[redacted]

FM 1-26

WAR DEPARTMENT

ARMY AIR FORCES FIELD MANUAL

DEFENSE OF AIRDROMES

20 January 1944

Dissemination of restricted matter.—The information contained in restricted documents and the essential characteristics of restricted material may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or to the press except by authorized military public relations agencies. (See also par. 18*b*, AR 380–5, 28 Sep 1942.)

ARMY AIR FORCES FIELD MANUAL

DEFENSE OF AIRDROMES

CHANGES No. 1

WAR DEPARTMENT,
WASHINGTON 25, D. C., 15 April 1944.

FM 1–26, 20 January 1944, is changed as follows:

29. CHEMICAL WARFARE SERVICE UNITS (Superseded).—*a.* There are several types of supply and service units of the Chemical Warfare Service assigned to duty with the Army Air Forces. These units, when assigned or attached to airdrome installations, have the primary mission of supply, maintenance, and/or technical operations pertinent to tactical use of chemical munitions from aircraft. These units are, however, provided with basic arms to include rifles, carbines, submachine guns, and machine guns for purposes of defense.

b. When defensive measures require defense against chemical attack, particularly when contamination results from enemy use of persistent agents, the Chemical Warfare Service units are available to supervise and assist the trained decontamination crews from base units and to render technical assistance in dealing with major decontamination problems.

[A. G. 300.7 (1 Apr 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION:

As prescribed in paragraph 9*a*, FM 21–6; R and H 1 (3); B 1 (6).

For explanation of symbols see FM 21–6.

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RESTRICTED

FM 1-26

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DEFENSE OF AIRDROMES

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WAR DEPARTMENT,
WASHINGTON 25, D. C., 20 January 1944.

FM 1–26, Army Air Forces Field Manual, Defense of Airdromes, is published for the information and guidance of all concerned.

[A. G. 300.7 (11 Dec 43).]

BY ORDER OF THE SECRETARY OF WAR:

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DISTRIBUTION:

R and H1 (3); Bn 1 (6).
(For explanation of symbols see FM 21–6.)

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ARMY AIR FORCES FIELD MANUAL

DEFENSE OF AIRDROMES

CHAPTER I

GENERAL

■ 1. SCOPE.—This manual is a guide for airdrome commanders, airdrome defense officers, and personnel available for the defense of airdromes. It treats of the local defense of forward-area airdromes, exclusive of counteraction by aircraft, by the personnel, armament, and equipment under the command of the airdrome commander, but much of its subject matter is applicable to the defense problems of any airdrome. It is also intended to serve as a training aid for units designed or assigned for the defense of airdromes. It presents an analysis of the forms of attack to which airdromes may be subjected and of the means and measures which may be taken to defeat such attacks or to minimize their effect.

■ 2. ESSENTIAL CONSIDERATIONS.—*a.* Airdromes are established for the purpose of securing and maintaining air power.

b. The strategic importance of airdromes makes them primary targets for attack. They are subject to sabotage and, depending on their location and the military situation, to attack from the sea, ground, or air. Military employment of the airplane has introduced new methods of destroying installations and personnel by bombing and strafing and of capturing the airdrome itself by airborne attack. The inherent flexibility of air power permits enemy capabilities in a particular theater to change rapidly and frequently.

c. A defense must be prepared to meet hostile action against our airdromes with the view of defeating it in the early stages of operation. Careful attention must be given to all details of both active and passive defense within the capabilities of means made available. When the location

and lay-out of an airdrome are being decided, matters affecting its defense must be given full consideration.

d. The means made available for the defense of an airdrome depend upon the probable forms of attack to which it may be subjected, the effect that its loss or neutralization will have on military or naval operations, and resources of the theater commander.

e. Enemy capabilities have important bearing on the preparations for defense of an airdrome. The most accurate information possible must be obtained concerning the following: the enemy's air power; the number of his bases available and their distances from the airdromes to be defended; the number of his carriers; the distance of the airdrome from his naval bases whether or not he has local naval superiority, whether or not he has local air superiority; and the situation of the ground forces.

■ 3. DEFINITIONS.—*a. Airdrome.*—An airdrome is a landing field at which military facilities for shelter, supply, and repair of aircraft have been provided (AR 95–35). For the purposes of this manual, "airdrome" is considered a generic term for all military landing fields.

b. Security.—Security is the all around protection of the command. It is obtained through effective measures to prevent surprise and interference by the enemy, to insure secrecy for plans and movements, and to retain freedom of action. It involves special measures against espionage, sabotage, subversive activities, attack by hostile aviation (including airborne troops), attack by chemical agents, and attack by ground forces.

c. Local defense.—Local defense is the active and passive defense of an airdrome provided by its commander with the personnel, armament, and equipment under his command. The object of local defense is to enable friendly aircraft to continue to operate from the airdrome, to protect aircraft on the ground, installations, and personnel, and to deny the use of the airdrome to the enemy.

d. Local ground defense.—Local ground defense is the local defense of the airdrome against ground forces or airborne troops. Specifically it excludes counteraction by aircraft or by the fire of antiaircraft artillery against aircraft. Its object is to deny to the enemy the area encompassing all vital buildings, installations, landing fields and dispersal areas, and adjacent terrain from which he could render the airdrome inoperative by aimed small-arms fire.

■ 4. RESPONSIBILITY.—*a.* Responsibility for the security of an airdrome rests with the local airdrome commander. He is directly responsible for the local defense against sabotage, espionage, and attack by organized enemy forces to the extent of the resources under his command. (See FM 100–15.) His responsibility will not be construed, however, as relieving the commanders of his subordinate units of the responsibility of preparing and executing plans for the local security of their organizations and installations. All such plans must conform to the general plan in effect for the security of the airdrome.

b. The defense of an airdrome is also an integral part of the defense of the entire area in which it is located. Theater and defense commanders will allocate local ground defense forces, in excess of available air force units, to the extent necessary for the minimum initial defense of the *air base.* Such forces, in accordance with the decision of higher commanders, may be dispersed to various *airdromes,* partially dispersed, or held in reserve. (See FM 100–15.)

c. In a general battle which develops in an area, responsibility for the defense of the airdrome and all other installations and areas in the vicinity may pass to the local ground force commander who represents the theater or territorial commander. This commander has the final responsibility for the defense of his entire area and must make such dispositions as are dictated by his estimate of the situation, in which all the factors that govern the prosecution of operation at hand will be considered.

■ 5. COMMAND.—The airdrome commander commands all units assigned for the local defense of the airdrome and is responsible for their training and operation. (See FM 100–15.) He normally appoints as defense officer the commander of one of his local ground or antiaircraft defense units and requires him to assume immediate command of all units available, primarily for defense, and to assume in his name immediate responsibility for the training and operation of all troops used in the defense. The airdrome commander will ordinarily discharge his responsibility for the safeguarding of military property and for the prevention of sabotage, espionage, and the compromise of classified information and matériel principally through an intelligence officer (S–2).

CHAPTER 2

FORMS OF ATTACK ON AIRDROMES

SECTION I

GENERAL

■ 6. FORMS OF ATTACK.—All airdromes are liable to sabotage and subversive action, and all within the range of enemy action are liable to external attack. Attacks may occur at any time, singly or repeatedly, for the purpose of neutralization, destruction, or occupation of the airdrome by the enemy to secure a point of departure for further ground or air operations. Attack will normally be characterized by speed and surprise, with means or organization designed to accomplish specific tasks. It is to be expected that the enemy will employ aircraft with demolition, fragmentation, and incendiary bombs, machine guns, automatic cannon, and chemicals; and airborne or ground forces, with armored vehicles, either singly or in combination. If the mission of the enemy is neutralization or destruction, it is to be expected that he will employ chemicals of a persistent or lethal type. Attacks may be classified as sabotage, ground attack, aerial bombardment, airborne attack, and chemical attack.

SECTION II

SABOTAGE

■ 7. FORMS OF SABOTAGE.—Sabotage is the destruction of property or disruption of facilities by stealth or by methods

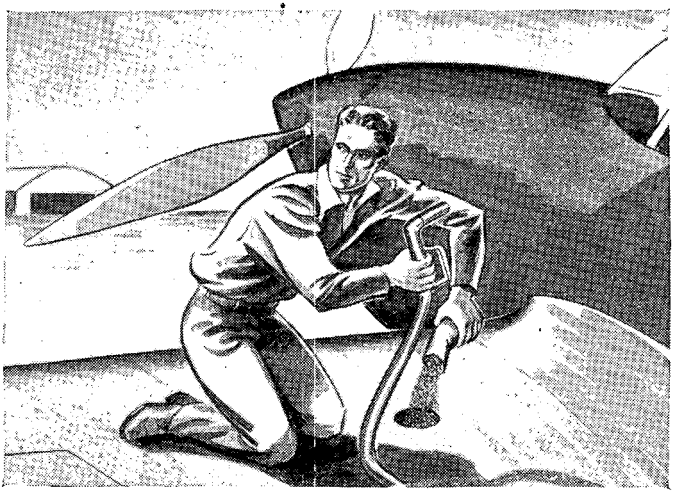

FIGURE 1.—Sabotage.

designed to suggest accident. Typical forms are damage to tools and shop machinery, hidden damage to aircraft to cause failure in flight, contamination of gasoline and oil supplies, disruption of the power system, and widespread and utter destruction by explosives. Methods of sabotage vary widely and are suggested by the habits of personnel and the arrangement of installations as well as by the immediate object of the saboteur. Probably the most effective instrument is fire, especially if it results in the detonation of explosives.

SECTION III

GROUND ATTACK

8. OVERLAND RAIDS.—The most probable ground attack on an airdrome is by mechanized raiding column. Strong hostile armored forces may be encountered 50 to 100 miles behind the general front of the field armies. Overland

raids may come after wide flanking movements or from troops which have assembled after successful infiltration. Such action is probable when the situation at the front is fluid or confused. Attacks may come with little warning and will be rapidly pushed home with a large volume of automatic small-arms fire and light-cannon fire.

■ 9. GENERAL ADVANCE.—The defense of the airdrome against a general hostile advance is the defense of a fixed position or a terrain feature by conventional methods, a responsibility of the territorial commander.

SECTION IV

AERIAL BOMBARDMENT AND STRAFING

■ 10. GENERAL.—The most common form of attack on airdromes is aerial bombardment. Various missiles may be employed—demolition bombs, fragmentation bombs, incendiary bombs, chemical filled bombs, and chemical spray. Strafing by aircraft weapons is a certain component of low-flying attack. The attacks may come from any altitude and from any direction. Harassing attacks may be made to slow down operations or interrupt normal use of the field. Attacks in force, intensive or sustained, may be made to destroy aircraft on the ground, airdrome facilities and installations, fuel reserves, bomb dumps, routes of communication, and personnel, or to neutralize the airdrome through destruction of the runways.

■ 11. HARASSING ATTACK.—Harassing attacks are characterized by surprise, deception, and hit-and-run tactics. The familiar types are minimum altitude bombing and machine-gun and cannon fire by fighter aircraft. The favorite targets are grounded planes. Not only is the airdrome strafed but often the surrounding terrain is thoroughly covered, usually with incendiary bullets. It is likely that extensive attacks will be preceded by careful reconnaissance and planning.

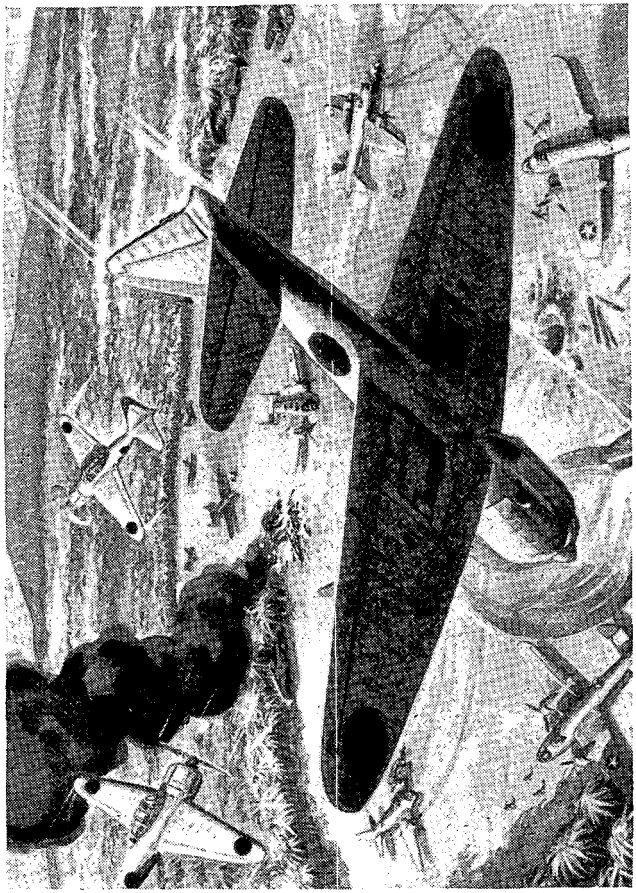

FIGURE 2.—Strafing an airdrome.

■ 12. ATTACK IN FORCE.—Attacks in force are conducted in such strength that their successful completion will bring to an end or seriously weaken the operational use of the airdrome. They may vary from a single intense raid by several flights to sustained high and minimum altitude bombardment and strafing concentrated within a few hours or successfully repeated for many days. A steady flow of aircraft to the attacked area may be expected, with one or two flights coming over the target in rapid succession. Reconnaissance planes will obtain target information, weather data, and probably pictures before the attack and during the progress of a sustained assault. Such attacks may be the beginning of an attempt by the enemy to seize the airdrome for his own use. If so, he is likely to spare the runways as much as possible so that he may land troop carriers when resistance has been sufficiently reduced.

SECTION V

AIRBORNE ATTACK

■ 13. GENERAL.—*a.* Airborne attack culminates in assault by troops landed by parachute or from airplanes or gliders on or near the objective. Its salient characteristic is the speed with which it can develop. Its normal development is as follows: extensive reconnaissance, intense preliminary bombardment and strafing, landing of parachute troops and perhaps glider troops, reinforcement from troop carrier planes, either on or off the airdrome. But any or all phases of the attack may occur simultaneously.

b. If an airdrome within reach of enemy aircraft is located in a strategically important area or if one becomes important because of a large-scale offensive, such an attack must be considered probable.

