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FM 6-20

WAR DEPARTMENT FIELD MANUAL

FIELD ARTILLERY

TACTICAL EMPLOYMENT

WAR DEPARTMENT • 5 FEBRUARY 1944

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FM 6–20

This manual, together with FM 6-100 and FM 6-101 when published, supersedes FM 6-20, Tactics and Technique, 10 July 1940, including C 1, 2 January 1941.

FIELD ARTILLERY

TACTICAL EMPLOYMENT

WAR DEPARTMENT *5 FEBRUARY 1944*

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CHAPTER 1
GENERAL

SECTION I
ROLE AND CHARACTERISTICS

1. ROLE OF FIELD ARTILLERY. Field artillery is a supporting arm. It contributes to the action of the entire force by giving close and continuous fire support to infantry (cavalry) (armored) units and by giving depth to combat by counterbattery fire, fire on hostile reserves, fire to restrict movements in rear areas, and fire to disrupt command agencies.

2. CHARACTERISTICS OF FIELD ARTILLERY.

a. General. Field artillery is an arm for relatively long range combat. Massed artillery fire possesses great power of destruction and neutralization. Artillery fire can be shifted rapidly in width and depth without changing positions. Artillery positions can be changed quickly during combat, and units can be regrouped to bring greater fire power to bear on important sectors. This flexibility gives the commander a powerful means of influencing the course of combat. The efficiency with which artillery fires are maneuvered depends upon adequate control, close liaison with supported troops, and efficient communications and observation.

b. Modes of transportation. Field artillery units differ in mobility depending on the type of transportation used.

(1) HORSE ARTILLERY. Horse artillery has great battlefield mobility. The cannoneers are individually mounted and their mounts furnish a reservoir for draft replacements and relays. It can march and maneuver with horse cavalry.

(2) PACK ARTILLERY. Pack artillery can operate over ground that is difficult or impassable for other types of artillery. It is suitable for mountain and jungle combat. Pack artillery cannot move faster than a walk, except for short distances. It marches quietly.

(3) MOTOR-DRAWN ARTILLERY. Artillery may be towed behind trucks, tractors, or other motor vehicles. Truck-drawn artillery has much greater mobility on roads than other types.

(4) SELF-PROPELLED ARTILLERY. Artillery may be mounted in wheeled, half-track, or full-track vehicles. Such artillery can move more rapidly into and out of position than towed artillery.

(5) AIRBORNE ARTILLERY. Artillery and its ground transportation may be carried in aircraft. Some types of artillery may be dropped by parachute.

c. Capabilities of weapons. Artillery is classified, based on caliber and weight, as light, medium, and heavy. All three classifications may include mortars, howitzers, and guns.

(1) Light artillery includes the 105-mm howitzer and smaller cannon. Its characteristics are mobility, flexibility of fire, high rate of fire, and rapidity of getting in and out of position. These characteristics, coupled with its range, enable it to render

continuous support to other ground forces over areas of great width and depth.

(2) Medium artillery varies from the 4.5-inch gun to the 155-mm howitzer, both inclusive. Medium artillery has a lower rate of fire but greater power than light artillery. Its weight of projectile and range make it preferable to light artillery for counterbattery. Its mobility over difficult terrain is appreciably less than that of light artillery.

(3) Heavy artillery includes the 155-mm gun and those of heavier caliber. Heavy artillery has a relatively low rate of fire, great power, and long range. It can execute counterbattery and interdiction deep within the enemy lines and can intensify and extend the neutralizing fires of light and medium artillery. It requires appreciably more time for emplacement than light and medium artillery.

SECTION II
ORGANIZATION

3. HOWITZER (GUN) BATTERY (FM 6–101). The howitzer (gun) battery is the basic field artillery unit; it is the smallest unit containing the personnel and equipment necessary for maneuver, delivery of fire, maintenance, and administration.

4. HOWITZER (GUN) BATTALION (FM 6–101). The howitzer (gun) battalion consists of a headquarters, two or more howitzer (gun) batteries (usually three), and a service unit. It has both tactical and administrative functions. The battalion is the usual unit for executing fire missions.

5. OBSERVATION BATTALION (FM 6–120). The observation battalion is equipped to execute flash

and sound ranging and to furnish topographic service and meteorological data.

6. GROUP (FM 6–100). A group consists of any combination of artillery units, usually from two to four battalions. A group headquarters is designated. It may be the headquarters of one of the units forming the group, or it may be a group headquarters (T/O 6–12).

7. DIVISION ARTILLERY (FM 6–100). The division artillery consists of a division artillery headquarters, headquarters battery, and such artillery battalions as are organic or attached. The artillery organically assigned to a division is the minimum habitually required for combat. For any action, except against weak forces, additional artillery is necessary.

8. BRIGADE (FM 6–100). The brigade consists of a brigade headquarters, headquarters battery, and such groups and battalions as are attached. Its functions are primarily tactical.

9. CORPS ARTILLERY (FM 6–100). The corps artillery consists organically of a corps artillery headquarters and headquarters battery and an observation battalion. Artillery brigade and group headquarters, groups, and battalions are attached as necessary. The term "artillery with the corps" includes both corps and division artillery.

10. ARMY ARTILLERY. There is no organic army artillery. The general headquarters or theater commander allocates artillery to an army for specific operations.

11. GENERAL HEADQUARTERS ARTILLERY. General headquarters artillery includes all artillery not organic to corps and divisions.

SECTION III
TYPES OF FIRE

12. GENERAL. Artillery fire may be classified as to types of ammunition employed, effect sought, form, whether observed or unobserved, and degree of prearrangement.

13. AMMUNITION. Artillery projectiles may be solid, or filled with high explosive or chemicals. Chemical shells may contain persistent gas, non-persistent gas, or smoke. Fuzes are classified as *time* or *impact*. Impact fuzes may be *quick* or *delay*.

14. EFFECT SOUGHT. Artillery fire may be for neutralization, destruction, registration, harassing, or interdiction effect.

a. Neutralization. Fire delivered on areas to destroy the combat efficiency of enemy personnel by causing severe losses and interrupting movement or action. Neutralization is established by delivering surprise fire in intense masses. It is maintained by intermittent bursts of fire in lesser amounts.

b. Destruction. Fire delivered for the sole purpose of destroying material objects. It requires, except when direct laying is used, a great deal of ammunition and time. Observation is essential. For the destruction of most targets, medium and heavy artillery are better suited than is light artillery. Fire is generally by one gun.

c. Registration. Fire delivered to obtain corrections for increasing the accuracy of subsequent fires.

d. Harassing. Fire delivered during relatively quiet periods, to lower enemy combat efficiency by keeping his troops unnecessarily alerted. Fire may be by single piece, platoon, or battery; the fire is intermittent. All echelons of artillery may fire harassing fire.

e. Interdiction. Fire delivered on points or areas to prevent the enemy from using them. Characteristic targets are roads used for moving supplies or reserves, crossroads, assembly areas, railroad stations, detraining points, defiles, bridges, and fords.

15. FORM. Artillery fires are classified as to form as *concentration* or *barrage*.

a. Concentration. A concentration is a volume of fire placed on an area within a limited time. The term is applied regardless of the tactical purpose of the fire or the nature of the tactical operation.

b. Barrage. A barrage is a special type of prearranged fire placed on a line either stationary or moving. Barrages are fired close in front of our own front lines.

(1) STANDING BARRAGE. Standing barrage is fire on a fixed line.

(2) NORMAL BARRAGE. Normal barrage is a standing barrage placed on a critical area that cannot be covered effectively by the weapons of the supported troops. A battery has only one normal barrage. It is laid on its normal barrage when not otherwise engaged, and fires the barrage on signal or call from the supported unit.

(3) EMERGENCY BARRAGE. An emergency barrage is a standing barrage employed to cover

gaps between normal barrages or to reinforce the normal barrage of another unit. A battery may have any number of emergency barrages. Such barrages are usually fired on call rather than signal.

(4) ROLLING BARRAGE. A rolling barrage is artillery fire delivered on one or more successive lines, advancing according to a prearranged schedule. Rolling barrages are employed to support an attack when the locations of hostile dispositions are obscure; to crater the ground; or to orient and guide the attacking troops.

(5) BOX BARRAGE. A box barrage is a special type of standing barrage inclosing two or more sides of an area. It is employed to isolate a portion of the hostile front.

(6) The authorized rate of fire and the effective width of burst limit the width of a barrage which may be effectively covered by a battery. The following widths of barrages per battery of four pieces should not be exceeded.

	75-mm	105-mm	155-mm
Normal barrage	200 yards	300 yards	400 yards
Emergency barrage	200 yards	300 yards	400 yards
Rolling barrage	100 yards	200 yards	*See note.

*Not suitable for firing close to our troops. May be used to add depth to barrage.

16. OBSERVED OR UNOBSERVED. Adjusting and correcting artillery fires by direct observation increases the effectiveness of artillery. Fires may be delivered on unobserved targets when the relative location of such targets with respect to the unit firing can be determined. (See FM 6–40 for detailed description of firing methods.)

17. DEGREE OF PREARRANGEMENT.

a. Prearranged fires. Fires planned in advance. They may be prearranged as to location and time of firing, for example, as part of a preparation; or they may be prearranged as to location only and then fired on call, for example, as a normal barrage.

b. Targets of opportunity. Targets for which fires are not prearranged. If an observer reports such a target while the unit is firing a prearranged mission, the artillery commander who receives the report decides whether to continue the current firing or to attack the new target.

