FM 6-135

DEPARTMENT OF THE ARMY FIELD MANUAL

ADJUSTMENT OF ARTILLERY FIRE BY THE COMBAT SOLDIER

HEADQUARTERS, DEPARTMENT OF THE ARMY

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* This manual supersedes FM 6–135, 5 July 1957.

CHAPTER 1

GENERAL

1. Purpose and Scope

This manual provides basic instruction in the technique of adjusting field artillery fire, including the conduct of area and precision fire, the principles of observation, and the data communicated in requesting artillery fire. It is written for the combat soldier who is not an artilleryman, but may find himself in a position from which he can observe and adjust artillery fire on an enemy. The material presented herein is applicable without modification to both nuclear and nonnuclear warfare.

2. Changes or Comments

Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to Commandant, U.S. Army Artillery and Missile School, Fort Sill, Okla.

3. Obtaining Artillery Fire

a. General. A field artillery observer will not always be present when a profitable target appears; hence, each combat soldier must be prepared to call for and adjust artillery fire. He requires only the necessary communications and a knowledge of the basic information contained in this manual.

b. Appropriate Artillery Targets. Judgment must be used in the selection of artillery targets. If other weapons are available that are more suitable under the conditions, they should be used instead of artillery. For example, if an observer sees an enemy patrol of only 2 or 3 men, within rifle or machinegun range, he should utilize small arms or automatic weapons fire. However, if he sees a company of enemy infantry or an enemy machinegun, he could properly call for artillery fire. Resupply of ammunition also is an important factor in deciding which weapon to use. A rifle bullet weighs less than an ounce while an artillery shell weighs many pounds. Some examples of appropriate artillery targets are listed below:

(1) Troops in foxholes or dug-in.

(2) Machineguns, especially when they have overhead cover.

(3) Artillery pieces, heavy weapons, mortars, or tanks.

(4) Concrete emplacements.

(5) Truck and tank columns.

(6) Truck parks.

(7) Assembly areas.

(8) Supply or ammunition dumps.

Note. Minefields or barbed wire entanglements are not included in this list of targets, because of the ineffectiveness of artillery shells on them.

c. Communications. The combat soldier desiring to adjust artillery fire may contact the artillery fire direction center by radio or telephone, through the artillery forward observer or liaison officer with his unit, or through the communication channels of his own unit (par. 47). For method of requesting fire, see paragraphs 14 through 26.

4. Basic Technical Knowledge

The combat soldier will find that much of his previous training and experience will be of great value in the adjustment of artillery fire. It is not necessary to be a trained forward observer or an expert in communication in order to observe and adjust field artillery fire. However, the adjustment of artillery fire is greatly facilitated by a knowledge of the methods for conducting fire, the communication nets available, and the proper radio telephone communications procedure. Every soldier receives training in the following military subjects which provide sufficient background to undertake the adjustment of artillery fire by using the procedure described in this manual:

a. Communications.

b. Map reading, terrain appreciation, and small unit tactics.

c. Range estimation.

d. Use of binoculars.

e. Phonetic alphabet.

5. Field Artillery Gunnery Team

a. General. When a combat soldier adjusts field artillery fire on a target, he becomes a member of the field artillery gunnery team (fig. 1) consisting of himself as the observer, an artillery fire direction center (FDC), and a firing battery. By use of his senses, he observes where the projectile bursts with respect to the target. He changes these *sensings* into corrections in *direction* (right or left) and *range* (drop or add) to bring the shell bursts closer to the target.

b. Fire Direction Center. Personnel in the field artillery fire direction center receive corrections from the observers, change them to fire commands, and then relay the fire commands to the weapon crews. If an observer becomes confused or forgets the steps in adjusting fire, he can ask the fire direction center personnel for assistance. If necessary, the fire direction center can coach the observer through his adjustment, step by step, and bring fire upon the target. This is obviously a slow process.

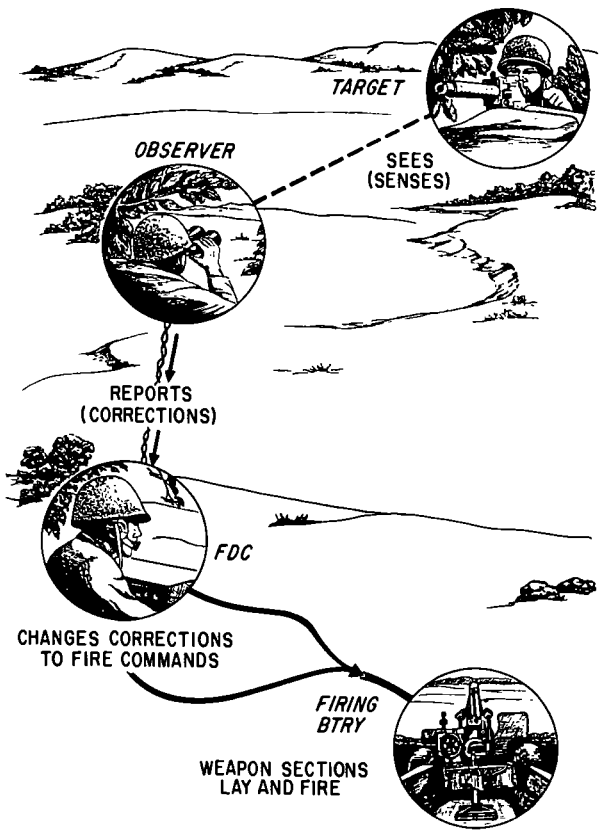


Figure 1. The field artillery gunnery team.

CHAPTER 2

CONDUCT OF FIRE

Section I. GENERAL

6. Introduction

a. The purpose of the conduct of fire is to place effective fire on the target by adjusting the fire with data from observed bursts. The fact that the fire has been adjusted on the target is established when rounds or fragments strike the target or the target has been enclosed by a bracket (par. 12) of appropriate size.

b. Binoculars, if available, should be used in adjusting fire. By using binoculars and the mil relation (par. 8), an observer can more accurately determine the distance to the right or left between the burst and the target. If binoculars are not available, the observer can measure the angle in mils with his hand (par. 10*b*) and convert the angle into meters.

7. Terminology

a. Certain standard terms are used in field artillery to simplify fire requests and radiotelephone procedure. The use of these terms is not in any way intended to keep the observer from sending other information, which would assist the

fire direction center personnel in bringing fire to bear upon the target.

b. The terms normally used by the observer in requesting fire are defined as follows (listed in the manner and order used in a request for fire) :

(1) FIRE MISSION (FM)—Warning order to alert the fire direction center personnel that the message to follow is a request for fire; warning to communications personnel that observer has a priority message.

(2) AZIMUTH (az)—The horizontal angle measured from north clockwise to the target. If the measurement is made from magnetic north, it is called magnetic azimuth. If the measurement is made from grid north (as taken from a map, photomap, or a declinated azimuth measuring instrument), it is called grid azimuth. For field artillery firing purposes, the term "azimuth" indicates grid azimuth; otherwise, MAGNETIC AZIMUTH must be announced by the observer.

(3) LEFT (L), RIGHT (R) (so many meters)—To correct the deviation as observed along the observer-target (OT) line. (The OT line is an imaginary line along the ground from the observer to the target.)

(4) ADD (+), DROP (—) (so many meters)—To increase or decrease the distance of the bursts from the observer.

(5) LOST—To indicate that the last round or volley was not observed.

(6) CORRECTION (corr)—A term used in a fire message to show that the observer made an error and that corrected data will follow. Any change in data to place the center of impact or burst closer to the target is *also* called a correction.

(7) REPEAT RANGE (RR)—To obtain fire at the same distance from the observer as the previous round or volley.

(8) FIRE FOR EFFECT (FFE)—To indicate that the adjustment is satisfactory and that the unit is to fire for effect.

(9) CEASE FIRING (CF)—To stop firing for any reason.

(10) END OF MISSION (EM)—To end firing on a specific target.

c. In addition to the terms defined in *b* above there are other terms which have a distinctive use in artillery and appear throughout this manual. A knowledge of the following terms will enable the combat soldier to better understand the subject matter contained herein:

(1) *Concentration (conc)*—

(*a*) An area designated and numbered for future reference as a possible target.

(*b*) A volume of fire placed on a specific area within a limited time.

(2) *Deviation (dev)*—The angular or linear displacement of a point of impact or a burst from the target or adjusting point, as measured by the observer.

(3) *Reference point (ref pt)*—

(*a*) A point with respect to which a target is located in an initial fire request.

(*b*) A point of known location (or direction from another point) generally used as the zero line for instrument reading.

(4) *Registration point (reg pt)*—A point in the target area of known location on the ground and on a firing chart, used for artillery registration. It must be readily identifiable and should be in the approximate center of the area for both deviation and range. It is used as a basis for computing data and as a reference point.

(5) *Salvo*—A method of fire in which the pieces of a battery or a portion thereof fire successively at specified intervals. The interval is 2 seconds unless otherwise specified by the fire direction officer (FDO) or requested by the observer.

(6) *Volley*—A method of fire in which the pieces of a battery or a portion thereof fire simultaneously. This method normally will be used unless the observer specifically requests a different method.

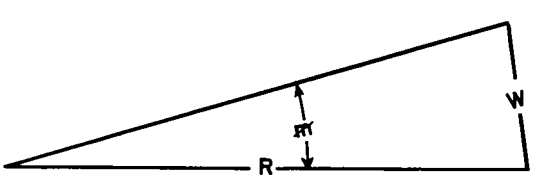
(7) *Sheaf*—

(*a*) The distance between the bursts fired by two or more weapons.

(*b*) The planes of fire of two or more weapons.

8. Mil Relation

a. The mil (mil) is the unit of angular measurement used in solving the few computations used in the adjustment of field artillery fire. A circle is divided into approximately 6,400 angles of 1 mil each. At a distance of 1,000 meters, an object 1 meter wide will measure 1 mil (mil). Thus, mils can be changed to meters by multiplying the number of mils by the range (distance) taken in thousands of meters. By a similar method, the unknown width of an object or the unknown range to an object may be obtained (fig. 2), e.g., an object is seen at a distance of 2,000 meters; it is measured with binoculars to be 3 mils wide. Three mils multiplied by the range (distance) in thousands (2) equals six meters. In other words the object is six meters wide.



mil IS THE ANGULAR WIDTH OF THE OBJECT IN MILS.
W IS THE WIDTH OF THE OBJECT IN METERS.
R IS THE RANGE OR DISTANCE IN THOUSANDS OF METERS.
(FORMULA: $\text{mil} = \frac{W}{R}$)

Figure 2. Mil relation.

b. The mil relation, as shown in figure 2, is expressed as $\text{mil} = \frac{W}{R}$; when mil is the angular width of the object in mils, W is the width of the object in meters, and R is the range or distance in thousands of meters. In solving for any one of the elements mil, W, or R, a simple rule for using the formula is to remember the word WORM, written $\frac{W}{R\,\text{mil}}$ (W Over Rmil). By covering up the letter for the desired element in $\frac{W}{R\,\text{mil}}$, the remainder of the letters that are visible will show the correct method for finding the answer. *For example—*

(1) To find *Width* when the known *Range* is 4,000 meters and the object is 15mil wide, multiply ($R \times$ mil) 4 (range in thousands) times 15 (mils) and the answer is 60 (meters), or $4 \times 15 = 60$ meters.