■ 14. RECONNAISSANCE.—Preparations for airborne attack are normally characterized by great care and thoroughness. The area of the objective will be subjected to extensive and detailed preliminary reconnaissance to determine the extent

and dispositions of troops and to obtain complete and accurate weather information. Reports of secret agents and enemy sympathizers concerning defense installations and military forces in the vicinity and concerning the probable attitude of the civilian population will probably be available to the enemy. During the period of preliminary reconnaissance light bombing and strafing attacks to bring about disclosure of defensive gun positions will probably be experienced. Close observation will normally be continued throughout the attack.

■ 15. FIFTH-COLUMN ACTIVITY.—Prior to the attack, increased activity by enemy sympathizers may be expected.

■ 16. PRELIMINARY BOMBARDMENT.—*a.* Airborne attack on a defended area such as an airdrome will usually be preceded by intense aerial bombardment to destroy defenses which might interfere with subsequent operations. High-altitude bombing will normally be followed by low-level bombing and strafing. All grounded aircraft, antiaircraft artillery, and ground defense installations will be targets of special importance. Antimorale attacks may also be made in which the enemy strafes or bombs indiscriminately. The bombardment and strafing will be continued during the landing of airborne troops. It will be lifted from only the actual landing places.

b. Aerial bombardment may not precede operation of parachute and air-landing troops when they are employed on missions requiring surprise.

■ 17. PARACHUTE TROOPS.—*a.* Parachute troops will normally be employed for the first landing of an airborne attack to seize key points or to destroy definite objectives such as antiaircraft batteries, headquarters, defense positions, and communications systems in preparation for the arrival of air-landing troops. Other functions are to harass and to create diversions and, when they are dropped in small numbers over large areas, to destroy bridges and generally in-

FIGURE 3.—Strafers attacking AA gun.

terrupt transportation, to prevent communications, to disclose targets with signals for bombardment, to cause confusion and panic, and to make contact with enemy sympathizers.

b. Most of the equipment of parachute troops is usually dropped in containers bearing colored markings or attached to colored parachutes to indicate the section to which they belong. This equipment may include machine guns, mor-

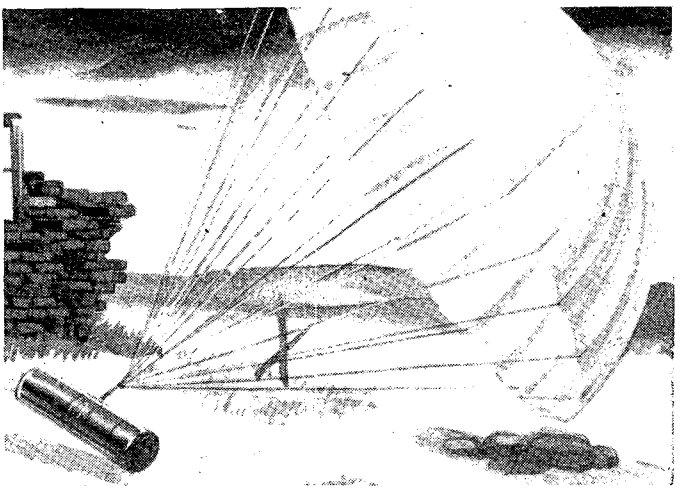

FIGURE 4.—Equipment container (German).

tars, antitank guns, mountain guns, infantry guns, flame throwers, tools, spare parts for the defenders' motor transport, bicycles, motorcycles, and even light cars. Additional equipment and food is dropped on signal.

c. To drop the members of a unit within a small area for quick assembly the carrier planes will approach in formation. The jump will be made from an altitude of 200 to 500 feet so that the descent will require about 20 seconds.

FIGURE 5.—The jump.

It is possible to land a company within an area 250 by 600 yards so that they can be assembled with weapons 10 to 15 minutes after the first man jumps. The troops may first be

landed widely scattered over the locality to confuse, harass, and dissipate the defender's forces. They will not ordinarily be dropped in the midst of defending troops, who can quickly dispose of them before they can free themselves of their harness and assemble, but will normally be dropped in depth around the airdrome or area selected for attack.

d. The first task of parachute troops will be to collect and assemble weapons and munitions dropped separately by parachute and to form their units. Once assembled they become light infantry with high fire power but limited mobility. This fire power can be sustained, however, only by the early reception of supplementary ammunition.

■ 18. GLIDER TROOPS.—*a.* Glider troops are normally employed in support of parachute trops, although they may be used for the first landing. Their tactical missions will normally include the silencing of antiaircraft guns covering the line of approach of troop carriers, the seizure of positions from which they can provide covering fire for the landing of other airborne troops, the provision of storm troops capable of concentrated fire power for the capture of key points, and the disrupting of communications. Objectives of the individual units may be planned as part of a company mission which fits into a detailed plan of attack.

b. Gliders can land where other aircraft cannot—in any area where 25 to 50 yards of reasonably flat surface is available.

c. On landing, the glider troops deplane as rapidly as possible. Reserve ammunition and equipment are left in the glider. If attacked on landing, glider troops quickly take up defensive positions.

■ 19. AIR-LANDING TROOPS.—With the landing of troops carrier planes the fight for the airdrome passes into its third phase. The air-landing troops constitute the main attacking force. Their mission will be to reinforce the parachute troops and consolidate their gains, to attack the more heavily defended positions, and to destroy or drive out completely the

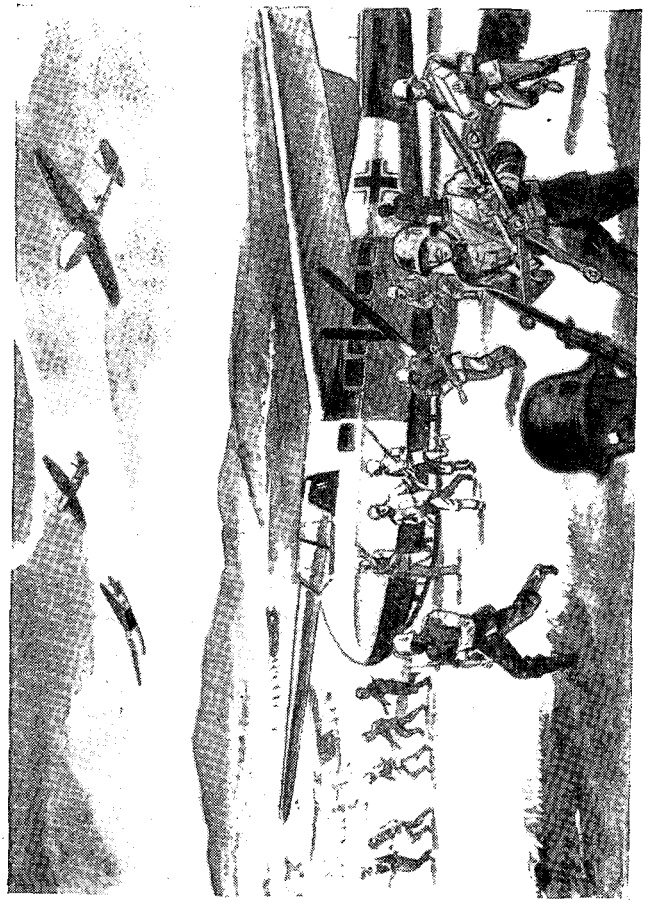

FIGURE 6.—Glider troops deplaning.

defense personnel. Air-landing troops are provided with the usual equipment of ground troops, including light artillery, armored carriers, scout cars, and perhaps light tanks. Nor-

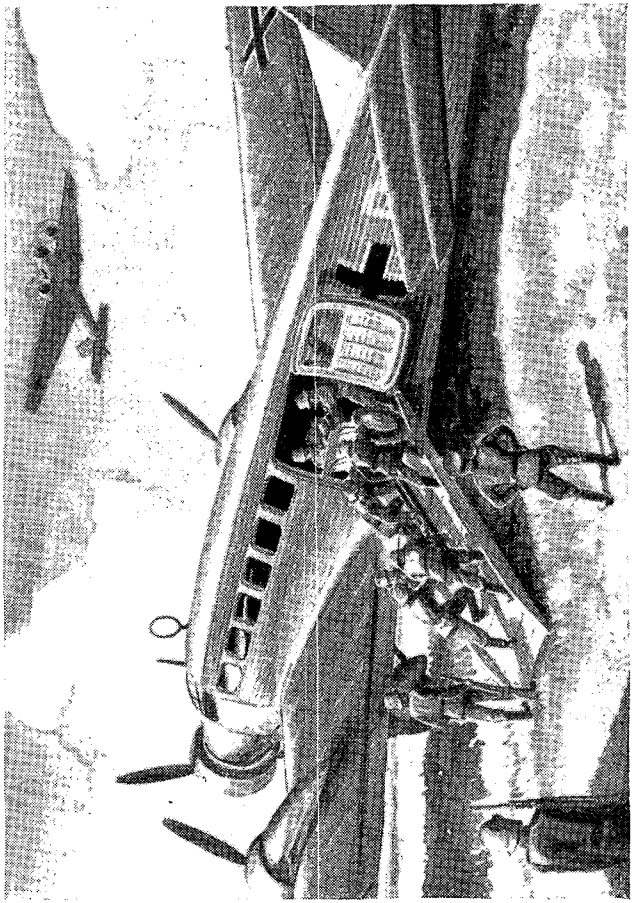

FIGURE 7.—Unloading a field piece.

mally platoons, or similar units, and their equipment will be landed simultaneously. Deplaning and unloading will require only a few minutes. The seizure of prepared fields

will not be essential, as roads or smooth ground will suffice for landings. Crash landings may be attempted on terrain unsuitable for normal landings.

SECTION VI

CHEMICAL ATTACK

■ 20. GENERAL.—The use of airplanes to project chemicals brings to the airdrome an ever present danger of chemical attack. Cruising radius and capacity are the chief limits on swift-striking chemical attacks.

■ 21. OBJECTIVES OF AERIAL CHEMICAL ATTACKS.—Chemical attacks from the air may be made to attain any of several objectives.

a. To inflict casualties on personnel.

b. To render airdromes unfit for use through neutralization or contamination of airplanes on the ground, hangars, and facilities for maintenance, administration, housing, and storage of material and supplies, by means of persistent vesicant agents.

c. To harass personnel by using lacrimators or toxic smokes to cause them to mask and thus lower their efficiency.

d. To cover with smoke to prevent effective defense of the airdrome.

e. To destroy various airdrome installations by means of incendiaries.

f. To affect morale.

■ 22. TYPES OF AERIAL CHEMICAL ATTACK.—An attack with chemical agents may be made with persistent gas, nonpersistent gas or toxic smoke, screening smoke, or incendiaries. These may be employed in impact bombs, airburst bombs, or spray. The most probable attack is one in which persistent chemicals are employed, almost certainly with high explosives and possibly with incendiaries. Both air-burst and impact bombs will be dropped on the airdrome and around it to keep the landing area under gas concentration as long as possible.

Defense is difficult, as personnel and material must be protected against chemicals and, at the same time, against other weapons of attack.

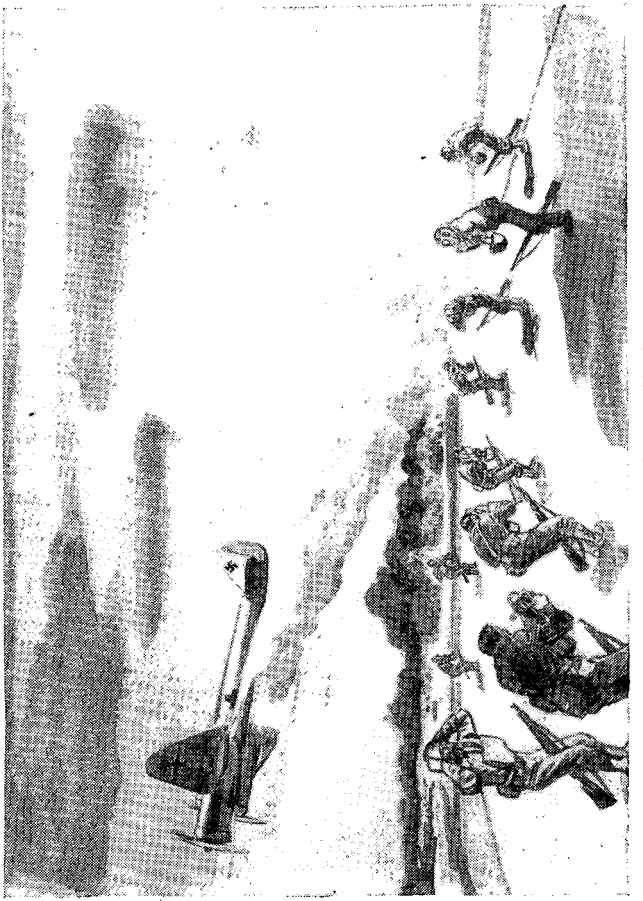

FIGURE 8.—Spray attack.

CHAPTER 3

TROOPS FOR DEFENSE OF AIRDROMES

SECTION I

FACTORS INFLUENCING ASSIGNMENT OF TROOPS FOR DEFENSE

■ 23. LIMITING CONSIDERATIONS.—The size and composition of the garrison of any particular airdrome is primarily dependent upon the number of troops available in the theater and the decision of the theater commander to allocate such troops for the defense of air force installations.

a. The assignment of defense units is dependent upon the resources of the theater commander. It may not be possible to provide at every airdrome the complement of troops, armament, and equipment needed for defense against all contingencies. Economy of force forbids the dispersion of large numbers of men and weapons for the defense of many fixed and limited areas. It is not expected that all airdromes, unsupported, resist indefinitely an aggressive enemy determined to capture them. If for several hours the defenders can prevent him seizing their field and bringing in large airborne reinforcements, they have performed their mission. Area reserves must, however, be capable of arriving within a very short time to convert the defense from a local problem to one of greater magnitude.

b. The assignment of defense units is influenced by the range of enemy action. In respect to their location, airdromes may be classified as follows:

(1) Airdromes which will probably be free from external attack. Their principal defense requirement is interior guard.

(2) Airdromes which may be subject to occasional long-range attacks by bombers. Their principal ground defense will be passive defense.

(3) Airdromes which may be subject to frequent bombing and strafing attacks by aircraft but yet which are not within range of serious attack by airborne troops. Their defenders will rely principally upon antiaircraft fire and passive measures.

