES

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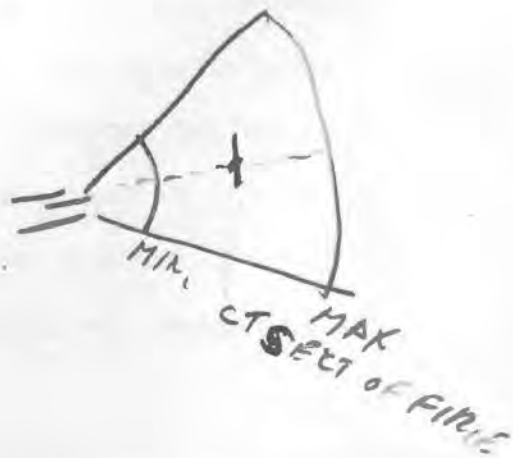
STUDENT OUTLINE

AERIAL ARTILLERY ADJUSTMENT IN SPECIAL SITUATION

Period One.

1. Targets normally engaged.
   a. lightly concealed
   b. good overhead cover.
   c. small targets
   d. very valuable targets
2. Deployment of Artillery.
   a.
   b.
   c.
   d.
   e.
3. Call for fire.
   a. Elements. mark center of
      (1) MARK center of fire sector.



Mark ct of sector 400 M range spread.

(2) bracket target center 200 short 200 long.

(3)

(a)

(b)

(4) 6 start call

(5) for fire

(a)

(b)

(c)

(d)

(6) * BRACKETING USE IT.

(a)

(b)

(c)

(d)

b. Correction of errors.

4. Method of attacking targets.

a. Flight path.

(1)

(2)

(3)

b. Creeping method.

c. Moving targets.

(1)

(2)

(3)

d. Preplanned targets.

(1)

(2)

5. Message to observer.

6. Subsequent corrections.

a.

b.

(1)

(2)

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CHAPTER 3

GENERAL

3. 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 air observer's point of view. We do not intend to make finish 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, it is 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 and understand; 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 pre-examination study. We strongly recommend that this outline be taken with you when leaving Fort Rucker and kept for future reference.

4. USE OF ADVANCE SHEET:

a. Student assignment.

Scan - 12-17.

Read - None.

Study - 18-19.

Turn in-31-33.

b. Special assignment (given in class).

(1)

(2)

(3)

5. REFERENCES - ARTILLERY SUBJECTS

FILE NO.	REFERENCE	PAGE AND/OR PARAGRAPHS
-580-2	FM 6-40	STUDY: FM 6-40, par 10-14, 149-159, 178-189, 203-206. READ: FM 6-40, par 5, 160. SCAN: None.

FILE NO.	REFERENCE	PAGE AND/OR PARAGRAPHS
-581-1	FM 6-40	STUDY: FM 6-40, par 161-163, 175-177, 190-193, 207-209, 286a, b, d. READ: FM 6-40, par 30. SCAN: FM 6-40, par 206.
-582-2	FM 6-40	STUDY: None. READ: None. SCAN: All previous references listed for -580-2 and -581-1.
-583-1	FM 6-40	STUDY: FM 6-40, par 194-197. READ: FM 6-40, par 557-559. SCAN: FM 6-40, par 161-163, 175-178, 180,182-189, 203-209.
-584-2	FM 6-40	STUDY: None. READ: None. SCAN: All previous references listed for -580-2, -581-1, and -583-1.
-586-2	None.	None.
Examination	All references listed	STUDY: All previous references listed for artillery subjects. READ: None. SCAN: None.

6. 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 prividing-

(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 artillery, and the Honest John (762mm rocket) has been replaced by the Little John rocket. 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 and headquarters battery, three 105mm howitzer batteries and a service battery.

(a) Headquarters and headquarters battery. This battery contains 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 is organized into a battery headquarters section, administrative section, operations and fire direction section, target acquisition platoon, communications platoon, liaison section and a medical section.

(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.

(c) Service battery. The mission of the service battery is to procure, break down, and distribute all classes of supplies to units of the battalion, maintain appropriate supply records, and perform motor maintenance functions not otherwise

accomplished within the battalion. The service battery consists of a battery headquarters, battalion supply section, battalion maintenance section, and an ammunition train.