(2) To find *Range* when the known *Width* in meters (between two bursts or two objects) is 60 meters and the angular measurement with binoculars for the same width is known to be 15 mils, divide ($W \div$ mil) 60 (meters) by 15 (mil) and the answer is 4 (thousand meters), or $\frac{60}{15} = 4{,}000$ meters.

(3) To find mil when the known *Width* in meters between a reference point and the target is 60 meters and the known

Range to the target is 4,000 meters, divide ($W \div R$) 60 (meters) by 4 (range in thousands) and the answer is 15 (m), or $\frac{60}{4} = 15$ mils.

c. The observer uses the mil relation in computing direction shifts as indicated in figure 3.

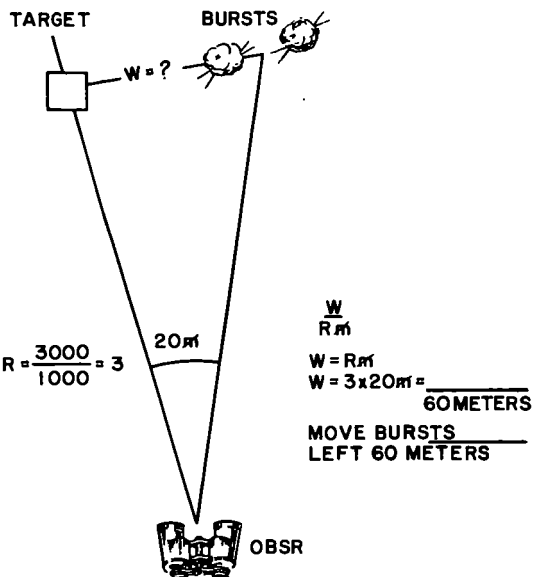


Figure 3. Computing direction shift.

9. Announcement of Numbers

Numbers are used in the adjustment of fire. They are announced over the telephone or radio as illustrated in the following examples:

10	One zero.
25	Two five.

300	Three hundred.
1,400	One four hundred.
6,000	Six thousand.
3,925	Three niner two five.
4,050	Four zero five zero.
10,000	One zero thousand.
10,300	One zero three hundred.
11,000	One one thousand.
100.7	One zero zero point seven.
254.4	Two five four point four.

10. Range (Distance) Estimation

a. General. In order to obtain a quick and accurate adjustment of fire the observer should be trained to estimate range (rg) or distance visually since this method is used in combat. Usually he estimates this distance in the same way that he estimates range for rifle firing. If maps or photographs are available, the distance can be measured. The horizontal distance (in meters) from the observer to the target is called the OT distance.

b. Lateral Distance Estimation. The observer must be able to tell quickly and with reasonable accuracy the shift in meters from an object, registration point, or reference point to a target (fig. 4). He can use an angle measuring instrument, such as binoculars, to measure the distance in mils, or he can use his hand and fingers, held at arm's length (fig. 4) to measure the angle. Each time the observer uses the hand method, he must extend his hand and fingers the same distance from his eye. Each individual, before going into the

field, should practice and determine the various measurements of his own hand (fig. 5). After getting a measurement in mils by either of the two methods, the observer uses the mil relation formula, $W = R \times m$ to obtain the width in meters between the object or bursts and the target.

11. Sensings

a. Range Sensing. To sense the burst with respect to a target, the observer mentally notes what he sees at the moment the shell bursts. The observer must make his sensing promptly. If the burst is directly behind the target, the burst is *over, line* (1, fig. 6). If the burst appears between the target and the observer, the burst is short, line (2, fig. 6). If the observer is not sure that the burst is over or short of a target, he senses it *doubtful* (3, fig. 6). A burst not seen by the observer is sensed *lost.* A sensing of *lost, over* (*lost, short*) may be made when the observer has accurate knowledge of the terrain. Sometimes it may be possible to sense a seemingly *doubtful* round by watching the drifting smoke or dust. The observer, however, must be careful in making such sensings. For example, if the wind is blowing away from the observer and across the OT line, it is possible for the dust and smoke of an off-line burst, which falls short of the target, to be blown behind the target. This would result in a false sensing of *over,* if the drifting smoke and dust were used as the basis for sensing. It can be seen that the wind direction at the target

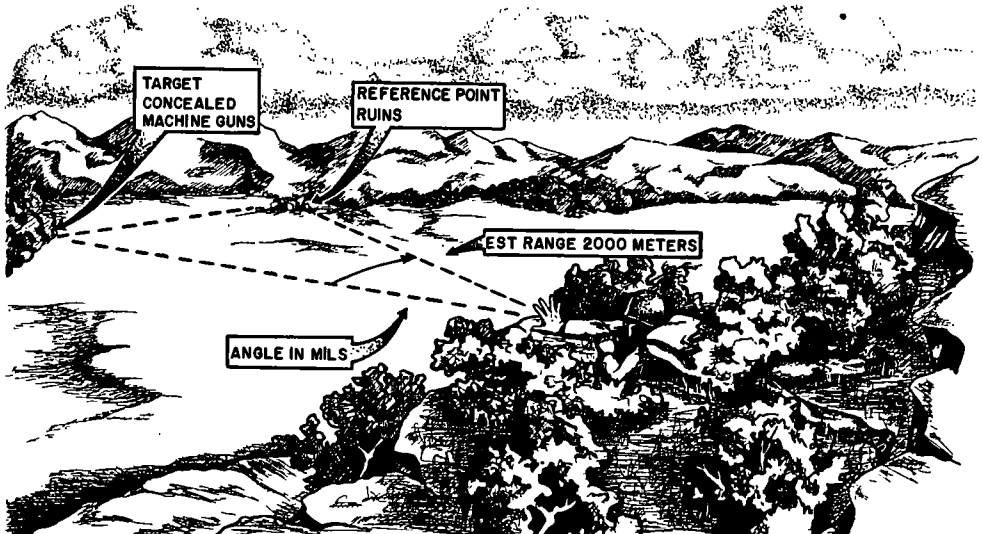


Figure 4. Measuring angles with hand and fingers held at arm's length from eye.

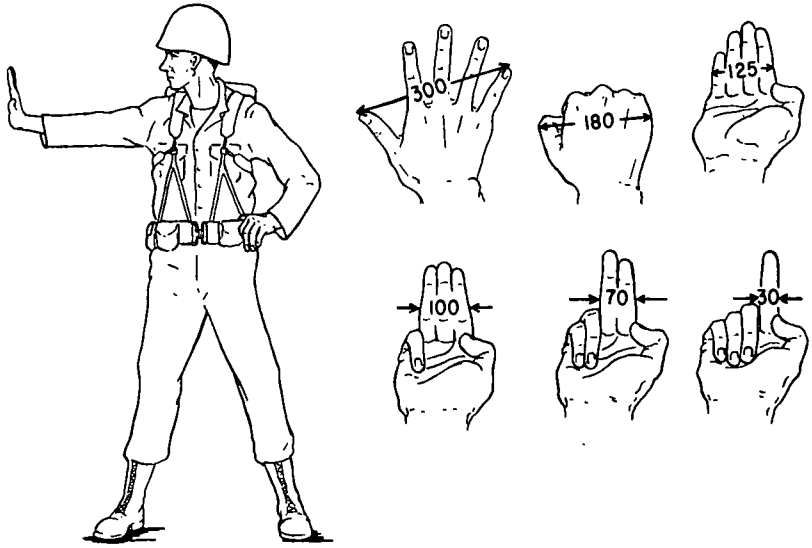


Figure 5. Measuring angles in terms of mils with hand or fingers.

must be determined to make sensings of value. Based on his sensings, the observer sends corrections to the fire direction center.

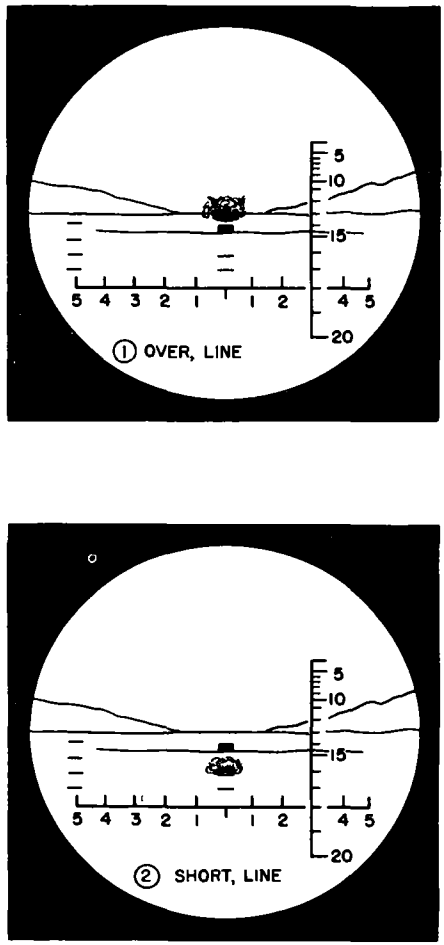


Figure 6. Bursts sensed for range.