(4) Airdromes which may be subject to frequent bombing and strafing attack by aircraft and are within the range of attack by airborne troops or by ground forces. Their defense requires troops to provide antiaircraft and local ground defense.

c. The size of an airdrome garrison is also determined by the strategic and tactical situations in the area. Attacks on area airdromes will be conditioned by the nature and success of friendly and enemy operations. The possession of air superiority and its degree are factors of great influence. The number, location, and operations of troops in the vicinity are matters which may be fundamental in determining the extent of the local ground defenses. Likewise, the strategic value of an airdrome may be the reason for the presence of ground forces in the vicinity and the key to their dispositions. In relation to the extent of friendly forces in the area and their disposition, there are four types of problems in local defense for airdromes—

(1) Those of airdromes which are completely isolated, such as island airdromes, but which are important. Here, in a sense, the area and the airdrome are the same, the strategic value of the surrounding area deriving from the presence of the airdrome. As no reinforcements are possible, a regiment or a larger force may be present for defense, and the command of the airdrome, to the extent of its defense, subordinate to the command of the defense forces.

(2) Those of airdromes in an area defense which are important but which can rely on area troops for resistance

against all-out attacks. Their need is for sufficient local defense to repel nuisance attacks and delay surprise thrusts.

(3) Those of advanced airdromes in areas where the situation is fluid and area troops cannot be diverted to defend them. Although these fields are important, they must defend themselves with the resources under local command.

(4) Those of airdromes in areas without area troops but not important enough or near enough to the enemy to be threatened by major action. Their ground defense requires only interior guard.

d. A requirement for adequate antiaircraft protection exists at all airdromes within reach of enemy aviation. This cannot be neglected, for air attack against any airdrome will be more frequent and must be considered more likely than any other form of attack.

SECTION II

TROOPS AVAILABLE FOR DEFENSE

■ 24. GENERAL.—There are several types of units which may be available to the airdrome commander for defensive purposes; airdrome and squadron personnel, ground force units assigned for local ground defense, aviation engineers, antiaircraft artillery assigned or attached, chemical warfare service detachments, and military police (aviation) companies. Nearby reserves of theater forces may also be available for support. A forward-area airdrome might have the following forces available to defend it:

a. Personnel from two fighter squadrons based at the airdromes, plus airdrome operational personnel and quartermaster and ordnance personnel.

b. A small infantry unit assigned for local defense.

c. One company of aviation engineers.

d. One or more antiaircraft artillery automatic weapons batteries.

e. One chemical warfare service platoon.

f. One infantry unit in reserve at some distance.

■ 25. AIRDROME AND SQUADRON PERSONNEL.—An airdrome will have available for defensive purposes at least its own assigned squadron personnel and that of any squadrons which use it as a base, that is, air force personnel connected with administration or operation of facilities, quartermaster and ordnance personnel, and ground crews, pilots, and flight crews off duty. Although primarily occupied with other duties, they are trained in the use of infantry weapons. They are normally employed in close-in defense and in forming supporting parties. If no other forces are available, they must also be used for counterattacking disorganized parachute troops.

■ 26. ASSIGNED INFANTRY.—*a.* If available, infantry assigned for the purpose forms the principal element in the local ground defense.

b. The mission of such units is, with the assistance of all other available local forces, to meet airborne attack during and shortly after landing, to hold the airdrome against any form of attack until the arrival of reinforcements, and to remove by counterattack any threat to the defended area. A part of the unit is used to establish the fixed defenses of the airdrome and to provide local security for dispersed aircraft and installations. The remainder is organized as one or more striking forces as the situation requires.

■ 27. AVIATION ENGINEERS.—*a.* Aviation engineer units are especially organized, equipped, and trained to meet the needs of the Army Air Forces for engineer work in a theater of operations. They are assigned to air forces and air task forces as required. In general, their organization is similar to that of combat and service units, but the battalion, consisting of battalion headquarters, three lettered companies, and a medical section, is the usual field operating unit. Separate engineer aviation companies are organized as required for particular missions, being identical with the lettered companies of the battalion. Company armament includes caliber .50 machine guns and an antitank gun.

b. Aviation engineers have the general engineer mission of facilitating the advance of friendly forces and hindering the advance of the enemy, usually by engineer construction but at times by taking part in combat. Their most important tasks are to construct advanced airdromes, to camouflage them, to maintain them under enemy bombing, and to assist in their defense. (See TM 5–255.) They have important technical duties connected in general with the organization of the ground and the building of protective structures. Included are camouflage, construction of defensive positions, construction of weapons emplacements, establishment of barriers for antimechanized defense and obstructions for preventing the landing of airborne troops, and demolition of the airdrome if capture becomes inevitable. These tasks are planned and executed under engineer control in accordance with defense plans of the airdrome commander.

■ 28. ANTIAIRCRAFT ARTILLERY UNITS.—*a.* The major antiaircraft artillery units are the brigade, the group, the battalion, and the battery. Most likely to be assigned or attached to the local defense of an airdrome are automatic weapons batteries. Antiaircraft guns (as opposed to automatic weapons) will probably be at such distances from the airdrome that they cannot be closely integrated into the local defense system; moreover they usually belong to the area defense rather than to the local defense. Normally, it is to be anticipated that airdromes in active theaters will be provided, as a minimum, with one automatic weapons battery equipped with eight 40-mm antiaircraft guns and eight multiple-machine-gun mounts.

b. Antiaircraft artillery has the primary mission of firing against enemy aircraft and the secondary mission of firing against ground targets. It will frequently be sited to perform the duel mission. If the ground attack should develop to the point that the enemy can no longer employ his aircraft without danger to his own troops, the antiaircraft guns become fully available for use against ground targets.

■ 29. CHEMICAL WARFARE SERVICE UNITS.—*a.* There are several types of supply and service units of the Chemical Warfare Service. The decontamination section of a chemical composite company is ordinarily used for defense of an airdrome.

b. The mission of the decontamination unit is to deal with major contamination problems.

■ 30. MILITARY POLICE.—The military police company (aviation) is a flexible organization, capable under the current Table of Organization of expansion to meet the specific military police need at any airdrome. Personnel are armed with pistols, rifles, shotguns, and submachine guns. Basic equipment includes motorcycles and trucks.

CHAPTER 4

DEFENSE AGAINST SABOTAGE

■ 31. CONTINUITY OF MENACE.—It can never be assumed that any area is free from the menace of the saboteur. He is as likely to be found in the combat zone as in the zone of the interior. He is likely to appear in peace as well as in war. He may be an enemy agent or a disaffected individual of friendly nationality.

■ 32. VIGILANCE.—*a.* Defense against sabotage is a matter of efficient interior guard. Stationary watchmen or roving guards who avoid routine movements are more effective than sentries who follow a set method of walking post. A system of checks on the guard and general protective system should be a part of the plan. Inspections by individuals not known to the guards may reveal laxity or other defects. An officer should be detailed to make a study on ways and means of sabotage in the area and to report his conclusions to the commanding officer.

b. There should be a continuous survey of personnel who have access to the area. Means of identification should be provided for persons not in uniform, and special passes should be required for entrance into restricted areas. The duty of examining credentials should be assigned to superior guards. If the loyalty or mental balance of an individual is doubted, he should be especially watched and denied approach to sensitive areas until a true estimate of him has been obtained. Aid in forming such estimates should be sought from other agencies. On most fields aircraft will be the most valuable military equipment. Unidentified individuals must not be allowed in their vicinity except under constant surveillance. If there is the slightest possibility of any unknown individual having access to baggage, preflight checks should be routine.

■ 33. MATERIAL OBSTACLES.—*a.* The work of the saboteur is greatly impeded by the use of wiring or fencing to restrict entrance and exit so that personnel can be subjected to inspection, and to isolate the more sensitive and vital installations, such as power plants or gasoline supply points. When sufficient wire is not available for these purposes, a system of signs and printed orders designed to control movement will greatly assist guards, as attention can be concentrated on any individual who disregards them.

b. In areas where it is possible to employ it, lighting lessens the possibility of sabotage at night. Guards should be provided with flashlights.

■ 34. REFERENCE.—A discussion of methods of sabotage and protective measures is available in TM 19–225.

CHAPTER V

ACTIVE DEFENSE

SECTION I

GENERAL

■ 35. BASIC PRINCIPLES.—*a.* The local ground defense of an airdrome is a relatively static defense of the runways or landing areas and vital airdrome installations, and a mobile defense of possible areas for the landing of airborne troops in the vicinity. The static defenses are located to cover the landing strips with heavy fire and to deny important avenues of approach. The location of the striking forces is dictated by the extent and location of other areas suitable for hostile landings and the routes of communication to them. Fixed defended localities are prepared for the mobile striking parties to occupy in the event that enemy forces are able to organize in large groups. These defended localities are located on key terrain points from which delaying action can be effected.

b. Antiaircraft artillery protection of forward area airdromes is of the utmost importance and must be considered both in planning airdrome installations and in planning the ground defense.

c. All planes should be put in the air as quickly as possible upon the approach of an enemy. They are parked to avoid unnecessary taxying, and crews are informed of the order of take-off. If simultaneous take-offs are possible, the direction of each plane is indicated by reference to markers on the field or features of the more distant landscape. A standing oper-

ating procedure designed to reduce last minute instructions to a minimum should be adopted and rehearsed. If attack is imminent, planes are periodically warmed up by ground crews or pilots.

SECTION II

ORGANIZATION OF THE GROUND

■ 36. AREA OF DEFENSE.—The area to be defended is determined only after a careful estimate of the situation in which the terrain and the available forces are the dominant considerations. In most situations the maximum practicable objective is the security of adjacent terrain from which the airdrome can be rendered inoperative by aimed small-arms fire.

■ 37. PRINCIPLES OF ORGANIZATION.—*a. Sector defense.*—Normally the local ground defense of an airdrome is a sector defense in depth. The area to be defended is subdivided by establishing sectors with a commander and troops designated for the defense of each. Sectors extend from a central point on the airdrome outward and provide cut-of-pie divisions of the area to be defended (see fig. 9).

b. Defense in depth.—Defense in depth is secured by a system of centers of resistance, gun positions, obstacles, road blocks, and fox holes planned for the delivery of covering fire upon important objectives and terrain. The inner defense positions should give mutual support. Outlying areas in the sectors are patrolled and defended by the sector defense forces. Reinforcement is provided for by mobile striking forces and by reserves formed from airdrome personnel.

c. All-around defense.—Whenever possible, defense positions are prepared for all-around defense.

d. Alternate positions.—In order to defeat enemy air reconnaissance alternate positions for weapons and men are dug so that the defense is flexible and elements can be shifted without loss of effectiveness.

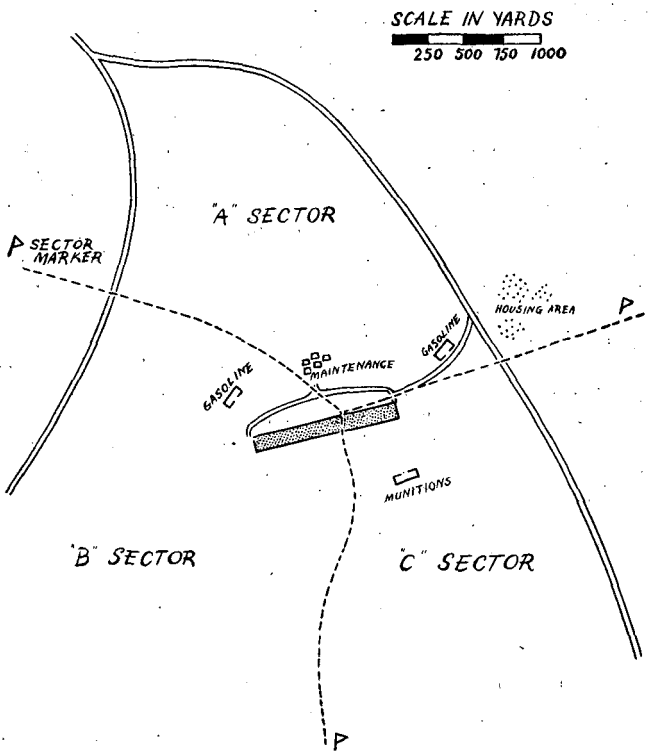

FIGURE 9.—Sector defense.

e. Safety.—Plans of fire and movement must be prepared and executed so that friendly elements do not fire into each other. Such plans are particularly important in airdrome defense because airborne attacks may come from so many directions that friendly fire will be difficult to control.

■ **38. RECONNAISSANCE.**—*a.* Before other than emergency dispositions are made, a thorough reconnaissance of the

terrain surrounding the airdrome should be undertaken. Detailed consideration should be given to the possibilities of attack under various conditions of time and weather. The defense commander should not be satisfied with initial dispositions dictated by obvious features of the terrain, but should plan such additional or alternate positions as will permit him to make best use of his forces when conditions change with the wind, the weather, the time, and the customs of the enemy.

b. Each place airborne troops *can* land must be determined, but shifts in the wind or changes in its velocity increase or decrease the natural hazard of an area for an enemy landing. Under certain conditions landings may be impossible in a given area. For dropping parachute troops with the minimum of casualties from the descent a fairly clear area 200 by 500 yards is required. Such a minimum space can not be used if the wind should be blowing perpendicular to its long axis, and the defense will consequently give it less attention than when the wind is blowing parallel to the long axis. Dispositions should constantly be shifted according to such changing circumstances. The direction and velocity of the wind and the state of the weather are important considerations in the plan for defense against any form of aerial attack. High winds may increase the hazard of dropping sufficiently to prevent the use of parachute troops altogether. On the other hand, high winds reduce the distance required for airplane landings and augment the number of potential landing sites. Low clouds and limited visibility may prevent the coordinated arrival of elements over the landing area and cut down the rate at which troops and supplies can be landed. The time of initiating and conducting operations will be determined largely by the weather forecast.

c. The enemy's customs of attack should be considered in making dispositions.

■ 39. TYPES OF DEFENSE POSITIONS.—*a. Centers of resistance.*—(1) Key elements in the organization of the ground

are strong centers of resistance. Each is provided with a supply of weapons, ammunition, food, and water and is capable of withstanding a short siege.

(2) The principal mission of the inner centers of resistance is to deny the landing strips and adjacent open areas to the

FIGURE 10.—Relation of direction of wind to choice of dropping areas.

enemy. They are sited, preferably clear of the field, to cover the whole of the landing ground by fire of automatic or other weapons against parachute troops or aircraft attempting to land troops and to fire outwards if enemy troops penetrate the outer defenses. Some landing grounds can be adequately covered by one or two such centers of resistance; others may require four or five.