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

(a) Headquarters and headquarters battery. This battery contains 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, administrative section, operations and fire direction section, survey section, liaison section, communications platoon and a medical section.

(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 9-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.

(d) Service battery. The mission of the service battery is to procure, breakdown, and distribute all classes of supplies to units of the battalion, maintain appropriate supply records, and perform motor maintenance functions not otherwise accomplished within the battalion. The service battery consists of a battery headquarters, battalion supply section, battalion maintenance section and ammunition trains. The ammunition trains consist of ammunition trains headquarters and four 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, three 105mm howitzer battalions and one howitzer/missile battalion.

(1) 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 6b (1).

(2) Howitzer/missile battalion. The howitzer missile battalion of the airborne division artillery contains the 155mm howitzer towed and the Little John rocket. The battalion is organized into a headquarters and headquarters battery, one 155mm howitzer battery and two Little John rocket batteries.

(a) Headquarters and headquarters battery. This battery contains 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, administrative section, operations and fire direction section, survey section, communications platoon, battalion supply section, battalion maintenance section and a medical section.

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

(c) Missile battery(ies), Little John rocket. The missile battery is organized into a battery headquarters, communications section, fire direction section, two firing platoons, and an assembly and transport section. The two firing platoons consist of a platoon headquarters and one firing section with one launcher per section.

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, rein-

forcing, general support, and general support reinforcing.

(1) Direct support. Direct support artillery has the mission of supporting a specific unit of a 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 artillery commander.

(2) Reinforcing. Reinforcing artillery has the mission of augmenting oncall, the fires of reinforced artillery. Artillery with a reinforcing mission remains under the 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.

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

(a) Light - under 115mm; the maximum range capability does not exceed 16,500 meters.

(b) Medium - 115mm or larger; the maximum range capability does not exceed 16,500 meters.

(c) Heavy - less than 210mm; the maximum range capability exceeds 16,500 meters.

(d) Very heavy - 210mm or larger; the maximum range capability exceeds 16,500 meters.

(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-37 in support of artillery.)

Range of weapon	11,270 meters
Classification	Light artillery
Width of lethal bursting area (high explosive projectile)	30 meters

105mm Howitzer (Self-Propelled)

Range of weapon	11,270 meters
Classification	Light artillery
Width of lethal bursting area (high explosive projectile)	30 meters

7. 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, par 10-14.

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. Only an impact fuze is used with this projectile because a graze burst is required. 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 cannisters 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 700-800 meters above the ground. The candle and parachute are base-ejected just as the smoke cannisters are ejected from the smoke round. A 105-man illuminating round produces 500,000 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.

(2) Some models. 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.

(3) 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.

(4) 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. This height of burst will cause maximum fragmentation effect on the ground. Only the HE projectile is used with a proximity fuze. A CVT fuzed projectile is most effectively used against troops dug-in or troops in the open.

8. KNOWN POINT SHIFT USING CONVENIENT SPOTTING LINE.

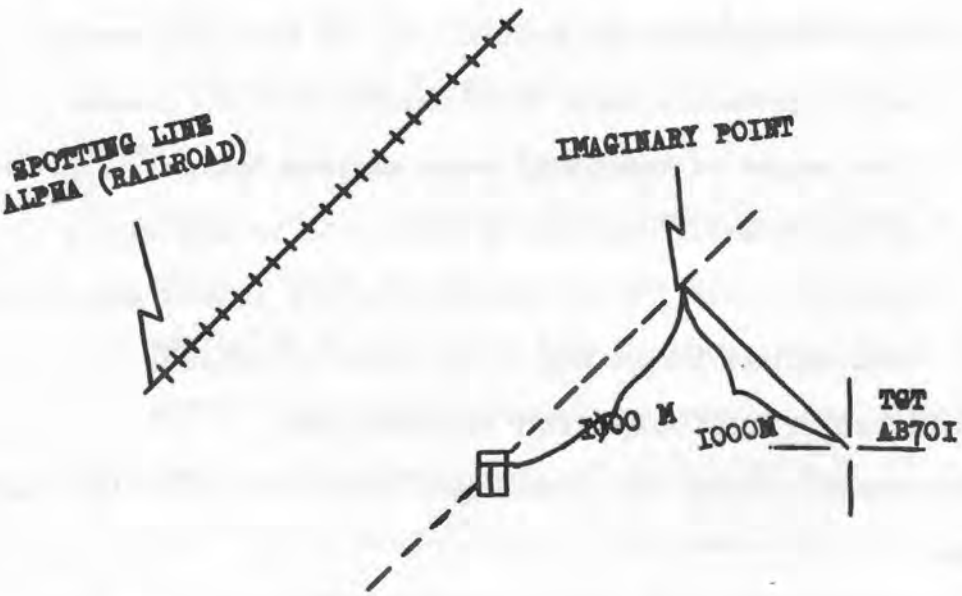
a. Superimpose spotting line Alpha over target parallel with spotting line.