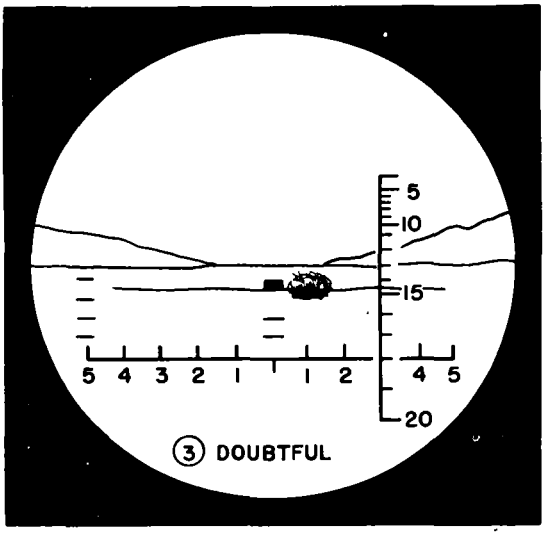


Figure 6 —Continued.

b. Deviation Sensings. An imaginary line from the observer to the target is called the OT (observer-target) line. The bursts of rounds are sensed for deviation as *right* or *left* (of the OT line), or *line* (on the OT line). A round must be sensed carefully from the center of the burst or, in the case of a volley or salvo, sensed from the center of the group of bursts. All sensings for deviation to the right (left) of the OT line are sensed (so much) *right* (*left*), and are measured in mils. For example, 40 RIGHT would mean that the observer saw and sensed the burst 40 mils to the right of the OT line.

c. *Factors Influencing Sensings.* The average soldier firing the rifle would be disappointed if he did not have a small compact group of hits, after firing a clip of ammunition at a target. It is not possible to obtain this compactness of hits with an artillery piece. Since each round is affected by varying conditions of weather and manufacture of the ammunition and weapon, several rounds fired at the same range will not strike in the same place. Because artillery shells burst and cover a wide area with steel fragments, a direct hit on the target is not always essential. The closer the burst is to the target, the more densely the fragments will cover the target, thus causing more casualties.

12. Bracketing

The basic principle in adjusting artillery fire is to bracket the target. Bracketing means to enclose the target between over and short bursts for range (fig. 7). For example, in bracketing a target, if a round bursts on the OT line between the observer and the target, and the next round is fired at a 400-meter greater range and bursts on the OT line beyond the target, the target is then bracketed between these two ranges. The observer knows that the target lies somewhere within the 400 meters and has thus established a 400-meter bracket. This bracket is split by dividing it in half; to do this the observer sends a correction, DROP 200. Whether the sensing of the next round fired is *short* (2, fig. 6) or over (1, fig. 6), the observer will know that the target

now lies within a 200-meter bracket. His next correction for range is to split this 200-meter bracket. Assuming that his second round was *short*, he announces a correction of ADD 100. At this point the bracket has been narrowed to 100 meters. If firing then results in a sensing of *over* (1, fig. 6), the observer has completed the adjustment and has established that the target is within a 100-meter bracket. A bracket of 100 meters is considered appropriate for most targets and fire for effect (pars. 28 and 33) is started with the splitting of the 100-meter bracket.

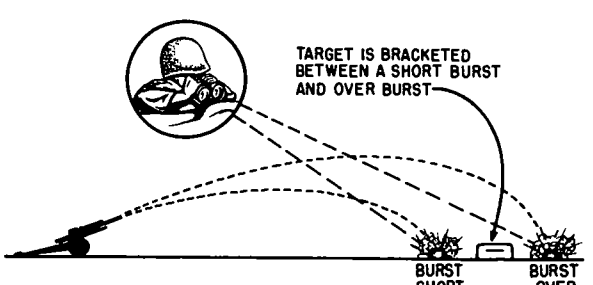


Figure 7. Bracketing target.

13. Range Bounds

a. First Bounds. After a round, salvo, or volley has been sensed, the first range correction sent to the fire direction center should be large enough to bracket the target. To obtain this bracket, the size of the first range bound is based on the accuracy of the location of the target and the estimated range error of the burst from the target. Initial range changes are made in hundreds of meters. Unless there is a definite indication as to the amount of range error, the initial range change should be at least 400 meters.

b. Bounds Close to Friendly Troops. When a target is close to friendly troops, fire is opened with data which are surely safe; that is, beyond the friendly troops. For additional information on targets of this nature, see paragraph 39.

Section II. REQUESTING FIRE

14. General

When calling for fire on a target, the observer should choose an adjusting point (adj pt) (fig. 8). The *adjusting point* is a plainly visible object which may be the target, a portion of the target, or some well-defined point in the target area which is used by the observer for the adjustment of fire. He must then visualize the imaginary OT line (par. 13*b*) between himself and the target (adjusting point). The distance from himself to the target (adjusting point) is called the *OT distance* and is determined by one of the methods outlined in paragraph 10.

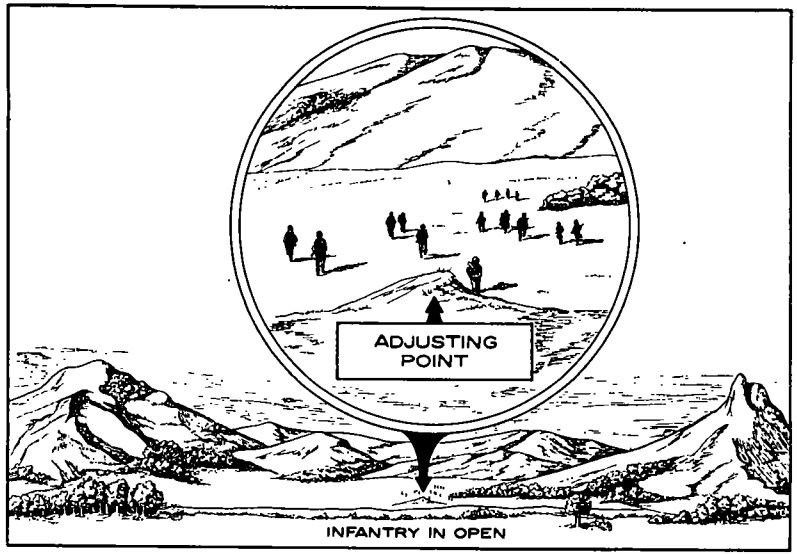


Figure 8. Adjusting point in area fire.

15. Initial Fire Request

a. After choosing an adjusting point and getting communications with the fire direction center, the observer sends his initial fire request.

b. The initial fire request includes those elements appropriate to the mission. Examples of the elements which should be considered in requesting a fire mission are listed below in the sequence they should be transmitted. These elements are explained in paragraphs 16 through 23.

Element	*Example*
(1) Identification of observer.	(1) I AM THE PLATOON SERGEANT OF THE 1ST PLATOON, ALFA COMPANY.
(2) Warning order ----	(2) FIRE MISSION (I have a fire mission).
(3) Location of target and azimuth from observer to target. (The sequence of these elements depends on the manner of reporting the location of target, as described in par. 18.)	(3) COORDINATES 555897, AZIMUTH 4340.
(4) Nature of target---	(4) TWO MACHINE GUNS DUG-IN.
(5) Type of adjustment-	(5) Usually omitted (par. 21).
(6) Ammunition ------	(6) Usually omitted (par. 22).

Element	*Example*
(7) Fuze action _____(7)	Usually omitted (par. 22).
(8) Control _____(8)	WILL ADJUST (I can adjust).

16. Identification of Observer

Whenever necessary, the observer identifies himself to the unit from which he is requesting fire. This may be done "in the clear," as indicated in the above example, when communicating by telephone, over the radio, the proper call sign should be used.

17. Warning Order

The observer sends FIRE MISSION to alert the fire-direction center personnel. It indicates that a request for fire follows and also gives the observer priority on channels of communication.

18. Azimuth From Observer to Target

a. The observer measures the azimuth in mils to the target from his position by use of a compass or a map, or determines it by using his binoculars to shift from a reference point to which the azimuth is known. If the measured or determined azimuth is magnetic, it must be so stated when sent to the FDC. In an initial fire request the azimuth is announced to the nearest 10 mils; for example, AZIMUTH 4340. When the azimuth to a reference point has been measured, the azimuth to a target may be determined as follows: First, measure the angle in mils between the reference point and target. Second,

if the target is to the left of the reference point, the angle is subtracted from the azimuth of the reference point; if the target is to the right of the reference point, the angle is added to the azimuth of the reference point.

Example 1: The azimuth from the observer's position to the reference point has been measured or is known to be 970 mils. A target is located 80 mils to the left of the reference point. Therefore, the angle is subtracted from the azimuth of the reference point. The azimuth to the target is 890 (970—80) mils.

Example 2: The azimuth to the reference point from the observer's position has been measured with a compass and found to be 4,140 mils. A target appears 200 mils to the right of the reference point, as measured with the binoculars. Therefore, the angle is added to the azimuth of the reference point. The azimuth to the target is 4,340 (4,140 + 200) mils.

b. When no azimuth measuring instrument is available, the observer must estimate the azimuth. If the announced azimuth is in error, it will be corrected by the fire direction center personnel during the course of the adjustment.

c. Azimuth is announced at that point in the sequence of the initial fire request where it can be most efficiently applied by the fire direction center personnel. Depending on the manner in which the location of the target (par. 19) is reported, azimuth is announced as follows:

(1) When the target location is given in the form of *coordinates*, the azimuth is announced after the coordinates; for example, COORDINATES 476521, AZIMUTH 1920.

(2) When the target is located by a *shift from a known point*, the azimuth is announced immediately after the designation of the point from which the shift is being made; for example, FROM REGISTRATION POINT, AZIMUTH 2450, RIGHT 250, ADD 400.

(3) When the target is located by *polar coordinates*, the azimuth is announced as the first element of the target location; for example, AZIMUTH 1870, DISTANCE 1600.

19. Location of Target

The location of the target may be given in any manner clearly understandable to both the observer and the fire direction center personnel. Normally, one of the methods in *a* through *e* below is used.

a. Coordinates. The observer may send a target location by giving the coordinates shown on a map. For example, a target is shown on a map 400 meters east (right) of the south to north line numbered 73, and 600 meters north (up) from the west to east line numbered 53. Its coordinates are 734 and 536 (to the nearest 100 meters). This is written as 734536 and announced: COORDINATES, SEVEN, THREE, FOUR, FIVE,

THREE, SIX. *Coordinates are always read to the right and up from the origin.* (See fig. 10 for example of a target designation by map coordinate.)

b. Shift. The observer may locate the target by a shift from a reference point, the registration point, a numbered concentration, or any other point the location of which is known to both the observer and the fire direction center personnel. A shift often may be made from a target previously fired on or from a smoke round fired deliberately into the center of the area to give the observer a point from which to shift the fire to the target (par. 19*d*). The shift is given as a correction in meters, usually to the nearest 10 meters. If either the direction or altitude of the target is the same as that of the reference point, that correction is omitted.

(1) *Direction.* The deviation angle in mils from the reference point to the target is measured and the distance to the reference point is estimated. Then, the correction in meters from the reference point to the OT line is determined by use of the mil relation (par. 8) and the observer-reference point distance (fig. 9).

(*a*) Measure the angle from the observer-reference point line to the OT line (400m in this case).

