

MHI
Copy 3

FM 44-2

WAR DEPARTMENT FIELD MANUAL

REGRADED UNCLASSIFIED BY
AUTHORITY OF DOD DIR. 5200.1 R
BY BAW/S ON 8/11/03

EMPLOYMENT OF 1950

ANTIAIRCRAFT ARTILLERY

AUTOMATIC WEAPONS

Quartermaster School
Technical Library
Camp Lee, Va

~~RESTRICTED~~ 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. 236, AR 380-5, 15 Mar 1944.)

WAR DEPARTMENT • DECEMBER 1944

FOR OFFICIAL USE ONLY

WAR DEPARTMENT FIELD MANUAL
FM 44-2

This manual supersedes FM 4-101, 29 March 1943; FM 4-102, 31 August 1943; FM 4-103, 30 September 1943; and TC No. 63, W.D., 1944.

EMPLOYMENT OF
ANTI-AIRCRAFT ARTILLERY
AUTOMATIC WEAPONS



WAR DEPARTMENT • DECEMBER 1944

~~RESTRICTED~~ **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. 23b, AR 380-5, 15 Mar 44.)

WAR DEPARTMENT
WASHINGTON 25, D. C., 21 December 1944

FM 44-2, Employment of Antiaircraft Artillery Automatic Weapons, is published for the information and guidance of all concerned.

[AG 300.7 (21 Nov 44)]

BY ORDER OF THE SECRETARY OF WAR:

OFFICIAL:

J. A. ULIO
Major General
The Adjutant General

G. C. MARSHALL
Chief of Staff

DISTRIBUTION:

AAF(10); AGF(10); ASF(2); T of Opns(5); Arm & Sv Bd(2); Def C(5); Island C(5); Base C(5); Depts(5); Tech Sv(2); SvC(10); HD(5); PC&S (1); Gen & Sp Sv Sch(50) except AAA Sch (300); USMA(2); ROTC(1); AA C(30); A (10); GHQ(10); D(2) except D 1, 7, 17, 44, 70, 72 (5); B 44(5); R 6, 7, 17, 18 (2), 44(5); SBn 6, 7, 17, 18 (2), 44(5); Bn 44(5); AF(5); G(2); S(2).
T/O & E: 44-25(100); 44-75(100); 44-125(100); 44-225S(100); 44-275(100); 44-475T(100).

For explanation of symbols, see FM 21-6.

CONTENTS

	<i>Paragraphs</i>	<i>Page</i>
CHAPTER 1. ORGANIZATION.		
<i>Section I.</i> Battery organization	1-3	1
<i>II.</i> Battalion organization	4-6	5
<i>III.</i> Group organization	7	8
CHAPTER 2. MISSIONS.	8-10	9
CHAPTER 3. CHARACTERISTICS OF AUTOMATIC WEAPONS.	11-16	12
CHAPTER 4. CONTROL AND CLASSES OF FIRE.		
<i>Section I.</i> General	17-18	22
<i>II.</i> Engaging	19-23	23
<i>III.</i> Barrage fire	24-27	25
CHAPTER 5. COMMUNICATIONS.		
<i>Section I.</i> General	28-31	28
<i>II.</i> Radio communications	32-36	29
<i>III.</i> Wire communications	37-38	36
CHAPTER 6. TACTICAL EMPLOYMENT.		
<i>Section I.</i> General	39-49	38
<i>II.</i> Static employment	50-53	49
<i>III.</i> Mobile employment	54-64	52
CHAPTER 7. EMPLOYMENT OF AIRBORNE AAA.		
<i>Section I.</i> General	65-76	72
<i>II.</i> Employment of airborne AAA battalion	77-84	78

	<i>Paragraphs</i>	<i>Page</i>
III. Employment of airborne machine gun battery	85-87	82
IV. Employment of airborne automatic weapons battery	88-92	84
V. Employment of separate airborne AAA machine gun battery	93-99	87
VI. Employment of air-transportable AAA automatic weapons battalions	100-104	90
 CHAPTER 8. EMPLOYMENT AGAINST GROUND AND NAVAL TARGETS.		
<i>Section I.</i> General	105-107	93
II. Mechanized targets	108-109	95
III. Ground role	110-116	97
IV. Naval targets	117-119	104
 CHAPTER 9. RECONNAISSANCE, SELECTION, AND OCCUPATION OF AA POSITIONS.		
<i>Section I.</i> General	120-123	105
II. Mobile, semimobile, and air-transportable units	124-129	107
III. Self-propelled units	130-132	118
IV. Airborne units	133-136	119
 CHAPTER 10. SUPPLY AND EVACUATION.		
<i>Section I.</i> Supply	137-147	120
II. Evacuation	148-152	125
 <i>Appendix. Estimates, plans, and field orders.</i>		
<i>Section I.</i> Estimates and plans	1	128
II. Field orders	2-10	128

CHAPTER 1

ORGANIZATION

Section I. BATTERY ORGANIZATION

1. BATTERY. **a.** The fire unit of the automatic weapons battery varies with the type of armament authorized by Tables of Organization and Equipment.

b. Mobile or semimobile fire unit armament consists of the 40-mm AA gun on carriage M2, director, power plant, and the multiple caliber .50 machine gun trailer mount M55 (or the multiple calibre .50 machine gun carriage M51). The personnel is divided into a range section, a machine gun section, and a gun section.

c. The self-propelled fire unit armament consists of a multiple gun motor carriage M15A1 (or a twin 40-mm gun motor carriage M19) and a multiple gun motor carriage M16. The personnel is divided into an automatic weapons squad and a machine gun squad.

d. The airborne fire unit armament consists of a caliber .50 machine gun or a 37-mm antitank gun.

e. The air-transportable fire unit armament consists of the 40-mm AA gun on mount M5, director, power plant, and the multiple caliber .50 machine gun trailer M55. The

Note. For definitions of military terms not contained herein, see TM 20-205.

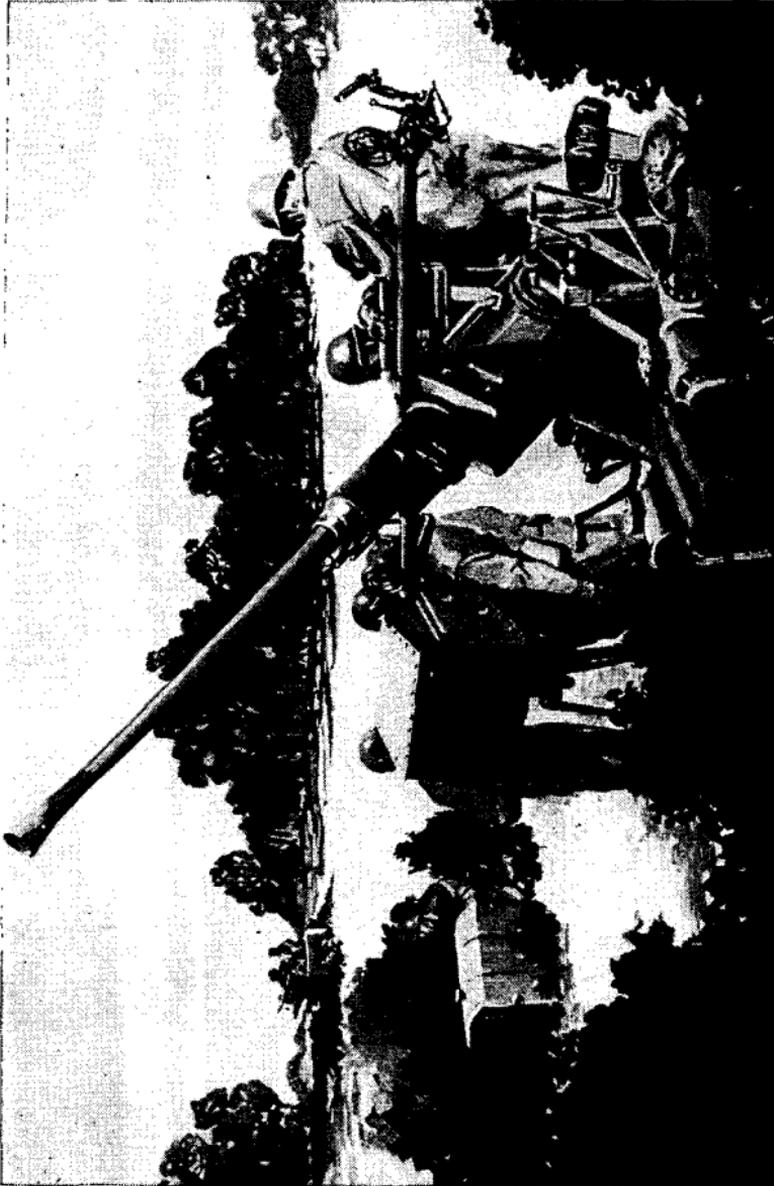


Figure 1. Automatic weapons fire unit, mobile or semimobile. (Not in combat position)

personnel is divided into a range section, a gun section, and a machine gun section.

2. TABLES OF ORGANIZATION. a. Mobile AAA automatic weapons battery (T/O 44-27).

b. Semimobile AAA automatic weapons battery (T/O 44-127).

c. Self-propelled AAA automatic weapons battery (T/O 44-77).

d. Airborne AAA automatic weapons battery (T/O 44-277).

e. Airborne AAA machine gun battery (T/O 44-278).

f. Separate airborne AAA machine gun battery (T/O 44-217).

g. Air-transportable AAA automatic weapons battery.

h. AAA machine gun battery (light).

3. BATTERY COMMANDER. The battery commander is responsible for the defense of the objectives assigned to the battery, and its training, administration and supply. He selects the positions to be occupied by the fire units by personal reconnaissance, whenever possible. Due to the dispersion of the units and the brief time of any one action, the battery commander cannot control the fire of his units. (The fire unit commander makes the actual selection of targets in accordance with target priorities dictated by higher command and SOP. (See FM 44-1 when published).) The battery commander is responsible for local security. Inspection of weapons, equipment, sanitary facilities, and personal cleanliness of the troops is a responsibility and function of the battery commander. He must organize and train the battery so that it can move out and occupy new positions rapidly. The battery commander is assisted in his duties by junior officers in accordance with appropriate T/O.

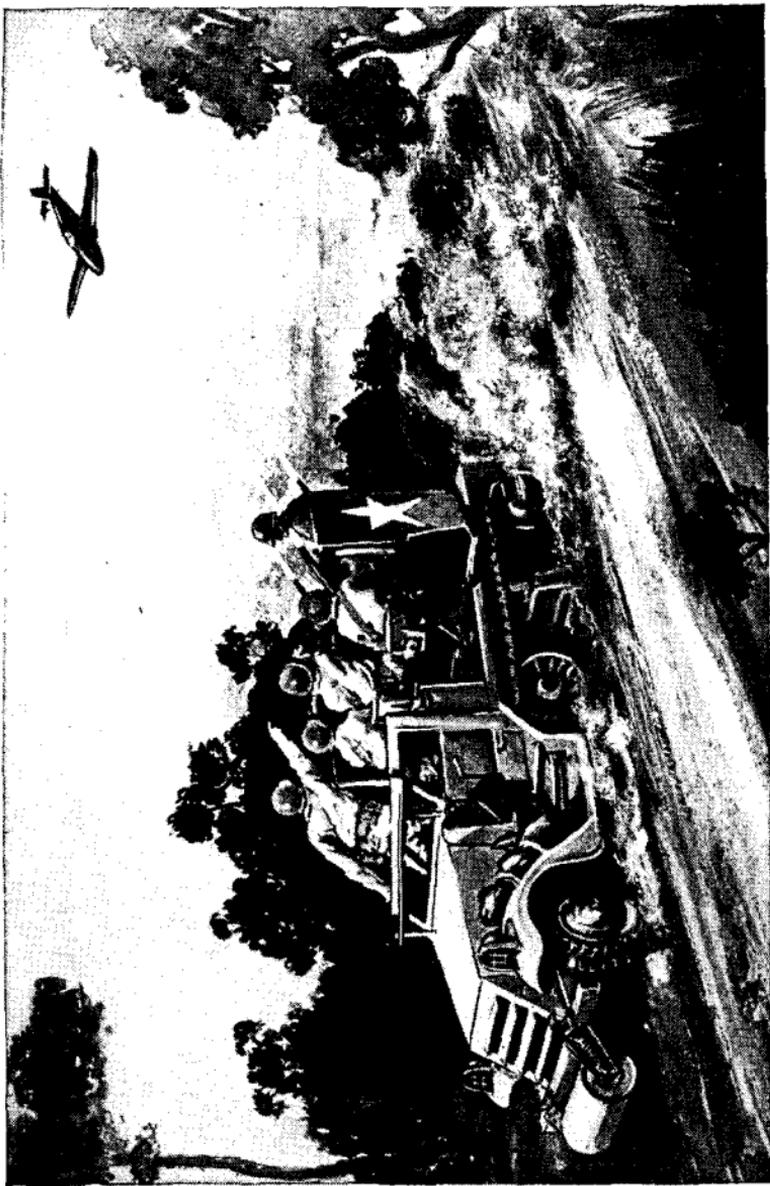


Figure 2. Self-propelled automatic weapons squad.

Section II. BATTALION ORGANIZATION

4. BATTALIONS. The battalion is the basic self-contained administrative and tactical unit of antiaircraft artillery. There are six types of automatic weapons battalions: mobile, semimobile, self-propelled, airborne, air-transportable, and machine gun (light). Their organization and T/O's are as follows:

a. Mobile automatic weapons battalion and medical detachment, T/O & E 44-25. The battalion consists of a headquarters and headquarters battery (T/O & E 44-26), and four mobile firing batteries (T/O & E 44-27).

b. Semimobile automatic weapons battalion and medical detachment, T/O & E 44-125. The battalion consists of a headquarters and headquarters battery (T/O & E 44-126), and four firing batteries (T/O & E 44-127).

c. Self-propelled automatic weapons battalion and medical detachment, T/O & E 44-75. The battalion consists of a headquarters and headquarters battery (T/O & E 44-76), and four self-propelled firing batteries (T/O & E 44-77).

d. Airborne automatic weapons battalion and medical detachment, T/O & E 44-275. The battalion consists of a headquarters and headquarters battery (T/O & E 44-276), three automatic weapons batteries (T/O & E 44-277), and three machine gun batteries (T/O & E 44-278). The airborne battalion is organic in the airborne division.

e. Air-transportable automatic weapons battalion T/O & E 44-225S. The battalion consists of a headquarters and headquarters battery (T/O & E 44-226S) and four automatic weapons batteries (T/O & E 44-227S).

f. Machine gun battalion (light), T/O & E 44-475T. The battalion consists of a headquarters and headquarters

battery (T/O & E 44-476T) and three machine gun batteries (T/O & E 44-477T). The machine gun battalion is organic in the light division.

5. BATTALION COMMANDER. a. The battalion commander is responsible for the tactical employment of the elements of his command and their training, administration, and supply. He is informed of priorities for AAA defense, and by consultation and liaison with his group or force commander he keeps informed of the general situation and contemplated movements. In addition, he must estimate the probable future situation based on the information available and prepare tentative plans for the employment of his unit. The organic AA weapons within the unit protected and the possibilities for passive air defense measures must be considered in any plan formulated.

b. The elements of his battalion may be widely scattered for extended periods of time. To maintain efficiency he must make frequent inspections covering all phases of activity engaged in by the elements of his command.

c. The battalion commander must keep his battery commanders advised of the friendly and enemy situation so far as it affects the performance of their mission. He gives such instructions concerning fire action as the situation warrants, directs changes of position when necessary, and supervises the supply of ammunition and other supplies to the batteries.

d. In situations where the AAA defense does not include AAA gun or searchlight battalions, the automatic weapons battalion commander is responsible for the establishment and operation of the AAOR and AAAIS. The personnel to operate the AAOR will be obtained from

sources available to the battalion commander, normally from the operations and communications sections of the battalion headquarters battery. Detailed information on the AAOR and AAAIS is found in FM 44-8.

e. Where an automatic weapons battalion is part of an AAA defense employing AAA guns or searchlights, it will contribute information for the AAAIS. The battalion AAAIS personnel includes all AAA observers of the defense that are in communication with the AAOR.

f. The senior AAA commander in any defense is responsible for the establishment and operation of an AAOR and AAAIS for that defense.

g. When the battalion commander is the senior AAA officer with a force it is also his responsibility to advise the force commander on AAA matters. His duties in this respect will be similar to those of a brigade or group commander as outlined in FM 44-1 (when published).

6. BATTALION STAFF. Battalion staff action must frequently be rapid and some of the steps may not be reduced to writing. Staff members should be selected for their ability to think clearly and act rapidly. The staff members assist the battalion commander by providing basic information and advice by which he arrives at his decisions. They develop details of the commander's plan, translate the plan into orders, transmit the orders to the batteries, anticipate future needs, draft tentative plans, and secure unity of action throughout the command. To insure unity of action the staff members should assist and advise the battery commanders whenever possible. The detailed duties of the various staff members are described in FM 101-5 and FM 44-1 (when published).