18. MAPS. Unobserved fires require that either a fire control map, a photomap, or coverage by vertical air photographs of target and gun position be available.

SECTION IV
TYPES OF EMPLOYMENT

19. GENERAL. Artillery assigned or attached to a unit may be retained by that unit or attached to a lower unit. Control of artillery units is decentralized when the artillery commander cannot effectively exercise control of their operations. Artillery may be given either the mission of direct support or general support. A unit employed in general support may be given a secondary mission of reinforcing the fires of another artillery unit.

20. DIRECT-SUPPORT MISSION. Direct-support artillery has the mission of supporting a subordinate unit of a command. Whenever practicable, a

particular artillery unit is placed in direct support of the same unit. Fire missions of a unit in direct support usually come directly from the supported unit. Direct-support artillery is not attached to the supported unit, but remains under the control of the higher artillery commander. The commander of a unit in direct support is free to maneuver as necessary, in order to furnish maximum aid to the supported unit. In the division (corps), fire of a unit in direct support may not be taken from the supported unit except with the authority of the division (corps) commander.

21. GENERAL-SUPPORT MISSION. General-support artillery has the mission of supporting the command as a whole. It is held under the control of the artillery commander. It is an immediate reserve available to the force commander with which he can influence the action.

22. REINFORCING MISSION. An artillery unit with a reinforcing mission receives calls for fire directly from the unit whose fires it is to reinforce. The reinforcing unit must be prepared to fire in the zone of the reinforced unit, to answer all calls for fire from the reinforced unit when answering such calls will not interfere with its primary mission, and to maintain liaison with the unit whose fires it is to reinforce.

23. ARTILLERY IN RESERVE. Artillery should not be held in reserve unless the situation is so obscure that the particular sector in which the bulk of the artillery fire power will be most needed cannot be foreseen. Artillery in support of a unit held in force reserve should be placed in general support

of the force, if time will permit its employment with the reserve unit when that unit is committed.

SECTION V
TACTICAL ORGANIZATION FOR COMBAT

24. TACTICAL ORGANIZATION.

a. The artillery of a command is organized for combat by attaching units where necessary and by assigning missions to the subordinate artillery units. In the division, organization for combat should provide artillery in direct support and artillery in general support. In the corps, organization for combat should provide for reinforcing the fires of division artillery and artillery to execute counter-battery, harassing, and interdiction fires.

b. To simplify control, various artillery units may be grouped. The artillery commander's order specifies the commander and headquarters of the group, the units that are to compose it, and its mission. The purpose of forming a group is to coordinate fire, observation, and liaison; the guiding principle in forming a group is that all artillery units in it have a common mission, regardless of caliber or other characteristics. The group commander has tactical control of the unit, and is responsible for ammunition supply. If a group is formed to furnish direct support to a given unit, the commander of the organic battalion normally charged with direct support of that unit should command the group.

25. ZONES OF FIRE.

a. When unusually large numbers of artillery battalions are available, missions may be clarified and

tactical organization improved by assigning zones of fire. The zone of fire of an artillery unit is the zone into which it must be prepared to fire. The normal zone of direct-support artillery coincides laterally with the zone or sector of the supported unit. Those portions of its zone of fire outside the normal zone are called contingent zones.

b. The normal zone of general support or corps artillery is either the zone or sector of the supported unit, or so much of the zone or sector as is specified. Contingent zones, into which these units may be ordered to shift their fires, may be prescribed. Commanders have primary responsibility for observation in, and ordinarily fire in their normal zones on their own initiative. Units deliver fire in their contingent zones only on order of higher artillery headquarters.

c. To insure proper coverage laterally, the exterior limits of the contingent zones of the various units are designated by lines labeled to show the fire power—usually expressed in battalions, calibers, and types—with which the units must reach the exterior limits.

d. Zones in depth may be prescribed by assigning position areas, or by prescribing minimum range lines and lines to be reached by all or part of the fire power of a unit.

SECTION VI
COMMAND AND STAFF

26. ARTILLERY OFFICERS. The term "artillery officer" is used to designate the senior officer in the field artillery section of army and higher head-

quarters. In the corps and division he is the artillery commander. The army artillery officer exercises no tactical command. The artillery commander of the corps and division has a dual role. He commands all the artillery, both organic and attached, which has not been attached to subordinate units; he is a member of the special staff of his commander, in which capacity he is the assistant and adviser regarding all artillery matters. In a task force of mixed arms, the senior artillery officer is the artillery officer of the force and performs duties similar to those of the artillery officer of the unit (army, corps, or division) which the force most resembles. For detailed description of duties and functions of artillery officers, see FM 6–100.

27. **CHAIN OF COMMAND.** There is no direct chain of artillery command from armies to corps or from corps to divisions. An army artillery officer's instructions for the artillery with a corps are issued to the corps commander in the name of the army commander. The corps artillery commander's instructions for division artillery are transmitted similarly.

28. **ARTILLERY STAFFS.** The staffs of all artillery echelons are similar in organization but vary in size and in the number, magnitude, and complexity of their functions. Artillery staffs usually include special staff officers, such as communication officer, liaison officer, ammunition train commander, motor officer, surgeon, and chaplain. For general description of staff functions see FM 101–5; for details of staff functions see FM 6–100 and 6–101.

29. COMMAND POSTS. The command post of the division artillery is at the division command post. The same principle applies in the case of the senior artillery commander of any force of combined arms. This may necessitate establishing the fire direction center well forward of the command post. Separating the command post and the fire direction center does not allow the artillery commander to exercise proper control over his staff and subordinate units. Force commanders must consider this when locating their command posts. Subordinate artillery commanders establish their command posts where they can exercise tactical command and fire direction most effectively. If an artillery commander locates his command post at a place other than the command post of the supported unit, he establishes liaison and maintains signal communications with the commander of the supported unit.

SECTION VII
PLANS AND ORDERS

30. ARTILLERY PLANS.

a. General. The basic decision as to the employment of the artillery in any operation is the responsibility of the force commander. He indicates the area in which the artillery will place the bulk of fire, or the element of the command that is to receive priority of artillery support. The artillery officer must be prepared to submit recommendations as to the employment of the artillery before the force commander formulates his decision.

b. Estimate of artillery situation and requirements. The artillery officer can be prepared properly to submit recommendations only if he and

his staff have made a continuous estimate of the situation, from the artillery viewpoint, at the same time that the force commander has been making his estimate of the situation. Artillery officers of the division, corps, army, or higher echelons may be called on to estimate requirements in artillery for a projected operation. The artillery officer of the echelon ordering or conducting the operation is primarily responsible for making the estimate of artillery requirements.

c. Formulation of artillery plan. The artillery plan must provide for maximum support of the scheme of maneuver. The successive steps in the formulation of the artillery officer's plan for the employment of the artillery are—

(1) An estimate by the field artillery officer and his staff prior to the commander's decision.

(2) Submission of recommendations by the artillery officer to the commander, prior to the commander's decision.

(3) Receipt of the commander's decision.

(4) Formulation of the plan for the employment of the artillery based on the commander's decision.

(5) Preparation of the order or annex to put the plan into effect.

31. ARTILLERY ORDERS.

a. General. For a general discussion of combat orders and annexes see FM 101–5. For detailed discussions of orders of artillery units see FM 6–100 and 6–101.

b. Artillery subparagraph. The artillery subparagraph of the corps (division) field order gives the commander's decision on the employment of the artillery with the corps (division). It includes only

details necessary for the information of the commanders of major echelons and for coordinating the fires of artillery units.

c. Artillery orders. Artillery orders, in general, follow the five-paragraph form. They may be fragmentary or complete, oral, written, or dictated. Artillery orders are usually oral, or in fragmentary message or overlay form, particularly in lower units. When written, they may be published as an artillery field order by an artillery commander; or as artillery annexes to the force commander's field order, in corps, divisions, and similar units.

CHAPTER 2
TACTICAL FUNCTIONS

SECTION I
RECONNAISSANCE

32. GENERAL. For general principles of reconnaissance see FM 100–5. For detailed discussion of reconnaissance for artillery units see FM 6–100 and 6–101. Artillery reconnaissance must be—

a. Planned with a definite object in view.

b. Active, timely, and continuous.

c. Limited to the individuals and vehicles required.

d. Progressive.

e. Decentralized when time is short.

33. RECONNAISSANCE FOR POSITIONS AND OBSERVATION. Reconnaissance is generally limited to the area the artillery unit must occupy to carry out its mission. The area may be prescribed by higher artillery headquarters. During a march in the presence of the enemy, probable position areas are reconnoitered and possibilities of observation are studied.

34. ROUTE RECONNAISSANCE (FM 25–10). Route reconnaissance must precede every column, even though the march is planned and controlled by higher headquarters. The higher headquarters may furnish reconnaissance information and repair work.

35. PLANNING RECONNAISSANCE. Ground reconnaissance should be preceded by map reconnaissance. A study of the terrain from a high point overlooking the area to be reconnoitered facilitates prompt decisions and allows the remaining reconnaissance to be planned effectively.

36. TIME AVAILABLE. Under some circumstances an artillery reconnaissance may be carried on for several days, as in the preparation for an offensive on a large scale. Under other circumstances it must be completed in a few minutes, while the units are moving up to the positions they are to occupy. When artillery must go into action quickly, delay caused by seeking a perfect position is unwarranted; reconnaissance is made for a position which will assure prompt and effective artillery support.