Note. A spotting line is the gun-target line, or a line of known direction, normally, a railroad, road, canal or any series of objects that is selected prior to flight by the observer and plotted on a firing chart by FDC personnel.

A spotting line may be selected while in flight. In this case, the spotting line is called a convenient spotting line. The observer must describe a convenient spotting line in detail to the FDC personnel so that its direction may be determined.

b. Estimate shift from known point to an imaginary point perpendicular to the spotting line (superimposed over target) and along the superimposed spotting line to target.

c. For initial shift, adjust imaginary point on superimposed spotting line and along the superimposed spotting line to the target. After initial shift, use superimposed spotting line for spotting line as basis for spottings and corrections.



Target number AB 701 - Known Point

++++++ Spotting Line ALPHA (Running NE or mils)

9. CALL FOR FIRE.

*(1)	Identification.	Flag Staff 20, this is Flag Staff 62,
*(2)	Warning (Volume of FFE).	Fire Mission, Battalion, over.
*(3)	Location of Target.	62, From Registration Point 1, Reference Line ALPHA, Left 150, drop 400.

*(4)	Nature of Target.	20 Man Engineer Section Repairing Road.
*(5)	Method of Engagement.	Danger Close .
	(a) Type of Adjustment-Classification of Fire.	High Angle.
	(b) Trajectory.	
	(c) Type of Projectile (Omitted for HE).	
	(d) Fuze Action .	Fuze VT.
	(e) Distribution of Fire.	Converge.
*(6)	Method of Fire and Control.	Adjust Fire, Over.

*Mandatory Elements.

Subsequent Corrections

(1) Spotting Line.

(2) Trajectory.

(3) Method of Fire

(4) Distribution.

(5) Shell.

(6) Fuze.