Section III. GROUP ORGANIZATION

7. GENERAL. Where two or more battalions are operating together they are either commanded by the senior battalion commander or are formed into a group and a headquarters is provided to exercise command. Groups operating together may be attached to AAA brigades. Groups or brigades may be attached to armies, corps, or other forces, as required. Any combination of the various types of battalions may be organized as a group. For the detailed organization of the group headquarters and headquarters battery see T/O 44-12.

CHAPTER 2

MISSIONS

8. PRIMARY MISSION. The primary mission of automatic weapons is to attack all enemy aircraft within range, particularly low flying aircraft to destroy them, cause them to abandon their missions, or to decrease the efficiency of their operations.

9. SECONDARY MISSION. The secondary mission of automatic weapons is to attack and destroy enemy mechanized or other ground targets within range, particularly light and medium tanks and armored cars; in coast defenses, to attack and destroy enemy motor torpedo boats or other light naval craft within range; or in support of infantry, to act as reinforcing infantry weapons or tank destroyers.

10. PRIMARY VS. SECONDARY MISSIONS. a. Although AAA automatic weapons are not primarily designated for fire against ground or naval targets, automatic weapons units may be diverted from their primary mission and employed on their secondary mission. *It is not normal, however, for field commanders to divert automatic weapons from their primary AA mission as long as there is a threat of enemy air action.*

b. The appropriate division or higher commander must decide in each case when automatic weapons will be diverted from their primary mission and employed to accomplish their secondary mission. When this is done, AAA

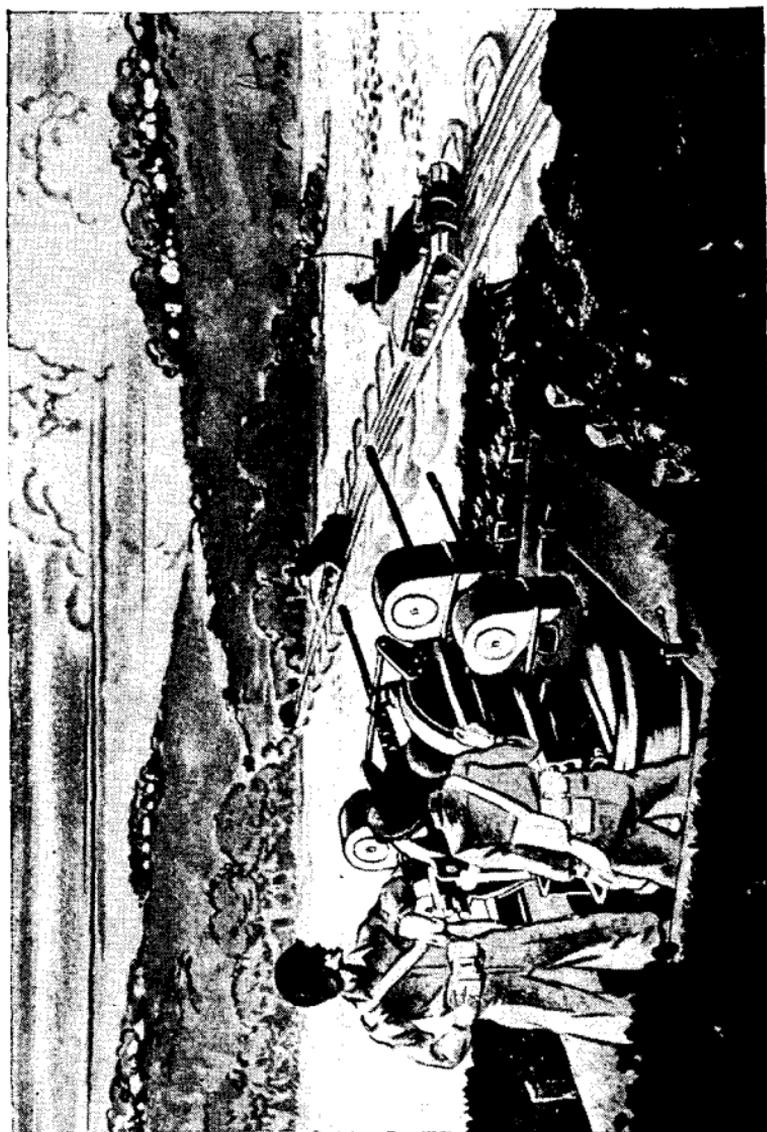


Figure 3. Multiple machine-gun mount.

automatic weapons cannot be expected to provide adequate protection from air attack.

c. AAA automatic weapons, when employed in the AA role, are habitually sited, so as to assist if possible, in the attack of ground and naval targets. In this case, the engagement of ground and naval targets is undertaken *only when such engagement will not interfere with the primary mission, or when ground defense of the automatic weapons unit becomes imperative.*

d. When AAA automatic weapons are engaged solely on their secondary mission, the high silhouette and relative immobility of most automatic weapons make them extremely vulnerable targets. In addition, the normal methods of technique, fire control, and fire direction cannot be used against ground or naval targets in most cases.

e. For further discussion, see chapter 8.

CHAPTER 3

CHARACTERISTICS OF AUTOMATIC WEAPONS

11. GENERAL. **a. Comparison with gunfire.** The fire of AAA automatic weapons differs from that of the larger caliber guns that use an explosive shell with a time fuze, in that, to be effective, the projectiles must actually strike the personnel or a vulnerable portion of the aircraft. The 37-mm and 40-mm shells are equipped with a supersensitive fuze which bursts on contact with the aircraft or destroys the projectile at the tracer burn-out point. Automatic weapons fire in close proximity to an aircraft may have a deterrent effect on enemy pilots as the tracer stream is frequently clearly visible. The effectiveness of automatic weapons, however, is measured by their ability to obtain hits on aircraft.

b. Flexibility. Automatic weapons have a flexibility permitting them to follow aircraft at a high angular rate and to shift promptly from one target to another. These factors and the great volume of fire which automatic weapons can deliver make them the most effective ground weapons against low-flying aircraft.

c. Mobility. (1) Self-propelled AAA automatic weapons have great mobility.

(2) The mobility of towed AAA automatic weapons generally is dependent upon and limited by the capabilities of their prime movers. The 40-mm gun on carriage M2 and the multiple machine gun carriage M51 are capable of high speed on good roads and medium speed on bad

roads or over rough terrain. The 40-mm gun on mount M5 and the multiple machine gun trailer mount M55 should not be towed over 10 mph except on good roads (these mounts have no springs or shock-absorbers). The M55 mount normally is loaded in a 2½ ton truck for motor movement of any distance. Towed AAA automatic weapons are heavy and generally unsuited to manhandling, except for very short distances.

d. Ammunition. (1) *Classes.* The principal classes of combat ammunition are ball, armor piercing, incendiary, armor piercing incendiary, and tracer for caliber .50 machine guns and high explosive shell and armor piercing shot for 37-mm and 40-mm guns. The tracer element of caliber .50 tracer ammunition burns out at a range of about 1850 or 2450 yards, depending on the type. Both 37-mm and 40-mm high explosive shells and AP shot contain tracer elements and both 37-mm and 40-mm high explosive shells are self destroying. (Self destroying ammunition explodes after a certain definite time of flight, or upon impact.) 37-mm high explosive shells are self destroying at a range of approximately 3500 yards. 40-mm high explosive shells are self destroying at ranges of approximately 3500 yards or 5500 yards, depending upon the type of tracer element used.

(2) *Uses.* The various classes of ammunition are suitable for the purpose indicated below:

(a) Caliber .50 ammunition and 37-mm and 40-mm high explosive shell are for use against personnel and light materiel.

(b) Caliber .50 and 37-mm and 40-mm armor piercing ammunition are for use against armored vehicles, concrete shelters, and similar penetration resisting targets.

(c) Caliber .50 incendiary ammunition is for use against inflammable or explosive targets.

(d) Caliber .50 tracer ammunition and the tracer elements of 37-mm and 40-mm ammunition are primarily for observation of fire.

Note. Caliber .50 ammunition is normally belted in the proportion of 2 armor piercing, 2 incendiary and 1 tracer. This proportion or the combination of ammunition should be changed to suit the mission.

12. RANGE LIMITS OF AUTOMATIC WEAPONS ANTI-AIRCRAFT FIRE. **a. Definitions.** It is convenient to define four range limits of automatic weapons antiaircraft fire, so that they may be referred to in the chapters that follow.

- (1) Extreme deterrent range.
- (2) Maximum hitting range.
- (3) Effective hitting range.
- (4) Minimum tracking range.

b. Extreme deterrent range. (1) Extreme deterrent range is defined as the tracer burnout range of automatic weapons projectiles. Fire at this range is not accurately aimed fire, and cannot be expected to make any given round a hit.

(2) Deterrent fire delivered at extreme ranges, and with maximum density, can decrease the efficiency of operation of enemy aircraft by making them break formation, take avoiding action, or, in some cases even abandon their mission.

(3) The extreme deterrent ranges for the various automatic weapons are:

(a) Caliber .50 machine gun—about 1800 or 2450 yards (depending on type of ammunition).

(b) 37-mm gun—about 3500 yards

(c) 40-mm gun—about 3500 or 5500 yards (depending on type of ammunition).

c. Maximum hitting range. (1) Maximum hitting range is defined as the longest range at which, under average conditions, the various weapons and methods of fire control can produce hits.

(2) Maximum hitting range depends on visibility of tracers when tracer observation is used for fire adjustment; on the approach angle of the target; on the speed of the target; and on the type of fire control employed.

(a) Off-carriage fire control provides an accurate tracking means. Fire adjustment is not necessarily dependent on tracer observation. The director controlled 40-mm gun can deliver aimed fire when the largest range is set in the director. This range setting can produce a hit on a target at about 2500 yards range.

(b) On-carriage fire control offers less accurate means of tracking than the director, and fire adjustment is largely dependent on tracer observation. Maximum hitting range is the longest range at which tracers can be interpreted. Experience has shown that the maximum hitting ranges of the various weapons using on-carriage fire control, are within the following limits.

Caliber .50 machine guns—800 to 1000 yards

37-mm and 40-mm guns—1500 to 1800 yards.

d. Effective hitting range. (1) Effective hitting range is defined as the range within which weapons can execute effective fire and hits can be expected. *It forms the basis for doctrines concerning tactical employment of automatic weapons.*

(2) Effective hitting range depends mainly on aiming tolerance, which can be defined as the mil angle subtended at the gun by the target. The actual physical size of the

target causes the target to subtend a greater angle at the gun at close ranges than it does at distant ranges. Therefore, there is more aiming tolerance at close ranges. The target must be close enough so that tracer sensings are fresh and reliable. Positive tracer observation is more necessary while using tracer control or on-carriage sights.

(3) Effective hitting range also varies with target speed, angle of approach, and state of training. Average effective hitting ranges are as follows:

(a) Caliber .50 machine guns—500 to 800 yards

(b) 37-mm or 40-mm guns—

On-carriage control—1000 to 1200 yards ,

(c) 40-mm guns—

Director control—1800 to 2000 yards

e. Minimum tracking range. (1) Minimum tracking range is the smallest range at which gun pointers can continue to track close-in, high speed targets. As the approach angle of such targets increases, the angular rate of travel may be so great as to make tracking inaccurate or impossible.

(2) The powered-operated caliber .50 machine gun turret mounts have virtually no minimum range limitation.

(3) 37-mm guns and 40-mm guns are generally incapable of dealing with high speed, close-in targets at less than 400 yards slant range.

13. WEAPONS.

a. 40-mm gun. The 40-mm gun is fully automatic, and can deliver short bursts at the rate of 120 rounds per minute. It is air-cooled, and if fired at full rate may begin to overheat after firing about 100 rounds. When overheated, fire must be suspended and the barrel changed (30-40 seconds). The gun can be fired full automatic or

by firing single shots. The best results are obtained if the gun is single-fired at a rate of 80–100 rounds per minute. For tactical planning of fields of fire, a horizontal range of 1500 yards is used (an average of pars. 12d(3) (b) and (c)). However, fire is not effective on crossing courses whose slant range is less than 400 yards due to limitations in the traverse rate of the gun. The gun will elevate from -6° to 90° and will traverse through 360° .

b. 37-mm gun. The 37-mm gun has practically the same characteristics as the 40-mm gun. It must be water cooled when overheated.

c. Caliber .50 machine gun. The caliber .50 machine gun fires at a rate of 450–600 rounds per minute. Its effective range is dependent primarily on the gunner's depth perception. For tactical planning of fields of fire, a horizontal range of 600 yards is used (an average of values in par. 12d (3) (a)). In most automatic weapons units, the caliber .50 machine gun is used in electrically operated multiple (quadruple) machine gun mounts, thus greatly increasing the fire power. These multiple machine gun mounts can be traversed and elevated at maximum rates of about 60° per second by a single operator. In airborne and light machine gun units, the machine gun is used singly on AA machine gun mount M63. The machine gun is also used in all units in M32 ring mounts on a basis of one per four trucks, $2\frac{1}{2}$ ton or larger.

14. TOWED MOUNTS AND CARRIAGES.

a. 40-mm gun on carriage M2. The 40-mm gun on carriage M2 is used in mobile and semimobile units. The time required to emplace the carriage from traveling position and commence firing (using direct fire sights) is 2 to 3 minutes. To emplace the director and prepare the unit for director controlled fire requires considerably more

time (see par. 16). The gun may be fired from the wheels using direct fire sights when at a halt, but more effective fire results when the gun is emplaced. The 40-mm gun on carriage M2 may be loaded in a C-47 or larger aircraft, if disassembled (see TM 71-210). (See FM 44-60 for drill procedures.)

b. 40-mm gun on mount M5. This mount is used in air-transportable units. The mount was designed to load in transport type aircraft. It may be loaded in a C-47 aircraft by removing the outriggers, automatic loader, oil gears, barrel, and sighting system. The mount is designed for quick disassembly and assembly. The mount must be emplaced prior to firing. The time required to emplace the mount from traveling position and commence firing (using direct fire sights) is 2 to 3 minutes. Considerably longer time is required to prepare the unit for director controlled fire. In addition to the normal traveling and firing positions, this mount has a maneuvering position which is used when man-handling the mount for short distances. See par. 11c(2) for mobility of the mount M5. (See FM 44-61.)

c. Multiple machine gun trailer mount M55. The multiple machine gun trailer mount M55 is used in mobile, semimobile, and air-transportable units. The mount may be loaded in a C-47 aircraft or CG-4A glider without disassembly, except for removing the ammunition chests. The mount must be emplaced prior to firing. The time required for emplacement is 1 to 2 minutes. Like the 40-mm gun mount M5, this mount has a maneuvering position for man-handling short distances. See par. 11c(2) and FM 44-61 (when published).

d. Multiple machine gun carriage M51. This carriage mounts the same multiple machine gun turret as the

trailer mount M55. The carriage is a modified generator trailer M7. Although the guns may be fired while the carriage is moving or at a halt, most effective fire results when the carriage is emplaced. The trailer mount M55 has replaced the carriage M51 as standard.

15. SELF-PROPELLED CARRIAGES.

a. Multiple gun motor carriage M15A1. The multiple gun motor carriage M15A1, used in self-propelled units, has one 37-mm gun and two caliber .50 machine guns mounted coaxially as a unit on a half-track vehicle. The gun mount is traversed and elevated manually. The mount can be elevated from 0° to 85° and traversed 360°. However, fire to the front of the vehicle is restricted at low elevations. (See FM 44-59.)

b. Multiple gun motor carriage M16. The multiple gun motor carriage M16, used in machine gun squads of self-propelled units, is a multiple machine gun mount mounted in a half-track vehicle. The machine gun mount is the same as used on the trailer mount M55 and carriage M51 (par. 14c and d). Fire to the front of the vehicle is restricted at low elevations (see FM 44-57 (when published)).

c. Twin 40-mm gun motor carriage M19. The twin 40-mm gun motor carriage M19 has two 40-mm guns mounted coaxially on a full-track vehicle (modified light tank M24 chassis). (See FM44-62 (when published).)

16. FIRE CONTROL SYSTEMS. Automatic weapons fire control systems are divided into two broad classes: off-carriage fire control and on-carriage (direct) fire control. (See FM 44-51 and FM 44-10.)

a. Off-carriage fire control. Off-carriage fire control is used as the primary fire control method with 40-mm guns on carriage M2 or mount M5. The director M5A2 (M5A1, M5) is the source of firing data. Slant range or altitude (depending on the type of director) is set into the director and the target is continuously tracked. Smooth tracking is essential. Firing data are computed by the director and transmitted electrically to the gun. The gun is laid automatically by a remote control system. The use of the director restricts fire in its general direction. For reasons of safety, a dead sector is created 35° on either side of the gun-director line and extended up to an angular height of 30° above a line from the gun trunnions to the top of the director.

b. On-carriage fire control. On-carriage (direct) fire control is used as the secondary and tertiary fire control methods on towed 40-mm guns (a above) and as the primary and secondary methods on all other automatic weapons. There are three general types of on-carriage sights:

(1) *Computing sights.* Computing sights are used on the 40-mm guns on carriage M2 and mount M5, multiple gun motor carriage M15A1, and twin 40-mm gun motor carriage M19. These are course-speed sighting devices. The target is tracked by lateral and vertical gun pointers. A third man, the lead setter, estimates the target's course and speed and sets these values on the sight mechanism. Fire adjustment is based on tracer observation.