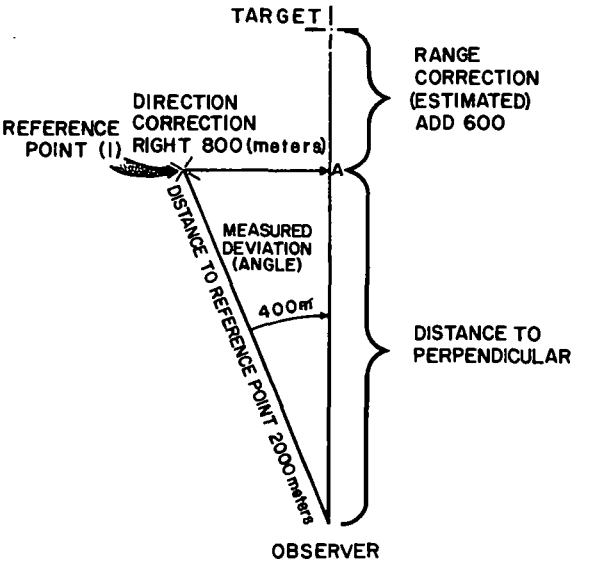


Figure 9. Determining direction and range corrections by shifting from reference point.

(*b*) By using the observer-reference point distance (2,000 meters in this case) as the range in the mil relation formula, determine the unknown width (correction in meters). ($W = 2 \times 400$ mils or 800 meters in this case.)

(*c*) The direction correction is included in the initial fire request; for example, FROM REFERENCE POINT, No. 1, azimuth (so much) RIGHT 800. If the target were left to the reference point, the correction would be FROM

REFERENCE POINT NO. 1, azimuth (so much) LEFT 800.

(2) *Range.* The correction for range from the reference point to the target is estimated by the observer (fig. 9). To estimate this distance, the observer imagines a line from the reference point to point A, making a right angle with the OT line. He estimates the distance from point A to the target. This estimated distance—point A to the target—is the range correction. He announces it as ADD 600. If the target were short of point A, the correction announced would be DROP (so much). If the range were the same as that of the reference point, the observer would give REPEAT RANGE.

c. Geographic Location. The location of a target may be given by means of geographic direction and distance from a known point. Examples are—

FROM CONCENTRATION AD 401, WEST 100, SOUTH 300.

FROM ROAD JUNCTION 615, AZIMUTH 1400, DISTANCE 900.

FROM CROSSROADS 932, NORTHEAST 600.

d. Marking Volley. The observer may request a marking volley from which he can shift to his target. This procedure is especially useful when the observer cannot identify any artillery points,

such as a registration point or reference point, from which he can shift, or when no maps or photomaps are available. Examples of requests for marking volleys are MARK REGISTRATION POINT 1 and MARK CENTER OF SECTOR. The observer may request an airburst to assist him in locating the fire he has asked for, particularly in terrain having a large amount of undergrowth and woods covering the target area.

e. Polar Coordinates. If the observer's location is known by the fire direction center personnel, the initial location of a target may be reported by giving the direction (azimuth) and distance to the target from his position. This is known as the polar coordinates method of locating targets. The fire direction center personnel plot the target on the azimuth and at the distance from the observer's location, as reported by the observer. This method is particularly desirable in the case of large lateral (horizontal) shifts of fire and short observing (OT) distances. *Example:* The observer reports: THIS IS PLATOON SERGEANT, ALFA COMPANY, FIRE MISSION, AZIMUTH 2000, RANGE 900, MORTARS, WILL ADJUST. The fire direction center personnel construct a ray from the observer's position at an azimuth of 2,000 mils and plot the target on this ray at a distance of 900 meters from the observer.

20. Nature of Target

The nature of the target consists of a description of the target to include the size, type, and

activity observed. This description should be brief but must tell enough to indicate to the fire direction center personnel the importance of the target and the best manner of attack. Examples of typical targets are platoon in open, company dug in, or machinegun emplacements.

21. Types of Adjustments

a. Two types of adjustments may be employed by the observer. They are *area fire* (par. 28) and *precision fire* (par. 32). If area fire methods are to be used, the observer omits any mention of the type of adjustment in his fire request. However, if he desires fire for *destruction* or for *registration* he specifies one or the other. For *area fire* the fire direction officer normally directs volley fire with two weapons, until the observer requests fire for effect, at which time all weapons of the adjusting unit will be used to neutralize the target. For *precision fire,* one weapon is adjusted on the target.

b. If, because of an unusual condition, the observer has some special requirement in his adjustment, he asks for it in his fire request. Such special requirements are BATTERY IN ADJUSTMENT SALVO RIGHT or SALVO LEFT. Salvo fire may be requested by the observer when, because of the wind blowing across the target, he is unable to get sensings with volley fire. When firing SALVO LEFT (RIGHT), the weapons fire in succession at 2-second intervals by starting with the weapon on the left (right). The time interval allows the dust and smoke from each

round to clear away before the next round bursts, thereby making sensing easier. The observer may request, in this element of his fire request, the volume of fire for effect he desires; for example, REQUEST BATTERY 3 ROUNDS or ALL AVAILABLE FIRE.

22. Ammunition and Fuze Action

The type of ammunition and fuze action is usually omitted and the fire direction officer, automatically, will direct that high explosive (HE) shell with a percussion fuze be used. If the observer wants a different type of shell or fuze action, he may request it; for example, SMOKE. For further discussion on fuze action see paragraph 40.

23. Control

The observer can designate *control* by including in his request for fire one of the terms defined in *a* through *d* below.

a. WILL ADJUST (WA)—Indicates that the observer can and will adjust the fire.

b. FIRE FOR EFFECT (FFE)—Means that the observer is absolutely *sure* that the fire requested will be effective without further adjustment or any adjustment at all. For example, when the target has been adjusted on previously, the observer may send CONCENTRATION AD 402, AZIMUTH 5100, FIRE FOR EFFECT.

c. AT MY COMMAND (AMC)—Used by the observer when he desires that the round(s) be

fired at specific times as called for by him. When using this method, the observer must give FIRE before the battery or battalion will fire. This method of fire remains in effect until a new method, such as WHEN READY, is requested by the observer.

d. CANNOT OBSERVE—Used by the observer when he is unable to see the target well enough to make an adjustment but believes that a target is at the given location.

24. Information Sent to Observer

a. Upon receipt of a fire mission, the fire direction officer, unless safety or some other consideration should interfere, immediately issues instructions, termed collectively as the fire order. From this order the fire commands for the pieces are prepared. Certain elements of the fire order are needed by the observer to inform him of the amount and type of fire which will be delivered. These elements of the fire order are transmitted to the observer at the time the fire order is being announced to the FDC personnel. These elements are indicated by asterisks (*) in the following fire order:

Element	*Example*
(1) Battery (ies) to fire for effect.	BATTALION
(2) Adjusting battery	BRAVO
(3) Ammunition lot and charge.	LOT XY, CHARGE 5

	Element	*Example*
*(4)	Fuze (when different from observers request).	FUZE TIME
*(5)	Number of volleys in fire for effect.	3 VOLLEYS
*(6)	Concentration numbers.	CONCENTRATION AD 405

b. If the mission cannot be fired, the observer is notified WILL NOT FIRE.

c. The fire direction center personnel inform the observer ON THE WAY, as each round, salvo, or volley in an adjustment is fired. When each battery starts fire for effect, the fire direction center personnel also inform the observer, ALFA (BRAVO, CHARLIE) FIRING FOR EFFECT. After fire for effect is completed, the fire direction center personnel inform the observer ROUNDS COMPLETE, ALFA (BRAVO, CHARLIE) or ROUNDS COMPLETE.

d. As an aid to the observer, he may request TIME OF FLIGHT or SPLASH from the fire direction center personnel. He can send these requests either at the beginning or at any time during the fire mission. On receipt of the TIME OF FLIGHT request, the fire direction center personnel send the observer TIME OF FLIGHT (so many) SECONDS. For the SPLASH request, the fire direction center will warn the observer by announcing SPLASH 5 seconds before each round (salvo, volley) is due to burst. The warn-

ing SPLASH is transmitted to the observer to assist him in identifying his own round, to eliminate the requirement for constant search by binoculars, or as a safety measure to allow him to take cover until immediately before he must look for his round to burst. Generally, when the time of flight is long, the fire direction center personnel send TIME OF FLIGHT and SPLASH without request. This is usually the case when medium and heavy artillery is fired or when high-angle fire is used.

25. Subsequent Fire Requests

a. Subsequent fire requests are the corrections made in any of the firing data after an adjustment has been started. The observer sends the fire direction center personnel the corrections which he wants applied for the next firing. Corrections are given in the following order:

(1) *Deviation correction*—to correct an off-line shot by moving the burst or bursts to the right (left) to bring it to the OT line.

(2) *Distribution correction*—to change the location of bursts in a volley or salvo to widen or narrow the distance between bursts. Examples are—

(*a*) CONVERGED SHEAF is given to indicate that all bursts are to be converged on a point.

(*b*) 50-METER (or so many meters) SHEAF is given to indicate that an

evenly spaced sheaf be spread over a 50-meter width.

(3) *Range correction*—to change the observer-burst distance to get the burst nearer to the target.

b. Subseqent fire requests may include corrections in data for an element of the initial fire request listed in paragraph 15. Any element of subsequent fire requests, other than the correction for range, may be omitted if no change in that element is desired. In any case the last element, range, must always be given. The range correction indicates to the fire direction officer that the observer's corrections for firing the next round(s) are complete. For example, LEFT 100, DROP 400. The element "drop 400" is the range correction. When the observer does not desire to make any change in data, and wants the next round(s) fired at the same range as the previous ones, he requests REPEAT RANGE.

26. Correction of Errors

a. Initial Fire Request. If the observer has sent his initial fire request and finds that he has made an error in one of the elements listed in paragraph 15, he sends CORRECTION followed by *only* the information pertaining to the element in error. The remaining parts of the initial fire request need not be repeated. If any part of the request has been omitted by mistake, the observer sends the omitted part to the fire direction center as a separate transmission, without repeating the entire initial fire request.

b. Subsequent Corrections. When the observer sends erroneous data during adjustment, he corrects it by sending CORRECTION, followed by entire corrected transmission. For example, the observer has transmitted LEFT 200, ADD 400. He desires to change ADD 400 to DROP 400. To correct his error, he sends CORRECTION, LEFT 200, DROP 400. The word "correction" in this case cancels the entire original transmission in which the error occurred.

Section III. AREA FIRE

27. General

The purpose of area fire is to cover the target area with dense fire so that the greatest possible effect will be obtained. In adjusting area fire, a bracket (par. 12) is obtained as quickly as possible, and the size of the bracket is rapidly reduced to 100 meters. Dense fire is then immediately brought on the target with fire for effect (par. 28). Speed and accuracy during adjustment are important. Speed will catch the enemy by surprise, and accuracy will cause the greatest damage and most casualties, before the enemy can move away or take cover. The type of ammunition and the amount of fire requested by the observer depends on the type of target and whether the target is moving; for example, infantry dug-in, machinegun nest, moving vehicles in open field. A good adjustment results in more effective fire.