37. PROGRESSIVE RECONNAISSANCE.

a. General. Except in displacements to the rear, artillery commanders habitually precede their commands to the position area.

b. Beginning of reconnaissance. During a march in the presence of the enemy, artillery personnel observe the terrain. To obtain early information of the plan of action and missions of artillery, the artillery commander keeps in close touch with the force commander and should accompany him on his reconnaissance. The artillery commander communicates his plan promptly to his subordinates, in order that their reconnaissance may be initiated as soon as practicable.

c. Extent of reconnaissance. The division artillery officer (group commander) reconnoiters for suitable battalion areas. He will rarely be able to make

a detailed ground reconnaissance for battalion areas, but frequently must assign areas after an air or a map reconnaissance, supplemented by information from other sources. The battalion commander reconnoiters in greater detail to select the battery position areas and locations for other elements of the battalion. In general, the battery commander selects exact positions for the pieces and exact locations for other elements of the battery. Generally two or more of these steps are carried out concurrently. In a fast moving situation, the reconnaissance and selection of position is decentralized normally to battalion and battery commanders.

SECTION II
OBSERVATION

38. GENERAL.

a. Observation is essential in order that field artillery may accomplish its mission of rendering continuous and close support. Supported commanders must plan their maneuvers to seize and hold terrain necessary for artillery observation. In order to render close support, field artillery observers must keep in close contact with the leading elements of the supported arm, and must dispose themselves so as to be able to locate and neutralize those hostile elements which interfere with the mission of the supported arm.

b. Artillery observation must be flexible in order to follow and support the constantly changing maneuver of our advanced elements. It should extend sufficiently deep into the hostile position to cover those areas from which fire can be delivered

on our troops. Observation and adjustment of artillery fire are not confined to artillery observers. Officers and men of the supported unit often report the locations of targets and sometimes adjust fire thereon.

c. Field artillery depends primarily on forward observers in carrying out its close-support mission. Forward observers are selected from the best shots in the battalion. Liaison personnel often observe and adjust fire. Field artillery units utilize both ground and air observation to cover the entire zone of action or defensive sector to the required depth. Ground observation may be executed by forward observers, observers at battalion and battery observation posts, and sound and flash units.

39. FORWARD OBSERVATION.

a. The forward observer is one assigned to observe in the zone of action or defensive sector of a given unit and to maintain contact with that unit. The supported arm is mutually responsible for maintaining this contact. Direct-support battalions, and in most cases battalions reinforcing the fires of direct-support battalions, send out forward observers. It is desirable to send out forward observers in the ratio of one to each front-line company or similar unit. Forward observers are controlled and coordinated by the artillery liaison officer from the direct-support artillery with the infantry (cavalry) (armored) battalion. All artillery observers coming forward to observe in an infantry (cavalry) (armored) battalion zone or sector report to the artillery liaison officer with that battalion, in order to insure proper coordinated employment of all observers and to exploit all means for observation. This is essential since the liaison offi-

cer knows the local situation and where the most advanced elements of our own troops are located.

b. The forward observer has two general missions. His primary mission is to observe and adjust artillery fire on those hostile elements which interfere with the mission of the unit with which he is working. His secondary mission is to keep the artillery battalion informed of the situation. The forward observer is not attached to the supported unit. He is not restricted to the zone of action or defensive sector of the supported unit. He goes where he can obtain the observation necessary to give effective artillery support. He is not restricted to reporting only those targets which are of importance to his supported unit. He should report everything he sees exactly as he sees it. He should not try to observe the entire battlefield, but should concentrate his observation in that area of primary interest to the unit with which he is working.

40. BATTALION AND BATTERY OBSERVATION POSTS. In order to cover effectively the entire zone of action or defensive sector to the required depth, field artillery units establish observation posts. When a unit establishes more than one such observation post, coordination is accomplished by assigning a zone of observation to each. Targets reported from battalion and battery observation posts are carefully checked through the fire direction center of the direct-support battalion prior to opening fire, to insure that such fire will not endanger our advanced elements.

41. SOUND AND FLASH UNITS. Sound and flash units provide a valuable means of locating hostile installations. Such units are organic in the corps

artillery but may be attached to division or lower units. (For details, see FM 6–100 and 6–120.)

42. AIR OBSERVATION.

a. General. Air observation is used to extend and supplement ground observation. Air observation permits reports of location of targets and adjustment of fire on targets normally defiladed from ground observers. Air observation missions for field artillery units may be performed by light airplanes organic in artillery units or by high performance units of the Army Air Forces. (See FM 6–40 for procedure in adjusting fire.)

b. Organic artillery air observation. Organic air observation for field artillery consists of a lightweight, unarmed, and unarmored airplane of slow cruising speed, operated by field artillery personnel, and capable of taking off and landing in small, unprepared fields and on roads in the vicinity of artillery command posts and firing batteries. Its primary purpose is to provide air observation of field artillery fire. A secondary purpose is to furnish oblique photography for use in the artillery and supported arms for terrain study of the zone or sector of the units involved. This airplane is vulnerable to the fire of hostile air and ground forces.

c. Artillery observation by air force units. Field artillery, especially long-range artillery, requires air observation beyond the capabilities of organic field artillery air observation. Such observation requires high performance airplanes of the Army Air Forces. The senior artillery commander submits requests to the force commander for such missions. In addition to missions of direct observation, the air force executes photographic missions for the

artillery. Oblique air photographs are furnished for terrain study. Vertical air photographs are provided to facilitate survey and provide targets for firing charts.

SECTION III
INTELLIGENCE

43. ARTILLERY INTELLIGENCE. In order to locate remunerative targets, artillery units continuously seek information of the enemy by all available means. The most valuable sources of information are artillery observers, including ground, air, sound and flash, and vertical air photography. The highly organized system of observation and communications installed by the field artillery makes it an important source of intelligence. These systems afford the force commander a quick means for determining the location of both our own and enemy installations. Artillery commanders may be extremely helpful to supported commanders by keeping them informed at all times of the disposition of our own leading elements through contact with artillery forward observers and liaison officers. S–2 sections gather and evaluate information and disseminate it to subordinate, adjacent, and higher echelons. In large operations the intelligence section of the corps artillery staff is the principal unit in artillery intelligence. Its most important mission is the location of enemy artillery. The most important sources of information for the location of enemy artillery are vertical air photographs and sound and flash units.

SECTION IV
LIAISON

44. GENERAL. Liaison is established between artillery and supported units and, in some cases, between artillery units. Close contact between the supported unit and the artillery makes possible the timely transmission of requests for fire and gives the artillery the intimate knowledge of the situation which it requires for effective performance of its mission. Maintenance of liaison is the mutual responsibility of the supported and the supporting unit.

45. COMMAND LIAISON. Command liaison is accomplished by direct conference between the commander of the supporting artillery and the commander of the supported unit. Upon receipt of orders committing units to action, commanders should hold a conference to formulate a general plan of artillery support. To assure the efficient continuance of artillery support to meet the needs of the supported unit, constant liaison is maintained with the command post of the supported unit. Additional conferences between commanders are held during the progress of the action. When an artillery unit has the mission of reinforcing the fires of other artillery units, command liaison should be established by the commander of the reinforcing unit with the commanders of the reinforced units.

46. LIAISON OFFICERS.

a. An artillery unit commander uses liaison officers to establish and maintain liaison with desig-

nated supported units or with artillery units whose fires his unit is to reinforce. A liaison officer is the personal representative of his commander with the commander of the supported or reinforced unit.

b. The primary mission of a liaison officer is to advise and assist the commander of the supported or reinforced unit in obtaining the desired supporting or reinforcing fires, and to keep his artillery commander informed of the plans, operations, and disposition of the supported or reinforced unit. He must be able to inform the supported commander of the capabilities of the artillery in delivering any fires desired and to transmit promptly to his headquarters requests for supporting fires. To enable the liaison officer to carry out his mission, the supported or reinforced unit commander must keep the liaison officer informed at all times of the location of hostile and friendly units, the scheme of maneuver, and the immediate needs of the supported or reinforced unit.

c. As a secondary mission the liaison officer adjusts the fire of his unit when necessary.

d. An artillery unit in direct support of an infantry unit sends liaison officers to all supported battalions. An artillery unit whose mission is to reinforce the fire of other artillery units sends liaison officers to each unit which it is reinforcing. Liaison officers should contact the commanders of the units with which they are to establish liaison in time to accompany the commanders on reconnaissance and secure detailed information as to specific fire missions desired by these units.

47. LIAISON SECTION (FM 6–101). A liaison section is normally provided to assist the liaison officer.

SECTION V
COORDINATION WITH SUPPORTED ARM

48. GENERAL. The employment of supporting fire is regulated by the needs of the supported arm in the various phases of combat. Supported unit commanders deal directly with the artillery assigned to their direct support. The supported unit commander, in making his plan of maneuver, must consider the capabilities of available artillery and the observation required by the artillery. This section deals primarily with coordination between artillery and infantry. The same general principles apply to coordination with other supported arms.

49. PLANNING SUPPORTING FIRES.

a. General. The planning of artillery support is influenced by many factors which include—

(1) Enemy situation, whether in movement, in position, or intrenched, and the amount and accuracy of information available on the location of enemy installations.

(2) Contemplated maneuver of the supported unit.

(3) Plan of supporting fire of other arms.

(4) Assistance which higher or adjacent artillery units will furnish or require.

(5) Conditions under which fire is to be delivered (observation, maps, time, and ammunition available).

b. Rapidly moving situations.