(2) *Speed ring sights.* Speed ring sights of various types are used on single caliber .50 machine guns; multiple machine gun mounts on trailer mount M55, carriage M51, and motor carriage M16; 40-mm guns on carriage M2 and mount M5; multiple gun motor carriage M15A1; and twin

40-mm gun motor carriage M19. In all cases adjustment of fire is based on tracer observation.

(3) *Sighting systems M5 and M6.* The sighting system M6 is the primary fire control device for the multiple gun motor carriage M15, while the sighting system M5 is used on multiple gun motor carriages M15A1 which are not equipped with computing and speed ring sights.

CHAPTER 4

CONTROL AND CLASSES OF FIRE

Section I. GENERAL

17. DEFINITIONS OF TERMS. a. Conduct of fire. The employment of the technical means to place accurate fire on a target.

b. Fire direction. The exercise of the tactical command over one or more fire units in the selection of targets, in the appropriately timed concentration or distribution of fire thereon, and in the restriction or release of fire. Fire direction may be exercised by the fire unit or higher commander.

c. Fire control. The exercise of the conduct of fire and of fire direction at the fire unit. The fire unit commander directs the technical means by tactical command to control the fire of his unit.

18. FIRE DIRECTION. a. General. (1) Because of the great speed and maneuverability of aircraft the degree of fire direction that can be exercised depends to a large extent upon the efficiency of the warning service. Warning will normally come from the AAOR, which is an organized center and tactical headquarters for the collection, evaluation, and dissemination of information from the AAAIS. (See FM 44-8.)

(2) In rapidly moving situations, or where a unit defends an isolated objective for only a short time, it is

not expected that the warning service will be elaborate. The unit will have to rely on the AAAIS sections or outposts for early warning. On the other hand, when units are emplaced in the defense of vital permanent establishments, the aircraft warning service (AWS) will probably be elaborate and furnished in addition to the AAAIS.

(3) In the centralized fire direction of a large defense the size, location, and course of an attack is plotted as the aircraft approach the vicinity of the defended area. The operations officer at the AAOR alerts units and issues such restrictions (or release from restrictions) beyond SOP as are necessary for the employment of the elements of the defense to the best advantage. (See FM 44-8.)

b. Automatic weapons. Due to their limited range and the short time that appropriate targets are presented, fire direction of automatic weapons is normally exercised by the fire unit commander even in a stabilized, coordinated defense. However, under certain conditions fire direction may be exercised by higher command through the AAOR.

c. Fire restrictions. (See FM 44-1 (when published).)

Section II. ENGAGING

19. SELECTION OF TARGETS. **a.** When two or more targets enter the field of fire of a fire unit, fire is opened on that target which offers the most dangerous threat to the mission of the defense of which the fire unit is a part.

b. When two or more targets offer an equally dangerous threat, that target which is not under the fire of other units should be engaged first.

c. Correlating doctrines in a and b above, the greatest

possible number of targets should be taken under fire by a defense.

d. The selection of an actual target in a formation will be made by the fire unit commander based on SOP. A system should be worked out so that all targets can be effectively engaged. (See FM 44-51.)

20. OPENING FIRE. The senior member present at any automatic weapons position is responsible for recognition and opening fire and for control of the fire during the engagement. Crews are trained so that commands during an action are unnecessary except for coaching by the gun commander. The fire unit commander is responsible for selecting and assigning the target most dangerous to the objective.

21. CHANGING TARGETS. During an action the fire unit commander must be alert to other possible targets which may be more dangerous to the objective than the one he is firing on. This requires clear thinking and rapid judgment. The fire unit commander is solely responsible for breaking off action against one target and opening fire on another, within the limitations set by higher command. He controls the fire of his unit by direct supervision.

22. CONTROL. Battery or platoon control of automatic weapons fire is impossible except in barrage fire, due to the dispersion of the fire units. Instructions covering the conditions under which fire will be opened are given the fire units in SOP. The fire unit commander must then be relied upon to defend the objective without further instructions from higher headquarters, except for necessary fire restriction orders.

23. CLASSES OF FIRE. Automatic weapons fire units normally fire continuous fire. The conduct of fire may be by director fire at seen targets, direct fire sights at seen targets, or barrage fire at predetermined points in the sky. AAA machine gun fire is conducted by tracer control. Instructions on these methods of conducting fire are published in FM 44-10 and FM 44-51.

Section III. BARRAGE FIRE

24. GENERAL. **a.** Barrage fire is designed to provide protection in those situations where normal methods of fire control cannot be used; as when the target cannot be tracked visually because of poor visibility due to low ceiling, fog, darkness, smoke, or the aircraft diving from the direction of the sun.

b. *It is emphasized that this type of fire is only a temporary emergency method and all automatic weapons barrages rely mainly on the deterrent effect of tracer ammunition.*

25. SUN BARRAGE. **a.** Aircraft attacking from the sun use its blinding glare to make them invisible to guns in the line of attack.

b. To defend against this type of attack, those fire units blinded by the sun's glare, point their weapons into the sun and generally fire full automatic. While firing, each gun is slowly traversed and elevated between the outer limits of the sun's glare (approximately 5°). This method is used whether operating with sight control or director control.

c. As the target moves from the sun, fire units individually resume normal methods of fire control.

d. Subject to restrictions of higher authority, the chief of section orders the sun barrage, and resumption of normal method of fire control when the target pulls out of the sun.

26. UNSEEN BARRAGE. a. Whenever past experience or existing conditions indicate that enemy aircraft are likely to attack along definite channels, barrage points are assigned each gun capable of laying a barrage in an expected channel of approach. Data for each gun must be computed separately.

b. The AAA defense commander is responsible for the selection of barrage points over the defended area.

c. The battery commander determines the final azimuth and quadrant elevation for each fire unit in his battery. (See FM 44-51.)

d. Fire direction on unseen targets will be exercised by the AAA defense commander through the AAOR. Fire control is the responsibility of the chief of section.

e. Machine guns and small arms will not fire on unseen targets.

27. SELECTION OF BARRAGE POINTS. a. Barrage points are selected along channels of approach which enemy aircraft are most likely to use to attack the objective. These points may be along the path of the attacking aircraft, or on a line across the path of the attacking aircraft.

b. The altitude of the barrage is determined from known existing conditions or from the most probable conditions of attack.

c. Data for barrage points are predetermined and each point given an identifying number or name. To effectively use the barrage, advance warning must be received at the

AAOR from the AAAIS or the AWS. This warning should include the altitude and direction of approach of the enemy aircraft. The AAOR plots the course and assigns barrage points to those fire units capable of laying the barrage.

d. Initial barrage fire is placed on points in advance of the enemy aircraft. The signal for opening fire is given by the AAOR and firing may be continued until the aircraft have passed through the barrage, a predetermined number of rounds has been fired, cease fire is ordered by the AAOR, or a definite period of time has elapsed.

e. Ammunition expenditure should be laid down beforehand. 8 or 10 rounds per gun are generally considered adequate, as a "repeat" can always be ordered if required.

CHAPTER 5

COMMUNICATIONS

Section I. GENERAL

28. GENERAL. **a.** AAA communications comprise all the means employed to transmit orders, intelligence, and commands between AAA units and for liaison with units of the other arms and services.

b. Within the AAA units, communications are needed between the various command posts and with service elements for normal command and administration. In addition, the ability of an aircraft to attack from any direction, and its great speed and maneuverability, require an intelligence net (AAAIS) that will give timely warning of the approach of hostile aircraft. In the lower echelons, communication must be established also for conduct of fire and for the use of AAA airguards. For responsibility of commanders, coordination and communication discipline, see FM 44-1 (when published).

29. NATURE AND EXTENT OF COMMUNICATION SYSTEMS. **a.** A selection of the agencies to be employed and the extent to which the communication system will be installed in any situation depend upon the following factors:

- (1) Facilities available.
- (2) Frequency of movement.
- (3) Dispersion of units.
- (4) Terrain and atmospheric conditions.
- (5) Secrecy restrictions.

30. AIRBORNE OPERATIONS. The speed required in the installation of initial communication systems, and the necessity for flexibility and for eliminating all possible excess weight and bulk, place an added responsibility on radio, visual, and sound communication. Prearranged messages and signals for use with radio, visual means, and sound are prepared in advance for use immediately after landing and during the development stage of the ensuing action. Every possible use of brevity codes must be exploited fully and all personnel must be thoroughly trained in their use prior to leaving the departure airdromes. Prearranged messages and signals to be used for security and liaison must be memorized by all personnel. Only by such thorough preliminary training and complete planning can a landing operation proceed with the speed and precision required in airborne operations.

31. AAOR AND AAAIS. FM 44-8 contains a detailed discussion of AAOR AND AAAIS communications.

Section II. RADIO COMMUNICATIONS

32. BRIGADE AND GROUP. For discussion of AAA group and AAA brigade radio equipment and radio nets see FM 44-1 (when published).

33. RADIO NETS, MOBILE, SEMIMOBILE, AND AIR-TRANSPORTABLE BATTALIONS. (See fig. 4.)

a. Higher headquarters net. The battalion headquarters SCR-177 is employed in the group command net when operating under group control. When the battalion is the highest AAA unit in the AAA defense this set is utilized to communicate with higher headquarters.

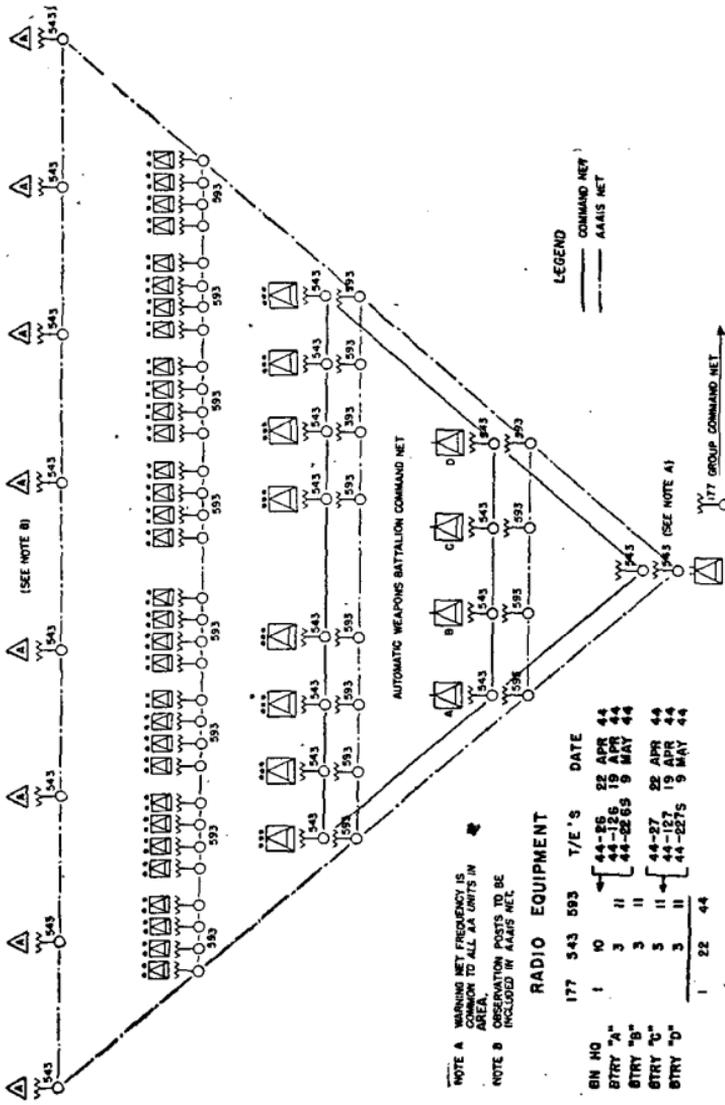


Figure 4. Radio nets, AAA automatic weapons battalion (mobile, semimobile, and air transportable).

b. Battalion command net. One frequency only is provided for command purposes from battalion to platoon headquarters. One of the SCR-543's located at battalion headquarters (net control station) and the SCR-543's located at battery and platoon headquarters are included in this net.

c. AAAIS net. This net includes the remaining SCR-543 at battalion headquarters (net control station), the eight SCR-543's located at the observation posts, and the SCR-593's located at each battery and platoon headquarters and gun sites. The warning net frequency is common to all AAA units in the army or air defense area.

34. RADIO NETS, SELF-PROPELLED BATTALION. (See fig. 5.)

a. Higher headquarters net. The SCR-506 located in the communications section at battalion headquarters is employed in the group command net when operating under group control. When the battalion is the highest AAA unit in the AAA defense, this set is utilized to communicate with higher headquarters.

b. Battalion command net. One frequency only is provided for command purposes from battalion headquarters to fire units. The SCR-508 located at battalion headquarters (communication section) is the control station of this net.

c. AAAIS net. This net includes the SCR-593 located at battalion headquarters (S-2 and S-3 section), the SCR-593's located at battery headquarters (communication section), the SCR-593's located at platoon headquarters (platoon commander's car), and the eight (8) SCR-543's located at observation posts. This frequency will be common to all AAA units in the army or air defense area.

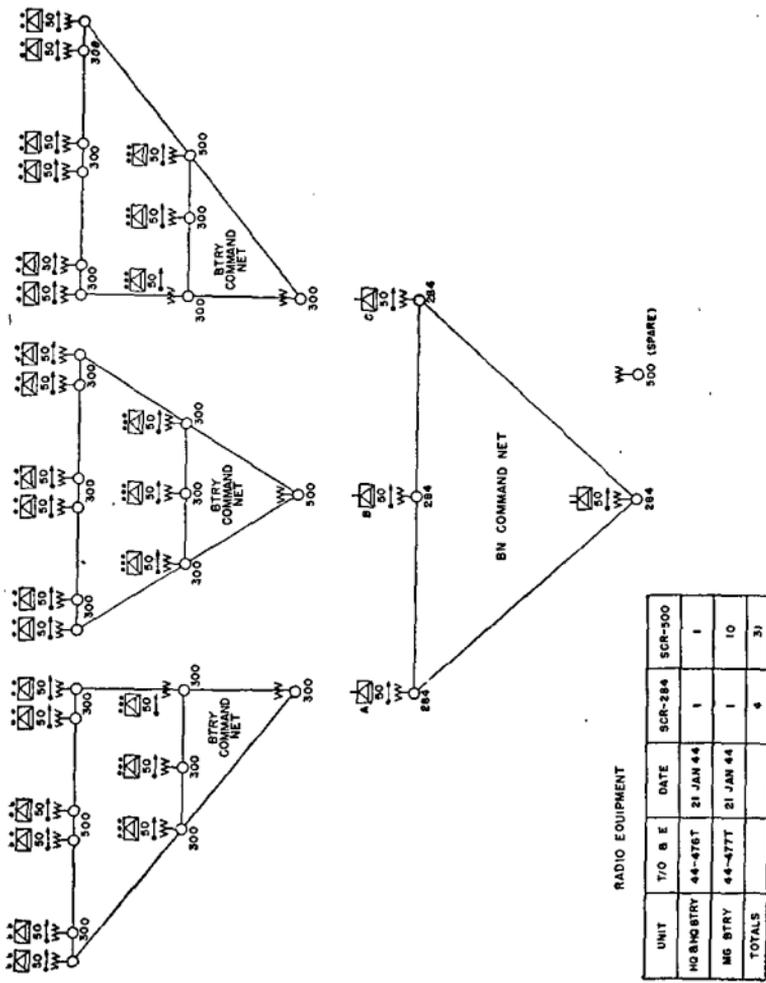


Figure 6. Radio nets, AAA machine gun battalion.

35. RADIO NETS, MACHINE GUN BATTALION (LIGHT).

(See fig. 6.)

a. Higher headquarters. The AAA machine gun battalion (light) is not provided with radios for communication with division headquarters.

b. Battalion command net. The SCR-284 located at battalion headquarters (net control station) and the SCR-284's at each battery are included in this net.

c. Battery command nets. Three frequencies are required, one for each battery. The SCR-300 at battery headquarters (net control station) and the SCR-300's at each platoon and section are included in this net.

d. AAAS net. This battalion is not provided with radios for AAAS.

36. RADIO NETS, AIRBORNE BATTALION. (See fig 7.)

a. Higher headquarters net. One of the battalion headquarters SCR-694's is used for communication with division headquarters in the division command net. The second SCR-694 is a spare.

b. Battalion command nets. The battalion requires two frequencies for its command nets.

(1) *Machine gun command net.* One of the SCR-619's at battalion headquarters (net control station), one SCR-619 at each battery, and the SCR-619's at the platoons are included in this net. The second SCR-619 at each battery is a spare.