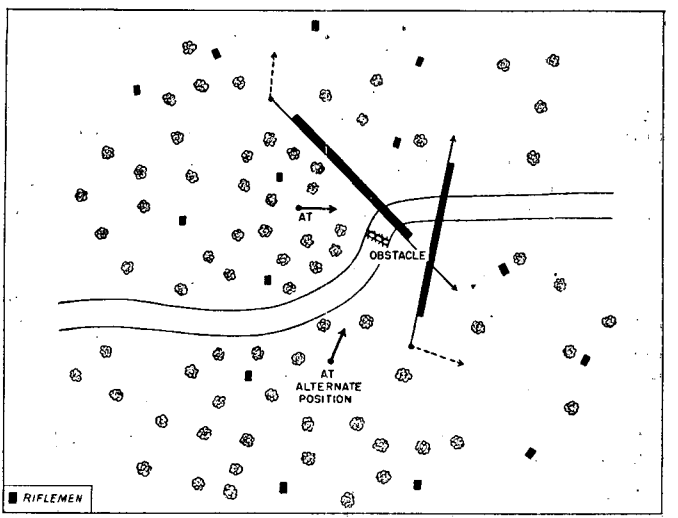

FIGURE 11.—Road block.

(3) The mission of the outer centers of resistance is to cover tactical features and approaches and broadly to serve as bases for the mobile defense. They are sited well clear of the airdrome. They may or may not be able to bring fire to bear on the airdrome itself. Some positions are for striking forces or reserves to occupy for delaying action in the event enemy forces succeed in organizing groups too strong to counterattack and will ordinarily be left unmanned

or manned by a skeleton garrison. In conjunction with the major centers of resistance a number of small protected posts sited in the vicinity of the airdrome will be of value to counter the effect of parachute troops dropped over a wide area or to serve as a screen in the face of infiltrating attack. A tendency towards wide dispersion must, however, be curbed, as the enemy has the initiative and can concentrate superior forces at the point he chooses. Road blocks are placed to cut off easy routes of access.

b. Supplementary positions.—Well-camouflaged fox holes must be provided for airdrome personnel immediately adjacent to their places of occupation to compose a last line of defense for installations and grounded aircraft. Concealed positions are prepared clear of the target area for parties of backers-up ready to fight among the installations. Rallying points should be designated on or near the airdrome to which isolated parties or individuals will move if overtaken by airborne attack while away from their units. Rallying points in the field, either prearranged or designated as needed, may be required. For these a system of visual or other signals is necessary. Field supply points are established in the defended area. Sufficient dispersion to insure rapid supply of units is necessary. Inflammable items should be stored separately. Observation posts with good communication are vital.

c. Command posts.—Command posts should be sited, preferably within a center of resistance, away from target areas. They should include splinterproof cover to contain telephone switchboards, map tables, shelter for runners and other necessary personnel, and limited sleeping accomodations. Alternate command posts must be provided.

■ 40. FORTIFICATIONS.—*a. General.*—Fortifications will be, in general, field works—fox holes, open emplacements, splinterproof cover, all well concealed and camouflaged. Elaborate fortifications of regular outline and raised parapets are targets for enemy action because of their regularity and

obviousness on the aerial photograph. Fortifications must be sited with careful consideration to security from bombardment and the provision of all around supporting fire and covering fire for obstacles, tank barriers, and areas and approaches of strategic value. Alternate positions and dummies to attract fire are of great value. Field fortifications are covered in FM 5–15.

b. Fox holes.—Both the fox hole and the trench with some splinterproof overhead cover have their merits and uses, but the fox hole will be of most general value. All earth dug out must be removed from the site. If it is necessary to build up the fox hole, care must be taken that the work blends with the background so that when a man comes up to fire his head will not be silhouetted. A number of alternatives must be dug. Dummies can be put inside those not in use. A light lid with a covering of camouflage to match the surrounding ground should be fitted over each.

c. Pill boxes.—Pill boxes are of value for machine guns firing on fixed lines against troops on the ground, but they must be completely camouflaged and earthed up as much as possible. If possible, they should be proof against a direct hit by at least the equivalent of a 3-inch mortar.

d. Obstacles.—Tactical wiring is of great value and should be used in places where natural or other features give concealment from the air. It should follow vegetation, tracks, ditches, and the edges of broken ground. Under no circumstances must it be circular. The combat posts should be very completely and thoroughly protected with wiring adapted to suit the ground. Those which are manned by troops whose mission it is to sally out to attack landing airborne troops or other troops must be wired so as not to delay exit. If wiring interferes with concealment, other protective devices, such as antipersonnel mines, must be substituted. In areas subject to mechanized ground attack antitank obstacles, primarily antitank mines, must be tied in with the defense. Construction of obstacles is covered in FM 5–30.

■ 41. WEAPONS.—*a. Machine guns.*—(1) Machine guns are the basic weapons used in defense against parachutists, airborne infantry, and ground troops. In a large measure their location will outline the defense plan. For defense against airborne attack the entire landing field and, to the extent possible, surrounding areas suitable for the landing of airborne troops should be covered by machine-gun fire.

(2) The principles of distributing and siting machine guns for the defense of an area are covered in field manuals on infantry tactics (see FM 7–15, 7–20, and 7–40). The principle of distribution in depth should be emphasized even more than ordinarily in the defense of an airdrome because of the greater probability of airborne attack. Guns should be located in irregular mutually supporting groups with the view of eliminating as much dead space as possible. To make them effective at night, coordinated fires should be planned, final protective lines determined, range cards prepared, and firing stakes set out. In siting guns particular attention should be paid to stone or brick buildings within the area. If the number of guns permits, they should be sited in pairs, but in any event each emplacement should be prepared for all-around fire and all-around protection and should be fought as a little isolated center of resistance, since maneuver during attack may become impossible. The preparation of alternate and supplementary emplacements should not be neglected on this account.

(3) As most attacks on an airdrome will be preceded by bombardment, the area will be liberally pocked with craters, which will form convenient defiladed areas for enemy troops to escape flat-trajectory fire. Mortars may be supplemented by machine guns placed in position on high ground or buildings to deliver plunging fire upon defiladed positions.

(4) As many heavy machine-gun positions as possible should be prepared to permit the engagement of hostile aircraft. Suitable machine-gun targets are strafers, transport planes which have leveled off to discharge parachutists,

gliders, fighter or bombardment planes protecting transports, and transports or gliders on the ground.

b. Mortars.—(1) Mortar fires are for the most part fires against personnel to cover dead spaces in the bands of machine-gun fire and defiladed areas where hostile forces might assemble for attack. Their positions must be within effective range and must afford observation of the targets and friendly troops from observation posts. As attacking forces, even parachutists, will be certain to have mortars in their armament, they are essential weapons for the defense of an airdrome subject to any form of infantry attack. They should be kept mobile.

(2) The 60-mm mortar is a highly mobile piece with a useful range of about 1,000 yards. The effective radius of burst of the high-explosive projectile is about 15 yards; casualty producing fragments carry much farther. It should not be located more than 500 yards behind friendly troops. Its low relief permits it to utilize the cover afforded by minor terrain features such as bomb craters, ditches, hillocks, or small rises.

(3) The 81-mm mortar combines mobility and power in greater degree than any other supporting weapon. Its projectiles have an explosive effect comparable to that of 75-mm projectiles. Its useful range is about 2,000 yards and its distance behind the farthest friendly troops should not exceed 800 yards.

(4) The principles of the employment of mortars are covered in FM 7–15, 7–20, and 7–40.

c. Antitank weapons.—(1) Direct-fire, high velocity antitank weapons are needed in the ground defense of forward airdromes. They are also effective against any observed targets such as machine guns, antitank guns, or landed aircraft. Antitank guns employ direct fire and engage only visible targets. Such characteristics indicate employment in close proximity to the troops or areas to be defended. Whenever possible, gun positions are selected in terrain which is unfavorable for tank operation but from which

effective flanking fire may be delivered against favorable avenues of approach. In covering a road the gun should be sited to fire on a stretch where detour is restricted by ditches, banks, heavy woods, or similar obstructions. One well-placed antitank weapon can temporarily stop or delay a large mechanized force.

(2) The antitank rocket launcher is an electrically operated shoulder weapon weighing about 15 pounds and having a maximum firing rate of eight rounds per minute. Primarily it is used to fire upon hostile armored vehicles which come within effective range. The rocket will penetrate 3½ inches, or approximately 90-mm, of armor plate. Although normally considered an antitank weapon, it has other tactical uses, including the following:

(*a*) To increase the fire power of close-support weapons.

(*b*) To provide close-in defense of crew-served weapons.

(*c*) To deliver harassing fire against concentrations of personnel.

(*d*) To protect mine fields, road blocks, and wire entanglements.

(*e*) To protect observation and command posts.

(3) Antitank protection can also be provided by the guns of the antiaircraft artillery defense, the 40-mm gun being an excellent antitank weapon. When possible, without material interference with their primary mission, these guns should be sited for a secondary mission against mechanized vehicles.

(4) The principles of the employment of antitank guns are covered in FM 7–20, 7–35, and 7–40.

d. Field artillery.—The actual assignment of a battery or other unit of field artillery to the local defense of an airdrome is the exception rather than the rule. The successful employment of field artillery in such a defense role demands the retention of full mobility. Field artillery should be disposed to cover the landing ground and so sited that it can fire on it over open sights from positions at some distance, possibly 1,500 to 2,000 yards, depending on the country. Possible approaches for mechanized ground forces should be

carefully targeted. An important mission is bringing fire to bear on areas near the airdrome on which the enemy may be attempting to land transport planes. Even if landings have been successfully made, accurate fire can destroy enemy infantry in assembly positions forming for attack. Timed artillery fire is effective over troops digging in under cover of their automatic weapons.

e. Antiaircraft artillery.—See paragraphs 45 to 51, inclusive.

■ 42. LOCAL SECURITY.—The danger of airborne attack increases the need for all-around and independent defense of units. Gun crews should be armed with rifles and supplemented with riflemen to provide for their own immediate defense. Light machine guns should be assigned to the local protection of antiaircraft and artillery pieces. All posts and detachments should be supplied with reserves of ammunition, food, and water.

■ 43. MOBILE DEFENSE.—*a. Striking forces.*—Striking forces must be available to attack parachute troops and air-landing troops at the earliest possible moment, to counterattack hostile forces, and to come to the relief of parts of the static defense if they are in danger of being overrun. They should be assigned to covered and concealed positions *off* the airdrome where they will not be exposed to the preliminary bombardment. They must be located near probable places of commitment, as during attack the enemy can be expected to strafe thoroughly all troop movements. They should be supplied with such transportation and weapons as will give them mobility and high fire power. They should be provided with entrenched positions into which they can withdraw for delaying action if the enemy succeeds in organizing concentrations too strong for them to attack. Normally they are an integral part of the sector defense to which they are assigned.

b. Reserve striking force.—A mobile striking force must be held in reserve for employment against enemy concentra-

tions which are too strong for the sector forces. It must be concealed off the airdrome. It is provided with such armor, troop carriers, scout cars, and mobile guns as are available. It is normally under the immediate control of the defense commander.

c. Armored vehicles.—To reinforce threatened points and to break up concentrations of hostile troops, armored vehicles, preferably tanks, should be available. Because of the cross-country mobility of tanks and armored half-tracks, their high fire power, and, in the case of tanks, their adaptability to crushing tactics and the protection they afford personnel, a few of them can be of decisive value.

■ 44. COMMUNICATIONS.—*a. General.*—The importance of adequate communications cannot be overstressed. During the crucial moments of the defense of an airdrome time is so short and the situation so fluid that there can be no delay in executing the proper actions. All detached posts must be in touch with the command post. Telephone may be used for all fixed installations, but radio is essential for units used as striking forces.

b. Alternate means of communication.—Visual or audible signals may become the only means of communication available for the command. A system of such signals should be carefully thought out and learned. The institution of a simple code for likely battle orders and information helps to overcome the complications of training the number of signalers required.

c. Radio jamming.—During an attack the enemy may attempt to jam the radio communication of the defense by transmitting blurring signals on defense frequencies. Preparations and instructions issued in advance will help maintain confidence and morale when jamming is attempted. Such precautions may include—

(1) Preparation of a scheme for changes in frequency when jamming is encountered.

(2) Transmissal of messages on several frequencies.

(3) Authentication of incoming messages. (It is likely that the enemy will intersperse jamming with false messages.)

SECTION III

ANTIAIRCRAFT DEFENSE

■ 45. REFERENCES.—The details of antiaircraft artillery defense are found in FM 4–100, 4–102, 4–104, and 4–106.

■ 46. GENERAL.—Air forces normally have antiaircraft artillery assigned or attached for the protection of operational airdromes. The antiaircraft artillery defense of an airdrome may include both guns and automatic weapons, but the local defense of forward-area airdromes consists ordinarily of automatic weapons. The antiaircraft artillery commander coordinates his fields of fire, emplacements, camouflage discipline, and communications with other airdrome defense troops and with the airdrome commander. It is particularly important that plans be prepared for the movement of friendly aircraft in the vicinity of the airdrome, for intercommunication between aircraft in flight and elements of the antiaircraft defense, and for recognition of aircraft.

■ 47. MISSION.—The mission of antiaircraft artillery employed in airdrome defense is threefold—

a. To defend the airdrome and its installations against air attack by destroying enemy aircraft, causing them to abandon their mission, or disturbing their actions to such an extent that they miss the target.

b. To defend the airdrome against attack by airborne troops by fire action prior to the landing.

c. To assist airdrome defense units by antimechanized fire and supporting fires on ground objectives.

■ 48. DEFENSE OF FORWARD-AREA AIRDROMES.—*a. General.*—Defense must be sited in depth so that attacks on the perimeter of the airdrome will not necessarily eliminate the antiaircraft defenses. Weapons must be sited to bring maximum

fire on all enemy aircraft, whether attacking simultaneously or in succession, before hostile acts are committed. Each defense must be constructed to meet the prevailing or indicated types of hostile action. Actual field disposition of fire units is adjusted to meet local conditions.

b. Employment of automatic weapons.—(1) *Targets.*—Primary targets of automatic weapons are hostile low-flying aircraft—low-altitude bombers, dive bombers, strafers, troop carriers, and gliders. Automatic weapons also have a secondary mission in antimechanized defense and the provision of supporting fire against ground and water-borne targets.

(2) *Range.*—The effective slant range of the 40-mm gun is taken as 1,500 yards.

(3) *Dispositions.*—As a rule, an automatic weapons defense will be provided to combat only low-altitude horizontal flight bombardment attack and ground strafing against the airdrome itself. Additional fire units are disposed to extend the defense in depth and to reinforce the defense, particularly along the more probable avenues of approach. For defense against horizontal flight attack, automatic weapons are placed at or near the bomb release line corresponding to the altitude of the attack. Against dive bombardments, units are sited as near the objective as possible, although not so close that attacks on the object will put the guns out of action or blind them by dust and debris from the explosives. This indicates that guns sited for defense against dive bombardment attacks should be located 300 to 500 yards away from the objective.