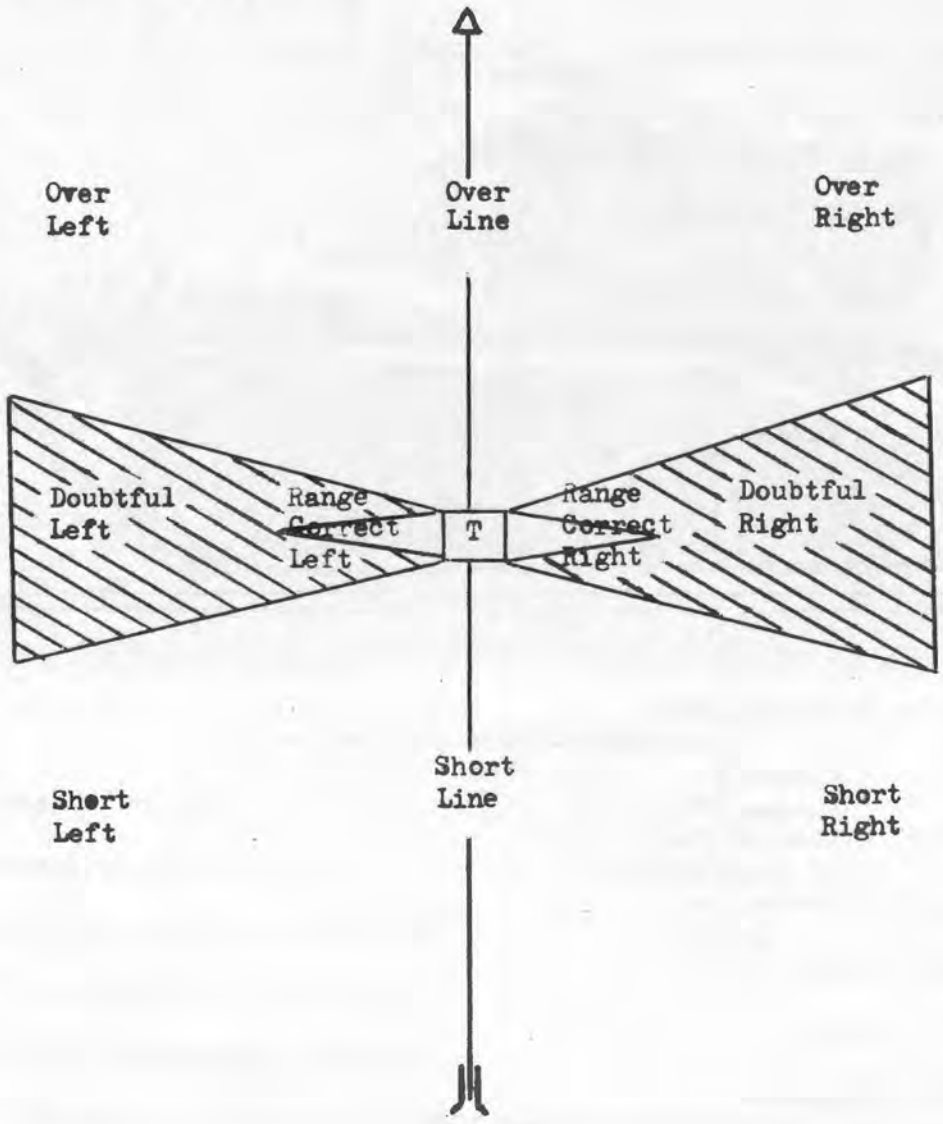
(7) Deviation.

(8) Range.

(9) Height of Burst.

(10) Control.

10. PATTERN OF SPOTTINGS



*Spottings of range correct are made mentally but are not transmitted to fire direction center during fire for effect phase of precision missions. Rounds falling in this area are transmitted to FDC as doubtful.

11. SUGGESTED METHODS OF ATTACK

TYPE OF TARGET	WEAPON	SHELL	FUZE	TYPE OF FIRE	REMARKS
Armor	All (Pref. 155mm or larger)	HE, HEAT, AP and WP	VT, Ti, Q	Neutralization destruction assault	
Boats	All	HE	VT	Neutralization direct	
Bridge	All (Pref. 155mm or larger)	HE	Q, CP, Delay	Destruction Harassing Interdiction	Fire at long axis if possible. Knock at bridge supports. Fuze Q for wooden or pantoon bridges.
Buildings (frame)	All	HE, WP	Q	Neutralization	Combine WP & 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.
Fortifications (Armored)	All	HEAT, AP, HE (large calibers)	Q	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, Delay - ricochet	Neutralization, Harrassing	
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 AMC 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 Delay - ricochet	Neutralization, Destruction	

Typical targets and suggested methods of attack

12. GLOSSARY

a. Adjusting point. A selected point which may be the target, a portion of the target or a well-defined point in the target area that is adjusted on to determine fire-for-effect firing data.

b. Altitude.

(1) Height of the target above sea level measured in meters.

(2) Height of burst above target.

c. Area fire. A volume of fire used to attack a target which is capable of movement or dispersed for purpose of neutralization, harassment, or interdiction.

d. Bracket. The distance between two rounds bursting on opposite extremes of a target.

e. Target. A location idenfified by a number which has been attacked ed or is planned to be attacked.

f. Target number. An identification number assigned to a target by the firing unit which is announced to the observer.

g. Correction. The distance in meters a burst or center of bursts is moved in deviation, range, or altitude to hit a target, establish a bracket, or establish a height of burst.

h. Destruction mission. Fire delivered on a point target incapable of movement for purpose of target destruction. This type mission is terminated by the observer.

i. Deviation. The distance in meters the burst is left or right of the gun-target line or other reference lines.

j. Dispersion. The pattern of bursts attained by a single

weapon when every effort is made to fire all rounds under like condition.

k. Fire-for-effect. A command which causes a predesignated number of pieces to fire at a specified target.