(2) *Automatic weapons command net.* The second SCR-619 at battalion headquarters (net control station), one SCR-619 at each battery, and the platoon SCR-619's are included in this net. The second SCR-619 at each battery is a spare.

c. **AA AIS net.** The airborne battalion is not provided with radios for AA AIS.

Section III. WIRE COMMUNICATIONS

37. GENERAL. Wire communications equipment provided by the Tables of Equipment is sufficient to install essential lines between the command posts, within the batteries, and for interior lines necessary for fire control of the various elements. Any additional equipment required may be drawn from Signal Corps supply depots. The extent to which wire communications are installed is governed by the tactical mission of the unit. The wire communication net of a unit employed in a static situation should be as complete and extensive as time and material permit. The wire communication net of a unit employed in a mobile situation, where frequent changes of position are involved, will necessarily be limited by the requirements of the situation. However, wire is the most dependable means of communication and every effort must be made to utilize it to the fullest extent. In the early stages of an operation or in rapidly moving situations, radio must furnish the initial means of communication; but, as time and circumstances permit, wire should be laid to supplement the radio net. Radio, in other than self-propelled units, should be considered the auxiliary means of communications, except between higher and widely separated headquarters.

38. AIRBORNE OPERATIONS. a. Because of the limited amount of wire and equipment that can be carried, every effort must be made by all commanders to conserve wire. The need for wire communication to each installation must be carefully considered. Command posts are located as near

as possible to the subordinate units in order to reduce the length of wire circuits. Wire circuits must be carefully laid and protected.

b. Since no provision is made for a wire communication detail within the battery, personnel from the gun squads are trained and used to establish, operate, and maintain wire communication and to operate the radio.

CHAPTER 6

TACTICAL EMPLOYMENT

Section I. GENERAL

39. GENERAL. a. The complete AAA defense of an objective involves the carefully coordinated employment of guns, automatic weapons, searchlights, barrage balloons, and smoke. It must be planned to provide the most effective opposition to the accomplishment of the enemy mission. (See FM 44-1 (when published).)

b. The active AAA defense must be coordinated with passive air defense measures. The amount of passive air defense possible will depend upon the available cover and concealment, and the area available for dispersion of troops and installations. The tactical situation will govern the relationship between active and passive measures.

c. All combat units having organic AA weapons will assist in the active defense against low-flying enemy aircraft. Each unit is responsible for providing its own lookouts and air guards.

d. Not even these combined efforts can guarantee the protection of any defended area. No matter how well an objective is defended, in the face of attacks by a determined foe it must be expected that some bombs will fall on the defended area.

e. This section deals with the general tactical employment of automatic weapons. The principles outlined herein

are applicable to both the static employment discussed in section II and the mobile employment in section III.

40. NATURE OF EMPLOYMENT. Employment of AAA is classified as static or mobile. A mobile or self-propelled automatic weapons unit may be employed in static or mobile roles. The semimobile and air-transportable units, with their limited organic transportation, are suitable only for static employment, unless additional transportation is provided. Mobile and self-propelled units have sufficient organic transportation to move all the fire units at once. Semimobile and air-transportable units do not have enough organic transportation to move all fire units simultaneously. Therefore recourse must be made to shuttling or else the necessary transportation must be obtained from other sources. No automatic weapons fire unit is more mobile than its prime mover and time must be allowed for emplacement and march order.

a. Static employment. The term static employment is used to describe the AAA defense of permanent or semi-permanent installations. Depending upon the situation, automatic weapons may be employed statically in the combat zone, the communications zone, or the zone of the interior.

b. Mobile employment. The term mobile employment is applied to AAA operations with ground combat forces in a moving situation.

41. ELEMENTS AFFECTING EMPLOYMENT. The principal elements affecting the employment of automatic weapons are:

- a.** The tactics of the enemy.
- b.** The type of objective.
- c.** Terrain.

42. TACTICS OF THE ENEMY. a. There are three main types of attack employed by enemy aircraft against which automatic weapons must defend.

(1) *Dive attack.* Dive bombing is employed against precision targets and is an accurate method of bombing. The pilot dives the aircraft directly at the target, and releases the bomb just prior to pulling out of the dive. The pull-out is usually 1000 feet to 3000 feet above the ground. The angle of dive is normally 50° to 80° . Dive bombing attacks are frequently made from out of the sun or a protecting cloud bank, or at dawn or dusk.

(2) *Minimum altitude attack.* Minimum altitude attacks are directed against personnel and ground installations. They may include strafing, skip-bombing, torpedo launching, mine laying, and chemical attacks, and are common types of attack against which automatic weapons must defend. In minimum altitude attacks the pilot stays as close to the ground as terrain permits, flying at altitudes of 15 feet up to 200 feet. The pilot takes advantage of protection afforded by flying behind hills, trees and buildings. Surprise is the pilot's greatest advantage, so he tries to reach the objective unobserved.

(3) *Low-level horizontal flight attacks.* Low-level horizontal flight attacks are those in which the aircraft flies a level course at altitudes greater than 200 feet but within range of automatic weapons. This type of attack is not common because it lacks surprise and the plane is more likely to be shot down. Low-level horizontal flight targets may include some types of rocket- or jet-propelled flying bombs.

b. The type of air attack which the enemy will employ and the weight of the attacks depend on the following:

(1) Capabilities, limitations, and number of aircraft available.

- (2) Distance of airdromes from the objective.
- (3) Local air superiority.
- (4) Estimate of the AAA defense.
- (5) Weather (visibility, cloud formations, and position of sun).
- (6) Size, shape and nature of objective, and terrain in its vicinity.
- (7) Importance of objective to the accomplishment of enemy mission.
- (8) Prevailing winds. In areas of prevailing winds, it may be expected that enemy planes will attack down wind so that their ground speed will be increased, and their time over the target reduced to a minimum.

43. TYPE OF OBJECTIVE. a. Objectives can be classified according to size as:

(1) *Single objective.* A single objective is any objective which is 500 yards or less in diameter, such as a factory building, a distributing point, a bridge, or a field artillery battery in position.

(2) *Vital area.* A vital area is any objective which has a diameter of more than 500 yards. It may be a group of single objectives separated by not more than 1500 yards, or it may be one large objective. Examples of vital areas are: a number of field artillery batteries in an artillery area, a scattered group of factory buildings, a railroad marshalling yard, or an airfield including the dispersal areas, repair shops, bomb-dumps, operations buildings and landing strips.

b. The shape of an objective will to some extent dictate the direction of air attack. A generally compact objective can be attacked by air from any direction. However, in order to attack effectively a long narrow objective, low-

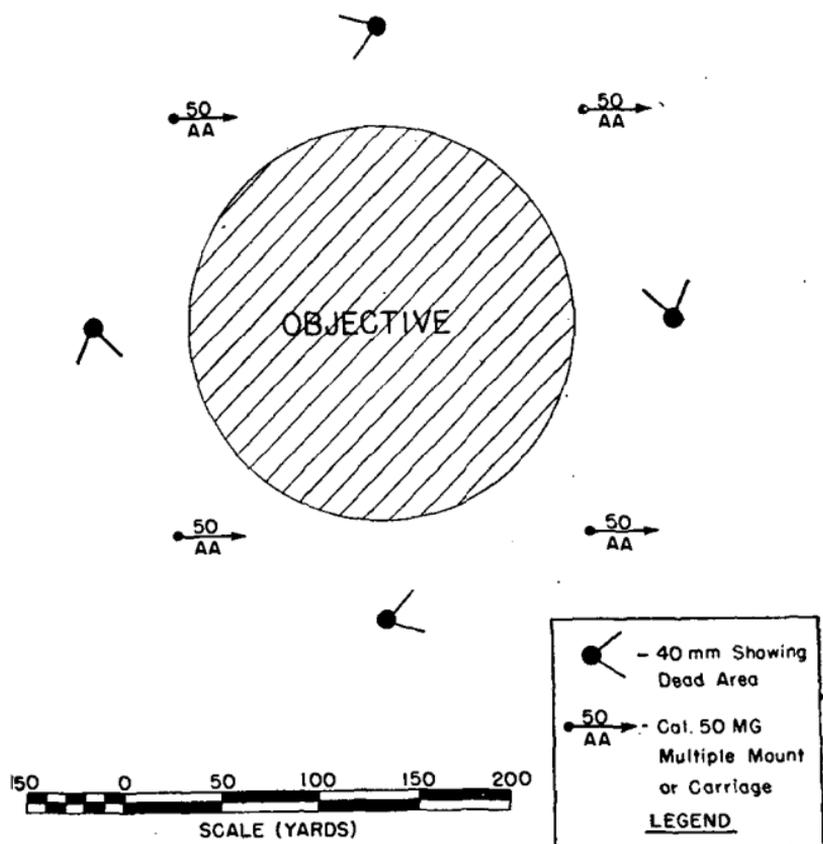


Figure 8. Defense of a "single objective" by a platoon.
 Note coordination of dead areas.

flying aircraft must make the bombing run along a line forming a reasonably small angle with the long axis of the objective.

44. TERRAIN. The importance of terrain in planning an automatic weapons defense cannot be over-emphasized. Terrain will influence the enemy's choice of type and direction of attack, and will dictate the actual siting of fire units.

a. Certain directions of attack may not be suitable for minimum altitude bombing if the pilot's view of the ob-

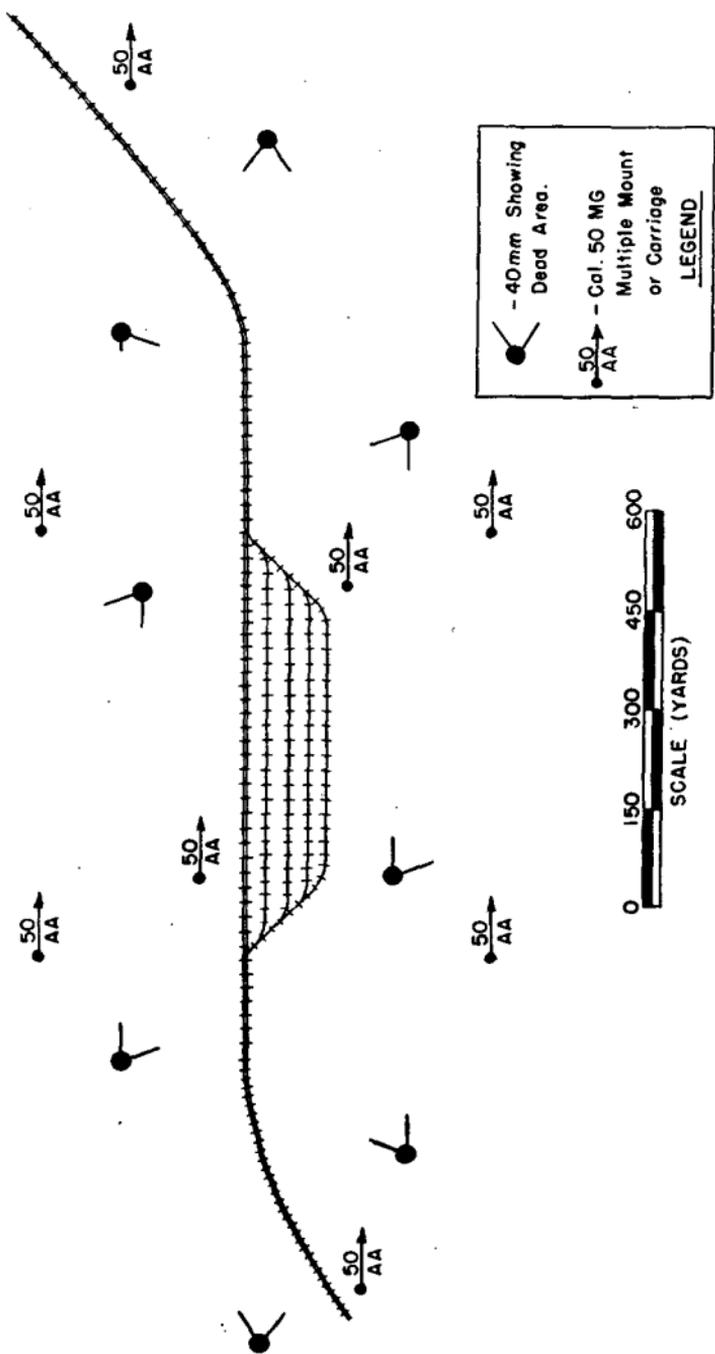


Figure 9. Defense of a "long narrow objective."

jective is restricted by terrain features. Among the principal factors influencing the attacker's choice of direction are the height and nature of the ground masks in the vicinity of the objective, their distance from the objective, and the length of time the pilot must view the target for purposes of approach and sighting. The time for the latter may vary from 2 to 10 seconds. Conversely, the attacker will, so far as practicable, take advantage of terrain features to conceal his approach.

b. Probable routes of approach are influenced by the presence of neighboring defended areas. The enemy may be expected to exploit approaches over water or dense woods, which indicate a weakly defended sector.

c. Due to the difficulties of navigation at very low altitudes, directional landmarks such as roads, rivers, railroads, and bridges, are often used by pilots as guides to their objectives. Hence, the presence of such landmarks will often indicate the likely avenues of approach. A thorough map and ground reconnaissance must be made of the territory surrounding the objective to locate the terrain features most likely to serve the enemy as initial points from which to attack.

d. Because of the limited angle of fall of bombs released from low altitudes, structures or natural obstacles within a defended area may afford some protection of the objective.

45. BASIS FOR EMPLOYMENT. The capabilities and limitations of automatic weapons, as well as the elements affecting their employment must be considered in planning a defense.

a. Defense against dive attack. In this type of attack, the attacking aircraft can be engaged most effectively

by weapons sited at the objective. The gunnery and fire control problems are simplified since the aircraft must fly almost directly down the barrel of those guns facing the attack. Simple coming courses are presented. From a practical standpoint it must be considered that weapons located at the objective are likely to be bombed with the objective and put out of action, and that dust, dirt, and debris resulting from the bombing may obscure the vision of the crews. For defense against dive attack, weapons should be sited on or as close to the objective as practicable after consideration of the advantages and disadvantages outlined above. If the defended area is more than 600-800 yards wide, some weapons should be sited within the area itself.

b. Defense against minimum altitude attack. The high rates of angular travel required to track fast, close-in crossing targets are beyond the capabilities of the 40-mm gun. Therefore, these weapons should be sited near the objective or along avenues of approach so that targets in their field of fire are likely to be incoming. The multiple caliber .50 machine gun mounts have the ability to track rapidly, and can engage high speed targets on close-in crossing courses. Machine guns also have a high rate of fire, and therefore are effective weapons to defend against this type of attack. The range of the latter weapons is relatively short and to be effective must be emplaced near the path of the attacking plane. Since the direction of attack cannot always be predicted, some machine guns must be emplaced very near the objective in order to insure that machine gun fire can be placed on any attacking plane.

c. Defense against low level horizontal attack. To defend against low-level, horizontal flight attack, weapons should be sited at a sufficient distance from the objective

to insure that fire can be placed on the target before its bombs are released. Because of its larger projectile and greater effective range, the 40-mm gun is generally more effective than the multiple caliber .50 machine gun mounts against such attacks. Low-level, horizontal flight attacks are not common and normally are not considered until reasonable protection against dive-bombing and minimum altitude attack has been provided. Protection against low-level horizontal flight attack is then provided incidental to the extension of the defense outward in depth along the known or expected avenues of approach. Rocket- or jet-propelled flying bombs can only be employed by the enemy in a few limited situations. When encountered, additional automatic weapons fire units should be employed to extend the existing defense in depth along the expected route of approach.

46. SITING OF WEAPONS. a. In order to obtain massing of fires and to secure the maximum number of incoming courses, 37-mm or 40-mm guns should be sited with about 300—400 yards between adjacent guns. In no event should adjacent guns be sited more than 1000 yards from each other.

b. In many situations it is advisable to divorce some or all multiple machine gun mounts from their fire units in order to provide maximum defense against minimum altitude attack. Otherwise, the caliber .50 multiple machine gun mounts are sited so as to supplement the fire of the 37-mm or 40-mm guns, and to best combat minimum altitude attacks.

c. In view of the present decrease in altitude, and increase in speed of daylight minimum altitude attacks, the siting of weapons so as to provide protection down to ground level is desirable. However, due to terrain features and obstacles,

such siting, throughout a 360° field of fire, is often impossible to attain. In this event, it may be necessary to accept a site affording a wide field of fire down to ground level in the most likely direction of approach, even if this results in a somewhat restricted field of fire in less probable directions of attack.

d. After a reasonable defense of the objective has been established, any additional units available are sited to extend the defense in depth. Concentration of fire power along the most probable routes of approach is the primary consideration in siting these units.

47. COORDINATION OF DEAD AREAS a. It is necessary in most cases to coordinate the dead areas so as to assure that there are no avenues of approach which cannot be fired upon. In coordinating dead areas the following must be considered:

(1) Each gun must be able to cover its assigned normal sector.

(2) The dead area of each gun should be covered by the gun of an adjacent fire unit.

(3) The defense should be such that a reasonable number of weapons can place fire over the objective.