(4) *Coordination of fire.*—Coordination of fire must be achieved. The dead areas of the guns are coordinated so that all avenues of approach will be covered by gun fire. To insure efficient engagement of all targets, normal and contingent zones of fire are specified for each firing unit. Fire direction is exercised by the fire unit commander subject to general directions from higher authority concerning such matters as withholding fire and priorities of targets

and specific orders to coordinate with friendly air force operations.

(5) *Examples.*—(*a*) *Fighter strip defended by one platoon of automatic weapons.*—The four fire units are emplaced on

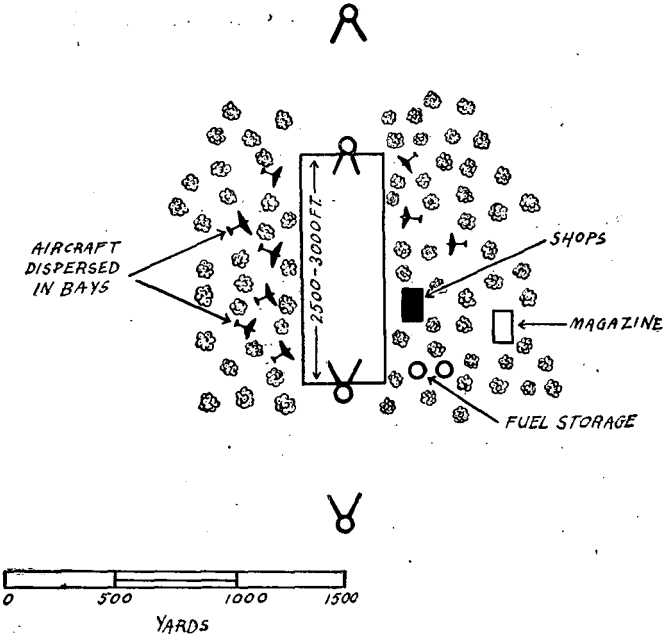

FIGURE 12.—Short strip defended by one platoon of automatic weapons.

the central axis of the strip, one at each end, and the other units 500 to 800 yards out. (See fig. 12.)

(*b*) *Fighter strip defended by one battery of automatic weapons.*—The defense is formed by adding to the four-unit defense shown in figure 12. The additional four units are set

out approximately 500 yards to each flank of the outermost guns. (See fig. 13.)

(c) *Bomber strip defended by 12 automatic weapons fire units and two 90-mm gun batteries.*

1. Automatic weapons.—The length of a 7,000-foot strip will cause the automatic weapons to be out

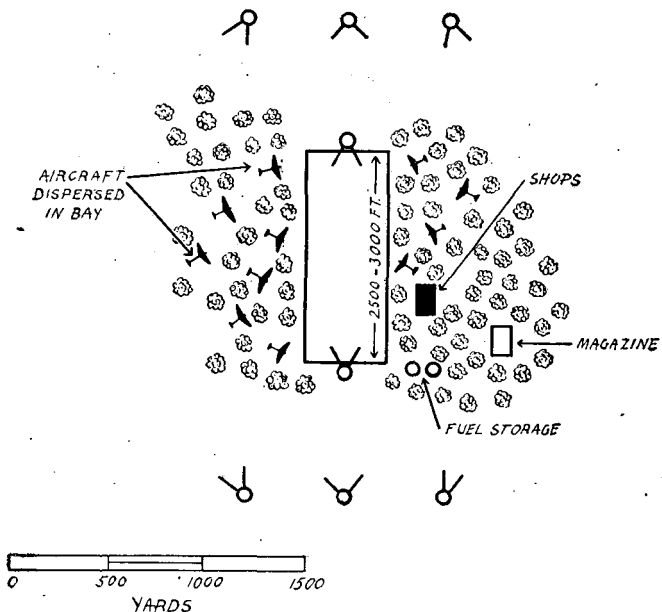

FIGURE 13.—Short strip defended by one battery of automatic weapons.

of supporting distance of each other if the method of emplacing used in (*a*) and (*b*) above is employed. The fire units are arranged in a ring 500 to 800 feet from the perimeter of the landing strip. (See fig. 14.) Dead areas are coordinated

as shown so that an adjacent gun covers the dead area of each gun.

2. *Gun batteries.*—At altitudes above 2,500 feet the approach most favorable to the bombers is perpendicular to the strip. The gun batteries are placed 2,500 to 3,000 yards out from the center of the strip perpendicular to its length. (See fig. 14.)

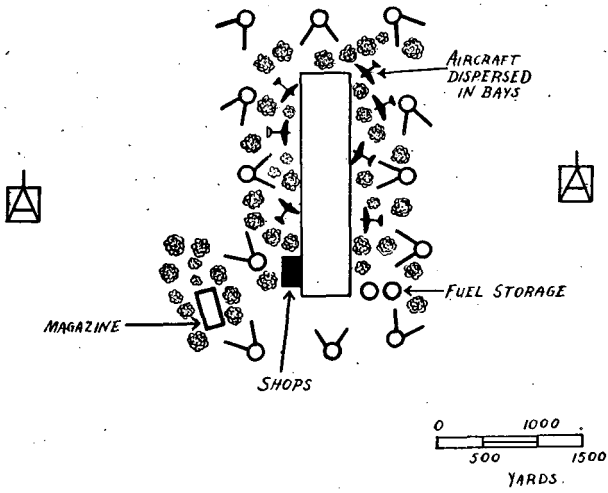

FIGURE 14.—Antiaircraft artillery defense of a bomber strip.

■ 49. RESTRICTIONS.—*a.* The following are some of the restrictions that might be imposed on fire:

(1) Any unit may fire, unless specifically restricted.

(2) Fire units not specifically prohibited from firing may fire on any airplane entering their field of fire unless it is definitely identified or recognized as friendly.

(3) Fire units may take under fire any airplane entering their fields of fire except those flying in definite channels of approach or definitely identified or recognized as friendly.

(4) Any airplane committing a hostile act may be taken under fire.

b. All personnel must be thoroughly trained in visual recognition.

c. Restrictions on opening fire will be placed in effect by the airdrome commander. Control is exercised through the antiaircraft artillery commander. Restrictions imposed on fire are normally the minimum consistent with coordination of the air defense and to insure the safety of friendly aircraft.

■ 50. LOCAL AIR GUARDS.—All fire units must be protected by local air guards. (See par. 79.) Guards must be provided with means of communication for transmitting warning of approaching planes.

■ 51. SMALL-ARMS FIRE AGAINST AIRCRAFT.—*a.* Properly delivered small-arms fire is an effective method of counter-attacking low-flying airplanes. Its effectiveness depends upon the training of personnel and upon their constant alertness. The result of small-arms fire upon aircraft is not to be measured only by the count of planes actually brought down. Damage to radio, mechanical, and electrical systems is frequently inflicted by rifle and machine-gun bullets which, though it may not prevent the plane from returning to its base, necessitates extensive repair. Damage caused by the passage of a bullet through a wing or control surface requires repair work that may prevent at least one operational flight. There is also an important effect upon the morale of troops employing their weapons against low-flying aircraft.

b. FM 21–45, 23–5, 23–6, 23–7, and 23–10 explain the technique of directing small-arms fire against aircraft.

SECTION IV

PERSONNEL

■ 52. GENERAL.—*a.* All troops stationed at an airdrome will be considered available for its defense when needed. The

order of availability will be the following: ground defense troops; aviation engineer troops; chemical warfare service decontamination troops and other service troops; Army Air Forces troops whose mission is administration or operation, maintenance, and repair of aircraft; and other troops within supporting distance. All personnel should have some defense duty assigned and be drilled in its performance. *All personnel not actually engaged at the moment in the maintenance or operation of aircraft must be prepared to engage in the fire fight.*

b. All personnel must keep gas masks, weapons, and ammunition close at hand. When the alarm sounds they will report to previously designated assembly areas, armed and read for combat.

■ 53. FIXED DEFENSES.—In general, armed airdrome personnel should man less vital static defenses in order to free garrison troops for mobile operations. Such posts can be left partially manned or unoccupied until the ground defense is placed on the alert. It is necessary, however, to have certain defensive positions manned continually. Antiaircraft weapons must always be ready to fire, as must, to a lesser extent, antitank weapons on likely routes of approach and machine-gun posts in vital areas. For all such assignments, no reliance initially should be placed upon men who have a full-time job that will demand their presence at another part of the airdrome. Airborne attacks develop too rapidly to permit them to man posts at any distance. Available airdrome personnel can be employed to reinforce centers of resistance. Dispersed personnel should be employed to create small islands of resistance near their place of employment. This practice will establish a series of garrisoned points to form a defensive zone that will limit the movements of enemy troops who break through or land on the airdrome itself in order to attack special installations.

■ 54. STRIKING FORCES AND RESERVES.—*a.* Striking forces should be composed of troops especially trained for ground

defense. Enemy airborne units may be expected to consist of troops who have received special training. Defensive units sent against them should consist of troops of corresponding caliber.

b. A final reserve can be formed from air force troops who have formed at assembly points at locations where the larger numbers of air force personnel are occupied.

SECTION V

EMPLOYMENT OF THE DEFENSE

■ 55. GENERAL.—Successful defensive tactics are based on adequate security measures and proper use of fire and maneuver. A proper evaluation of the terrain and an estimate of the situation are of first priority. Based on these, the defense is planned in accordance with established infantry and antiaircraft tactics.

■ 56. MINIMIZING EFFECTS ON BOMBARDMENT.—*a.* Before an attempt at airborne or ground attack, bombardment and strafing will normally be directed at defense and operational installations, at the outlined perimeter of the field and along the edges of surrounding woods, at housing areas, and at any location that suggests a remunerative target. Special defense forces can survive only by keeping under cover in concealed locations in the vicinity of the airdrome but not on it or its perimeter or in any place the enemy may be anticipated to suspect and bomb because of its aptness for concealment.

b. During the initial bombardment machine guns and other guns sited for ground defense normally remain concealed and reserve their fire for their primary targets. Likewise under certain conditions some of the antiaircraft weapons may remain silent. Preliminary bombing or strafing runs are often made with small force to provoke the defense into revealing dispositions.

■ 57. ALERTNESS.—Alertness is the first essential of defensive operations. At all times, even during the height of a bombardment, some men must be on the lookout to guard against surprise.

■ 58. OBSERVATION SYSTEM.—For proper employment of the defense it is essential the defense commander have a spotting system for accurately identifying danger points. The system should include observation posts and patrols. (See par. 79.)

■ 59. PATROLLING OUTLYING AREAS.—It is ordinarily not within the resources of the defenders to place combat groups at all possible landing places for airborne troops. The more distant of the probable landing areas should be patrolled.

■ 60. IMMOBILIZATION OF MOTOR VEHICLES.—Plans should be made for quick immobilization of all vehicles which cannot be kept from falling into enemy hands. Immobilization can be surely attained only by the removal of some major part or by wrecking. The same part must be taken from all vehicles to prevent the use of parts from some vehicles to make others operative. The attackers, even parachute troops, may be expected to come provided with various sizes of spark plugs, gaskets, hose joints and clips, distributor parts, wire, batteries, nuts and bolts, flexible tubing for gasoline and oil lines, hacksaws, screw drivers, hammers, chisels, spanners, and adjustable wrenches. The quickest method of destruction is by rifle and machine-gun fire on vital parts, including tires. The most satisfactory method, when time permits, is by the use of explosives.

■ 61. PRINCIPLES OF ACTION AGAINST AIRBORNE TROOPS.—*a. Nature of action.*—The nature of the action against airborne troops is such that once a defense unit is committed, its commander must act largely upon his initiative. The combat will normally develop into a series of independent

action to capture or destroy small groups of attackers before they can organize.

b. Advantages of the attack.—Airborne troops, particularly parachute troops, have a definite advantage over the defender in that the area selected for landing may be anywhere within a wide range and that the actual location and time of the landing can be kept secret until the descent is begun. Several landings can be made simultaneously to place the defense at the further disadvantage of uncertainty as to where the main effort of the attack is to be made. Under the threat of reinforcing immediate successes, the attacker can force the defense to disperse its forces or perhaps tempt it to improper use of them. In effect, the defense must guard against the sudden advent of the fire power and holding power of hostile infantry within its own lines.

c. Advantages of the defense.—(1) Until they are organized on the ground, airborne troops are dispersed and lightly armed infantrymen hampered by the necessity of freeing themselves from parachutes, gliders, or transports and of collecting and assembling weapons or unloading them. During the first few minutes after their arrival they can be destroyed by a fraction of the number of defenders.

(2) For about 30 seconds before the jump, a transport plane loaded with parachute troops levels off at a low altitude and flies a straight course toward the landing area. As it takes about 10 seconds for a squad and its equipment to be discharged, the transport is flying slowly along a straight course for a total period of about 40 seconds, an easy target. Parachutists are practically helpless during their descent and in the period immediately following their landing when they must collapse their parachutes and get out of their harness. Matériel containers must then be located and unpacked and the squads or larger units must assemble. As the landing pattern of a squad is large, its average length being about 400 yards, assembly takes an appreciable period of time.