28. Adjustment

a. General. Paragraph 30 illustrates an example of the adjustment of area fire. To save ammunition, the adjustment of artillery fire is usually started with the two center pieces. The other pieces of the battery are fired when desired by the observer or as directed by the fire direction officer. The range of the volley as a whole unit is sensed; for example, *short, line; over, 5 right.*

b. Direction and Distribution. The deviation of the burst center with respect to the OT line is determined (par. 11*b*). The burst center is then brought to and kept on the OT line. A burst center which is to one side of the OT line is brought to the line by multiplying the observed deviation (angle) in mils by the estimated OT range and sending the resulting correction of RIGHT (LEFT) (so much) (fig. 3) to the fire direction center.

c. Range. Range changes are made in hundreds of meters, until a range change of less than 100 meters is required. Normally, range bounds are 200, 400, or 800 meters. A range change of less than 50 meters is not made when firing on an area target. The bracket sought in adjustment depends on the nature of the target and on the knowledge of its location. A bracket of 100 meters is obtained prior to fire for effect, because most targets that occupy a small area are not expected to move quickly. A larger bracket may be used when firing for effect on targets that occupy a larger area. The fire direction officer may decide on the size of the bracket for fire for effect.

29. Fire for Effect

a. General. Fire for effect is started when a satisfactory adjustment has been obtained; that is, when the direction of fire and the range are correct, or if effective fire will result when the range bracket is split. Range and deviation are sensed for each volley as a whole unit; for example, *over line* (par. 28*a*).

b. Range. The fire direction officer will order an appropriate number of rounds to be fired during fire for effect. If fire for effect is accurate but insufficient, the observer may announce REPEAT RANGE, REPEAT FIRE FOR EFFECT.

c. Report of Observer. On completion of fire for effect, the observer sends END OF MISSION (if the fire has been effective and sufficient) and reports the effect which he has observed; for example, END OF MISSION, INFANTRY DISPERSED.

30. Illustrative Example, Area Fire Mission

The target is a vehicle park in the open in the vicinity of the adjusting point; materiel, 105-mm howitzer; ammunition, shell HE. In the examples that follow, the symbol "+" indicates a sensing of *over*, "—" a sensing of *short*, and "?" a sensing of doubtful. (See fig. 10 for observer-target relationship.) In the following example, the observer locates the target on his map. The

target is, therefore, designated by means of coordinates and not by reference to a registration point or other reference point. (The azimuth announced in the initial fire request is grid azimuth, measured on the map.)

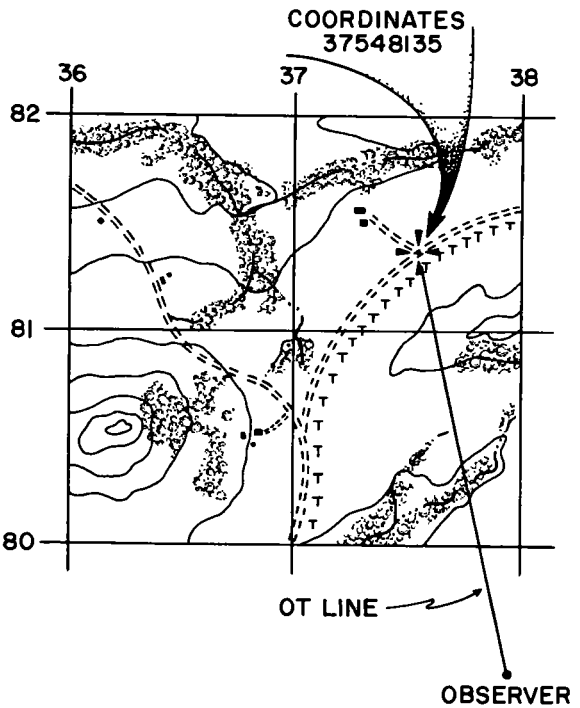
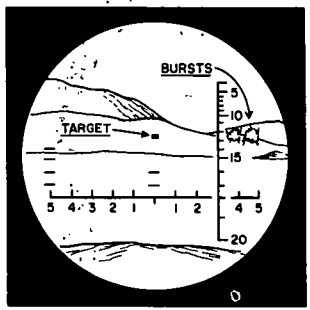
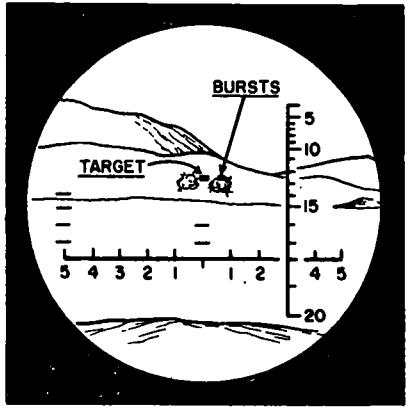


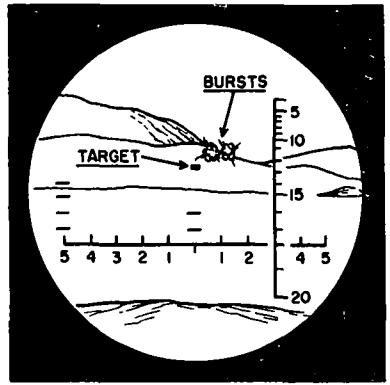
Figure 10. Observer-target relationship in area fire mission.

Transmissions	Results	Sensings: Rg	Sensings: Dev.
Observer to FDC: (initial fire request) I AM PLATOON SERGEANT ALFA COMPANY FIRE MISSION COORDINATES 37548135 AZIMUTH 6200 VEHICLE PARK IN THE OPEN WILL ADJUST FDO fire order: *BATTALION BRAVO CHARGE 5 *2 VOLLEYS *CONCENTRATION AD 406 FDC to observer. ON THE WAY		?	40 right

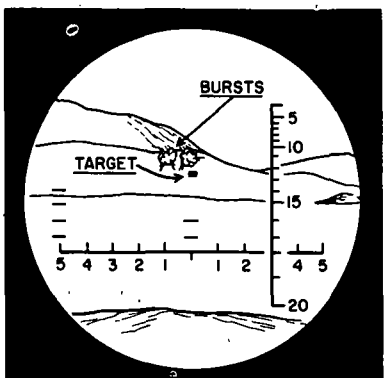
*Elements needed by observer

Remarks: Estimated OT distance = 2,000 meters. With binoculars, observer measures deviation of burst center as 40 mils right of OT line. Observed deviation = 80 meters (40 x 2). No range sensing is obtained.

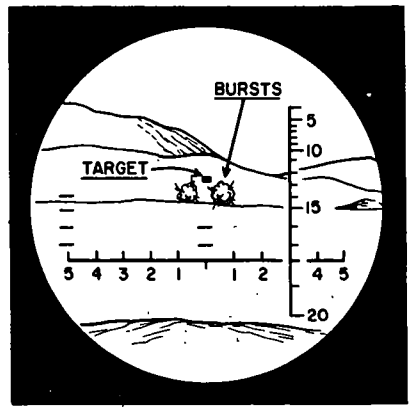
Transmissions	Results	Sensings	
		Rg	Dev
Observer to FDC: LEFT 80, REPEAT RANGE. FDC to Observer: ON THE WAY		—	line

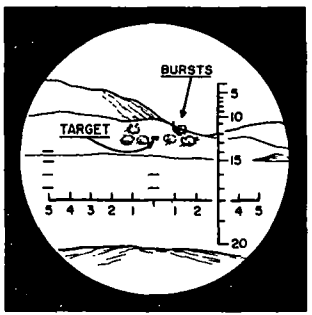
Transmissions	Results	Sensings	
		Rg	Dev
Observer to FDC: ADD 400 FDC to Observer: ON THE WAY.		+	5 right

Remarks: Small deviation is ignored by observer unless it persists in same sense.

Transmissions	Results	Sensings	
		Rg	Dev
Observer to FDC: DROP 200 FDC to Observer: ON THE WAY.		+	3 left

Remarks: Small deviation of 3 mils is ignored by observer.

Transmissions	Results	Sensings	
		Rg	Dev
Observer to FDC: DROP 100. FDC to Observer: ON THE WAY.		—	line

Transmissions	Results	Sensings	
		Rg	Dev
Observer to FDC: ADD 50, FIRE FDR EFFECT. FDC to Dbserver: BRAVO FIRING FDR EFFECT.		Range Correct.	line

Remarks: First volley in effect sensed range correct, line. Remainder of fire is observed and if necessary, corrections are sent to the fire direction center.

Dbserver to FDC:
END OF MISSION,
VEHICLES
DISPERSED.

Section IV. PRECISION FIRE

31. General

a. The object in precision fire is to place the center of impact of a number of rounds on the target. Precision fire is often used for registration or for obtaining accurate corrections for firing data applicable to some targets. Precision fire is used also for the attack of point targets and the destruction of targets. It is used only against stationary objects. Precision fire must be *accurate.*

b. The adjustment in precision fire is made by a single artillery piece. The object of adjustment is to obtain a *trial range.* The trial range is the range for the center of a 100-meter bracket or a range which has given a target hit. In order to obtain a trial range, an initial range bracket is sought; thereafter, the bracket is successively split (par. 12) until the trial range is determined.

32. Adjustment

The adjustment of precision fire is, in principle, the same as that for area fire (par. 28). The observer makes his sensings and gives his corrections with relation to the OT line. The fire direction officer sends data to the weapons to keep the bursts on the OT line. An early bracket on the target is sought and, when obtained, is split successively by adding or dropping appropriate amounts along the OT line, until the trial range (par. 33*a*) is determined. See paragraph 34 for an example of a precision adjustment.

33. Fire for Effect

a. General. Fire for effect is started at the *trial range.* Normally, during fire for effect, the observer sends no corrections to the fire direction center but sends only his sensings of the rounds as observed. Deviations are sensed at RIGHT, LEFT, or LINE; range is sensed as OVER, SHORT, DOUBTFUL, or TARGET (fig. 11). The necessary action, based on such sensings, is taken at the fire direction center. If, however, the deviation is large or the amount of deviation may assist the fire direction center personnel in expediting the mission, the observer announces the amount of deviation in *meters* from the OT line. In this case only does the observer sense any off-line rounds as OVER (SHORT) (DOUBTFUL), (so much) RIGHT (LEFT). Rounds may be fired singly or in groups. The fire direction center personnel will notify the observer when more than one round is to be fired.

b. Control During a Destruction Mission. When the mission is destruction, fire is continued until the observer notifies the fire direction center personnel that the mission has been accomplished. Fuze quick generally is used during adjustment and in the first group of six rounds in fire for effect. Subsequently, the FDO directs the use of the fuze that will be most effective against the target. If this subsequent fuze is not effective, the observer must request a change to a fuze which, in his opinion, will be more effective.