(4) If the objective offers considerable mask to closely sited weapons, their dead sector should be directed toward the objective. If the objective offers no mask, one side of the dead sector should be tangent to the outline of the objective or toward another mask. This will provide maximum fire density over the objective.

b. Where many 37-mm and 40-mm guns and multiple caliber .50 machine gun mounts are massed in a relatively small area, less thought need be given to mutual support and protection of dead areas, as this will be partially accomplished by the close spacing of weapons.

48. EMPLOYMENT WITH SEARCHLIGHTS. Spread beam searchlights provide target illumination for the night action of automatic weapons. The night employment of automatic weapons follows the principles established for daylight operation. However, range setters should have special training in estimating the range of illuminated targets because of the problem of false depth perception involved. For a detailed discussion of spread beam searchlight employment with automatic weapons see FM 44-6 when published.

49. EMPLOYMENT DURING SMOKE SCREEN OPERATION. a. When automatic weapons are employed in a defense where smoke is used to screen the objective from enemy air attack, there is no change in the doctrine governing their employment. Weapons blanketed by smoke may be ordered by the AAOR to fire barrage fire. (See FM 44-51.) Machine guns will not fire at unseen targets.

b. (1) The use of smoke may make necessary the temporary relocation of some fire units. In this event, the AAA defense commander may order some of the fire units to move to previously selected alternate positions. A sufficient number of weapons must be retained in their normal positions to maintain a reasonable defense of the objective in the event sudden changes of weather render the screen partially ineffective. The use of smoke is contemplated only for relatively large attacks or those which may last a considerable length of time. The time for movement to alternate positions may be as follows:

(a) Movement immediately after receipt of warning and decision to employ smoke. Movement at this time is made when reliable warning has been received which gives adequate time for complete screening of the objective prior to the first attack.

(b) Movement after individual gun positions have been covered by smoke. Movement at this time is necessary when insufficient warning has been received to allow complete screening of the objective prior to attack.

(2) Fire units will be retained in their normal position regardless of smoke, *unless all of the following conditions exist:*

(a) Suitable alternate positions have been selected and prepared.

(b) Sufficient weapons are available so that weapons in alternate positions will not be over 800 yards apart, and sufficient weapons can be left in normal positions to afford a reasonable defense of the objective.

(c) Complete communications including AAOR and necessary command nets have been installed at the alternate positions.

(d) Adequate road nets are available for the move to the alternate positions.

(e) The weapons can be moved to the alternate positions, emplaced, and ready to fire with on-carriage fire control within 15 minutes.

Section II. STATIC EMPLOYMENT

50. GENERAL. This section pertains to the tactical employment of automatic weapons in the defense of permanent or semipermanent installations.

a. The principles and considerations outlined in the preceding section are applicable to the static employment of automatic weapons.

b. All types of automatic weapons units are suitable for this type of employment.

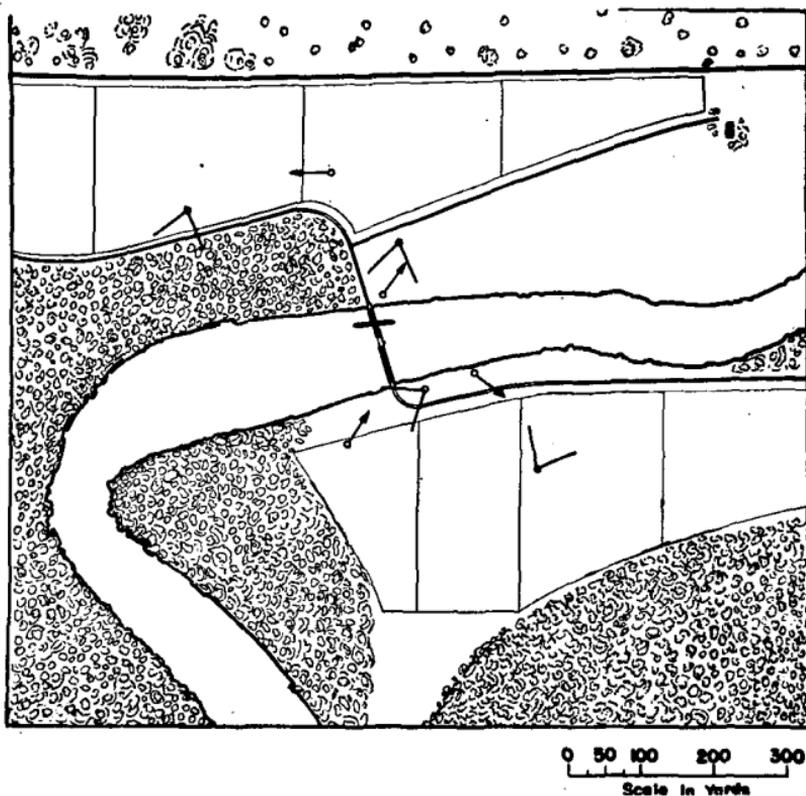


Figure 10. Defense of a bridge by a platoon.

c. 40-mm guns normally will be employed with director control.

51. MISSION. The defense, theater, or force commander will designate the areas or establishments to be protected. They normally will be beyond the range of enemy field artillery. Examples of permanent or semipermanent installations are ports, air bases, critical points on routes of communications, depots, or other establishments vital to the combat forces. The theater or similar commander will organize a complete air defense to coordinate the fighter

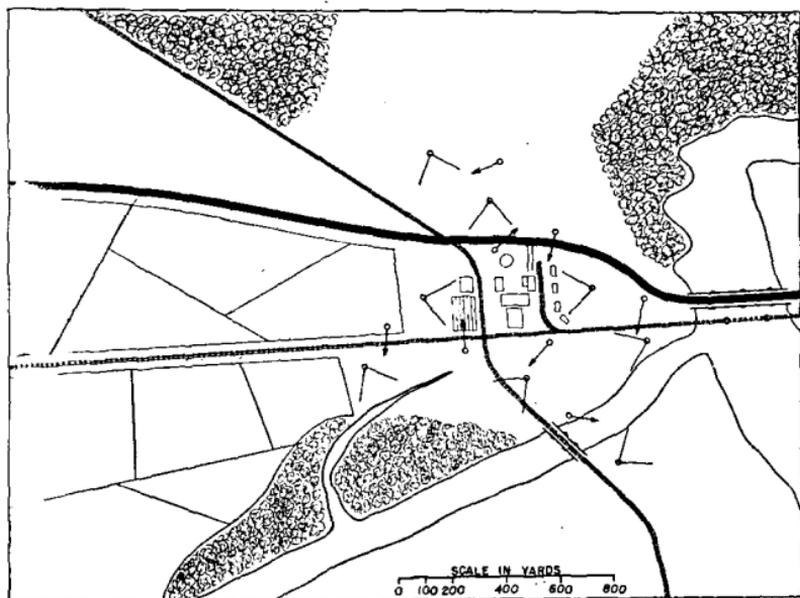


Figure 11. Defense of a single objective by one battery. Note dead areas facing masks.

aviation, AAA, and aircraft warning service. The AAA defense commander will establish an AAOR and AAAIS to coordinate and control the AAA units employed. (See FM 44-8.)

52. AIRDROME DEFENSE. a. AAA protection of area airdromes is of the utmost importance. Friendly aircraft cannot be expected to achieve and maintain air superiority over unprotected airdromes. Enemy aircraft may be expected to place unprotected airdromes in the highest priority for all forms of air attack.

b. Most airdromes should be considered as objectives for dive bombing and minimum altitude attack. AAA defense may include both guns and automatic weapons. The doctrines and principles outlined in section I apply

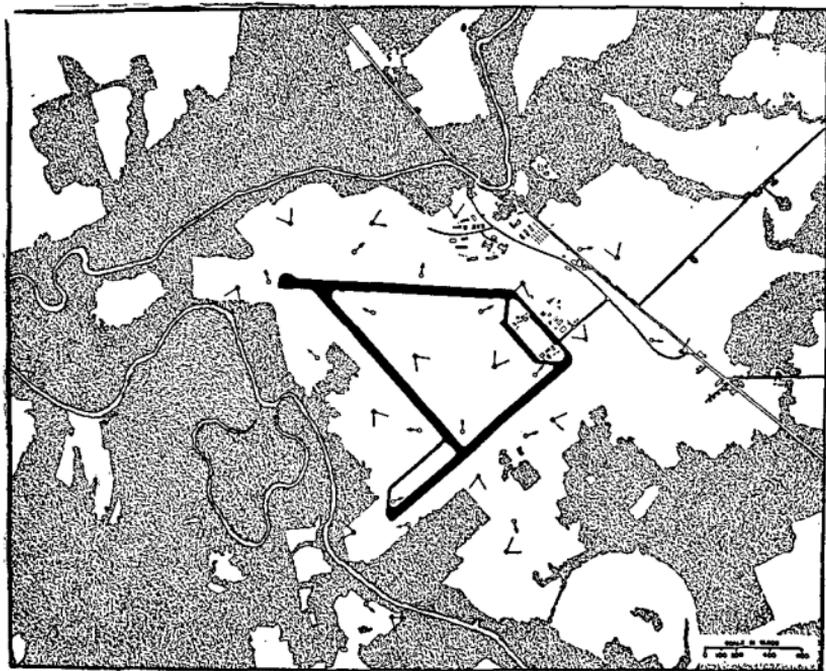


Figure 12. Defense of an airfield by two batteries. Dead areas are coordinated. Defense is planned to give protection to dispersal areas, runway and vital buildings and installations.

to automatic weapons employed for defense of airdromes. (See FM 44-1.)

53. ILLUSTRATIVE EXAMPLES. Figures 10, 11, and 12 indicate methods of defending the particular objectives illustrated, but do not represent the only effective defense possible. The establishment of a reasonable automatic weapons defense is based on the intelligent application of principles to each individual situation.

Section III. MOBILE EMPLOYMENT

54. GENERAL. Automatic weapons units operating with ground combat forces in a moving situation are confronted

with the problems of providing protection for troops and installations or areas nonpermanent in nature which are likely to become targets of air attack. The automatic weapons units must be mobile, because the ground force elements and installations they protect change position frequently. Weapons are often required to operate with on-carriage sights, and off-carriage fire control equipment is carried in the unit rear echelon (or with the fire unit, but not used) until such time as the situation makes its use practicable. The doctrine for disposition of automatic weapons as discussed in section I, applies to the mobile employment of automatic weapons.

55. BASIS FOR EMPLOYMENT. **a.** Elements and installations most vital to the plan of operation, and those most vulnerable to enemy air attack, are given the highest priority for AAA protection. Priorities are established by the force commander, or by the commander of the unit to which the automatic weapons unit is attached. Elements of low priority are required to rely on their organic AA weapons and passive defense measures.

b. Railheads normally require AAA protection only while they are in operation. Supply installations and infantry normally do not have a high priority for AAA defense if they are sufficiently dispersed or concealed.

c. The mobility of automatic weapons is normally equal to or greater than that of the protected elements. Nevertheless, when protecting ground forces on the move, automatic weapons must be deployed before such elements enter the danger zone.

d. Automatic weapons battalions operating with ground combat forces—such as armies, corps, and divisions—are rarely disposed as units. It may be necessary to distribute batteries and even platoons throughout the zone of action

to provide protection for vital elements and installations. Under such circumstances battalion control becomes difficult, and in some instances impossible. The decision to attach batteries to regimental combat teams, field artillery battalions, or unit trains, or to retain them under central control, is a command decision based on the situation. *It is highly desirable to retain central control of automatic weapons battalions when the situation permits.*

e. At times, moving situations may slow up and become static for days or longer. In such event, it is possible and desirable for AAA units which may have been attached to other units, to revert to their higher AAA headquarters.

f. Care must be taken to conceal the disposition, employment, and shifting of the AAA automatic weapons operating with combat forces so as not to divulge vital information to the enemy. If the situation permits, fire units move at night and are in position, ready to fire, prior to daybreak.

g. Self-propelled automatic weapons battalions may be employed in the same manner as mobile automatic weapons battalions, and are especially suited for the following types of action:

- (1) Protection of field artillery with advance units or with the rear guard in delaying actions.
- (2) Protection of motor movements.
- (3) Amphibious operations.

56. EMPLOYMENT WITH ARMORED UNITS. a. General. The employment of AAA automatic weapons with armored units is governed by the same basic principles as the employment of automatic weapons with other types of ground combat forces units in moving situations. Self-propelled automatic weapons units are best suited for em-

ployment with armored units and should be used when available.

b. Priorities. (1) In establishing priorities, the AAA commander, acting as AAA officer on the armored unit staff, considers the vulnerability to air attack of the various armored elements, their organic AA weapons, and their importance to the accomplishment of the mission. He then makes recommendations for AAA defense to the armored unit commander.

(a) Armored field artillery should have high priority for automatic weapons protection.

(b) Armored division trains normally will require automatic weapons protection in bivouac and on daylight marches.

(c) Armored infantry may require automatic weapons protection on the march, in entrucking, detrucking, or assembly areas.

(d) Armored engineers require automatic weapons protection during assembly for and installation of bridges on the route of advance, particularly in extreme forward areas.

(e) Tank units are least vulnerable to air attack and will seldom need additional automatic weapons protection.

(2) Coordination with the organic AA weapons of the armored unit is a responsibility of the AAA commander acting as AAA officer on the division or subordinate staff, whether he be an AAA battalion, battery or platoon commander.

c. Control. Armored units are normally employed to take full advantage of their mobility and fire power. Automatic weapons units protecting armored field artillery become widely scattered. In such situations, control must be decentralized to the extent of attaching an automatic weapons battery to an armored artillery battalion, or a

platoon to an armored artillery battery. When the situation becomes stabilized, the automatic weapons units should again revert to the centralized control of the automatic weapons battalion commander.

57. EMPLOYMENT WITH THE FIELD ARTILLERY. a.

General. Field artillery is protected from dive bombing and minimum altitude attack by AAA automatic weapons. One automatic weapons battery normally is assigned the mission of protecting one field artillery battalion. However, if a number of field artillery battalions are massed in a relatively compact area, an automatic weapons battalion may be assigned the mission of furnishing defense of the entire area.

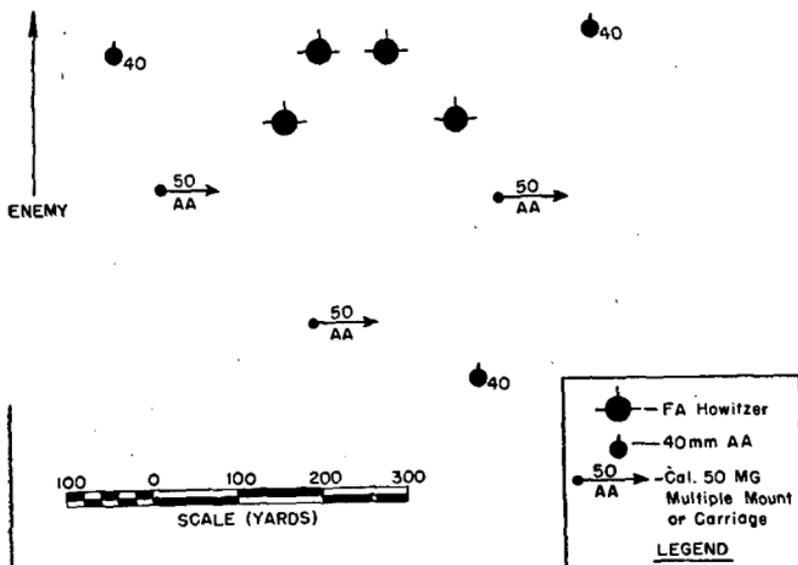


Figure 13. Defense of a field artillery battery by a provisional automatic weapons platoon.

b. Organization. Field artillery may move by simultaneous displacement of the entire battalion or by single battery. It may be necessary, therefore, to form the automatic weapons battery into three provisional platoons of 3, 3 and 2 fire units, and to assign each platoon the mission of protecting a specific field artillery battery so that it can move with that battery and give it continuous protection.

c. Disposition. (1) The basic doctrine and principles set forth in the preceding sections I and II are equally applicable to the employment of AAA automatic weapons with field artillery. However, since field artillery is sited to take advantage of maximum defilade, it is often difficult to dispose automatic weapons in the best AA positions. Also, hostile counterbattery fire against the field artillery must be

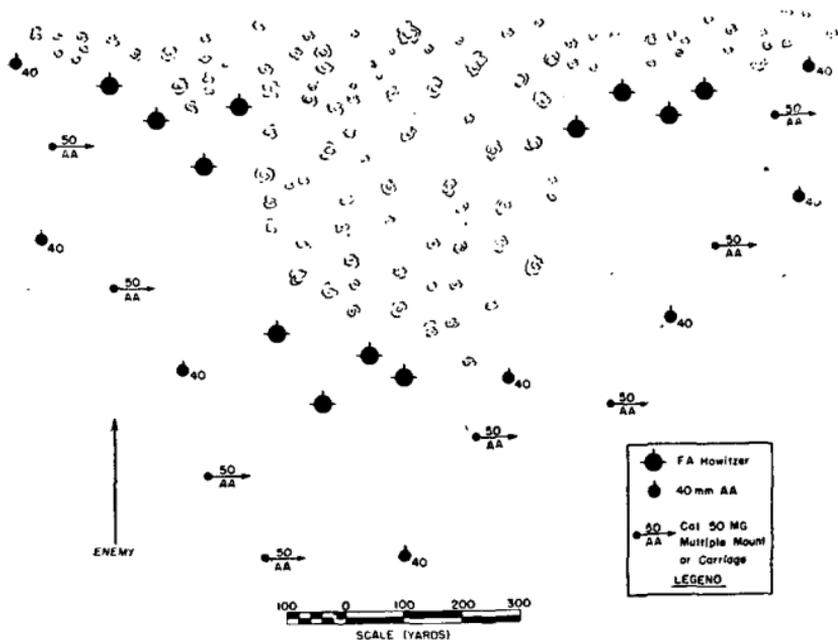


Figure 14. Defense of a field artillery battalion by an automatic weapons battery.

considered in planning the defense; although this should not be a primary factor. The best possible disposition for accomplishment of the mission should receive first consideration. Automatic weapons fire units should not be sited closer than 100 yards to the nearest gun of the defended units. If automatic weapons are placed in rear of the field artillery guns, they should be sufficiently in rear to minimize the possibility of damage from hostile counterbattery fire. Counterbattery fire is less accurate in range than in azimuth. However, air attack is more likely to be made along, or at a slight angle to the line of field artillery guns; therefore, in dispersing automatic weapons, emphasis should be given to the flanks of the field artillery.