(1) The division order gives the general plan, the missions of major units, and the general artillery

missions. It designates artillery units in support of particular units. The orders of the commanders of supported regiments give additional information required by the direct-support artillery, including the number of front-line battalions, their zones of action, location of regimental and battalion commanders, regions where the artillery should be prepared to fire, and method of calling for and lifting fires. When practicable, the supported commander indicates where the artillery should place its fires. He usually delegates the indication of specific locations to his battalion commanders.

(2) Based on the information outlined in (1) above, artillery commanders adopt dispositions to insure observed fire on targets as they develop and permit the artillery to furnish continuous support. Their arrangements include—

(*a*) Sending of liaison detachments to infantry battalions and assignment of missions to forward observers.

(*b*) Agreement with supported infantry commanders as to artillery support and signals for shifting artillery fires, if not already prescribed.

(*c*) Preparation and distribution of overlays, maps, or photographs showing the location of check concentrations and any prearranged fires in order to facilitate designation of targets by infantry commanders, liaison officers, and air and artillery observers.

c. Prearrangement of fires.

(1) Prearranged fires are employed whenever the conditions of the operation permit. In conference with the infantry regimental commander, the artillery battalion commander formulates a tentative general plan of artillery support, including general

location, time, duration, and priority of fires requested by the infantry commander.

(2) Tentative plans for the close-support fires desired by the infantry battalions are made by the artillery liaison officers in conference with the infantry battalion commanders. This conference is usually preceded by a joint reconnaissance. The artillery commander must then coordinate the close-support plans with the general plan of support agreed upon by the infantry regimental commander. If the powers of the artillery are not fully exploited, the artillery commander suggests additional fires; if the artillery is unable to furnish sufficient fire to meet the requests, the infantry commander, with the assistance of the artillery commander, determines which of the fires available will contribute most to the success of the infantry operation. Details of the infantry plan sometimes must be changed to accord with the capabilities of the available artillery.

50. EXECUTING AND SHIFTING FIRE (FM 6–101). Fires may be executed and shifted by means of artillery observation (ground or air), on call or signal from the supported unit, by time schedule, or by a combination of these methods.

a. Artillery observation. Artillery observation is used whenever it is possible to secure it, either as a primary means of executing or lifting fires or as a supplement to other methods.

b. Call or signal from supported unit.

(1) Regulation of fires by call or signal from the supported unit, in conjunction with artillery observation, is suited to rapidly moving situations and those in which there is doubt as to the location of hostile elements. Fires regulated by call or signal

may be either prearranged fires or fires on targets of opportunity.

(2) When time permits, fires to be delivered on call are prepared for likely locations of hostile troops. The supported unit then calls for such of these fires as are required to meet developments of the combat. Duration of these fires may be prearranged; or the lifts may be made on call.

(3) When the location of the enemy is known, groups of prearranged concentrations may be fired in a definite sequence; each lift to the next target is made at the request of the supported unit. A high degree of training of supported and supporting units is required. Otherwise confusion may result particularly if many lifts are scheduled.

(4) Requests for fire should include—

(*a*) Accurate location of the target.

(*b*) Description of the type of target and its dimensions.

(*c*) Location and contemplated maneuver of friendly troops, near the target.

(*d*) Duration of the fire.

(5) Time of ceasing fire can usually be coordinated by specifying its duration. A standard duration for all such fires may be arranged prior to the attack. In special cases the supported arm may specify one of the following:

(*a*) Duration and exact hour of opening.

(*b*) Duration, opening of fire to be upon a prearranged signal.

(*c*) Exact or latest hour for ceasing fire.

(*d*) Time of opening fire, cessation being on signal.

c. Time schedule.

(1) Fires may be lifted and advanced on a time schedule based on the estimated rate of movement

of the supported troops. This method of regulating the delivery of fires requires time for preparation, and is inflexible and difficult to adjust to the maneuver of supported troops. *Its employment in rapidly moving situations is limited; when favored by conditions it may be used for one or two groups of fires.* The time schedule will be used more often in operations such as the early stages of attacks against hostile positions. Reinforcement of the organic division artillery and engagement of large forces on relatively narrow fronts can be expected to create conditions of poor visibility. In such cases the timetable, with provision for dealing with discrepancies between the actual and expected advance, normally becomes the principal basis for lifting fires.

(2) Only minor changes in the time schedule are practicable during the attack; when extensive revision is required, abandonment of the schedule in favor of other methods or a new schedule will usually be necessary.

(3) Schedule fires are planned in independent series to avoid tying the attack to a time schedule over a long period. Each series corresponds to a maneuver phase terminated by the capture of an objective. Execution of a new series of fires is usually begun on call.

d. Targets of opportunity. In case an important target of opportunity presents itself to an artillery unit which is engaged on prearranged fire missions, the artillery commander, in the absence of instructions, decides whether to continue his mission or attack the new target.

SECTION VI
FIRE DIRECTION

51. GENERAL. Fire direction is the tactical command of one or more artillery units, for the purpose of bringing their fire to bear upon the proper targets at the proper time. The degree to which fire direction is exercised by an artillery commander depends on his knowledge of the situation and upon the degree to which operations are centralized. Subordinate commanders are permitted sufficient latitude and initiative to meet local situations promptly.

52. FIRE DIRECTION BY LARGE UNITS. Artillery commanders of units larger than a battalion control the fire power of lower units by organizing the artillery for combat; by assigning position areas; by assigning zones of fire to insure that fires may be massed on important areas; by designating specific important targets or areas to be covered by fire; by procuring and allocating ammunition; and by coordinating survey, communications, observation, and displacements. The ability of the higher artillery commanders to mass fires quickly by designating areas to be fired upon by subordinate units depends upon a well coordinated system of communications. When possible, direct communications to battalions by radio should be established. This will permit the force commander through his artillery commander to place masses of artillery fire on critical areas with the least possible delay.

53. FIRE DIRECTION WITHIN BATTALION. For the technique of controlling and maneuvering the fires of the battalion, see FM 6–101 and 6–40.

54. **DISPLACEMENTS.** Artillery displaces during combat in order to fire at effective ranges and to maintain continuous communication with liaison officers and forward observers. The method of displacement is such that some fire support is furnished at all times. The artillery commander temporarily reassigns the essential missions of the displacing units to units that remain in position. The time that units are out of action while displacing should be reduced to a minimum. When two or more artillery units must displace over the same route, the next higher artillery commander coordinates the movements. When artillery must displace over a route used by units of other arms, the force commander coordinates the movements. In general, direct-support artillery should have priority on roads.

a. Displacement of direct-support artillery. The displacement of direct-support artillery is coordinated with the supported unit. The artillery commander plans his displacement in conference with the supported unit commander. The supported unit's plan influences the time of displacement, the method of displacement, and the selection of the new position area.

b. Displacement of general-support artillery. The displacement of general-support artillery is coordinated with the action of the command as a whole. The unit displaces on orders of the next higher artillery commander; for example, the division artillery in general support displaces on order of the division artillery officer.

SECTION VII
SIGNAL COMMUNICATIONS

55. REFERENCES. For principles and procedures relating to signal communications see FM 24–5. Technical manuals provide technical information on signal equipment. For details of signal communications in field artillery units see FM 6–100 and 6–101.

56. GENERAL. The commander of each field artillery unit is responsible for the establishment of signal communication within his own unit, with supported, reinforced, and attached units, and with other units as directed by higher authority.

57. RECONNAISSANCE. Artillery reconnaissance includes consideration of the means of communication to be employed.

58. AXIS OF SIGNAL COMMUNICATION. The axis of signal communication for an artillery unit follows that of the supported unit. When the commander of an artillery unit cannot designate an axis of communication, he reports each successive location of his command post to the next higher artillery commander as soon as it is selected.

59. MEANS OF COMMUNICATION. Means of communication employed by the field artillery are: radio (telephone and telegraph), wire (telephone and telegraph), messengers (airplane, motor, mounted, dismounted), visual, voice, and sound. No one means of communication is infallible. Alternate means must be provided.

a. Wire. Wire communication is established when the situation permits. The time available and future needs for wire are governing factors. An initial wire system may be expanded by installation of additional circuits and switching centrals until the desired flexibility has been obtained. Artillery wire systems include trunk circuits between switching centrals and local circuits to observation posts, battery positions, liaison officers, elements of command posts, administrative installations, etc.

b. Radio. Radio communication is provided for essential elements of a unit and for communication between units. In general, each headquarters maintains a station in the net of the next higher headquarters. Special purpose nets are organized as required. On a functional basis, artillery radio nets are designed for command, fire direction, observation, liaison, and warnings. Radio is nonsecret. When more secret means are available, its use should be suspended except where speed of transmission is essential.

c. Messengers. Messengers are used when distances are short, when early delivery of message is not urgent, when the character of the message precludes the use of other means, to confirm messages transmitted by other means, or when other means of communication fail or are inadequate.

d. Visual. Visual communication is well suited for prearranged signals and short code groups.

e. Voice and sound. Voice is used between elements within easy voice range of each other. Sound communication is of value chiefly for alarms and for transmission of short, prearranged messages.

60. CODES AND CIPHERS. Artillery battalions and higher units are equipped with the codes and

ciphers authorized for the unit of which they are a part. Extensive use is made of brevity codes. The Fire Control Code and the Meteorological Code provide brevity in transmitting and recording fire commands and meteorological data.