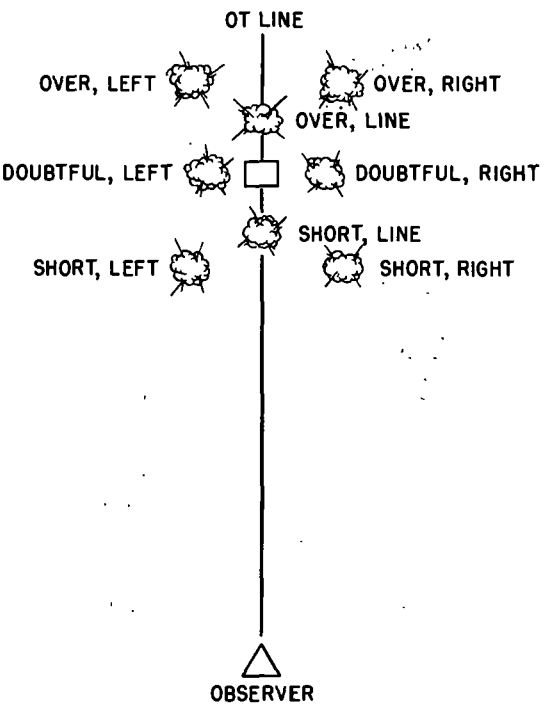


Figure 11. Sensing fire for effect in precision mission.

34. Illustrative Example, Precision Fire Mission

The target is a pillbox; mission, destruction; materiel, 8-inch howitzer; ammunition, shell HE; fuze, combination quick and delay. For a sketch of the observer-target relationship, see figure 12.

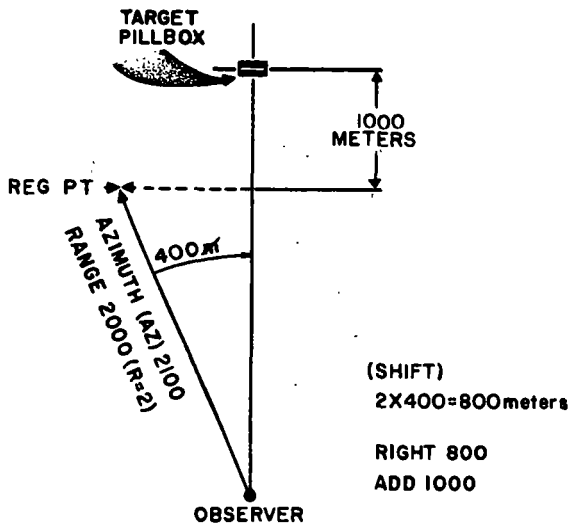
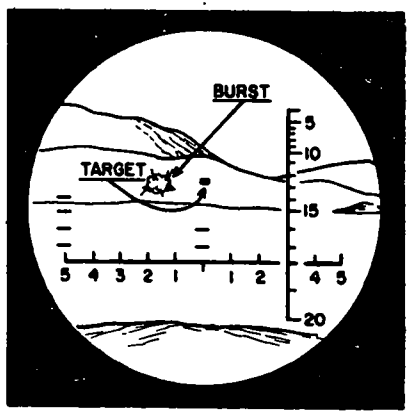
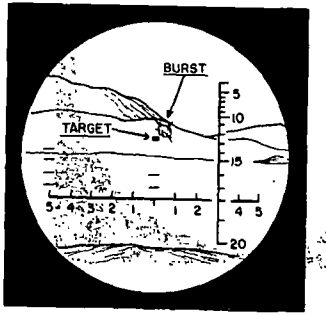


Figure 12. Sketch of observer-target relationship in precision fire mission.

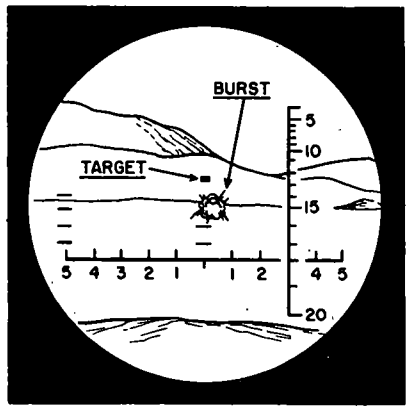
Transmissions	Results	Sensings	
		Rg	Dev.
Observer to FDC: (initial fire request). I AM PLATOON SERGEANT ALFA COMPANY. FIRE MISSION. FROM REGISTRATION POINT. AZIMUTH 2500 RIGHT 800, ADD 1000. PILLBOX DESTRUCTION. WILL ADJUST. FDO fire order: *BRAVO CHARGE 6 *DESTRUCTION *CONCENTRATION AD407 FDC to observer: ON THE WAY		?	15 left

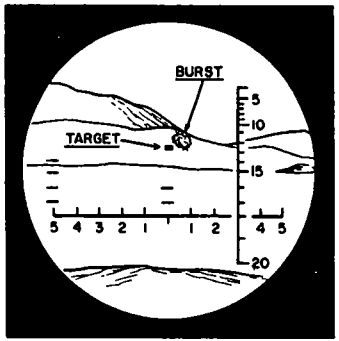
*Elements needed by observer.

Remarks. Estimated OT distance = 3,000 meters. With binoculars, observer measures deviation of burst 15 mils left of OT line. Observer deviation = 45 meters (15 x 3). No range sensing is obtained. Observer determines shift of right 45 (50) to bring burst to the OT line.

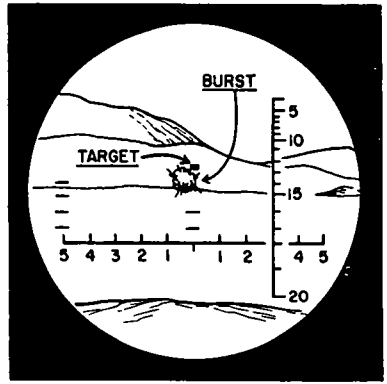
Transmissions	Results	Sensings: Rg	Sensings: Dev
Observer to FDC: RIGHT 45 (50) REPEAT RANGE. FDC to Observer: ON THE WAY.		+	line

Remarks: The burst has been brought to the OT line. From the sensing of over, the observer decides to make a range change of 200 meters.

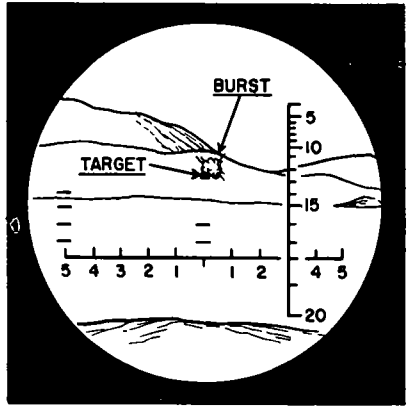
Transmissions	Results	Sensings	
		Rg	Dev
Observer to FDC: DROP 200 FDC to Observer: ON THE WAY.		—	line

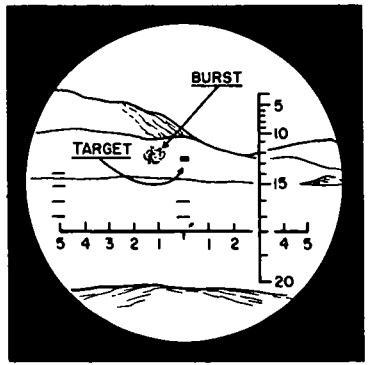
Transmissions	Results	Sensinge	
		Rg	Dev
Observer to FDC: ADD 100. FDC to Obeerver: ON THE WAY		+	line

Remarks: A 100-meter bracket hoebeen obtained olang the OT line. For the next round, the observer will request a change of 50 meters, and thie round will be the first in fire for effect (trial rangs).

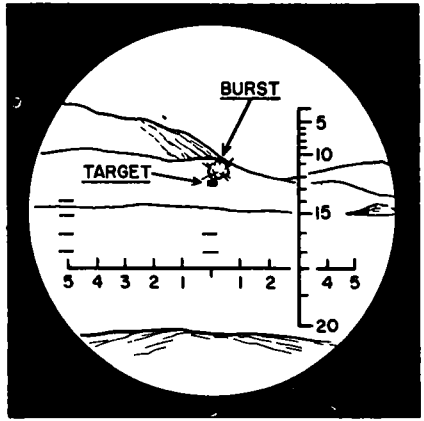
Transmissions	Results	Sensings	
		Rg	Dev
Observer to FDC: DROP 50, FIRE FOR EFFECT. FDC to Observer: ON THE WAY. Observer to FDC: SHORT, LINE.		——	line

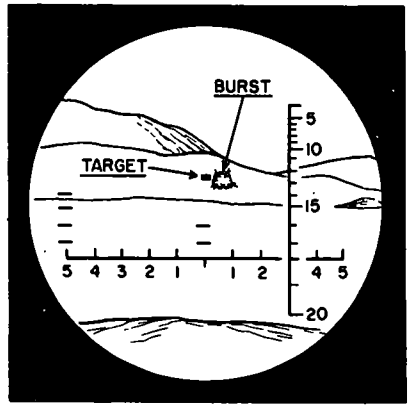
Remorks: No further corrections ore given by the observer. The observer reports only his sensings.

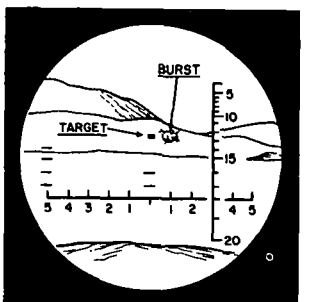
Transmissions	Results	Sensings	
		Rg	Dev
FDC to Observer: ON THE WAY. Observer to FDC: OVER, LINE.		+	line

Transmissions	Results	Sensings	
		Rg	Dev
FDC to Observer: ON THE WAY. Observer to FDC: DOUBTFUL, LEFT		?	left

Remarks: The round appears off the OT line. The observer does not attempt to sense the range, he merely reports the round as DOUBTFUL, LEFT (par. 32 and fig. 11).

Transmissions	Results	Sensings	
		Rg	Dev
FDC to Observer: ON THE WAY. Observer to FDC: OVER, LINE.		+	line

Transmissions	Results	Sensings	
		Rg	Dev
FDC to Observer: ON THE WAY. Observer to FDC: SHORT, LINE.		—	line

Transmissions	Results	Sensings	
		Rg	Dev
FDC to Observer: ON THE WAY. Observer to FDC DOUBTFUL, RIGHT		?	right

Remarks: FDC personnel have now obtained six sensings from which they compute more accurate data. Firing is continued with delay fuze until the observer is satisfied that destruction is complete and notifies the FDC to cease firing.