(2) The organic AA machine guns of the defended field artillery unit will be considered in planning the defense. The defense will also be coordinated with any adjacent AAA units. Multiple machine gun mounts may be used as separate weapons, and should be sited closer to the defended objective than the 40-mm guns, so as to take full advantage of their fast traverse in fire on close-in rapidly moving targets.

d. (1) Close liaison will be maintained with the defended unit at all times.

(2) Orders for reconnaissance and movement will normally come from the field artillery commander.

(3) Warning of hostile ground attacks is the responsibility of the field artillery.

(4) The AAA will furnish the defended unit early warning of air attack.

58. CONCENTRATIONS—BIVOUACS. a. Concentration and bivouac areas are likely objectives for enemy air attack. Troop movements into and from a concentration or bivouac area must be unimpeded and unobserved, and the troops

and installations within the area must also be protected from air attack and observation. This requires that some automatic weapons units be among the first to arrive in the concentration or bivouac area, and among the last to leave. It also requires that particular attention be paid to camouflage discipline and all other passive air defense measures.

b. For protection against hostile observation, emphasis is placed on passive air defense measures. Since secrecy is a prime consideration, care must be taken not to reveal the location and importance of a concentration or bivouac area by automatic weapons fire unit dispositions or premature fire. Normally, automatic weapons will withhold fire until the area is attacked.

c. Automatic weapons are employed to combat dive bombing and minimum altitude attacks. Priorities for defense in a concentration area will include critical points along the routes to and from the concentration area, de-training and entraining areas, and installations and troops. The basic AAA defense should be furnished by the highest echelon possible. For instance, corps AAA should form the basis for the defense of a corps concentration area in order that the defense will not be unduly disturbed when automatic weapons battalions commence moving out with divisions to which they are attached.

d. Normally, automatic weapons will be the only AAA weapons provided for the defense of a bivouac area. In determining their disposition, consideration must be given to the amount of local protection that units can secure from their organic AA weapons, and the extent to which such units can utilize passive air defense measures

59. TROOP MOVEMENTS. **a.** The problem of defending a column or columns is principally one of defending



Figure 15. When a bivouac is well concealed, do not fire at aircraft unless the bivouac is attacked.



Figure 16. To do so will disclose the position and heavy attack may result.

critical localities along the route of march. The advance of the column must be unimpeded, and troops and materiel must arrive at their destination in sufficient strength and condition to accomplish the mission.

b. Automatic weapons units responsible for route protection must be in position ready to defend critical points before the main body of the column reaches those points. This requires such units to march well forward in the column—some between the advance guard and main body; others in convenient intervals in the column, or with such units as engineers whose bridging operations they may be assigned to protect. If a strong reconnaissance screen is preceding the columns, automatic weapons units may march behind it. Self-propelled automatic weapons units are particularly suited for this type of employment.

c. The force commander should give the AAA road priority when this is necessary for the accomplishment of its mission. Moreover, in order that automatic weapons units will be more mobile, directors may be left in the unit rear echelon and the guns employed with on-carriage sights.

d. Protection of critical points should normally be furnished by the highest echelon involved in the movement. For example, in the advance of a corps, the corps AAA should defend critical points along the main routes. This gives continuous defense to the advance and allows automatic weapons units attached to divisions to remain with them and furnish protection to the division on the march and during halts and bivouacs.

e. Critical points may include bridges, defiles, initial points, entrucking and detrucking areas, bivouac and assembly areas. However, choice of the critical points which AAA will defend must be carefully considered. A bridge

or crossroad is not necessarily a critical point unless its destruction will actually impede the advance of the column, and no other route is readily available. Straight open stretches of road may be just as favorable for enemy air attack as actual defiles.

f. If sufficient AAA automatic weapons are available, particularly self-propelled units and multiple machine gun mounts, they should be distributed throughout the column within mutual supporting distance. All organic AA weapons in the hands of ground troops may be employed against hostile aircraft within range.

g. Since advances are generally made in more than one column, decentralization of control is advisable. Portions of automatic weapons battalions attached to divisions may be attached to regimental combat teams; and, in order to facilitate the early advance of corps AAA units for route protection, it may be advisable to attach them to divisions for the advance. This insures the corps AAA units a place in the march tables of the units with which they must move and, when they reach the objective they are to defend, they may again revert to corps control. Corps AAA units can also be moved forward for route protection under corps control, provided the corps gives them road priority, or arranges road space in division columns.

h. Detachments of AAA automatic weapons are often attached to troop units moving by rail for the purpose of providing AAA protection en route. These weapons are mounted, ready to fire, on flat cars or gondolas, spotted in the train so as to provide all around fields of fire.

60. THE OFFENSIVE. **a.** The problem of furnishing AAA protection in support of an offensive is primarily one of warding off air attacks designed to stall the offensive, and

of denying the enemy observation of friendly operations, particularly during the preparation and development of the attack.

b. Priority for automatic weapons defense is given to those elements and installations supporting the main effort, and to those troops whose delay or disorganization would most jeopardize the accomplishment of the assigned mission. These may include artillery areas, critical points in the zone of advance, reserves, assembly positions, supply installations and train bivouacs, and concentrations of troops involved in the main effort.

c. AAA means are supplemented by organic AA weapons of troops, and the utilization, insofar as the situation permits, of cover, defilade, dispersion, and night movements.

d. Displacement of fire units should be made in accordance with the movements of units they are defending, or when the changing situation indicates the necessity for revision of established priorities.

e. The initial coordination of division, corps and army AAA should be provided for in the army attack order. Normally, one or more automatic weapons battalions will be attached to the divisions making the main effort, and their first priority will be the divisional artillery. Other priorities may be the division reserve and troops engaged in the main effort which are likely objectives for air attack.

f. Since automatic weapons will be employed well forward in an offensive, often within range of enemy artillery fire, an effort should be made to select positions affording defilade as well as concealment from enemy observation.

g. In an attack to force the crossing of a river line, automatic weapons defense is centered around the crossing fronts, particularly the sites of bridges. This requires that

AAA automatic weapons units be among the first troops to arrive at the crossing fronts. If the situation permits, a portion of the fire units is crossed to the far bank by boat or ferry before construction of the bridge is started. Protection must be afforded personnel and bridging material while bridges are under construction. Continuous protection for the bridges is maintained as long as required. If the river is wide, automatic weapons can be floated on ferries in the river in order to round out the defense.

61. PURSUIT. The problem of AAA protection in a pursuit is essentially an offensive operation in the case of direct pressure, and a rapid advance in the case of an encircling movement. Armored units normally are assigned the mission of the encircling maneuver in the pursuit. As coordination is difficult during a pursuit, it is usually necessary to attach automatic weapons units to the various elements continuing the attack; this is particularly true of the force making the encircling move. Self-propelled automatic weapons units are especially well suited for this type of employment.

62. DEFENSIVE. **a.** When a force is on the defensive, AAA defense becomes of increasing importance as there is usually a local inferiority in strength not only of the ground forces, but also of the air forces. A hostile attack will usually be supported by powerful enemy concentrations of combat aviation which will achieve local air advantage. Under these conditions, the AAA units must furnish the major portion of the defense against hostile air activity, except that afforded by other units with their organic weapons and passive defense measures.

b. Automatic weapons are disposed initially to protect the organization and occupation of the battle position from

hostile observation and air attack. After the position has been organized, priorities for automatic weapons defense will be the artillery, the reserves in a counterattack, and troops defending the most vital areas of the battle position. If sufficient AAA is available, some units will be assigned to the defense of important supply installations and critical defiles (such as bridges and road junctions) along routes to the defensive position. The AAAIS gives prompt warning of the approach of hostile aircraft to all units concerned.

c. Automatic weapons are sited so they may be employed against attack by mechanized vehicles when this can be done without interference with their primary mission. In the event of simultaneous attack from hostile aircraft and mechanized vehicles, fire must be concentrated against the most dangerous threat.

d. In general, AAA units are not attached to divisions when part of a corps during a defense. The defense established is an area defense coordinated by the corps AAA commander. In planning the AAA defense, passive air defense measures should be stressed and the organic AA weapons of other units should be taken in account. Provision must also be made to coordinate the AAA defense and AAAIS with that of other defensive positions that may be on the flanks. Automatic weapons positions should be selected to afford defilade from enemy artillery fire, and alternate and dummy positions should be prepared.

e. Employment of automatic weapons units in counterattacks is similar to their employment in the attack, provision being made in the plan for prompt reestablishment of the defense when the objective of the counterattack has been secured, or for continuing the attack in case the counterattack develops into an offensive.

f. In the defense of a river line, automatic weapons will

be employed to protect the artillery and the reserves. In addition, some automatic weapons protection should be provided on or near the river line.

63. RETROGRADE MOVEMENT. a. When withdrawing under pressure from hostile ground forces, automatic weapons protection is provided for the moving columns as in an advance. In addition, the rear guard and particularly the field artillery attached to it, must be provided with automatic weapons protection as in a defensive situation. It is highly probable that the enemy will have at least limited air superiority. The progress of leading elements must not be obstructed as this would jeopardize the movements of the main forces following. Protection of assembly areas and critical localities along the routes of withdrawal will, therefore, be of the utmost importance.

b. The success of a withdrawal will depend largely on the secrecy with which it is accomplished. Therefore, it is usually made under cover of darkness. However, the tactical situation may in exceptional cases demand a daylight operation. AAA protection becomes even more important under this condition.

c. In a withdrawal, enemy mechanized forces are a serious menace, and the automatic weapons defense should be planned with this in mind. Care must be taken that automatic weapons fire units are not left without protection in positions exposed to mechanized attack. Alternate positions for antimechanized fire should be reconnoitered, so that ground targets may be engaged if the mechanized threat requires it.

d. In a delaying action automatic weapons protect the artillery and critical points in rear of the delaying position.

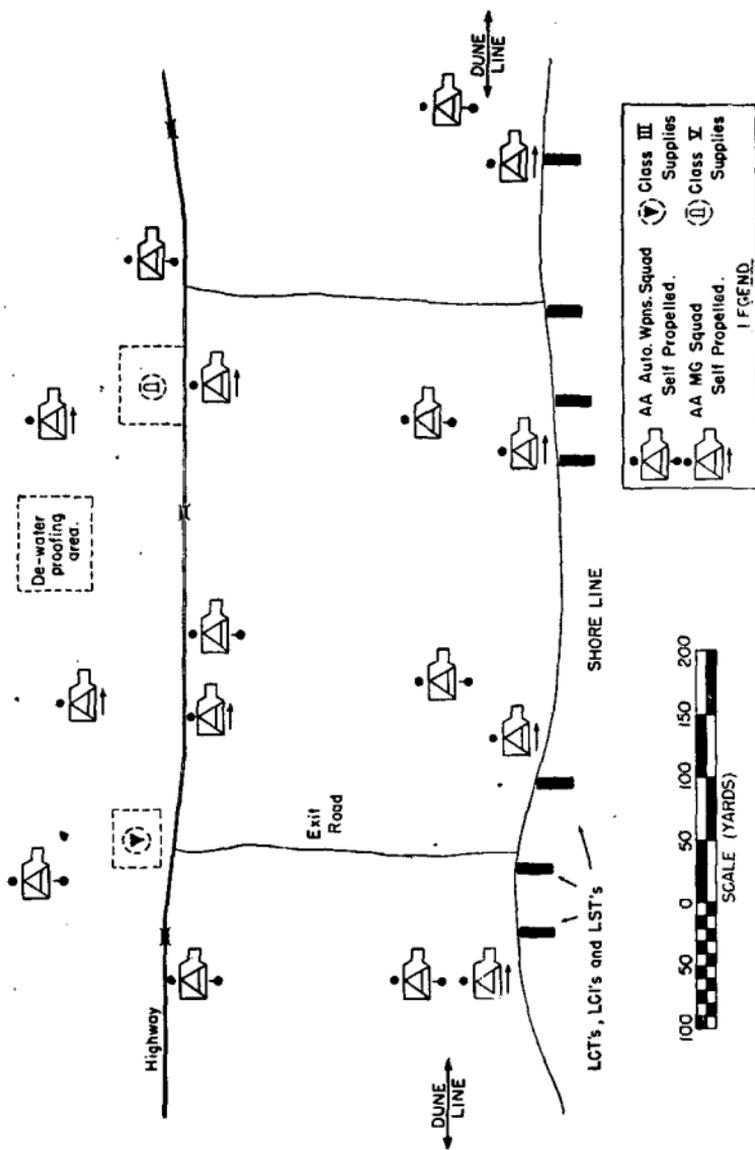


Figure 17. Beach defense by a self-propelled battery.

64. AMPHIBIOUS OPERATIONS. a. General. (1) Each phase of an amphibious operation requires adequate AAA protection. AAA automatic weapons units normally are attached to the landing force. Automatic weapons units may be attached to the naval force to augment naval AA defense aboard ships and landing craft.

(2) See FM 31-5 and also 44-1 (when published) for more detailed information on amphibious operations.

b. Missions. (1) Primary missions of AAA automatic weapons attached to the landing force may include:

(a) Protection of assault landing waves, subsequent boat operations in the beach area, and the assault forces as they proceed inland against minimum altitude dive bombing, and low altitude air attack.

(b) Protection of beach installations, airfields, and port facilities against minimum altitude, low altitude, and dive bombing attacks.

(2) Secondary missions may include:

(a) Assisting in the antimechanized defense of the beach.

(b) Assisting the Navy in protecting shore operations against seaborne attack by light naval forces.

c. Command. (1) Command of AAA automatic weapons normally will have to be decentralized during the initial assault phase. Automatic weapons batteries designated to participate in the landing assault, either in initial waves or in subsequent early landings, are attached to battalion landing teams. As soon as practicable, such batteries revert to AAA battalion control, in order that an integrated AAA defense of the regimental combat team area may be provided as early as possible. The time or circumstances of such detachment and consolidation must be clearly given in the plan.

(2) Automatic weapons units, which are deck-loaded for the voyage only, are controlled by the Navy during the voyage. Upon reaching the landing area, such units revert to the landing force.

d. Embarkation. Automatic weapons used to augment the naval AA defense during the voyage are deck-loaded. Consideration must be given to the ship space available for the equipment and the operating crews.

e. Landing phase. (1) Automatic weapons batteries are needed first to cover the critical assault period and the initial beach organization. Self-propelled automatic weapons are particularly suited for the initial portion of the landing phase. Automatic weapons batteries attached to battalion landing teams usually land with the assault waves or follow them closely.

(2) If self-propelled automatic weapons are not available, towed multiple machine gun mounts should be brought ashore first.

(3) Towed 40-mm guns are brought ashore last. On-carriage fire control is used initially, and off-carriage fire control equipment brought ashore later as the situation permits.

(4) Consideration should be given to landing a portion of the battalion AAAIS section with each automatic weapons battery to facilitate early establishment of the AAAIS.

(5) It is essential that automatic weapons units are landed ready for action. Weapons and necessary ammunition and personnel must be loaded in the same landing craft. Only essential personnel and equipment are taken ashore initially.

(6) Forward and rear echelons of battalion headquarters and headquarters batteries normally land with the forward and rear echelons, respectively, of the regimental combat team to which attached.

(7) Division reserves may include automatic weapons battalions intended to accompany the assault force inland.

f. Shore operations. (1) Initial establishment and integration of AAA defense proceeds as for normal operations under the senior AAA officer in each battalion landing team.

(2) Units intended for beach defense should not be extended inland with assault elements or otherwise dissipated by assault unit commanders, except upon approval of the landing force commander. As soon as practicable, or whenever prescribed by higher authority, automatic weapons units intended for continued beach defense will be released from the assault division and attached to higher AAA command echelons landed to take over the AAA defense of the beach. This release must be coordinated carefully with the landing of additional automatic weapons units to accompany the assault division inland.