(3) Gliders are extremely vulnerable if they come low over hostile troops. As their flight is very slow, the troops they

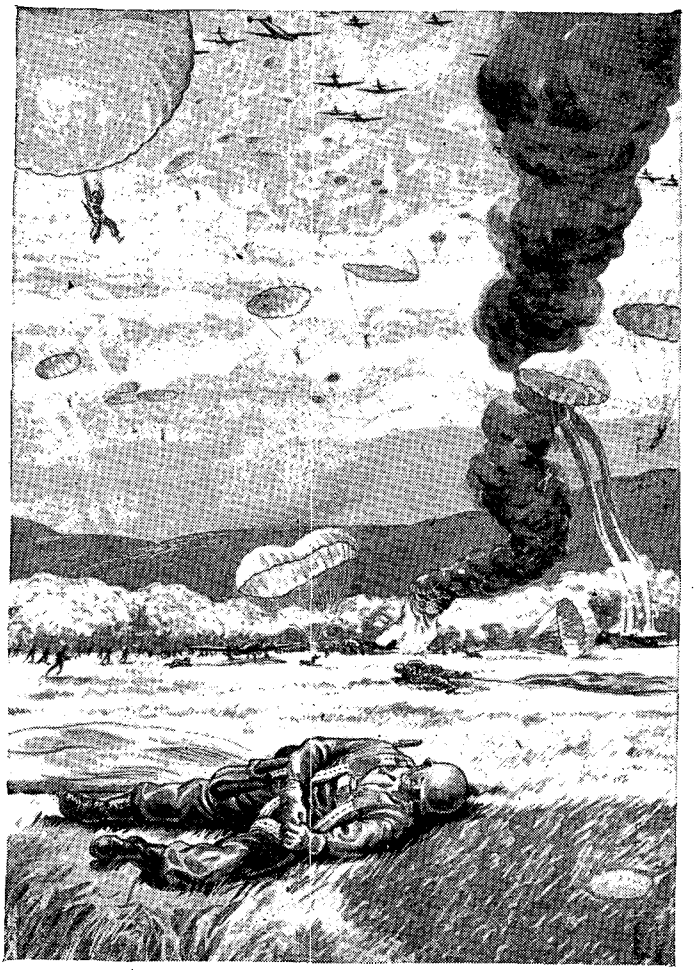

FIGURE 15.—Parachute troops landing.

carry can be destroyed before the landing. Fire directed at the forward part may reach the pilot and cause the glider to crash. Landings on bad ground, even if the glider is not smashed, may temporarily shock or stun the troops.

d. Employment of heavy weapons.—The necessity for rapid entry into action against airborne troops dictates that heavy weapons be located in firing positions. Artillery is normally limited to direct fire. Its primary targets are gliders or transport planes halted or moving slowly on the ground.

e. Time of opening fire.—Time of opening fire is controlled to conceal the locations of weapons and organizations until they can be employed with best effect. Outguards open fire on transport planes and parachutists as soon as they are within range and maintain intensive fire. The reserve elements in concealed areas hold their fire until they are committed to action or are directly in the path of descending troops. Heavy weapons normally open fire on appropriate targets of opportunity as they arrive within suitable range. Some antiaircraft weapons may remain silent to deal with the main attack when it develops. When transport planes come in for a landing, the defender must be ready with firepower and the maximum possible surprise to inflict heavy casualties on the initial landing party.

f. Counterattack.—(1). Regardless of antiaircraft fire, in any airborne attack of force some troops must be expected to effect a landing. The defender must attack and destroy them before they can assemble and develop an effective force. Landing fields and other vulnerable areas can best be protected by fast-moving hard-hitting striking forces equipped with automatic weapons capable of high-angle fire, light cannon, armored vehicles, and transportation which can destroy the attacker before he completes his landing or organizes on the ground. Later counterattacks should be undertaken only with strong fire support and by the methods which would be necessary against any other ground force. The character of action by the airdrome defenders, however,

must be offensive, and time is the element of greatest importance.

(2) Parachute troops must be attacked immediately. If parachutists land close by, it is essential that the personnel of even small defense posts sally out to attack them with automatic weapons, grenades, rifles, and bayonets. A small, determined force can cope with several times its number of parachutists if it attacks the instant they hit the ground. For 30 seconds after landing parachute troops are quite helpless, for 2 minutes they are more or less helpless, and for the 3 to 5 minutes it requires for them to begin organizing and digging in they are very vulnerable. If they are not destroyed during this time, reserves must be committed in sufficient force to isolate or destroy them before they can organize into larger units and move on vital areas for completion of their mission or before they can be reinforced. *It must be expected that forces moving to the counterattack will be strafed by the enemy's supporting aviation.* Troops constantly need to take advantage of cover to minimize the effects of the fire of the enemy's aircraft. Successful counterattacks may be turned into failure if the attackers do not find cover before being counterattacked in their turn by hostile aircraft.

(3) Armored vehicles are of the utmost value in the counterattack. They should be concealed in relatively safe positions during the preliminary bombardment and brought into action during the critical stage of the ground action which may subsequently develop. They must be regarded as striking units and must not be employed in a static role in lieu of fixed defense posts to cover any predetermined areas or any particular approaches. Their primary mission is offensive action to cause as many casualties, as much damage to equipment, and as much confusion among landed troops as possible. They must not be allotted such tasks as carrying messages or hunting down parachute troops dispersed individually over the countryside. After delivering their attacks they should be withdrawn and held in reserve

FIGURE 16.—Tanks attacking parachute troops.

to meet further threats. Because of their speed, armor, fire power and weight, tanks are especially valuable for attacking parachute troops as they land. While parachutists are struggling with their harness, tanks should cruise among them, crushing them and their equipment. Half-tracks should not come close enough to be the targets for hand grenades. Their loads of troops should get out and attack as skirmishers or dig in for holding fire. Scout cars may be used to screen the movement of a striking force to a threatened area. Rifle troops should follow closely behind armored vehicles. These troops should, if possible, be moved by truck close to the area of initial employment. Personnel carriers may be used to transport small combat groups to the attack of enemy positions.

(4) Some members of a counterattacking force must be detailed to collect or destroy arms containers and their contents or, in haste, to hide their distinctively colored parachutes. All personnel should give special attention to any parachutes of a color in a minority, as they may mark weapons, officers, rallying points, etc. If there is any wind, arms containers may be dragged down wind by their parachutes. Movement in this direction will insure early contact with parachutists and facilitate the capture of their equipment. Every effort should be made to confuse supporting aircraft by firing captured Very pistols and laying out captured signal strips and flags. Patrols should be sent out to capture supplies dropped at later periods or to cover them with fire, but striking forces and reserves should not be weakened during the attack on the airdromes to supply details to mop up small isolated groups of parachutists who may have dug in. These elements should be disposed of in detail later.

g. Feints.—A parachute attack will probably be accompanied by feints. Dummies may be dropped at one place and the troops for the attack at another. It must therefore be quickly determined in every instance whether dum-

mies or troops are being dropped. Dummies hit the ground hard and bounce. If there is even a slight wind, they are pulled along lifelessly by the parachute. The difference most visible from a distance is the absence of efforts like those made by parachutists to control their descent. Unless the terrain is free of obstacles, genuine parachutists will be observed maneuvering their parachutes to land in a favorable place by twisting their bodies and pulling their shroud lines as they near the ground.

h. Interference with communications.—The success of an airborne attack depends largely upon radio and visual communications. In the early stages of the operation the reports received at enemy headquarters from reconnaissance aircraft are the basis for determining detail of subsequent operations. In the later stages information must be had from units on the ground by means of radio or visual signals. It may be possible to jam the enemy's radio traffic with good results, and his visual signals can be copied and repeated to his confusion.

i. Plans for action.—The details of the execution of a general plan of action against airborne troops (see par. 105 and 106) cannot be evolved until actual dropping or landing has begun and it becomes possible for the defenders to discern the enemy's intentions. Each unit commander, however, should attempt to anticipate the various forms the attack might take in the area assigned to him and prepare a plan for each imagined possibility. Any plans given to the troops should be simple and flexible and not tied down unalterably to geographic localities, as it cannot be foreseen where the enemy will drop his troops or land his gliders or that he will succeed in placing them where he wants to place them. The important factor is that his troops are extremely vulnerable immediately after landing; consequently, it is the aim of the defense to conserve its strength until the enemy is on the ground and then to attack vigorously no matter how badly it may appear to be outnumbered. Each commander must visualize exactly what he is going to do in each con-

tingency during the few critical minutes most favorable to his success. Counterattacks should be rehearsed by troops assigned to the sector.

■ 62. DELAYING ACTION.—It is probable that the forces available for the local defense of the airdrome will be consistent with the battle situation in the area. The local ground defense is normally a delaying action fought to hold the airdrome or to deny its use to the enemy until supporting forces in the area can come up.

CHAPTER 6

PASSIVE DEFENSE

SECTION I

DISPERSION

■ 63. GENERAL.—Dispersion is an essential measure in the passive defense of an airdrome. Normally there should be nothing in the landing area but those planes which are on the alert.

■ 64. AIRCRAFT.—It is of the utmost importance to avoid the grouping of aircraft on the ground. Planes not in revetments should be in groups of three planes, each plane at least 150 yards from the next and each group at least 200 yards from any plane or other group. Revetments should be 150 feet apart in similar groups. Airplanes, revetted or unrevetted, must not be parked along straight lines nor in continuation of the runways or other natural bombing or strafing runs. Fighter aircraft are kept near the down-wind ends of the runways, ready to take off with a minimum loss of time in the event of an attack. Special precautions should be taken at night to disperse planes which are not on the night alert. If planes are not to be flown, they are moved off the field. Bombardment and reconnaissance planes are dispersed at some distance from the airdrome. A mile is not excessive if it facilitates concealment. Extent of dispersal depends, however, not only on local terrain but also on the requirements for protecting the aircraft from sabotage

or from possible airborne action. Parked planes at airdromes within range of enemy fighters must not be dispersed so widely that they are not under the cover of antiaircraft fire.

■ 65. INSTALLATIONS AND HOUSING.—Technical and operational installations are located near the landing area, but a formalized arrangement should be avoided. Only the control tower need be in the immediate vicinity of the runways. Base operations should be off the edge of the field and away from conspicuous features of the runways or prominent landmarks. It should have no standard location with respect to other airdrome features or similar installations at other airdromes. The engineering maintenance area should be as far removed from the landing area as conditions permit. Thorough reconnaissance of the area should be undertaken to find suitable areas for the housing of personnel. The fullest possible use should be made of existing structures, and new ones should be designed and sited to conform to those normally found in the region.

■ 66. STORAGE.—Fixed servicing and supply facilities are not built at field airdromes. Gasoline, ammunition, bombs, and other supplies are delivered to aircraft at dispersed locations from dispersed stores. Armament and fuel supply points should be well away from the airdrome and isolated from all other equipment, matériel, or dispersal areas. Stores of gasoline in drums should be at least 150 feet apart, if given a protective earth traverse on all sides. Without such protection storage piles should be spaced at 200 yards. Ammunition, bombs, pyrotechnic, and chemical stores should be dispersed under the direction of ordnance personnel or in accordance with the standard safety distances given the Ordnance Safety Manual.

■ 67. REFERENCE.—See TM 5–255 for specific distances and details of dispersion.

SECTION II

COVER

■ 68. PERSONNEL.—At all installations such as headquarters, supply points, engineering maintenance, aircraft dispersal areas, and defense positions, and in all housing areas or any place habitually occupied, air raid shelters must be provided for personnel. The special trench, braced to resist earth shock, is the simplest protection and one of the best. The trace of these trenches is either a chevron or an L to permit occupants to take shelter in a leg which is perpendicular to the direction of flight of a strafing plane. If it is not possible to dig trenches because of the soil, effective protection against heavy machine-gun fire can be had by setting up oil drums filled with sand. For aircraft combat crews, overhead cover, sufficient at least to withstand splinters, must be provided if they are to secure the rest to perform their subsequent missions without undue loss of men and material. Dugouts can be made to serve.

■ 69. AIRCRAFT.—Revetments provide supplementary protection for dispersed aircraft. They reduce damage from bomb fragments but do not prevent effective strafing. They draw fire if they are not wall concealed, and they are extremely hard to camouflage. The commander of the airdrome should determine whether or not they are to be constructed. A War Department order prohibits their construction in the continental United States without specific authority. Elaborate revetments are seldom constructed. Good ones can be constructed quickly by throwing up U-shaped embankments of earth high enough to hide a plane from horizontal view. Their openings should face in different directions. Sand bags filled with the spoil from other works can be used for their construction. Sunken revetments are inadvisable.

■ 70. STORES AND EQUIPMENT.—Normally, all storage at field airdromes will be above ground in dispersed revetments. For

bombs and other supplies which are not affected by the weather, open storage in revetted traverses is ample. The quantity of supplies on hand at advanced field airdromes does not normally justify attempting to give them protection against small-arms fire or bombs. If warehouses are built, they should be theater of operations type. All storage facilities should be carefully camouflaged. Machine tools should

FIGURE 17.—Bomb storage in revetment.

be protected by surrounding walls of concrete or sandbags. If they are in trailers, the parked vehicles should be revetted with earth or sandbags at semipermanent establishments. Under special conditions it may be necessary to construct theater of operations type of buildings to house the power tools.

■ 71. REFERENCE.—See TM 5–255 for details of method and construction of cover.

SECTION III

CAMOUFLAGE

■ 72. GENERAL.—Camouflage is any and every means of concealing, disguising, or obscuring the airdrome or its installations, planes, matériel, and personnel so that the enemy finds it difficult to recognize or identify his target. The extreme importance of taking adequate camouflage measures cannot be overstressed. Continuous and effective efforts for disguise or concealment are vital to the defense of an airdrome. Camouflage discipline must be thorough and rigorously observed. Troops and installations unsatisfactorily camouflaged are not likely to survive for local defense or for any other mission. The more successful the deception, the less the airdrome will look like an airdrome, the less attention it will draw from the enemy. The more effective the camouflage, the more installations and the more personnel will endure for attack and defense. Although camouflage officers of the aviation engineers are available for technical advice and the planning of large-scale projects, camouflage is the job of all personnel, who must be indoctrinated with the necessity of constant effort and vigilance and made to understand the underlying principles of good camouflage as well as the means and methods of achieving it. What hundreds have labored to do, one can carelessly or thoughtlessly undo. Good camouflage in the field does not of necessity demand elaborate prefabricated materials nor specially schooled direction and labor. Time spent in careful planning and common sense employed in the use of existing local cover and concealment and local materials, supplemented if necessary with simple artificial devices, will result in good camouflage, while no amount of special equipment will take the place of thoughtful planning and good camouflage discipline. If it is realized what will give a position away to the enemy, much equipment and labor will not be needed to disguise it. If it is not realized what will give a position away, all the equipment in a base supply depot will not suffice.

■ 73. REFERENCES.—Detailed information and instructions relating to camouflage can be found in FM 5–20 and in TM 5–255, 5–266, and 5–267 and its supplements.

SECTION IV

OBSTACLES

■ 74. GENERAL.—Obstacles of all types have become increasingly important. They are used at airdromes for three general purposes: to prevent the safe landing of enemy aircraft; to impede the advance of mechanized vehicles; and to hinder the attack of foot elements. Temporary obstructions for landing areas, antimechanized obstacles, and barriers for close-in all-around defense are of extremely limited value unless they are covered by fire.