SECTION VIII
SECURITY

61. SCOPE. Security embraces all measures taken by a command to protect itself against annoyance, surprise, and observation by an enemy. Each commander is responsible for the security of his command. Regardless of the security measures taken by higher commanders, all artillery units must consider the probability of air and ground attack and take appropriate security measures. For general principles of security see FM 100–5; for protective measures of individuals and small units see FM 21–45.

SECTION IX
ARTILLERY AND AIR SUPPORT

62. REFERENCES. See FM 100–20 for doctrine of employment of air power.

63. AIR-ARTILLERY COOPERATION. Air force operations in the battle area are planned jointly by the air force commander and the ground force commander. Air forces usually attack targets that cannot be reached by artillery. During the planning phase of air-ground operations the artillery officer of the ground force should be consulted con-

cerning the capabilities of artillery fire. In decisive and critical phases, air forces may reinforce artillery fire. Artillery fire may be used to identify targets or to mark bomb safety lines.

64. AIR PHOTOGRAPHS. Vertical air photographs are of special importance in obtaining locations of enemy artillery. Distribution of information secured from air photographs is expedited by maintaining an artillery officer at the point where they are initially developed.

65. OBSERVATION MISSIONS. High performance airplanes of the air forces may be used to observe and adjust artillery fire, particularly long-range fire. A conference between the observer and a representative of the artillery unit concerned relative to communication and technique is usually necessary to insure success of the mission.

CHAPTER 3
TROOP MOVEMENTS, HALTS, AND BIVOUACS

SECTION I
GENERAL

66. REFERENCES. For the basic doctrine governing troop movements, see FM 100–5. For technical and logistical data pertaining to troop movements, see FM 101–10. For detailed treatment of motor movements, see FM 25–10. For details of march hygiene, see FM 21–10. For check lists for march orders and march tables, see FM 101–5. For details of marches of artillery battalions and batteries, see FM 6–101.

SECTION II
ARTILLERY ON THE MARCH

67. GENERAL. When the command marches in multiple columns each column usually includes some artillery. Artillery is attached to the march group until centralized control is ordered by a higher headquarters. Artillery reconnaissance, survey, and liaison personnel habitually march with forward elements of the command. Marches may be classified according to the imminence of contact, and according to whether the march is made during daylight or at night.

68. DAY MARCHES. During the day, when the column is marching in the presence of the enemy, the disposition of artillery units in the column is determined by tactical considerations, time and space factors, the road net, and condition of the roads.

69. NIGHT MARCHES. Artillery is of little combat value during a night march. Consequently, at night artillery units usually march at the tail of the combat elements of the main body during an advance and at the head of the combat elements during a retrograde movement. If the night march is to extend beyond daybreak, the artillery is located to facilitate its possible action after daybreak.

SECTION III
ARTILLERY WITH MARCH SECURITY DETACHMENTS

70. ADVANCE GUARD ARTILLERY.

a. Strength. The strength of the advance guard artillery depends upon the ability of the artillery with the main body to occupy positions to support the advance guard when contact is made and the advance guard is deployed. If the artillery with the main body cannot support the advance guard, some artillery is attached. Usually one battery of light artillery is attached to an advance guard of one basic infantry (cavalry) (armored) battalion. This battery should be reinforced by liaison personnel and equipment and a section from the ammunition train. For larger advance guards, a battalion may be attached. Medium artillery is attached to the advance guard artillery if its early employment is foreseen.

b. Dispositions. The artillery of the advance guard should be located so that it can enter action promptly, and so that other elements of the advance guard can protect it from enemy surprise attacks. The commander of the advance guard artillery marches with the advance guard commander. Reconnaissance and survey personnel of advance guard artillery accompany the leading elements of the column. When the advance guard deploys, its artillery occupies position to cover the deployment.

71. REAR GUARD ARTILLERY.

a. Strength. The rear guard should be especially strong in artillery. Less than a battalion is seldom attached to the rear guard of a division; medium artillery should be included.

b. Dispositions. Rear guard artillery usually marches by bounds in the interval between the main body and the rear guard. The commander of the rear guard artillery marches with the commander of the rear guard. When the rear guard is deployed, the rear guard artillery occupies positions to permit early delivery of fire on hostile columns.

72. FLANK GUARD ARTILLERY. The employment of artillery with a flank guard is similar to the employment of advance guard artillery. When no artillery is attached, the artillery of the main body is so disposed as to facilitate prompt support of the flank guard.

SECTION IV
RAIL AND WATER MOVEMENTS

73. REFERENCES. For general procedures governing movements by rail and water, see FM 100–5.

For technical and logistical data pertaining to rail and water movements, see FM 101–10. For check list for orders and for entraining and detraining tables, see FM 101–5. For the general organization, operation, and control of rail and water transportation, see FM 100–10. For details of artillery movements by rail and water, see FM 6–101 and AR 55–145.

SECTION V
MARCH HALTS AND BIVOUACS

74. **ARTILLERY DURING MARCH HALTS.** When the command makes a long halt during a march in the presence of the enemy, the advance, flank, and rear guards establish march outposts. Units of the support occupy critical terrain features, establish outguards, and send out patrols. Antiaircraft and antimechanized defense are stressed.

75. **ARTILLERY IN BIVOUAC.** When the command bivouacs in the presence of the enemy, an outpost is organized (FM 100–5). The column commander assigns bivouac areas to artillery units in his column. Artillery positions are selected primarily to permit support of the outpost line of resistance. Positions are prepared for all-round defense. Installations are dispersed. The positions should permit fire on the probable routes of approach and on critical areas that cannot be covered by infantry weapons. The artillery attached to the outpost usually occupies position. The commander of the artillery establishes his command post near that of the outpost commander. Defensive fires are prearranged; liaison, observation, and communication are established.

CHAPTER 4
OFFENSIVE COMBAT

SECTION I
ARTILLERY IN OFFENSIVE COMBAT

76. GENERAL. See FM 100–5 for general doctrine governing offensive combat.

77. POSITIONS.

a. General. Artillery positions in offensive combat are located well forward, to exploit the range of the weapons and to facilitate cohesion of command posts of supporting and supported units. A field artillery battalion usually occupies a position in the zone of action of the unit it supports. Artillery that has been attached to a corps or division and that will revert upon reaching the limit of its range from initial positions, is usually emplaced farthest forward.

b. Meeting engagements. When the advance guard deploys, any artillery attached to it occupies position at once to cover the deployment; usually the remainder of the artillery of the column also occupies position immediately to furnish support. Units that have occupied positions during the advance guard action may have to displace early in order to be in forward positions to support the attack by the time it jumps off. The artillery moving to positions should be given priority on roads. The

early employment of observation battalion reconnaissance and survey elements is desirable.

c. Attack of organized position. The bulk of the artillery supports the main attack and, in general, occupies positions behind it. If the main and secondary attacks are sufficiently close together, the positions should permit the bulk of the artillery to support the secondary attack also. Artillery in position during the operations preceding the attack may have to displace laterally to occupy positions for the support of the main attack.

78. **CONTROL.** When communications exist through which the division, corps, or force commanders can direct quickly the fire of the bulk of the artillery, control is centralized. When such communications do not exist, control is decentralized. Control of artillery should be centralized as quickly as possible in order that the force commander may have available a mass of fire power to be employed as the situation dictates. In an advance guard action and in a meeting engagement, control is of necessity decentralized. During the progress of the development of a position, centralized control is developed as the situation stabilizes. Prior to the preparation, control is centralized and remains so initially during the attack. As the attack develops and units such as an encircling force become separated from the main attack, control will again become decentralized or partially decentralized.

79. **ARTILLERY FIRES.**

a. In support of advance guard. In the advance guard action, artillery fires are executed to cover the deployment of friendly troops and to disrupt the movement of enemy formations to meet the at-

tack. Artillery missions include interdiction of routes and assembly areas, neutralization of enemy artillery, fires on enemy forward elements, and the attack of other targets of opportunity.

b. Preliminary combat to develop hostile main position. When the leading troops have gained contact with the enemy covering forces, the bulk, often all, of the division artillery is committed. Corps artillery is engaged as soon as possible. Special attention is paid to protecting the leading troops from counterattack. If a minor break-through operation is necessary to drive in the covering forces, artillery should be a part of the task force assigned that mission; other artillery supports the operation with particular attention to the flanks of the break-through. The bulk of the artillery, displaced forward after the covering forces have been driven in, usually remains silent prior to the preparation to maintain secrecy.

c. Artillery preparation.

(1) GENERAL. An artillery preparation, a system of intensive fires delivered during the period immediately before the infantry crosses the line of departure, is designed to secure domination over hostile artillery and infantry. All artillery participates in the preparation.

(2) PREARRANGEMENT. Fires prearranged as to location and time are usually limited to known targets and to areas that are strongly suspected of containing remunerative targets. Certain units are assigned additional missions of attacking targets of opportunity discovered too late to be included in the prearranged fires.

(3) DECISION TO FIRE PREPARATION. The force commander decides whether a preparation is to be fired. He considers whether—

(*a*) A sufficient number of remunerative targets will be accurately located in time for preparing the fires.

(*b*) The probable effect of the preparation will justify the attendant loss of tactical surprise.

(*c*) The ammunition supply is adequate.

(4) DURATION. The force commander also decides the duration of the preparation. In general, a preparation should be long enough to accomplish the effect sought, but not so long as to permit the enemy to change his major tactical dispositions in time to meet the attack. The duration may be governed by the ammunition supply.