l. Gun-target line. An imaginary spotting line established from the weapon through the target. All spottings for deviation and rante are made in spotting to this line.

m. Height of burst. The distance in meters a burst appears above the the target or terrain.

n. High angle fire. Fire delivered at elevations greater than the elevation for maximum range causing the projectile to fall with a steep angle of descent.

o. Call for fire. A request for artillery fire which alerts the firing unit, locates and describes the target and control the observer will exercise over time of fire delivery. It also may include type of engagement request for high angle adjustment, request for type projectile (other than HE) and type fuze action (other than fuze Q).

p. Low angle fire. Fire delivered at an elevation below elevation for maximum range. All fire will be fired low angle unless observer requests high angle in call for fire or subsequent corrections.

q. No fire line. A line identified by code name of date-time group located in front of friendly elements behind which artillery cannot be fired unless approval is received from direct support artillery battalion which coordinates with the supported unit.

The line is established in coordination with infantry/armor commanders.

r. Nuclear safety line. A line established in front of friendly elements. Troops behind this line are safe from effects of friendly nuclear bursts.

s. Precision fire. Fire delivered from one weapon for purpose of destroying a target or obtaining registration data for applying to future fire missions.

t. Range. The horizontal distance from the weapons to the target.

u. Reference point. A prominent and easily located point on the terrain which is used for orientation to locate targets or other points.

v. Registration. The adjustment of fire on a selected point in the target area to determine data for use in subsequent firing.

w. Registration point. A point in the target area the location of which is known on the ground and on a firing chart.

x. Spotting. Determination by the observer of the location of a burst or group of bursts IN RELATION to the adjusting point as observed along the gun-target line. Spots are made for range, height of burst, and deviation.

y. Spotting line. An imaginary line established by an observer (gun-target line) or a line of known direction formed by easily defined terrain features. This line is utilized by an observer for adjustment of artillery fire.

z. Subsequent corrections. After the initial burst appears, the requests include appropriate changes in elements previously

transmitted and necessary changes in deviation, height of burst, and range.

aa. Trajectory. The curve traced by the center of gravity of the projectile in its flight from the muzzle of the weapon the point of impact or burst.

bb. Warning order. Transmitted in the call for fire, the words FIRE MISSION alert the firing unit for an incoming mission.

13. WORKSHEET

REQUIREMENT "A." Define the following terms:

a. Spotting line.

b. Spotting.

c. Correction.

d. Registration.

REQUIREMENT "B"

a. Precision fire consists of _____ and _____ missions.

b. List the elements of the initial fire request.

(1)

(2)

(3)

(4)

(5)

(6)

c. Which of the initial fire request elements are mandatory?

(1)

(2)

(3)

(4)

(5)

d. How many weapons are fired in precision fire?

e. Fuzes are classified according to method of functioning as _____, _____, or _____.

f. When fragmentation is the effect desired on the target, what projectile should be used?

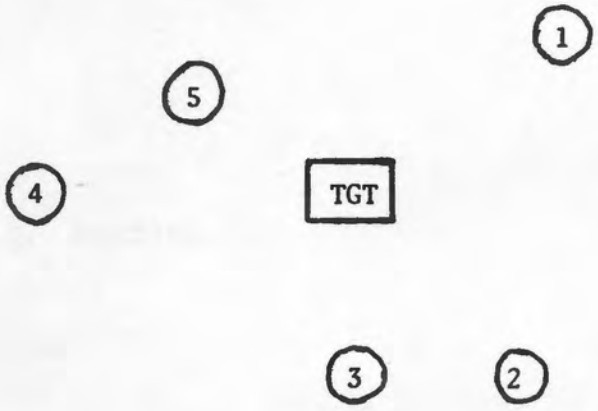
g. At what point during the adjustment may we begin fire-for-effect?

(1)

(2)

(3)

REQUIREMENT "C." Spot the following rounds:



1. _____
2. _____
3. _____
4. _____
5. _____

Guns

20 81

Fire mission

registration point ordered.

20 81 GMO (843 165)

FIRE MISSION

PRM HOSPITAL

~~AB 702~~ OUD

B 3rd AB 702 OUT,

A 4 AB 706

R 21 C9 AB 708

A, 3R AB 706

10 SUB CORR,