(3) Automatic weapons units accompanying the assault division inland are employed in their normal roles.

(4) Automatic weapons units landed during the consolidation phase are used in normal roles in the AAA defense of the beachhead.

CHAPTER 7

EMPLOYMENT OF AIRBORNE AAA

Section I. GENERAL

65. MISSION OF AIRBORNE FORCES. The mission of an airborne force is to broaden and deepen the combat area by executing an envelopment from the air, ordinarily in conjunction with other ground forces. This type of tactical operation involves troop movements by aircraft and gliders. If the landing area at the final destination has been secured from hostile small-arms and artillery fire, the subsequent operation of airborne troops does not differ from those of similar units transported by any other method, except for lack of organic transportation and difficulty of supply. Airborne troops normally encounter defensive action upon landing and this chapter deals with such opposed landings. (See FM 100-5, also FM 71-30 (when published).)

66. MISSION OF AIRBORNE AAA UNITS. The missions of airborne AAA units generally are no different than those of other AAA automatic weapons units (see ch. 2). An exception is the automatic weapons batteries of the airborne AAA battalion which are not equipped for AA fire and have a primary antitank mission.

67. TRAINING. Airborne AAA battalions and separate batteries receive the same training as other AAA units with similar weapons. In addition they must be specially trained in the following:

a. Enplaning and deplaning of troops, equipment, and supplies, to include practice loading in mock-ups, lashing of equipment and computing of loads. (See TM 71-210 (when published).)

b. Planning and execution of operations requiring precise coordination with air forces, parachute troops and other arms.

c. Administration, supply, and evacuation without normal motor transportation facilities.

d. Independent operation of squads, sections, and platoons.

e. Basic principles in the use of parachutes and jump procedure.

f. Flight discipline prior to enplaning and while in flight.

68. EMPLOYMENT. a. Airborne AAA is transported by fire units in transport type aircraft or gliders. Immediately upon landing the units set up a defense of the area to protect other elements arriving. Following elements occupy positions previously selected and strengthen the defense of the area. As time permits, emplacements are continually improved and camouflaged. Communication with command posts of higher echelons and with individual fire units is established as soon as possible after landing.

b. Speed is essential in disembarking, organizing and moving to predesignated positions. Where gliders are used, AAA troops will assist in the removal of the gliders from the landing area.

c. The AAA commander arrives with the first element of his first unit. He advises the force commander of the situation regarding the AAA defense of the area. He coordinates the occupation of positions by the AAA units as they arrive.

69. PLANNING. **a.** Detailed plans, flexible enough to meet unforeseen contingencies, must be made prior to an operation. Air photographs and maps of the landing area and vicinity must be secured and distributed down to include the platoon. Unless the operation is planned thoroughly, and in great detail, confusion, delay and even disorganization may result. All loading plans must be developed in such a way that all essential personnel can be landed in the forward echelon.

b. The success of airborne operations depends upon accurate and careful prior planning as regards intelligence, operations, and supply. Sufficient time must be allowed before the operation is to commence in order to permit the briefing of lower echelons and the detailed rehearsing necessary for execution of the mission as planned.

c. Rendezvous points should be designated by commanding officers before the operation is started. Tentative gun and command post positions are selected. An advance party should accompany the first elements flown in, to reconnoiter the positions selected and act as guides for units as they arrive. Alternate positions should be selected.

d. During the planning stage, constant contact must be maintained with the force G-2. All pertinent information gained concerning the enemy should be disseminated throughout the AAA unit.

e. Plans for the recognition and identification of aircraft are particularly important, since the normal AAAIS and AWS will probably be lacking during the early stages of airborne operations.

f. Effective liaison between transported units and the air forces is a prerequisite for a successful landing, and there must be opportunities for rehearsal and practice.

g. Steps to maintain secrecy regarding large troop movements must begin with the inception of the plan so that

reports of concentrations or activities involving transport aircraft or gliders do not reach the enemy. Actual flights must avoid thickly populated areas if possible and fly at very low altitudes or at night. Activity which might disclose time and date of attack, or the location of the combat area, is deferred as long as practicable.

70. AIR SUPERIORITY. Air superiority is essential for a successful air troop movement. The airborne force is closely protected by combat aviation during the time of loading, while in flight, and at the time of landing. The troops are particularly vulnerable during the flight, while landing, and while reorganizing after landing.

71. LOADING. (See TM 71-210 (when published).)

a. Since the relationship of the load to the center of gravity of the aircraft is of prime importance, great care must be exercised in the placing of the load to avoid exceeding the relatively small tolerance allowed in order that undesirable flight characteristics do not result.

b. Responsibility for the proper loading of the aircraft rests primarily with the pilot. Likewise, it is his responsibility to take the proper precautions to avoid damage or injury to the aircraft and personnel engaged in the actual loading operation. It is therefore necessary that great care be exercised in loading of weapons, vehicles, and other heavy equipment.

c. In placing loads in aircraft, it is essential that they be so positioned that the tie-downs used are of sufficient strength to withstand the loads applied to them. In addition, care must be taken not to overload the floor upon which the loads are to be placed.

d. Rope is generally used in lashing all pieces of equipment in the aircraft. However, a combination of ropes and

chains are used for lashing the heavier equipment such as the air-transportable 40-mm gun on mount M5, and the multiple cal. .50 machine gun trailer mount M55.

e. Loading lists and time tables must be carefully prepared. Every person responsible for the loading of a glider or aircraft should have a list showing what personnel and equipment will be loaded in the glider or aircraft, and see that the necessary equipment for loading and lashing is on hand. All equipment, armament and ammunition must be carefully inspected prior to an operation.

f. Weapons are transported with the crews that serve the weapons. In addition the glider or aircraft carries ammunition, rations, and spare parts needed for emergency repairs.

72. LANDING. a. No operation in the combined airborne effort requires more careful reconnaissance, study, planning, and coordination in its execution than a successful landing in enemy territory. Operations of airborne troops are characterized by speed, initiative on the part of all commanders, boldness in order to take maximum advantage of initial surprise, and lack of supporting fires except by combat aviation.

b. AAA automatic weapons normally are one of the first elements landed. Upon landing, the situation may require immediate AAA protection for the landing area. In that case, the first fire unit that arrives goes into position in the immediate vicinity of the point of landing to protect other elements arriving. The remainder of the organization move to their selected positions. Where a unit is required to move some distance after landing to set up its AAA defense, movements are made by individual guns or platoons. Waiting to assemble an entire battery wastes time. Speed is an all important factor in landing and going into position.

c. In landing on an airfield which has been secured by our forces and setting up an AAA defense for that field, the pilots can assist materially by landing their aircraft as close as possible to the selected gun positions. This saves time and also disperses the aircraft. Cooperation can be accomplished prior to take-off by having the unit commander confer with the pilots and point out the gun positions on a map or air photograph.

73. EQUIPMENT AND WEAPONS. a. All equipment and weapons must be light in weight and compact in order to facilitate transport both in the air and on the ground. Weapons and equipment which are intricate and require specialists to adjust and repair cannot be used in airborne operations. Personnel must be able to accomplish all repairs to equipment and weapons that may be required during intensive operations over a period of several days. There is neither time nor transportation available to send equipment or weapons to a rear base for repairs. All repairs are made on the spot with the tools and spare parts carried in the operation. Fire control and fire direction are as simple as possible.

b. The mobility of airborne troops after landing is limited to that of foot troops with a few light vehicles. Motor transportation is limited and careful supervision must be maintained in order to obtain the maximum benefit from its use. Airborne troops should obtain enemy vehicles, civilian vehicles and pack animals from every possible source to aid them in supply, administration and changes of position. The capture of such transportation cannot be depended on and all plans must be based on the organic transportation. Depending upon the availability of air transportation, as much motor transportation as possible is flown in with the units.

74. AIR TRANSPORTATION. a. The principal reason for the employment of gliders is that they can be landed on areas where it is impossible to land powered aircraft. A secondary reason is that gliders can be released at some distance from the landing area and make their approach silently.

b. Since either gliders or aircraft may be used to transport troops, airborne AAA units must be trained in the loading and lashing of both.

75. LOCAL SECURITY. Local security is established in each position. It is important to remember that there is no "front" in airborne operations. Outposts, AA lookouts, and patrols are established to give an early warning of an impending attack by mechanized vehicles or aircraft. Close contact and coordination with surrounding units greatly strengthens the security of positions.

76. SEPARATE PROBLEM. Each airborne operation is a separate and distinct problem in itself. No hard and fast rules can be promulgated in view of the many local factors prevalent at any one landing area.

Section II. EMPLOYMENT OF AIRBORNE AAA BATTALION

77. MISSION. Airborne AAA battalions are employed with airborne divisions, or task forces of the airborne division, to give AA and antitank protection to the division. The basic principles of employment outlined in chapter 6, FM 44-1 (when published), and FM 7-35 are applicable.

78. DISTINCTIVE CHARACTERISTICS OF AIRBORNE AAA BATTALION.

a. Distinctive characteristics of the employment of airborne AAA are—

(1) The engagement of all types of ground targets, not only for local security, but to support the infantry by fire both in the attack and defense.

(2) Minimum communication facilities.

(3) Conservation of ammunition.

(4) All around security.

(5) Rapid movement with frequent changes of position.

(6) Movement by hand or limited motor transportation.

b. In airborne operations many difficulties and unforeseen eventualities arise which call for initiative, and bold and aggressive action by all personnel within the battalion. Only careful training can produce intelligent and energetic troops able to cope with the difficulties which are encountered. Airborne operations require great physical exertion and every effort must be made to insure that all men are at the peak of condition prior to action.

79. AAA COMMANDER. The AAA battalion commander, besides commanding his battalion, may be called upon to perform the following:

a. Coordinate the antiaircraft defense of the division.

b. Coordinate the antitank defense of the division.

c. Act as special staff officer in the division, in which capacity he is the adviser to the division commander regarding all AA and/or antitank matters.

d. Control all of the AA and/or antitank weapons in the division.

80. PLANNING. **a.** Detailed plans are made prior to an operation. These plans must be flexible to meet any unforeseen contingency that may arise. Air photographs and

maps of landing areas and the surrounding terrain are secured and distributed down to include the platoon. Tentative gun and command post positions are selected from air photographs or maps. When possible, sand table reproductions of the terrain are made and carefully studied prior to selection of positions and preparation of plans. An advance party must accompany the first elements flown in, to reconnoiter the positions selected, and act as guides for units as they arrive. Alternate positions are selected and reconnoitered. All equipment must be inspected for quantity and serviceability prior to an operation.

b. During the planning stage, the battalion headquarters must maintain constant contact with the division G-2. All pertinent information gained concerning the enemy must be disseminated throughout the battalion.

c. The battalion commander habitually accompanies the leading elements of his organization. This affords the battalion commander an opportunity to make an estimate of the situation and coordinate the AA and antitank defense. The battalion staff moves in two echelons. This gives further assurance of the arrival of a control for the battalion. The battery commander rides with the leading glider or aircraft of his battery, so that he can maintain control and organize his defenses upon landing.

d. Factors to be considered in planning an airborne operation are type and number of transport aircraft (or bombardment aircraft in lieu thereof) needed, enemy capabilities, sequence of enplaning and deplaning, missions for leading and subsequent waves, weather and terrain, supply and evacuation, time required to complete move, and selection of assembly or rendezvous points. All plans and preparations should be completed prior to the time of departure.

81. CONTROL. The nature of AAA and antitank employment is such that it must be closely coordinated and integrated. The decision whether to attach batteries to combat teams of the airborne division, or to have the batteries support such units under the AAA battalion commander's control, is a command decision which must be based on the situation. *Retain batteries under the AAA battalion commander whenever possible.* He can adequately perform his mission only if he can use all the facilities at his command to establish a coordinated AAA and antitank defense. *No protection of any value can be given by single weapons.*

82. LOCAL SECURITY. Local security is established in each position. In every case a complete all-around defense must be established. Outposts, AA lookouts, and patrols are established to give an early warning of an impending attack by mechanized vehicles or aircraft. Ground defense plans must be prepared against possible paratroop attack and enemy patrols. Close contact and coordination with adjacent units is necessary for the security of positions. (See FM 44-1 (when published) and FM 100-5.)

83. MOTOR TRANSPORTATION. Motor transportation is limited and careful supervision must be maintained in order to obtain maximum benefit of its use. Plans and check sheets must be adopted to insure proper and efficient maintenance. Transportation should be obtained from every source possible to aid the unit in supply, administration, and changes in tactical position. During an airborne operation, chauffeurs must always remain with their vehicles.

84. AIR TRANSPORTATION. a. Normally the airborne AAA battalion is transported in gliders, however,

transport aircraft are often used. These gliders and aircraft are furnished by the air forces.

b. To move an airborne AAA battalion, 77 C-47 aircraft or 115 CG-4A gliders are necessary.

(1) Headquarters and headquarters battery requires two C-47 aircraft or six CG-4A gliders for transportation. Personnel must be so divided among the different aircraft or gliders that all the key personnel in headquarters are not lost in case an aircraft or glider is lost.

(2) The medical detachment requires four CG-4A gliders or two C-47 aircraft for transportation. The aid men assigned to each battery accompany that battery in all movements.

(3) Each machine-gun battery requires 17 CG-4A gliders or 12 C-47 aircraft.

(4) Each automatic weapons battery requires 18 CG-4A gliders or 12 C-47 aircraft.

Section III. EMPLOYMENT OF AIRBORNE MACHINE GUN BATTERY

85. MISSION. a. See paragraph 8.

b. Special tasks assigned may include engagement of light armored vehicles and direct fire support for the infantry.

c. Within the limitations of matériel, protection may be provided for the following elements:

- (1) Landing areas.
- (2) Supply points.
- (3) Reserves.
- (4) Command posts.
- (5) Troops in the attack or defense.

86. LOADING AND LANDING. **a. Loading.** In loading the gliders or aircraft, weapons are transported with the crews that serve them. In addition, the glider or aircraft carries ammunition and rations. This type of load is called a "combat" load and is used in order that the loss of one glider or aircraft does not seriously hamper the operation. Each glider or aircraft must be loaded to full capacity. Ammunition is always added to make up capacity loads.

b. Landing. In an airborne operation AAA batteries are usually one of the first elements loaded.

c. Coordination between the air force and the AAA is required. Fire must be withheld when it endangers friendly transport aircraft and gliders. (See FM 44-1 (when published).)

87. EMPLOYMENT. **a.** Upon landing, the situation may require immediate AAA protection of the landing area. If so, the first platoon that arrives goes into action in the immediate vicinity of the point of landing and the remainder of the organization moves to previously selected positions. AAA units when landed do not assemble into platoons or batteries. Instead, each squad as it lands proceeds immediately to its previously selected position and prepares for action. While landing and immediately thereafter, air transported units are vulnerable to enemy aircraft and infiltration by ground units. Therefore, speed is essential in disembarking, organizing, and moving to predesignated positions.

b. Establishing a position. In setting up a defense of important supply points, command posts, or in keeping landing strips open for resupply, gun positions are fortified and camouflaged. Alternate positions are selected and improved. Communication is installed from the battery

CP to the various gun positions, and from the battalion CP to the battery CP.

c. Moving with infantry. When protecting infantry in an advance, guns are located in a checkerboard pattern approximately 500 yards apart. *In moving forward, keep as many guns in position as possible, and have the rear guns leapfrog the forward guns.* The 1/4-ton truck may aid in moving the guns and equipment to the advanced positions. AAA units follow closely behind the attacking infantry to insure better AAA protection for the infantry, and to secure the protection afforded by the infantry elements.

Section IV. EMPLOYMENT OF AIRBORNE AUTOMATIC WEAPONS BATTERY

88. MISSION. **a.** The mission of the automatic weapons battery is to defend the division against attack by hostile mechanized units.

b. Special tasks that may be assigned to the automatic weapons battery include—

- (1) Destruction of fixed centers of resistance, including concrete pill boxes.
- (2) Protection of road blocks.

89. LOADING AND LANDING. **a. Loading.** Each glider or aircraft is loaded with a combat load so that its loss will not seriously affect the functioning of the battery.

b. Landing. In an airborne operation, automatic weapons batteries are one of the first elements landed.

90. SELECTION OF POSITION. **a.** In all cases, a thorough study of the landing areas from air photos and maps must be made by all key personnel and initial and alternate fire unit position areas determined.

b. Each chief of section, immediately upon landing—

(1) Disembarks personnel, matériel, and equipment from his glider or aircraft.

(2) Couples the 37-mm antitank gun to the 1/4-ton truck and directs its movement off the landing area.

(3) Has truck return to transport equipment, supplies, and ammunition off the landing area.

(4) Moves glider off the landing area.