(5) MISSIONS DURING PREPARATION. The number of phases, length of phases, and missions are varied to fit the particular situation. In a three-phase preparation the missions might be as follows:

(*a*) *First phase.* During the first phase the corps artillery, reinforced as necessary by division artillery, gains ascendancy over the hostile artillery; units not required for counterbattery interdict routes and neutralize enemy systems of command, signal communication, and observation.

(*b*) *Second phase.*

1. Corps artillery maintains neutralization of that hostile artillery neutralized during the first phase; executes counterbattery of enemy artillery located after the preparation starts.
2. Division artillery neutralizes enemy systems of command, communication, and observation; neutralizes defensive areas, reserves, and assembled mechanized units; destroys obstacles.

(*c*) *Third phase.*

1. Corps artillery continues counterbattery. Corps artillery units not required for counterbattery reinforce the division artillery in neutralizing enemy defensive areas and smoke enemy observation.
2. Division artillery delivers massed fires successively on defensive areas in the forward portion of the enemy position, with priority to known defensive elements that most seriously threaten the success of the attack.

(6) ARTILLERY PREPARATION IN ATTACK OF ORGANIZED POSITION. In an attack of an organized position, the artillery must batter the enemy strength to the point of complete collapse before friendly infantry is committed to the assault. Profitable targets are located by interpretation of air photographs, by sound ranging and flash ranging, and through other intelligence agencies. If the secondary attack is to be launched prior to the main attack, the preparation on the front of the secondary attack precedes that on the front of the main attack; it is participated in only by artillery whose positions are such that firing from them will not disclose the location of the main attack.

(7) ARTILLERY PREPARATION FOR PENETRATION. The artillery preparation preceding a penetration is in general longer and more violent than that preceding an envelopment. The bulk of the preparation fires is placed on the front and flanks of the intended penetration. In its final phase the preparation maintains ascendancy over hostile artillery in order to minimize any counterpreparation.

d. During attack.

(1) During the attack artillery fires are delivered to—

(*a*) Assist the advance of the infantry by attacking defensive areas and emplaced weapons.

(*b*) Assist the infantry in gaining fire superiority on each successive objective, so that the leading echelons can close to assaulting distance.

(*c*) Protect the supported units during periods of reorganization.

(*d*) Assist in breaking up counterattacks. This requires that concentrations on likely areas and routes for counterattacks be prearranged so as to mass artillery on the counterattack before it gets under way.

(*e*) Continue the neutralization of hostile observation.

(*f*) Continue the neutralization of hostile artillery.

(*g*) Prevent the enemy from disengaging his forces.

(*h*) Assist the supported units in holding the ground gained.

(2) These fires may be in the form of successive concentrations, rolling barrages, or a combination of both.

(*a*) Successive concentrations on known or suspected enemy locations are used when the hostile dispositions are either known or can be deduced accurately from a study of the terrain.

(*b*) A rolling barrage is utilized when information of enemy dispositions is insufficient to justify successive concentrations and when ammunition is plentiful.

80. REGISTRATION.

a. **Advantages and disadvantages.** Registration increases the accuracy of subsequent fires, permits placing unobserved fires closer to friendly troops than would otherwise by justifiable, and saves ammunition. Unrestricted registration discloses the artillery positions and thereby reveals the deployment of the force, indicates the commander's intentions, and invites untimely neutralization of our artillery. The disadvantages of registration can be minimized by using special registration positions (FM 6–40), by keeping the number of registering batteries to the effective minimum, by registering as late as practicable, or by registering many units simultaneously.

b. **Decision as to registration.** The force commander makes the decision as to whether registration will be restricted or prohibited. It is rarely necessary to prohibit registrations completely. When registrations are restricted, the force commander determines the time they may begin and time by which they will be completed.

c. **Procedure.** The technique of registration is covered in FM 6–40. Coordination with the supported unit is necessary to prevent registration fires from endangering friendly covering forces and patrols. Units that have not been able to fire prior to becoming actively engaged should register at the first opportunity that presents itself during the action.

81. PREPARATION FOR ATTACK. Preparations that the command makes before the occupation of final assembly positions include the systematic organization of ground observation, the completion of the signal communication system, organization

of the command for combat, organization of the ammunition supply, assembling supplies and equipment in forward areas, the movement of the artillery into position, and the coordination of the supporting fires of all arms. Engineer units clear obstacles and assist in the movement of tanks, artillery, and heavy transport. Operations that might reveal the attacker's plan must be carried out secretly or deferred as long as possible.

SECTION II

ARTILLERY IN DEFENSIVE-OFFENSIVE

82. **GENERAL.** See FM 100–5 for the general doctrine governing defensive-offensive operations.

a. Defensive phase. The amount of artillery supporting the defending force is the minimum necessary for the successful execution of the defensive mission. The remainder of the artillery is usually held in reserve in locations that provide positive concealment; or a part may be emplaced in concealed positions to support the contemplated attack and required to remain silent during the defense.

b. Counteroffensive phase. The artillery is employed as in offensive action. The following factors are essential to the effectiveness of its employment:

(1) A thorough knowledge of the counteroffensive plan.

(2) Complete preparations, to include observation, positions, routes, survey, prearrangement of fires, and coordination of fires with those of other arms.

(3) A careful computation of time and space factors.
(4) Secrecy of execution.

SECTION III
ARTILLERY IN PURSUIT

83. EMPLOYMENT OF ARTILLERY IN PURSUIT. See FM 100–5 for general principles relating to pursuit.

a. Direct-pressure force. Often some of the artillery supporting the direct-pressure force must be attached to the elements that are making the most progress. Long-range artillery remains under centralized control. Its missions include interdiction of routes of retreat.

b. Encircling force. Artillery with an encircling force is nearly always attached. In general, considerations of fire power, mobility, and ammunition supply make the 105-mm howitzer the most suitable weapon. Other considerations permitting, the units that are least actively engaged are selected. The supply of ammunition and fuel to the encircling force artillery must receive major consideration.

CHAPTER 5
DEFENSIVE COMBAT

84. DEFENSIVE COMBAT. See FM 100–5 for discussion of defensive principles.

85. ARTILLERY POSITIONS.

a. Location. Artillery positions are usually in the sector of the supported unit and are echeloned in depth. All light artillery and all medium howitzers must be able to fire immediately in front of the main defensive area. The bulk of the light artillery must be able to place defensive fires and support counterattacks throughout the depth of the defensive position. The positions of forward units are usually selected to facilitate counterbattery, interdiction, and harassing fire. The positions of other units are echeloned in depth to provide flexibility of fire and to permit continuity of support in case artillery in forward positions is forced back by local successes of the enemy. Gun units are given priority in choice of positions. Natural tank obstacles are considered, particularly in the assignment of positions to heavy artillery.

b. Occupation and organization. Positions are occupied with maximum secrecy. In addition to the usual measures taken upon occupying position, lateral circuits are usually laid to provide alternate communication; principal circuits are buried when practicable; and alternate command post locations are prepared.

c. Preparations for units not in position. Preparations for the artillery initially attached to covering

forces and for reinforcing artillery coming in later are made by units already in position, or by advance parties from the attached reinforcing units.

d. Alternate and temporary positions. To remain in action in the face of hostile superiority, artillery must exploit its mobility. Alternate positions must be prepared to which batteries move when there are indications that the occupied positions have been discovered. Dummy positions are prepared for deception. Temporary and dummy positions may be used for interdiction and harassing fire in quiet periods, and are habitually used for registration.

86. ARTILLERY SUPPORT OF COVERING FORCES. Strong artillery support is attached to the advanced mobile covering forces; suitable mobile weapons with the longest range should be included. If the general outpost is beyond the effective supporting range of direct-support artillery emplaced in the battle position, artillery from the main force is attached. Upon withdrawal, artillery attached to the advanced covering force or to the outpost is released from attachment when it reaches the main battle position.

87. PHASES OF ARTILLERY FIRES. Artillery fires in support of defensive combat are usually divided into four phases:

a. Fires delivered before the enemy forms for attack.

b. The counterpreparation.

c. Fires to break up the attack after it is launched, final defensive fires, and fires to continue neutralization of the attacking force.

d. Fires to support counterattacks.

88. FIRES DELIVERED BEFORE ENEMY FORMS FOR ATTACK.

a. Time of opening fire. Time of opening fire is decided by the force commander, except for artillery units supporting the outpost. Premature firing exposes the artillery to neutralization and may reveal the scheme of defense of the force. In general, the bulk of the artillery remains silent until dangerous or highly remunerative targets are discovered.

b. Positions. Units required to fire prior to counterprepartion should do so from positions other than those from which they are to deliver counterpreparation fires.

c. Registration. Registration is highly important (see par. 80).

89. COUNTERPREPARATION.

a. Definition. A counterpreparation is a system of intensive prearranged fire delivered when the imminence of the enemy attack is discovered. It is designed to break up enemy attack formations; disorganize the enemy's systems of command, communication, and observation; decrease the effectiveness of his artillery preparation; and impair his offensive spirit. Counterpreparations may be general or local.

(1) General counterpreparation is planned to meet a general attack. It involves the entire front; all of the artillery participates. Since the enemy may launch his main attack from any of several areas, planning more than one general counterpreparation may be necessary; in this case each is given a specific designation.

(2) Local counterpreparation involves only that part of the front that is threatened by a local attack.