Observer to FDC:
END OF MISSION, PILLBOX
DESTROYED

Section V. SUMMARY OF PRINCIPLES

35. Adjusting Fire

a. Adjusting of fire is conducted with relation to the OT line; the observer proceeds to bracket the target and to narrow the bracket systematically (par. 12).

b. Bursts are brought to the OT line by applying corrections determined by multiplying the observed deviation in mils by the estimated OT range in thousands of meters (par. 8).

36. Area Fire

a. Adjustment.

(1) The object of adjustment is to inclose the target within a range bracket of suitable depth with fire centered on the target or to obtain target hits. Fire for effect generally is not called for until a bracket of 100 meters is split (par. 12).

(2) The type of ammunition and fuze action selected is that which will be most effective against the target.

(3) The center of the burst is brought to the OT line by appropriate corrections.

b. Fire for Effect.

(1) Fire for effect is started when direction and range are correct or when effective fire will result from the next split in bracket (par. 29).

(2) Fire for effect is started at the center range of the established bracket.

(3) On entering fire for effect, deviation is corrected so that the fire is centered on the target or the area to be covered.

(4) The range is improved if the bulk of the fire for effect is over or short. The direction is established properly when the sheaf is centered on the target.

(5) If fire for effect is ineffective or insufficient, necessary corrections are made and additional fire for effect is requested.

(6) On completion of fires for effect, the observer sends END OF MISSION and reports the effect observed.

37. Precision Fire

a. Adjustment. The object of adjustment is to determine the *trial range.* The trial range is the range for the center of a 100-meter range bracket, or a range giving a target hit. The adjustment is the same as that for area fire except that a single piece is used (par. 32).

b. Fire for Effect.

(1) Fire for effect is started at the trial range (par. 33*a*). The rounds are fired singly or in groups. The observer will be notified if more than one round is to be fired.

(2) Sensings only are sent to the fire direction center personnel.

(3) In a destruction mission, the fire is continued until stopped by the observer.

Section VI. SUGGESTIONS FOR OBSERVERS

38. Lost Rounds

If the terrain is rough or if the observer's location of the target is in error to the extent that he cannot see the first round, the round is LOST. The observer may see smoke or dust rising from the burst (par. 11) or hear the sound of the burst. If the observer cannot locate the burst, he should report the round as LOST and—

a. Ask for a change in range or direction that may bring the burst in open terrain. *Care must be taken not to move the next burst into an area occupied by friendly troops.*

b. Ask for a round of smoke or white phosphorus.

39. Targets Close to Friendly Troops

When a target is close to friendly troops, fire should be opened with a range that definitely results in a burst beyond the target. To do this the observer requires the first round to be fired with an additional 200 meters in range as a safety factor. Range is then decreased by bounds of one-half the estimated range error (overage) of the preceding burst from the target, until a correct range is obtained. He makes no range correction of less than 25 meters. Therefore, as the bursts are brought close to the target, he may use a series of 25-meter range corrections, until he obtains a target hit or a short. This type of an adjustment is called creeping.

40. Selection of Fuze

The observer should consider the nature of his target in selecting the most effective fuze. The characteristics of the fuzes and the types of targets on which they are effective are discussed in *a* and *b* below.

a. Fuze Quick (FQ). Fuze quick bursts on impact and is effective against personnel in the open and against materiel. It can be used for adjustment on a target. Fuze quick is the fuze the fire direction officer will fire, if the observer does not mention *any* fuze in the initial fire request.

b. Fuze Delay (FD). With fuze delay, the shell has time either to penetrate the ground and produce mine action (burst below the ground surface) or to ricochet before detonation. If the shell ricochets (the projectile hits the ground without bursting and bounces back into the air), the burst will look like a low air burst, as in time fire. The delayed action of the fuze keeps it from bursting when the projectile first hits. If mine action occurs, the burst will appear as a small column of dust and dirt shooting into the air. Sensings used for height of burst when fuze delay is used are: AIR (for ricochet) and GRAZE (for mine action).

(1) Ricochet bursts from fuze delay are effective against personnel in the open or dug-in without heavy overhead cover.

(2) Fuze delay is effective in penetrating pillboxes, bunkers, dugouts, or caves.

(3) If the observer desires fuze delay, he will request FUZE DELAY in the initial fire request.

41. Observer's Notes (Record of Adjustment)

The observer or his assistant may record the corrections sent to the fire direction center while adjusting fire. This is not necessary, but it will be helpful to the observer who has trouble remembering the size of his bracket and his last correction.

42. Control of Fire

If smoke obscures the target or if, for any reason, the observer desires to control the actual time the weapons fire, he sends AT MY COMMAND to the fire direction center. In this case, fire direction center personnel report BATTERY IS READY, when the weapons are ready to fire. When the observer desires the weapons to fire, he commands FIRE. When the necessity for firing at his command ceases, the observer includes the phrase FIRE WHEN READY in his next message.

Section VII. OBSERVATION

43. General

The artillery forward observer often will not be able to obtain an observation post which will permit him to see all the targets which appear in his area of responsibility. The combat soldier can fill any gaps in the forward observer's field of

view. These gaps may be found on a probable avenue of approach, on a boundary between units, or in any area in which the assigned forward observer cannot see. In the course of his normal duties, the combat soldier often will have an opportunity to occupy a vantage point from which he will be able to observe targets and adjust artillery fire. He will find the information in paragraph 44 useful in establishing an observation post.

44. Selection of Observation Posts

a. General. Observation posts should be selected to obtain a wide and deep field of view. Consideration should be given to ease of concealment of the location and the routes leading to the observation post, as well as to the ease of installation, maintenance of communication, and the avoidance of prominent landmarks.

b. Alternate Observation Posts. After locating and establishing the best available observation post, the observer selects and prepares an alternate observation post. He occupies the alternate post, if he is discovered by the enemy or required to move for any other reason.

c. Reverse Slope Position (fig. 13).

(1) *Advantages.*

(*a*) May be initially occupied during daylight hours.

(*b*) Allows personnel greater freedom of movement during daylight, although it must be remembered that no un-

necessary movement should be permitted.

(*c*) Facilities installation, maintenance, and concealment of communications.

(2) *Disadvantages.*

(*a*) Usually affords only a limited view of the immediate front.

(*b*) Fire from enemy weapons adjusted on the crest may neutralize the observation post.

(*c*) Instruments and personnel appearing above the crest are difficult to conceal, particularly if the crest forms a skyline as seen from the enemy area.

d. Forward Slope Position (fig. 14).

(1) *Advantages.*

(*a*) Affords better view of the immediate front as well as the flanks.

(*b*) Provides a background so the observer party will not be silhouetted.

(2) *Disadvantages.*

(*a*) Frequently, must be occupied under cover of darkness to prevent discovery.

(*b*) Frequently, the observer's location cannot be changed during daylight without risk of disclosing his position.

(*c*) Maintenance of wire communications during daylight is often impractical and difficult.

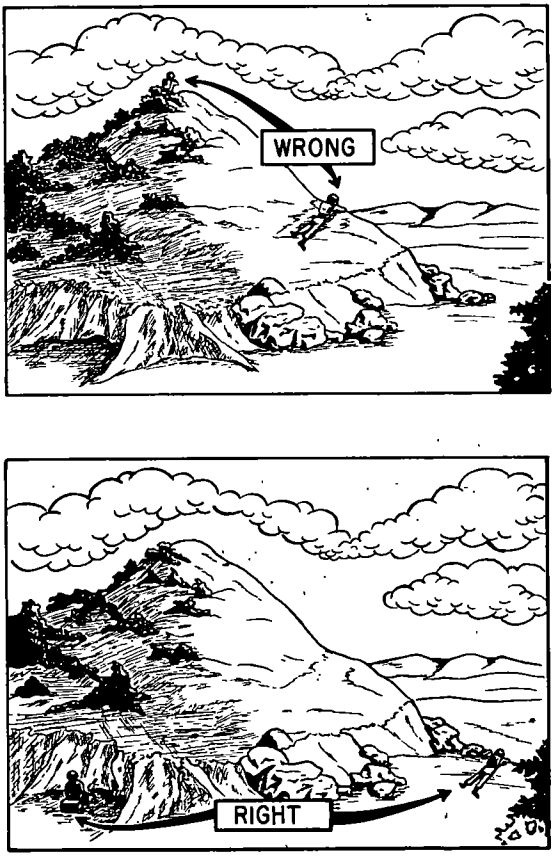


Figure 13. Reverse slope position.

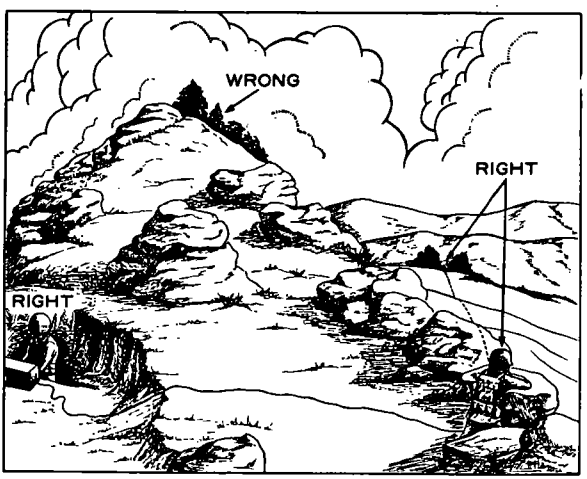


Figure 14. Forward slope position.

45. Observer's Report

a. The observer reports all observed activities and includes the following information:

(1) Whether fire is desired.

(2) Nature of activity observed.

(3) Location of activity—by coordinates, with respect to a numbered concentration, or by direction and distance from a reference point.

(4) Number of units—individuals, vehicles, tanks, and anything else seen in hostile territory. For example, 5 men on bicycles; 2 medium tanks, etc.

(5) Direction and speed of movement in hostile territory.

(6) Location and movement of friendly forward elements, with regard for the security of such information.

b. The observer reports exactly what he observes and never infers or deduces from his observation.

c. During intervals when no activity is observed, he makes periodic negative reports.

46. Auxiliary Map Data

a. Augmentation of Map Data. As soon as the observer has oriented himself, he should begin a systematic augmentation of map data. The map is augmented with lines of direction radiating from the observer's position at convenient angular intervals. These lines are intersected with arcs of

distance by using the observer's position as the center (fig. 15). The observer then marks points of importance which were not included on the map, when it was printed. He also marks (emphasizes) any points which he might frequently need, such as reference points, registration points, concentrations, and likely points of enemy activity.