■ 75. OBSTRUCTION OF LANDING AREAS.—*a.* Obstacles to prevent the landing of aircraft are called obstructions. Plans may call for obstructing all landing areas in the vicinity of the airdrome, including those on which gliders or planes might be successfully crash landed. Reconnaissance of adjacent areas not used by friendly air forces must be undertaken to determine the obstruction necessary and the feasibility of placing it. Such locations should be blocked with permanent rather than temporary obstructions. They are spaced so that a landing plane will strike at least two in a run of 100 yards. Since airborne troops will be used to clear landing areas, the obstructions must be difficult to remove.

b. The best obstruction is a ditch or trench. A series of shallow trenches about 3 feet wide and 6 feet long dug at 50-foot intervals is effective. If time permits, the spoil should be removed so that it will not be available for filling. A variation is a series of hummocks of earth irregularly spotted at 50-foot intervals and made by excavating at a distance of 10 to 12 feet around a point and throwing the spoil to the center. Another method of obstruction consists of checkerboards of double furrows spaced to form 100-yard squares. Rows of posts are effective but require considerable time to

place. Various other obstructions afford a measure of security. Large and heavy objects such as concrete pipes, concrete blocks, useless vehicles, rock-filled drums, steel tetrahedrons, or cut trees will suffice. Roads which might be used for the landing of air transports can be blocked by putting obstacles along the shoulders high enough to catch the wings or by stretching cables across the road high enough to permit the passage of vehicles.

c. The successful temporary obstruction of operational fields and runways is difficult. About the only quickly placed temporary obstructions are motor vehicles which can be driven on and parked or objects which can be hastily towed into position. The unused portion of landing grounds in operation should not be permanently blocked, as night landings of friendly planes, without lights and under various weather conditions, are in themselves sufficiently hazardous without further complications.

■ 76. ANTIMECHANIZED OBSTACLES.—Concealed or camouflaged obstacles should be used on all approaches to the airdrome which are not needed for its defense. Even though a ground mechanized threat does not exist, protection should be provided against tanks light enough to be transported by air. (See FM 5–30 concerning location and construction.)

■ 77. BARRIERS AGAINST PERSONNEL.—At airdromes where the situation indicates possibility of attack by airborne or ground troops, all positions which are to be defended should be given as complete wire protection as will not interfere with concealment. The order of erecting available wire should be around gun emplacements near the outskirts of the defense, around gun emplacements within the defended area, around other defense positions, and across access to more dangerous avenues of approach and defiladed areas. Defense wiring should be carefully planned to prevent disclosure of positions. Symmetrical or circular outlines are normally avoided. The construction of common types of protective wiring is shown in FM 5–15.

SECTION V

ALARM SYSTEMS

■ 78. LOCAL ALARM SYSTEM.—An effective local alarm system is essential. Normally every airdrome will be included in an Aircraft Warning Service (see FM 1–25) established by higher authority which will notify the local airdrome commander of the approach of hostile aircraft. Warning will also be received from the Antiaircraft Artillery Intelligence Service (see FM 4–106). A local alarm system of sentinels and observation posts, adequate communications, and warning signals, is, however, necessary to supplement outside warning services and to alert personnel upon hostile approach.

■ 79. SENTINELS AND OBSERVATION POSTS.—Sentinels should be posted and observation posts maintained at strategic points outside the airdrome to give the alarm for approaching hostile aircraft, to warn of chemical attack, and to act as spotters in case of airborne or ground attack. Personnel at these posts should be trained in the recognition of aircraft. All areas likely to be attacked by airborne or ground troops must be kept under continuous observation. Spotters must be on the alert for parachute or air-landing troops and be prepared to guide friendly troops to their landing places. Provision must be made for the immediate verification of reports of the dropping of parachute troops. In friendly territory maximum advantage should be taken of the services of civil organizations which can be formed and trained to report attacks by parachute troops, air-landing troops, or mechanized forces. An AAAIS, if present, will provide the basis for an observation system.

■ 80. COMMUNICATIONS.—The observation system is comparatively useless without unfailing communications. Telephone, radio, and improvised signals must be ready for immediate report of impending attack. The time for warn-

ing is often so short that vehicles or runners will not suffice. Complete dependence cannot be placed on any one method of communication (see par. 44*b*). The signal system must also provide for the rapid communication of warning to higher headquarters or to the nearest agency of the Aircraft Warning Service.

■ 81. WARNING SIGNALS.—A set of signals, both audible and visual, must be devised for warning personnel. The system should be based on a general alarm signal, preferably a siren or special horn, to alert the command. This signal can be followed by another general signal which will send all personnel to battle stations. Special signals are needed. If the hostile mission is one of aerial bombardment only, as much of personnel as possible will take cover, but to resist airborne attack or ground attack local ground defense plans must be put into operation. Special signals, such as the striking of a steel triangle or the sounding of a klaxon horn or combinations of signals, must be available for gas attack. Means to give information or orders may be required. Local signal codes are extremely useful and not difficult to improvise. A loud speaker system has many advantages.

SECTION VI

DAMAGE CONTROL

■ 82. GENERAL.—Provision must be made for emergency damage control. Fires must be controlled and incendiaries dealt with immediately. Communications must be maintained. Decontamination of installations essential to the defense may be necessary. Damage to vital installations must be given emergency repair if it is required that the airdrome continue to operate under attack. If friendly planes are in the air or are to be put into the air, one runway must be kept in condition for use. Speedy repairs depend largely on advance preparations and training and the use of equipment rather than hand labor. (See TM 5–255.)

■ 83. PLANS AND COORDINATION.—Detailed plans and effective coordination are required. A damage control officer should be appointed to assist the defense officer by directing all repair activities. Details must be organized to control and repair damage as it occurs. Fire plans and efficient fire-fighting squads must be ready. Details must also be organized for the maintenance of communications and the repair of runways. Damage control details will normally be organized from appropriate service troops available, augmented if necessary by specially trained Army Air Forces personnel. During an attack only the minimum repair details will be exempted from the general defense and will be at emergency stations. Additional personnel, if required, will be obtained from the fighting personnel under control of the defense officer.

■ 84. REPAIRS AFTER ATTACK.—All service personnel who can be spared will be released by unit commanders to work under the general supervision of the damage control officer. To survey the extent of damage and to establish priority of work, a hasty reconnaissance should be undertaken immediately.

SECTION VII

PROTECTION AGAINST CHEMICALS

■ 85. GENERAL.—All personnel must be trained and conditioned so that they will be able to carry out their duties promptly and efficiently during a chemical attack. Chemical defense plans must be based on what the enemy can do, not on what it is thought he will do.

■ 86. GAS DISCIPLINE.—Gas discipline is essential. All personnel should feel that the security of the command depends upon the orderly and prompt execution of the protective procedures in which they have been drilled.

■ 87. PROTECTION BY DISPERSION.—Dispersion of aircraft and airdrome facilities, installations, and equipment is a primary means of defense against chemical attack.

■ 88. PROTECTION BY GASPROOFING.—Matériel and installations necessary to the functioning of the airdrome must be protected against chemicals. The communications center and the operations and control centers should be gasproof. Although it is neither necessary nor feasible to provide gasproof protection for all installations at an airdrome, every structure which is protected against bombing can be gasproofed. Those structures which are to be protected against gas must also be at least blastproof and splinterproof. (See FM 21–40 and TM 5–310.)

■ 89. RUNWAYS AND LANDING AREAS.—Chemical agents do relatively little direct damage to runways or landing areas, although mustard type agents will contaminate the grass on turfed fields. The greatest difficulty will result from the use of persistent gas to delay repair of damage caused by high explosives. The contamination of a large area of a runway or landing ground will, however, interfere with its use by aircraft. Neutralization of the chemicals by prompt decontamination is the primary defensive measure. For bomb craters or for small areas satisfactory results can be had from the standard demustardizing apparatus, but for larger areas, such as runways, a motor-driven unit is required. No special measures against incendiaries are necessary other than to keep grass and brush cut back from dispersed aircraft and buildings.

■ 90. PROTECTION OF AIRCRAFT.—If possible, aircraft should be protected from contact with liquid chemicals, but revetments which are proof against chemicals in liquid form will not ordinarily be provided. Overhead cover for large bombardment planes is not normally practicable. Except for the largest planes, however, protection against overhead and drifting sprays should be provided. Covers of impermeable material for cockpit, engine, and propellers are effective and should be employed, when available, to protect planes not being used or serviced.

■ 91. EXPLOSIVES AND INFLAMMABLE STORES.—Explosives and inflammables are not appreciably affected by chemicals except when the liquid comes in contact with metallic containers. Storage of gasoline and other fuels underground adequately protects them from chemical contamination as well as from incendiaries under ordinary conditions. Magazines and similar buildings used for storing explosives give sufficient protection. Bombs, munitions, gasoline, oil, and equipment stored in the open should be protected by gasproof tarpaulins.

■ 92. FACILITIES FOR REPAIR AND MAINTENANCE.—The protection of facilities for repair and maintenance will vary with the degree of exposure of the airdrome and the time, personnel, and materials which are available for construction. If bombproof repair shops are built, they should also be gasproofed. Easily damaged equipment, such as parachutes and bomb sights, should be kept in blastproof, fire-resistant gasproof storage.

■ 93. PROTECTION OF PERSONNEL.—*a. General.*—Personnel should be required to have gas masks available at all times and, since attack by persistent chemicals is one of the best means for neutralizing an airdrome, should be provided with clothing impregnated for protection. Each man should have a designated place to go during chemical attack, and should be drilled to go immediately to his place without confusion. With only those exceptions necessitated by the defense plan, these places should provide overhead and vertical protection against chemical spray.

b. Gas alarm system.—The "alert" signal announcing the probable approach of hostile planes should be the signal for waking sleeping personnel, closing gasproof shelters, and covering airplanes, trucks, food supplies, and water. The "gas alarm," however, should not be given until it is necessary for men to mask. Alarms should be located over the airdrome to relay the warning from any one part of the field to all others. The main alarm should be located at the

FIGURE 18.—Camouflaged auxiliary alarm made from truck axle.

operations office, and auxiliary alarms should be placed where men are habitually at work.

c. Gas sentries.—Gas sentries should be posted at or near all gas alarms, gasproof shelters, working parties, and sleeping men. Guards stationed at the headquarters of various units and at important installations should also be trained in the duties of gas sentries.

d. Shelters.—Gasproof shelter can normally be provided only for those installations that must be kept in operation during the attack. Installations seriously impaired in operating efficiency when personnel is masked should be given priority. One or two bombproof gasproof shelters may be placed at each end of the landing area, one at the operations office, and one at the first aid station or at any other important installation. Personnel engaged in activities requiring a number of men should at a minimum be provided with overhead cover adequate to protect them from spray and with vertical cover, such as that afforded by impermeable paulins, which can be shifted as the wind changes. Impervious covers should be liberally provided for fox holes.

e. First aid.—The medical service should provide a special organization for the prophylaxis and treatment of gas cases.

f. Warning signs.—Warning signs should be promptly posted at all contaminated areas. Vigilance is required to prevent contamination from contact with objects, structures, and ground splashed with vesicants. The first to move after the attack must be the decontamination squads, which must prepare and mark off paths before activities can be resumed safely.

g. Decontamination stations.—Men contaminated by liquid chemicals must be required to report at once to a decontamination station. Assembly points can be designated in distant areas so that contaminated men may be transported by truck.

■ 94. PROTECTION OF DEFENSE INSTALLATIONS.—Few defense installations can be protected against chemicals. Antiaircraft

guns cannot be given protective cover and still function. At such installations protective clothing must be worn. Other weapons may be given cover overhead against spray, but some men at each gun should wear masks and protective clothing at all times when attack is possible. Frequent changes of shifts are necessary to reduce fatigue caused by wearing such clothing.

■ 95. CHEMICAL WARFARE DEFENSE CENTER.—Separate storage should be given to materials and equipment used for decontamination. Decontamination squads should assemble at the storage point upon the "alert" signal.

■ 96. PLANS.—For every airdrome an integrated chemical defense plan is required. Because of the technicality of the defense measures and the specialized training necessary, Chemical Warfare Service troops should be available for its execution.

■ 97. REFERENCES.—See FM 21–40 and TM 5–310.

SECTION VIII

DEMOLITION

■ 98. GENERAL.—*a.* If an airdrome is liable to capture and if its possession intact would be of material advantage to the enemy, plans for its defense must include measures to prevent or delay its use by him. The complete demolition of an airdrome, however, is a major operation which requires time and a large amount of explosives. Although installations and equipment present no unusual problem, the destruction of landing areas is difficult. Lack of time may prevent complete demolition. The following list suggests priorities and personnel for demolition:

(1) Runways and taxiways—aviation engineers.

(2) Remainder of landing area—aviation engineers.

(3) Routes of communication to the airdrome—engineers.

(4) Construction equipment at the airdrome—aviation engineers.

(5) Technical buildings—air force ground troops with engineer help.

(6) Supplies of gasoline, oil, and bombs—air force ground troops.

(7) Motor vehicles and unserviceable aircraft—air force ground troops.

(8) Housing—air force ground troops with engineer help.

b. Accomplishment of the complete list of demolitions would so effectively destroy the airdrome as to deny its use to the enemy without an entire rebuilding.

■ 99. METHODS.—The methods of carrying out demolition must be decided on the location, as they will largely depend on the time available and the type of constructions. Paved runways present the most difficult problem. They may be cratered by means of explosives or torn up by mechanical grubbers. Bangalore torpedoes may be placed when the occasion arises in holes under the runways made by horizontal drills, or in culverts constructed at a depth of about 30 inches when the runway was built. To crater a runway effectively will require rows of charges placed across the runway at 5-yard intervals every 100 yards, a task requiring much time, trained personnel, and a large amount of explosive. Grassed landing areas can be destroyed with moderate effectiveness by bulldozing or plowing 20-foot bands across them every 50 yards. Wet weather operation may be impeded or prevented if patches of the turf are killed by spraying heavily with engine oil. Booby traps planted in damaged areas, underneath soil and tied to obstructions, will slow reconstruction. The standard demolition procedures described in FM 5–25 may be applied to installations and facilities. If it appears that a well-camouflaged field will fall into enemy hands without complete or effective demolition, it should be marked for subsequent bombing by some readily discernible sign which will be difficult to remove. Such a mark may be made by plowing, burning, or staining the runways portion with a cross approximately 100 yards across.

CHAPTER 7

PLANS AND TRAINING

SECTION I

GENERAL

■ 100. RESPONSIBILITY.—The commanding officer of an airdrome will make and announce a plan for its defense. He may delegate the preparation of the basic plan and the coordination of the plans of specialists (chemical, ordnance, etc.) to a defense officer.

■ 101. RECONNAISSANCE AND SURVEYS.—To prepare effective plans, the commanding officer and other personnel must reconnoiter carefully the airdrome, the surrounding areas, and routes of movement in the vicinity. A survey must be made of the facilities, installations, and equipment immediately available, and one of the locality and its inhabitants to determine what facilities and installations are available to supplement them.