In the army (corps) the term "local" applies to a counterpreparation fired by one or more, but not by all, of the front-line corps (divisions); a division is the smallest unit to execute a counterpreparation.

b. Authority to fire counterpreparation. The attacker may be expected to use every artifice to induce the defender to fire his counterpreparation prematurely. Such premature firing furnishes the enemy with counterbattery data for his artillery preparation, indicates to the enemy what areas are to be avoided in forming for the attack, and expends ammunition that may not be replaceable. On the other hand, the counterpreparation must be fired in time to meet the attack. The order to fire a counterpreparation requires a command decision; the military intelligence upon which the decision is based must be reliable and prompt.

c. Missions in counterpreparation.

(1) GENERAL. Essential to the success of the counterpreparation are counterbattery, the disruption of the enemy's systems of command and communication, and the neutralization of tank assemblies.

(2) MISSIONS OF ECHELONS. In general, the counterpreparation missions of the various echelons are—

(*a*) *Corps artillery.* Counterbattery; reinforcing the fires of the division artillery.

(*b*) *Division artillery.* Neutralization of known or suspected routes and assembly positions of troops forming for the attack; enemy systems of communication, observation, and command; hostile forward elements; known or suspected assemblies of tanks and reserves. Division medium howitzers may reinforce the corps artillery counterbattery.

90. FIRES TO BREAK UP ATTACK AFTER IT IS LAUNCHED. Should the enemy succeed in launching his attack, the artillery delivers intensive massed fires against the main attack. It keeps the enemy under fire by defensive concentrations on his attack echelons and reserves. Counterbattery is continued. Profitable targets of opportunity are attacked; special attention is paid to enemy mechanized elements. As the enemy approaches the forward defense areas of the supported unit, normal barrages and other final defensive concentrations are fired on call. Should the enemy succeed in penetrating the position, concentrations are fired to disorganize his forces and stop their progress.

91. FIRES IN SUPPORT OF COUNTERATTACKS. Concentrations in support of local counterattacks are prearranged to the greatest extent practicable. A general counterattack is given maximum artillery support, which usually includes an artillery preparation. Secrecy is paramount.

92. COORDINATION OF ARTILLERY FIRES. Fires are prearranged to the maximum and are coordinated both laterally and in depth throughout the defensive sector. Except for initial attachments to covering forces, the artillery is held under centralized control in the defense, so that fires can be massed on critical areas at critical times.

93. ARTILLERY SUPPORT OF REAR POSITION. In preparing the defense, the force commander may designate a rear position to which the force will move in case a withdrawal becomes necessary. The rear position is at such distance from the battle position that the enemy must regroup his forces and displace

his artillery before resuming the attack. When a rear position is designated, the artillery reconnoiters and prepares positions and observation.

CHAPTER 6

ARTILLERY IN RETROGRADE MOVEMENTS

94. GENERAL. See FM 100–5 for general principles relating to retrograde movements.

95. NIGHT WITHDRAWAL. In a night withdrawal, artillery sufficient to keep up the appearance of normal activity is left in position in direct support of the outpost elements. When only organic artillery has been present, one battery per battalion is appropriate support. When reinforcing artillery has been present, the amount of artillery left in position is proportionally increased. Parts of the liaison and observation systems remain in operation. Units remaining must be well supplied with ammunition. The fires of the artillery left in position are as nearly as practicable the same in quantity and type as those previously executed by the artillery of the force. The artillery left in position withdraws just before the outpost elements. Artillery which is not to remain in position is usually withdrawn shortly after dark, moving to assembly points where march columns are formed, or to positions from which it will support a new defensive position. All of this artillery may move at one time when the road net permits; otherwise, priority is usually given to the heavier artillery.

96. DAYLIGHT WITHDRAWAL. The force commander designates a general covering force, mobile

and strong in fire power. Local commanders designate local covering forces to assist their firing lines in breaking off the engagement. Some artillery is attached to the general mobile covering force; at least a battalion is desirable. The artillery of the main force displaces by echelons and furnishes continuous support as the main force withdraws. In exceptional cases artillery may be attached to local covering forces. The corps artillery is moved to the rear early in order to clear the routes of withdrawal.

97. DELAYING ACTION. The artillery is placed well forward behind the first main position to permit long-range fire. Close support of a delaying position usually is not important. If a daylight withdrawal is anticipated, the artillery is disposed in depth, with some of it in rear of the next position. When all of the artillery is emplaced well forward behind the first delaying position, a portion of it must be withdrawn early to cover the displacement of the remainder. Artillery reconnaissance for positions after displacement to the rear must be initiated as soon as the forward position is occupied. Each delaying position should be located to provide adequate ground observation for the artillery. When practicable, control of the artillery in rear of each position is centralized, to permit massing of all artillery fire on critical points.

98. RETIREMENT. Sufficient artillery is provided the flank and rear guards to support them in the execution of their missions. If the enemy presses his pursuit, the remainder of the artillery is so disposed in the column or columns as best to protect the main body or to furnish additional support for

the security detachments (see pars. 81 and 82). Otherwise, the bulk of the artillery may precede the main body in order to clear the routes.

CHAPTER 7

ARTILLERY IN SPECIAL OPERATIONS

99. GENERAL (FM 100–5). Special operations are those in which terrain, weather, or nature of the operation create the need for special measures and techniques.

100. ARTILLERY IN SUPPORT OF RAID. Artillery fires in support of a raid are prearranged and must be closely coordinated with the plan of action of the supported unit. They may include counterbattery, neutralization of hostile reserves, neutralization of known or suspected elements of the position to be raided, interdiction of routes leading to the area, concentrations and barrages to isolate the area, and protective concentrations to cover the withdrawal.

101. ARTILLERY SUPPORT OF NIGHT ATTACK. The artillery completes the necessary survey, establishes liaison, and prearranges fires before dark. Plans must be simple. Fires include counterbattery, fires to deceive the enemy as to location of attack, fires to cover noise made by attacking troops, fires to orient attacking troops, protective fires during the infantry reorganization of the objective, fires to break up enemy counterattacks, and fires to cover a withdrawal. If a preparation is fired, it is usually short and intense.

102. ARTILLERY SUPPORT OF RIVER CROSSING.

a. General. Positions are well forward. Some of the artillery may occupy positions from which it can support both a feint and the main crossing. Secrecy is furthered by the selection of concealed positions, careful planning of march serials, postponing occupation of positions as long as practicable, and limiting or prohibiting registration.

b. Attack of first objective. If the probable effect outweighs the advantage of secrecy, an artillery preparation may be fired; otherwise, all fire is normally held until the leading attack waves have been discovered. Artillery observers and reconnaissance details accompany the leading waves.

c. Attack of second objective. As soon as the leading elements of the supported unit advance from the first objective, the artillery begins displacing across the river. It generally displaces by battery, using ferries. The first artillery units to cross are attached to the supported unit until the bulk of the artillery has crossed.

d. Attack of third objective. The bulk of the artillery should be ready to render continuous support from positions on the enemy side of the river. Centralized control is highly desirable.

103. ARTILLERY IN DEFENSE OF RIVER LINE.

A river may be employed as an obstacle in front of a defensive or delaying position, or in conjunction with a defensive-offensive operation.

a. When river line is employed as obstacle. The artillery is employed as in the defense of a position except that usually only a part of the artillery is emplaced initially to cover the most likely crossing places, probable assembly areas, and avenues of ap-

proach. The remainder is held in reserve to support the defense when the location of the main crossing is discovered. The enemy will employ every subterfuge to cause the defending artillery to open fire and thus disclose its positions. To defeat these attempts, some units may be directed to open fire only on orders of higher headquarters.

b. When river line is aid to defensive-offensive. In this case, some artillery is attached to the outpost detachments. It is employed as in the support of an outpost of a defensive position. Platoons or batteries are emplaced in concealed positions to cover the probable points of crossing and the approaches to them. These units remain silent until suitable targets present themselves; then they deliver surprise fire. The mass of the artillery is held in reserve, prepared to support the defensive-offensive. The artillery plans usually cover two phases: First, the support of the outpost detachments where a hostile crossing is being made; second, support of the main force in its counteroffensive. In the first phase, the artillery occupies positions from which it can concentrate against the hostile points of crossings, bridges under construction, and hostile approaches to the river. In the second phase, the artillery is employed as in the support of an attack.

104. ARTILLERY OPERATIONS IN SNOW AND EXTREME COLD. Operations in snow and extreme cold are covered in detail in FM 31–15. The measures necessitated by snow and extreme cold are technical rather than tactical. In deep snow it may be necessary to replace trucks with track-laying vehicles and to place runners under wheels. The use of trail-breaking vehicles to pack roads and trails in advance of wheeled or track-laying vehicles

is recommended. The value of pack units is seriously impaired when the depth of snow exceeds 20 inches. In extreme cold, special lubricants must be provided for weapons and instruments; recoil oil is warmed before use, unless special recoil oil is provided.

105. ARTILLERY IN MOUNTAIN WARFARE. In forces operating in mountainous terrain it is desirable that a portion of the artillery be pack units for operating off the main route. Other artillery, so far as practicable, should be capable of high-angle fire. Interdiction and fires on enemy assembly areas are particularly effective because the points that the enemy is compelled to pass and the areas in which he will form for attack may be determined usually by a study of the terrain. Observers are echeloned in altitude as well as in width and depth. Control of artillery is generally decentralized.