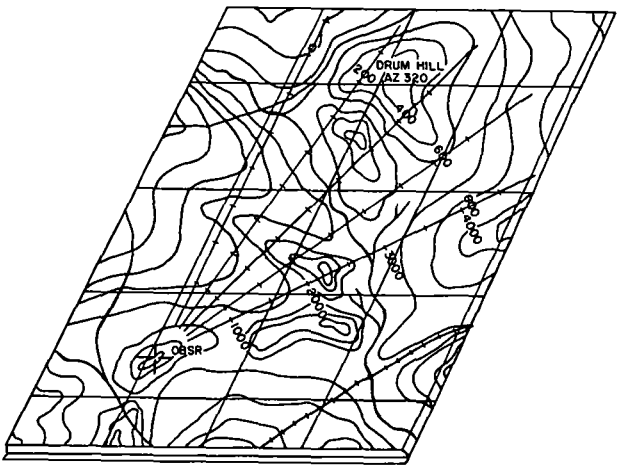


Figure 15. Map augmented to show lines of direction and distances from observer's position.

b. Terrain Sketch. A rough sketch of the terrain on which the observer expects to select targets and adjust fire will help him to determine the locations of targets. If known, such points as the

registration point, reference points, and concentration should be drawn on the sketch in their approximate locations. These points can be used by the observer to assist in the initial location of targets. The observer should record on the sketch any pertinent data on targets upon which he has previously fired (fig. 16). When available, photographs of the area of observation should be marked to show pertinent points and lines of direction, and used in conjunction with the terrain sketch.

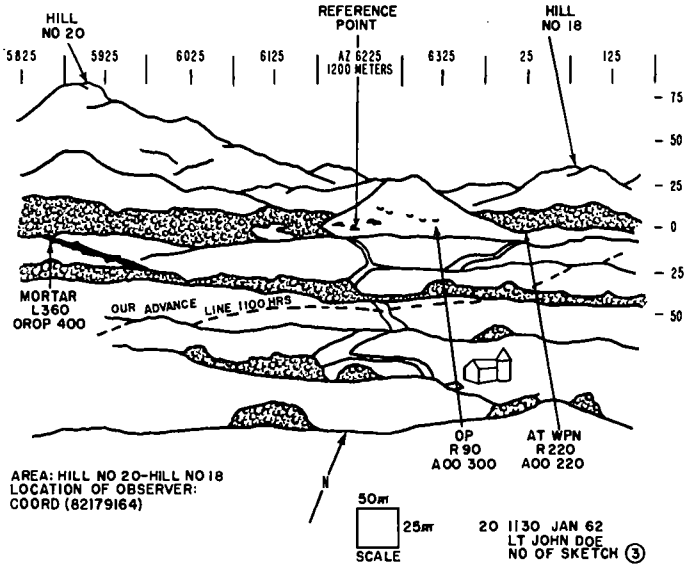


Figure 16. Terrain sketch.

Section VIII. COMMUNICATIONS

47. Communication Procedures

a. Normally, there is a field artillery liaison officer with each airborne infantry, mechanized infantry, infantry or tank battalions and a field artillery forward observer with each committed rifle or tank company. The liaison officer and forward observer are equipped with radio and telephone equipment with which they can send fire missions to the field artillery unit without delay. When an artillery observer is not available, fire missions may be sent to the artillery unit in one of several ways (fig. 17). Some methods of communicating with the field artillery unit are as follows:

(1) Any station in the rifle company command net or in the company wire system can contact the field artillery forward observer by radio or telephone. The forward observer has the necessary equipment to operate in both systems. He can receive the fire mission through either system and relay it to the field artillery unit through artillery channels, utilizing either radio or wire. In addition, the platoon leader can be reached through the squad leader's radio and telephone. The platoon leader would then contact the artillery FO on the company net or wire system.

(2) The forward observer from the battalion mortar/Davy Crockett platoon can re-

ceive the fire mission by either wire or radio in the company communications system, as he has the necessary equipment to operate in both nets. He can then transmit the fire mission to the mortar/Davy Crockett platoon FDC over the platoon fire direction net or by telephone. The platoon FDC can then transmit the fire mission directly to the artillery unit FDC by radio.

(3) If the artillery FO cannot be reached by either (1) or (2) above, the company commander's communication channels, either wire or radio, may be used to relay fire requests to either infantry battalion or brigade headquarters where the artillery unit liaison officer can transmit the fire mission to the field artillery unit through artillery channels utilizing either wire or radio communications.

b. The battalions of the armored division artillery rely principally on the use of radio communications. The use of wire (telephone) communications is not practical for armor units when they are moving rapidly; therefore, all tanks of an armored division have radios. The field artillery forward observer with a tank unit usually has a tank assigned to him.

c. The airborne division artillery, normally maintains the same radio and telephone communication systems as the infantry division artillery.

48. Phonetic Alphabet

a. The phonetic alphabet is a list of words used to identify letters in a message given by radio or telephone. The purpose of the phonetic alphabet is to assist in clarifying and identifying letters or words which over radio or telephone might be difficult to hear or understand.

A	ALFA	N	NOVEMBER
B	BRAVO	O	OSCAR
C	CHARLIE	P	PAPA
D	DELTA	Q	QUEBEC
E	ECHO	R	ROMEO
F	FOXTROT	S	SIERRA
G	GOLF	T	TANGO
H	HOTEL	U	UNIFORM
I	INDIA	V	VICTOR
J	JULIET	W	WHISKEY
K	KILO	X	XRAY
L	LIMA	Y	YANKEE
M	MIKE	Z	ZULU

b. Examples in the use of the phonetic alphabet in *a* above are—

P–39 ------Papa dash three niner.
Forward ---Foxtrot oscar romeo whiskey alfa romeo delta.

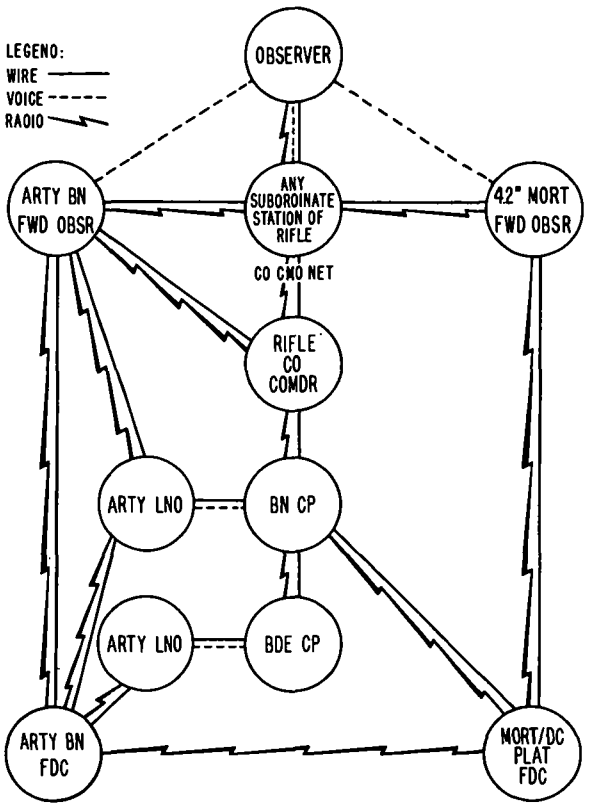


Figure 17. Channels of communication available to the observer calling for artillery fire.

APPENDIX I
REFERENCES

AR 320–5	Dictionary of United States Army Terms.
AR 320–50	Authorized Abbreviations.
DA Pam 108–1	Index of Army Motion Pictures, Filmstrips, Slides, and Phono-Recordings.
DA Pam 310-series	Military Publications Indexes.
FM 6–10	Field Artillery Communication.
FM 6–40	Field Artillery Cannon Gunnery.
FM 7–11	Rifle Company, Infantry, Airborne Infantry and Mechanized Infantry.
FM 17–15	Tank Units, Platoon, Company and Battalion.
FM 21–5	Military Training.
FM 21–6	Techniques of Military Instruction.
FM 21–26	Map Reading.
FM 21–30	Military Symbols.
FM 23–90	81-mm Mortar, M29.

FM 23–92	4.2-inch Mortar, M2
TM 9–1300–205	Ammunition for Mortars
SM 9–5–1390	Ammunition, Fuzes and Primers, Federal Supply Classification 1390.
JANAP 164	Joint Radio and Telephone Procedure for Conduct of Artillery and Naval Gunfire.

APPENDIX II
HINTS FOR THE OBSERVER

1. One of the most important skills in observation is the ability to read maps and photographs.

2. The use of the compass is necessary to the observer because he must be able to orient his maps and know his own location at all times.

3. Prepare a terrain sketch and keep it current.

4. Boobytraps and antipersonnel and antitank mines are a problem which sometimes confront observers. When such obstacles are discovered, they should be marked and their location should be reported to higher headquarters.

5. Dig foxholes deep. Keep your equipment, rations, communication, and other equipment under cover from sun reflection and out of sight from observation. If possible, dig a connecting communication trench.

6. Know when and where friendly patrols go so that you will not bring artillery fire on them.

7. Always know the location of forward friendly elements.

8. Be able to use binoculars skillfully.

9. Enemy guns, especially antitank guns which first open fire on our attacking forces, are usually in the second line of defense. The close-up guns

are waiting for an easy kill. Be on the lookout and see them first.

10. Even though you see only a small part of an object, such as a gun, tank, vehicle, or anti-tank gun, be able to identify it as enemy equipment.

11. Remember that CONTINUOUS AND CLOSE WATCHING of the target area is vitally important and may save valuable life and equipment.

12. Prompt and proper treatment of wounds will prevent shock, one of the real killers on the battlefield. Know the locations of aidmen and the infantry aid station.

13. Personal reconnaissance is better than any map for planning a forward movement. If reconnaissance is impossible, the careful study of air photographs will aid in planning movements.

14. Use every pair of eyes available to you to observe and designate targets for you; there are many pairs of eyes in your unit.

15. Know these words: WHO? WHAT? WHEN? WHERE? HOW? They are the key words for all observers and intelligence personnel when reporting enemy activities.

INDEX

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NG: State AG (3); units—same as active Army except allowance is one copy to each unit.

USAR: Same as active Army except allowance is one copy to each unit.

For explanation of abbreviations used, see AR 320-50.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1963—650528

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FM 6-135 ADJUSTMENT OF ARTILLERY FIRE BY THE COMBAT SOLDIER—1963