■ 102. INSPECTIONS AND TESTS.—The commanding officer will provide for the instruction of all personnel in their essential duties under the defense plans. He will conduct inspections to insure that the continuous security measures are effective and will prescribe alerts by day and by night to test the effectiveness of the various alert plans and the operational efficiency of the personnel involved.

■ 103. STANDING OPERATING PROCEDURE.—Each unit of the defense will establish appropriate and effective procedure adapted to operating conditions and conforming to that established by the airdrome commander. Standing Operat-

ing Procedure will be devised to expedite those features of operations which permit definite or standardized execution without loss of effectiveness.

■ 104. LIAISON WITH SUPPORTING UNITS.—Defense plans should be coordinated with those of all theater reserves which may be dispatched to assist the local defense. Such prospective reinforcements should be familiar with the organization of the ground before they are called in. Range cards, for example, may be made for field artillery whether the guns are in the local defense or with supporting units.

SECTION II

CONTENT OF PLANS FOR LOCAL GROUND DEFENSE

■ 105. GENERAL.—All defense plans should contemplate the immediate defense of the airdrome by means of only existing facilities, fortifications, weapons, and troops and with little or no warning. In drawing them up the principles outlined in FM 101–5 for the preparation of combat orders should be observed. Each unit should have definite, concise instructions concerning the responsibilities and duties of its personnel for each anticipated major contingency. Uniformity of the parts of the plan is desirable to facilitate coordination and understanding by personnel transferring or changing duties within the command. If it is within the capabilities of the enemy to execute any form of attack or sabotage, a plan to defeat such attack will be made as soon as the installation exists. Initially, and in mobile situations, the plan may be quickly conceived and announced orally. In static situations, it will be deliberately prepared and written. The amount of detail contained in a plan varies inversely with the experience and state of training of the troops who are to execute it. Whatever their form and extent, such plans cover the following points:

a. Observation, alarm, and communication system.
b. Day and night recognition signals for friendly aircraft.
c. Camouflage and dispersion.

d. Organization of the ground—areas to be defended, weapon emplacements, fields of fire, obstacles, and obstructions.

e. Assignment of personnel to assembly areas for combat or for shelter.

f. Immobilization of vehicles not used by the defenders.

g. Damage control.

h. Defense against chemical attack.

i. Liaison with reserves and all possible supporting forces.

j. Emergency evacuation of aircraft.

k. Demolitions to prevent seizure and use of the airdrome by hostile forces.

■ 106. PLANNING.—*a.* The capabilities of the enemy will be evaluated and the defense prepared accordingly.

b. Friendly troops in the area will be contacted with a view to forming a coordinated defense.

c. Care will be taken, in assigning the various units to the different forces, that units working or living in a sector are assigned where possible to forces operating in that sector.

d. All personnel (including transients) at a station will be accounted for in the plan. Provision will be made for the final use, if necessary, of *all troops* in the *active* defense of the station.

e. A mobile striking force or forces will be provided for.

f. A reserve force will be provided for, prepared to exploit any success or to intervene at any threatened point.

g. Care will be taken to specifically designate commanders for the sectors, the striking forces, the reserve, and other echelons of the defense force.

h. Each force will prepare the sector allotted to it for operations.

i. Most of the plan can and should be shown on an operations map.

j. Specialist officers, when available, will be required to prepare those parts of the plan, particularly annexes, pertaining to their specialties.

k. Whenever feasible, the plan will be supported by a complete and concise statement of the situation for the benefit of personnel who might be required to carry out its provisions without having had an opportunity to make thorough investigation and reconnaissance of the conditions involved. A list indicative of the considerations to be covered follows. It is to be taken as a guide and not as a complete catalog of all the factors which may exist in any given situation.

(1) Strategic location. (Is the area within range of hostile attack?)

(2) Surrounding terrain and features of military importance. (Is the surrounding area open, or is cover available to permit surveillance or the approach of hostile forces without detection?)

(3) Location with respect to civilian population. (This item might be favorable or unfavorable. Information should be included concerning any useful industrial or public developments and any potential hazards from local hostility.)

(4) Roads and railroads. (Does the surrounding road net facilitate the advance of hostile ground forces or undetected surveillance by enemy sympathizers or hostile agents?)

(5) Location with respect to reinforcements. (Include type and size of reinforcements, availability, communications facilities, distance, and time intervals involved.)

(6) Area and boundaries. (Do the size and shape of the airdrome and the locations of its boundaries favor the defense?)

(7) Location of vital installations. (What are the locations of the water system, bomb sight storage, supply points, hangars, motor pool, communications center, etc., and what are their capabilities for defense?)

(8) Isolated installations. (What installations are located at a distance from other installations and what provision is made for their defense?)

(9) Type of construction. (What is the spacing for protection against fire?)

■ 107. OUTLINE MODEL OF A PLAN.—An outline model of a deliberately conceived written plan for the defense of a forward-area airdrome follows: It is to be used only as a guide for form and content. As no two installations are exactly alike, the situation and solution presented here should not be blindly applied. In addition to one fighter squadron, the presence of one infantry battalion and one battery of automatic weapons antiaircraft artillery is assumed.

DEFENSE PLAN

(Name of station)

(Date of issue)

ASSIGNMENT OF TROOPS

(As assignments will change because of transfer of units, etc., they are shown on a separate page of the plan so that it may easily be revised and reissued as necessary to keep it up to date.)

A Force—Co. A, 306th Inf Bn, reinforced by such detachments of the Heavy Weapons Co. and Antitank Platoon, Hq. Co., 306th Inf Bn, as may be assigned.
50 men from 795th Fighter Sq.
Commander: Company Commander, Co. A, 306th Inf Bn.

B Force—Co. B, 306th Inf Bn, reinforced by such detachments of the Heavy Weapons Co. and the Antitank Platoon, Hq. Co., 306th Inf Bn, as may be assigned.
50 men from 795th Fighter Sq.
Commander: Company Commander, Co. B, 306th Inf Bn.

C Force—Co. C, 306th Inf Bn.
12 ¼-ton trucks and 12 ¼-ton trailers from the Heavy Weapons Co., 306th Inf Bn.
4 1½-ton trucks from Hqs. Co., 306th Inf Bn.
2 1½-ton trucks from 795th Fighter Sq.
Commander: Company Commander, Co. C, 306th Inf Bn.

D Force—Battery A, 425th A. A. A. A. W. Bn.
Commander: Battery Commander, Battery A, 425th A. A. A. A. W. Bn.

E Force—100 men from 795th Fighter Sq.
Commander: Adjutant, 795th Fighter Sq.

1. *a. Enemy capabilities.*
(A brief estimate of the situation to indicate the threats the plan is designed to defeat.)

b. Supporting troops.

(1) This station is within the ———— Subarea, ———— Area of the ———— Sector. ———— Subsector Hq is at ————. ———— Sector Hq. is at ————. ———— Command Hq. is at ————.

(2) *The ground forces in this area are:*

———— at ————.
———— at ————.
———— at ————.

Since their mission is to defend the ———— Subarea, including this station, assistance may be expected from them according to developments in the situation.

(3) In order that the action of all forces opposing an enemy ground attack may be coordinated, the defense forces of this station come under the operational control of———— (local area military commander) when ————

(Cite directive, etc.)

(4) AA units in the vicinity are:

———— at ————
———— at ————

(5) In the event of an attack on this station the afore-mentioned forces may be able to intervene at once, later, or not at all. The personnel of this station will be prepared to undertake the defense thereof without outside assistance.

2. *Mission.*

a. All personnel on this station will be prepared to participate in the active defense thereof, for the purpose of:

(1) Preventing enemy interference with the operation thereof,

(2) Preventing the enemy from taking the station for his own use or for the purpose of destroying it,

(3) Permitting, if necessary, an orderly evacuation.

b. Initially, designated personnel are assigned to combat forces, to damage control duties, and to passive defense duties, while others will carry on their normal operational duties. However, the tasks of various individuals and groups will be altered in accordance with developments in the situation.

3. *a. A Force* will prepare, and when alerted for ground defense, defend Sector A (Annex 1), including fixed positions and road blocks. It will provide striking forces for the sector.

b. B Force will prepare, and when alerted for ground defense, defend Sector B (Annex 1), including fixed positions and road blocks. It will provide striking forces for the sector.

c. C Force will constitute a mobile reserve striking force, and will be prepared to move, when ordered, with all possible speed to exploit success, counterattack, or reinforce threatened points. The personnel of D Force will remain in position at ———— (Annex 1).

d. D Force will man its automatic weapons continuously from 30 minutes before daylight until 30 minutes after dark, and at night for 5 days before and after full moon. Primary targets—

enemy aircraft within range. Additional targets—enemy ground forces.

e. E Force will constitute a general reserve, prepared, on orders, to reinforce threatened points. It will assemble, when alerted for ground defense, at ———— by the most expeditious means available. The MTO will dispatch ———— trucks to ———— for use by this force (par. *3g*).

f. Remaining unassigned personnel and transients will man trenches at their places of occupation or quarters when any assigned duties cannot be performed.

g. The MTO will, when the ground defense alert is sounded, dispatch:

———— trucks to ———— (par. *3e*). Remaining vehicles will be dispersed and immobilized at ————

(1) The static defense is made up of prepared positions within the sectors—centers of resistance, machine-gun posts, and fox holes sited to cover the landing ground and the approaches to the airdrome (Annex 1).

(2) OP's 1, 3, and 5 will be manned at all times. Others will be manned immediately upon the sounding of any alarm. They will report all enemy air and ground activity.

(3) Airplanes will be so dispersed as to minimize the effect of air attack on groups of planes.

(4) All personnel will make full use of camouflage and natural concealment. Permanent installations will be camouflaged to break their general outlines and make them less apparent targets.

(5) *Warning system:*

(*a*) *Air raid.* The air raid warning, a rising and falling note, will be sounded upon the station siren. Upon the sounding of this warning, D Force (par. *3c*) will at once man all its positions, all OP's (par. *3x*(2)) will be manned, and Damage Control (Annex 3) and Passive Defense measures (Annex 6) will be taken.

(*b*) *Ground defense.* The warning signal for ground defense will be ————. when this alert is signaled, all provisions of this plan relating to repelling an enemy attack on the ground will be placed into effect immediately.

(6) Night (special provisions to make the plan effective at night, when personnel are in quarters).

(7) Arms (instructions for distribution of hand arms so that an adequate number will be available when and where needed, day or night).

4. *a. Supply.*

(1) Rations and water (instructions for maintenance of emergency supplies of rations and water).

(2) Ammunition—the following ammunition will be drawn and maintained in serviceable condition at all times:

(*a*) Riflemen—1 full belt.
(*b*) Thompson submachine gunners—3 full clips.
(*c*) Pistol—3 full clips.
(*d*) Machine guns—600 rounds.
(*e*) Mortars—_____ rounds.
(*f*) 40-mm automatic weapons, antiaircraft—_____ rounds.

(*g*) Reserve ammunition at the rate of three times these amounts will be stored in sectors by force commanders for immediate issue.

b. Aid stations. (Annex 1.)

5. *a.* All defended localities, OP's, and machine-gun positions are connected to Battle Headquarters by field telephone.

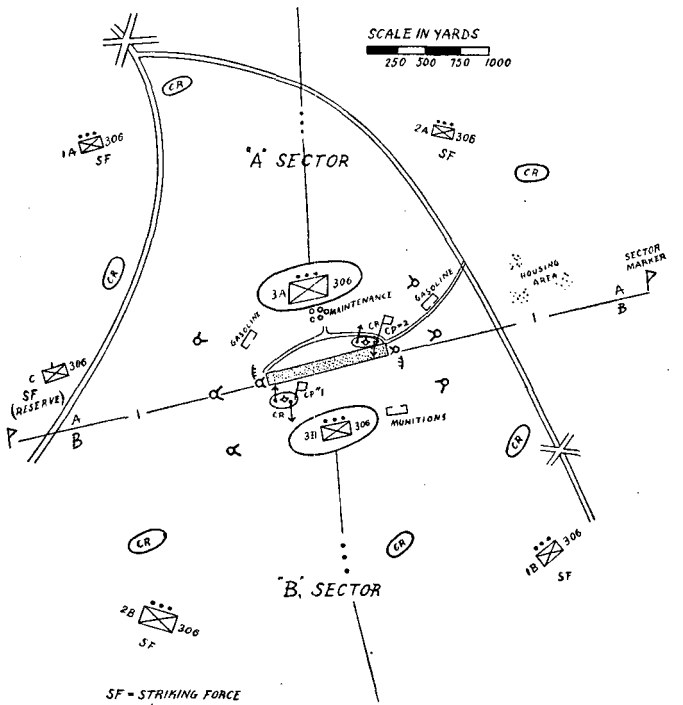

FIGURE 19.—Principal dispositions for defense of a forward-area airdrome (par. 107).

b. (1) *Command posts.* (Annex 1.)
(2) *Battle headquarters.* A watch will be maintained at battle headquarters at all times.

Commanding.

Concur:

(Area commander)

ANNEXES:
No. 1. Operations Map.
No. 2. Signal Communications.
No. 3. Damage Control.
No. 4. Chemical Defense.
No. 5. Medical.
No. 6. Passive Defense.
No. 7. Evacuation and Demolitions

■ 108. REVISION.—Plans will be reviewed periodically and whenever the conditions on which they were based have changed.

SECTION III

TRAINING

■ 109. GENERAL.—Plans alone are not sufficient. Their execution in an emergency must be insured by an intensive training program which provides for their frequent rehearsal and the working out of small problems that will arise from them. Indoctrination of troops should be so thorough that they will carry on with correct procedures under their own initiative.

Exercises can take the general form of—

a. A map exercise, including an enemy appreciation of the best way of capturing the airdrome.

b. Exercises with the troops to test out—

(1) Arrangements for command.
(2) Communications.
(3) Fire plan.
(4) Arrangements for relief.
(5) Smooth execution of procedures.

c. The exercises should include attack by airplanes, representation of the dropping of parachute troops, and, if possible, the actual landing of airborne troops. It is essential that

troops at the various installations be practiced in the bold, offensive action needed to defeat parachute and air-landing troops. Small problems which require immediate coordinated action for their solution should be devised and executed on the ground. There is no reason why the defense of an airdrome should lack cunning, field craft, and deception. Troops must be trained by day and by night to take advantage of every fold in the ground and every bush and every scrap of cover and drilled in methods of silent approach. Rehearsals must not become routine.

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