106. ARTILLERY IN JUNGLE WARFARE. Jungle warfare is covered in FM 31–20. The jungle affects artillery employment by restricting observation, movement, and supply. Light artillery may be transported by air to the general vicinity of position areas. Movement by other means is generally restricted and slow. Methods of transport include motor, pack animal, draft animal, barge, boat, improvised handcart or sled, and manpower. Great reliance is placed in forward observers with the foremost infantry elements. These observers are often required to adjust fires by estimating the location of bursts by sound (by ear, not mechanically). Suitable battalion and battery observation posts are seldom found. Observation from boats offshore may be feasible in coastal regions. Air observation

and sound-ranging are sometimes practicable. Communication is relatively restricted and slow. Wire is the principal means of ground communication. Control of artillery is often decentralized. High-angle fire and adjustments close to friendly troops are often necessary.

107. ARTILLERY IN DESERT WARFARE (FM 31–25). The field artillery uses its normal types of fire and fire direction in desert warfare. Fire by direct laying is important. Security against ground attacks is stressed. Dispersion is the primary means of passive defense against air attack and counterbattery. Ground observation is frequently limited to 2,000 yards by undulations in the terrain and by shimmering atmosphere. Air observation, sound ranging, and flash ranging are employed to the maximum.

108. LANDING OPERATIONS (FM 31–5). Landing operations and the attack of coast lines involve joint action by the Army and Navy; they are governed by special regulations.

109. ARTILLERY IN DEFENSE OF COAST LINES (FM 31–10). The bulk of the subsector field artillery must be able to oppose a hostile main attack and to support a counterattack by the subsector reserve. Until the location of the main attack is known, a large part of the artillery is emplaced initially to support the outposts actively engaged; the amount so emplaced depends on the mobility of the artillery and on the road net. The initial positions should be near roads to facilitate prompt displacement. Light artillery supporting the outposts is placed well forward in the probable landing areas

to execute fire by direct laying on enemy landing craft, support organized tactical localities along the shore line, and enfilade critical areas of the beach. The remainder of the artillery may be held in reserve or emplaced in depth to support the defensive position.

110. ARTILLERY IN ATTACK OF FORTIFIED LOCALITY.

a. General. Attack of fortified areas is covered in FM 31–50. A fortified position is a defense area which contains numerous steel, concrete, or other permanent defensive works. Depending on its extent and depth, the position may be classified as a fortified locality, a fortified line, or a fortified zone. A fortified locality is a single, strongly organized defensive work; a series of fortified localities disposed in great depth and breadth constitute a fortified zone. A fortified zone may be outposted by a fortified line, or by less highly organized tactical localities.

b. Intelligence. Artillery units exploit fully all intelligence agencies to determine in detail the location of all elements of the hostile position. The production, interpretation, and distribution of air photographs is absolutely essential in order that enemy defensive installations and artillery positions may be plotted on firing charts and neutralized during the preparation and attack.

c. Control. The control of artillery units assigned direct-laying missions is decentralized. Such missions are usually carried out by single weapons attached directly to assault detachments. The bulk of the artillery is held under centralized control in order that massed fire may be employed against enemy artillery, critical areas, and counterattacks.

d. Reduction of outpost. Part of the heavy artillery assists the preliminary operations by constant bombardment of the hostile main position, paying particular attention to hostile artillery which can bring fire to bear upon the troops engaged. The remainder of the artillery furnishes close support to the assault echelons. Supporting fires conform to the movements of the assault units. The heavy calibers place fire on emplacements, massive obstacles, and wire entanglements in the outpost system; flat-trajectory weapons with high muzzle velocity employ direct laying against embrasures. Fires are also placed on flank positions and troop emplacements not being attacked, and particular attention is paid to locating and bringing fire to bear on hostile mechanized elements and local reserves forming for counterattack. A rolling barrage may be employed to support the attack and crater the terrain.

e. Support of break-through. The amount of ammunition and artillery available, the degree of surprise possible, the amount of hostile artillery present, and the depth of the fortifications on the front of the penetration determine the length and intensity of the preparation. Prior to the hour of the attack, the bulk of all supporting fires is concentrated on the front of the initial penetration. Heavy and medium artillery are concentrated on points in the fortifications that offer the greatest danger to the success of the attack; the flat-trajectory weapons are employed against loopholes in the fortifications. Smoke is used extensively. When the preparation is completed, the bulk of the artillery fire is shifted to those areas from which fires can be delivered against the initial assault. Because an enemy in a fortified locality is able to organize and launch counterattacks with unusual rapidity, particular

attention is paid to the support of the units extending the flanks of the gap. Once the break-through of the entire locality has been effected, highly mobile artillery is attached to mobile reserves pushed through the gap, while other artillery supports the units that are keeping the gap open.

111. ARTILLERY COMBAT IN TOWNS (FM 100–5).

a. General. Built-up areas, such as towns and villages, offer concealment for troops and weapons and protection from fire and mechanized attack. Since the characteristics of town and village fighting favor the defense, the attacker will usually seek to bypass strongly defended towns rather than make a direct attack.

b. Phases of attack on towns. The attack on a town consists of two phases: First, the capture of an initial position, the possession of which will cut off flat-trajectory fires and limit enemy observation outside the area; second, the advance through the built-up area.

(1) FIRST PHASE. Artillery is used as in the attack of an organized position (ch. 4). Control of the artillery is centralized. The attack is usually preceded by a preparation.

(2) SECOND PHASE. A portion of the artillery may be attached to assaulting units to furnish support by direct laying. Such missions are best performed by tanks, tank destroyers, or infantry cannon weapons. Such weapons should be used if available. The bulk of the artillery should be held under centralized control, available for massed employment against critical areas and against the defender's artillery.

c. Defense of towns. The employment of artillery in the defense of towns is similar to its employment in the defense of an organized position. It is disposed in depth and held under centralized control. Initially, all or part of the artillery may be emplaced well forward to support the outpost. During the attack the massed fire of artillery units should be employed against hostile penetrations and in support of counterattacks.

CHAPTER 8
SUPPLY AND EVACUATION

SECTION I
AMMUNITION SUPPLY

112. GENERAL. Details of supply procedure are covered in FM 100–10 and 101–10. For duties and responsibilities of artillery commanders and staffs in supply, see FM 6–100 and 6–101.

113. CLASS V SUPPLY.

a. General. The supply of ammunition for large units is ordinarily on a credit basis. Distribution is normally made by battalion ammunition trains operating directly from army supply points to battalion position areas.

b. Estimate of requirements. The artillery officer of the echelon conducting the operation makes the estimate of ammunition requirements. He confers with the G–4 and the ordnance officer of the echelon in drawing up his recommendation. He maintains close liaison with them to insure prompt and appropriate changes in allocations, to recommend initial locations and changes in locations of ammunition supply points, and to make certain that adequate stockages are maintained at the supply points.

c. Allocation. The force commander allocates artillery ammunition upon recommendation of the artillery officer. The allocations depend on amount available, type of operation, the missions assigned to the different subordinate echelons, and, in some

cases, on the proportion of credit that is to be retained as a reserve.

d. Information on ammunition supply. Artillery commanders must promptly transmit to their staffs and subordinate commanders information concerning—

(1) Allocations.
(2) Location and hour of opening of ammunition office and supply point.
(3) Procedure in drawing ammunition.
(4) Restrictions as to routes or time of drawing.
(5) Amounts to be dumped at gun positions.
(6) Time of submission of ammunition reports and the periods they are to include.

e. Haulage of ammunition. The artillery ammunition supply plan must provide sufficient ammunition to enable the unit to execute all required missions from a given position, displace with its normal loads intact, and leave little, if any, ammunition behind. Haulage plans should permit delivery to the unit of all ammunition that it will expend prior to displacement.

f. Ammunition dumps. The order prescribing the establishment of an ammunition dump includes its location and the amount of ammunition to be stocked there. Prior to prescribing that dumps be established, the artillery commander obtains the approval of the force commander. The location should be beyond the range of hostile light artillery.

g. Ammunition reports. Ammunition reports are of great assistance in the preparation of estimates of ammunition requirements, stockages at supply points, traffic, and transportation needs. The reports detail the ammunition status at the beginning of the period, the receipts and expenditures during the period, and the balance on hand at the close of

the period. Consolidation of reports is made at each echelon headquarters prior to forwarding a report to the next higher artillery commander. A copy of the consolidated report is furnished to the echelon G–4 and to the ordnance office. Reports are expedited if battalions are required to submit a report of expenditures only.

SECTION II
MAINTENANCE AND SALVAGE

114. MAINTENANCE. Corps ordnance repair units inspect damaged artillery matériel and either repair or replace it. Division ordnance units are usually equipped to furnish only inspection service and to make minor repairs of artillery matériel. First and second echelon maintenance of motor transportation are functions of the combat unit (FM 25–10). Higher echelon maintenance is performed by the ordnance (FM 9–5). Damaged vehicles, after inspection, are either repaired or replaced.

115. SALVAGE.

a. General. The prompt salvage of equipment which has been abandoned on the battlefield and in bivouac areas, exploitation of captured supplies, and utilization of waste materials are important measures for conservation of military resources (FM 100–10). Salvage points are designated in administrative orders and are operated by the quartermaster. Unit commanders are responsible for the collection of salvage within their areas and for its delivery to salvage points. The S–1 section compiles and forwards reports of captured and salvaged materials. The S–4 section is charged with collection

and delivery to the salvage point. Salvage operations must never be permitted to impede normal combat or supply functions.

b. Salvage of ammunition. The difficulties of ammunition supply make it imperative that ammunition left in abandoned positions and supply installations be salvaged. When an artillery unit must abandon ammunition upon displacing, the munitions officer reports the amount and location to the munitions officer of the next higher echelon.

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