(5) Contacts other elements in the vicinity and immediately takes under fire any enemy targets that are interfering with the landing or organization of the defense.

c. Upon landing it may be necessary for commanders of units to regain control of their units before proceeding on their mission. This may be accomplished by selecting a rendezvous place or rallying point from air photographs before leaving the departure area. This position should afford cover from small-arms fire. As the 37-mm antitank guns arrive in the rallying area the commander assigns them exact positions.

d. The battery commander, as soon as possible, sends a messenger to the battalion command post to report the number of 37-mm antitank guns successfully landed, and the exact position of each gun.

e. Ideal firing positions may be difficult to locate near the landing area. However, tentative 37-mm gun positions are selected by a map reconnaissance prior to the landing. Ability to execute the mission, defilade, and cover are the controlling factors in the selection of positions. Guides should be provided to insure that 37-mm guns are moved rapidly off the landing area without confusion. If cover is sparse, it is better to scatter the guns in an open but de-

filaded position than to overcrowd a small covered area. Nearby alternate firing positions must be selected to which the guns can move during a lull in the action or when brought under fire.

f. In general not all of the antitank weapons are employed around an area to be defended. A number of weapons are held in reserve at centrally located positions. Guns are employed along all routes of approach to the defended area.

91. SECURITY OF POSITION. Local security is established in each position. The 1/4-ton trucks are used to establish out-posts and patrols so as to give warning of an impending attack. Interference by infiltration of hostile light armored elements is especially to be expected.

92. FORWARD DISPLACEMENT. The division commander decides whether the automatic weapons batteries are to be employed with the division in forward displacement or remain at the landing area and protect it against mechanized attack.

a. 1/4-ton truck is the prime mover for the 37-mm gun when used in displacement. When the guns have been displaced, the trucks shuttle back and forth from the old to the new position areas, transporting ammunition, supplies, and equipment. In many cases, however, the 37-mm anti-tank gun is moved by hand.

b. When moving with the division, as many guns as possible should be kept in position. New positions are boldly occupied close behind the leading elements of the infantry. When the infantry finds easy going, displacement is frequent. The 37-mm gun squad must always be prepared to drop trails and deliver necessary fire during forward displacement.

Section V. EMPLOYMENT OF SEPARATE AIRBORNE AAA MACHINE GUN BATTERY

93. MISSION. The mission of the separate airborne AAA battery is to furnish AAA defense to advanced landing fields which are inaccessible except by air.

94. CHARACTERISTICS. The separate airborne AAA batteries are light, compact units for the establishment of AAA defense against strafing and dive-bombing attacks for single important installations. The battery has only enough transportation to handle partially the administration and supply within the battery. The battery must depend on other units for its supply and arrangements should be made with these units to deliver the supplies to the battery. It must also depend upon other units for transportation when any movement is to be made outside of its defended area. Limited communications makes it compulsory for the battery to establish immediate contact with the air forces on the field or other adjacent units.

95. PLANNING. Prior to an operation, all equipment and armament must be checked. It is the responsibility of the battery commander to see that his battery is properly equipped to meet the conditions of the locality in which the battery is expected to operate. If possible, an advance party should be dispatched to make a reconnaissance of the area, select positions, and make arrangements for the necessary administrative details.

96. AIR TRANSPORTATION. Normally the battery is transported by aircraft. The battery must be prepared to move, not only in transport aircraft but also in bombers or any other type of aircraft that may be available. It

normally requires eleven C-47 aircraft to move the battery. However, this figure may be increased depending upon the situation. Movement plans must be simple, and arrangements made directly with the air force unit which furnishes the air transportation.

97. EMPLOYMENT. **a.** Normally the battery can expect to occupy AAA defensive positions for long periods. Therefore, all personnel should accompany the battery in all operations and movements.

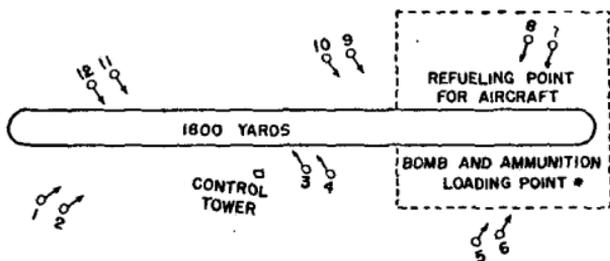
b. In the defense of a landing field, the battery command post should be located at the operations office for the landing field. By close cooperation with the local air force unit, timely warnings of the approach of all airplanes may be obtained.

c. Several alternate positions for each gun must be selected. The tactics of enemy pilots should be studied carefully and some alternate positions are selected well outside the defended area and along the habitual route of approach. Changes of positions are made during the hours of darkness whenever possible. When a position has been disclosed to the enemy, immediate movement is normal.

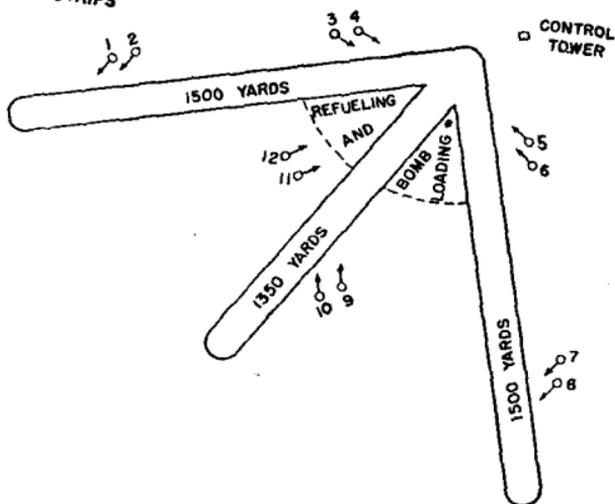
98. SECURITY. An all around defense must be established. An efficient warning system (AAAIS) must be established in order to reduce the personnel on alert status, and to prevent surprise.

99. DEFENSE OF ADVANCED LANDING AREA. **a.** The planning of the defense of a landing strip in a forward area necessitates a detailed study of air photographs to determine the most favorable gun locations. *Positions which take advantage of natural concealment and camouflage are preferred to those which require artificial camouflage.*

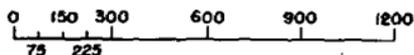
A. SINGLE AIRSTRIP



B. MULTIPLE STRIPS



SCALE IN YARDS



* DUMPS DISPERSED AWAY FROM TARGET AREA

Figure 18. Disposition of a machine gun battery on a single strip and a multiple strip air field.

b. The average airfield has runways from 3,000 to 7,000 feet in length. If sufficient armament is available machine guns should be emplaced in such a way that no hostile aircraft can approach the field without coming under the fire of one or more machine guns before reaching the objective. However, machine guns must not be separated to such an extent that they will not be mutually supporting.

c. Because the machine guns of an airborne machine gun battery are mounted singly, one fire unit does not provide the volume of fire required to combat successfully high speed, minimum altitude aircraft. Even though it is desirable to space machine guns at such a distance apart as will aid tracer discrimination, it may often be necessary to emplace them by sections and sometimes by platoons so that individual machine guns within sections or platoons are not separated by more than 100 yards. (See fig. 18.) Terrain conditions dictate to some extent the distance from the runways that guns may be sited.

d. Advantage is taken of elevation, natural or artificial, as such vantage points make excellent machine gun positions, giving excellent fields of fire.

Section VI. EMPLOYMENT OF AIR-TRANSPORTABLE AAA AUTOMATIC WEAPONS BATTALIONS

100. MISSION. a. The primary mission of air-transportable AAA weapons units is to provide protection for airdromes or for objectives in the vicinity of the airdrome. Secondary missions of ground defense may be assigned. The air-transportable AAA unit is capable of providing a static automatic weapons defense of an objective which may be inaccessible by transportation other than air. It may also be employed when the tactical situation requires an

immediate AAA defense of an objective and there is not time to bring weapons forward by ground transportation.

101. LOADING. Each aircraft is loaded with a combat load so that the fire unit can function immediately upon its arrival at its destination and its loss will not prevent other fire units from functioning. The planning and loading is similar to that of an airborne AAA unit (par. 69 and 71). For further discussion see TM 71-210 (when published) and FM 44-61 (when published).

102. EMPLOYMENT. a. Upon completion of the flight to the destination, and after the personnel, weapons, and equipment have been unloaded, the air-transportable AAA unit is used in the same manner as the semimobile automatic weapons battalion.

b. It must be remembered that although the mobility has been increased by air travel, it is done at the expense of mobility on the ground. The construction of the weapons restricts towing speeds on the ground to 10 mph on secondary roads. Also the transportation furnished is so limited that recourse must be made to shuttling in order to move fire units.

c. The weapons can be manhandled for short distances in the maneuvering position.

d. For air transport, the battery and fire units are divided into forward and rear echelons. Included in the forward echelon are the personnel and equipment necessary to conduct fire with on-carriage sights. The rear echelon consists of the balance of the equipment and personnel required to conduct fire with off-carriage fire control.

e. The limitations and characteristics of the weapons used in the air-transportable units are discussed in Chapter 3.

103. MOTOR TRANSPORTATION. Air - transportable AAA battalions are equipped with more transportation than airborne AAA battalions, but considerably less than the mobile AAA automatic weapons battalions. During an airborne mission, however, the transportation is extremely limited. The heavier trucks will usually arrive by land or water in the follow-up. The battalion must be trained to handle their own supply and administration with a minimum of transportation, and to maintain their vehicles in such a manner that they will receive the maximum benefit from them.

104. AIR TRANSPORTATION. a. Normally the air-transportable AAA automatic weapons battalion is transported in aircraft.

b. To move an air-transportable AAA automatic weapons battalion, 179 C-47 aircraft are necessary. (This includes 47 aircraft for rear echelon elements).

(1) Headquarters and headquarters detachment require 17 C-47 aircraft for transportation. (This includes 7 aircraft for rear echelon elements).

(2) The medical detachment, less the dental officer, requires 2 C-47 aircraft for transportation. The dental officer usually rides with the rear echelon.

(3) Each automatic weapons battery requires 40 C-47 aircraft. (This includes 10 aircraft for rear echelon elements).

CHAPTER 8

EMPLOYMENT AGAINST GROUND AND NAVAL TARGETS

Section I. GENERAL

105. GENERAL CONSIDERATIONS. As indicated in Chapter 2, AAA automatic weapons may be utilized for the engagement of ground and naval targets. Such employment falls into two general classes:

a. The engagement of ground and naval targets as a secondary mission when employed in a primary AA role. AA automatic weapons, when employed in the AA role, are habitually sited, so as to assist if possible, in the attack of ground and naval targets. In this case, the engagement of ground and naval targets is undertaken *only when such engagement will not interfere with the primary mission or when ground defense of the AAA unit becomes imperative.*

b. The engagement of ground and naval targets when diverted from their primary AA mission and employed to accomplish their secondary mission. *It is not normal, however, for field commanders to divert AAA from its primary AA mission as long as there is a threat of enemy air action.* The appropriate division or higher commander must decide in each case when AAA automatic weapons units will be diverted from their AA role and employed against ground and naval targets. When this is done, automatic weapons units can not be expected to provide adequate protection from air attack.

106. LIMITATIONS OF AAA AUTOMATIC WEAPONS.

a. AAA automatic weapons have certain tactical and technical limitations which must be given due consideration when automatic weapons are to be employed against ground targets.

(1) The different types and varying degrees of mobility of AAA automatic weapons must be taken into account. The mobility of towed weapons is dependent upon and limited by the capabilities of their prime movers. These weapons are considerably heavier than other weapons of equivalent caliber, and generally cannot be manhandled except for short distances. Self-propelled automatic weapons have great mobility.

(2) While most towed automatic weapons can be fired from the wheels, more accurate fire results when the weapons are emplaced.

(3) AAA automatic weapons are high velocity weapons. Their flat trajectory and fire control deny the use of defilade, except hull defilade.

(4) Their high silhouette, lack of protective armor, and general vulnerability dictate their use from dug-in, concealed positions in most cases.

(5) Normal methods of AA technique, fire control, and fire direction can not be used against ground targets in most cases. Present automatic weapons are not equipped with sighting devices appropriate for indirect fire.

b. The above limitations are less important when considering the use of AAA automatic weapons against naval targets.

107. ADVANTAGES. AAA automatic weapons are capable of delivering considerable more fire power in a given time than other weapons of similar calibers. However, these high rates of fire should be sustained for short inter-

vals only to prevent overheating of barrels and waste of ammunition. For this reason only two of the four machine guns on multiple machine gun mounts should be fired simultaneously at ground targets.

Section II. MECHANIZED TARGETS

108. CHARACTERISTICS OF TARGETS. Heavily armored vehicles are not normal targets for automatic weapons. 37 and 40-mm automatic weapons are effective against the more vulnerable parts of medium armored vehicles at ranges up to 600 yards. Unarmored and lightly armored vehicles are suitable targets for all AAA automatic weapons.

a. Vulnerability of tanks. Tanks are most heavily armored on turrets and the front of the vehicle. The most vulnerable points are the vision slits, ports, belly, tracks, and track suspension mechanisms. Flanking fire is preferable to frontal, because most of these vulnerable points are brought under fire. At close range even small-arms fire should be brought to bear on the vulnerable points.

b. Recognition of targets. The personnel of AAA batteries must be trained to distinguish between hostile and friendly armored vehicles. FM 30-40 will serve as a guide for this training. FM 21-7 lists film strips and film slides on recognition of armored vehicles.

109. FIRE CONTROL DOCTRINE. a. Decentralized. Control of fire is decentralized to the fire unit commander.

b. Targets. In general as many targets as possible, within range, will be engaged by the fire unit. The fire of more than one gun on one target will be ordered only when no other suitable target presents itself for the other guns.

c. Tanks abreast gun position. The crews of moving tanks are relatively deaf and blind except in a narrow sector to their front. These handicaps should be exploited by the use of ambush wherever possible. For example, three tanks which appear to be traveling a course that will take them to the flank of a gun position should be permitted to come almost abreast of the position and the *last* tank in column engaged first; then the second in column; and, last, the leading tank. The essential feature of this action is that the tanks are not threatening the fire unit position.

d. Tanks approaching or stopped. On the other hand when tanks are threatening to overrun a gun position, the tank which is most menacing (usually the closest to the gun) should be fired upon until hit; then the next nearest (or most menacing) should be fired upon. A halted tank is capable of more effective fire than a moving tank. Consequently a halted tank that is firing upon the gun position may be more menacing than a closer, moving tank.

e. Accuracy of fire. To stop a tank, it must be hit with a force sufficient to penetrate the armor, demolish a vital part of the mechanism, or incapacitate the crew. It is essential that initial fire be accurate. If opening fire is inaccurate, the tank can seek another avenue of approach or withdraw to a defiladed spot and neutralize the disclosed position. Also when antitank positions are disclosed, they may be attacked by dismounted parties. To obtain greater initial accuracy AAA automatic weapons must withhold fire until mechanized targets are within 600 yards for 37-mm or 40-mm and 400 yards for caliber .50 machine guns.

f. Speed of opening fire. Mechanized attacks may come quickly and with little warning, and must be engaged speedily. In a rapidly shifting situation the fire unit commander will be forced to use his own judgment and

initiative and will have to make the final decision as to the targets to be engaged. Once the target is within the range specified above, every second of delay in opening fire increases the probability of discovery with possible disastrous results to the fire unit.

Section III. GROUND ROLE

110. GENERAL. a. The appropriate division of higher commander must decide in each case when AAA automatic weapons units will be diverted from their AA role and employed in a ground support role. To permit necessary supply and control, units no smaller than a platoon are so employed. Whenever possible automatic weapons battalions should be employed as a unit under the battalion commander.

b. The commander of the unit to which the automatic weapons are attached gives the general missions and designates what units the AAA automatic weapons will support. The exact missions and position areas for the automatic weapons are determined in conference by the supported unit commander and the commander of the AAA unit supporting him. Close and continuous fire support to other ground units requires close liaison, coordination, and communication with commanders of the support units.

c. AAA automatic weapons are primarily weapons for prompt action against moving targets of opportunity. Other targets are stationary enemy weapons, road blocks, pill boxes, fortified buildings, and concentrated groups of enemy personnel.

d. Concealment of positions, surprise, and accuracy of the initial fire are primary considerations. Concealed routes

to positions should be utilized. If possible, the positions should be dug in and occupied under cover of darkness.

e. A ground reconnaissance in conjunction with the commander of the supported unit is the responsibility of the battery and platoon commanders prior to entry into combat. It must be carefully planned, coordinated with the supported unit, and continued with emphasis on—

(1) The selection of initial and alternate positions which will permit the accomplishment of the assigned mission and will take full advantage of cover and concealment.

(2) The selection of routes to the position.

(3) Location of targets or areas in which targets are likely to appear, such as avenues of approach for tanks.

(4) Locations of elements of supported units and of nearby friendly troops and installations.

(5) The location of command posts, communication routes, and initial and subsequent ammunition supply points.

111. SELECTION AND OCCUPATION OF POSITIONS.

a. The locations of AAA automatic weapons units must be coordinated with those of the antitank units and the mission stated with sufficient clarity for AAA commanders to employ their units intelligently. In general, weapons are disposed to cover probable routes of mechanized approach and in such a manner that they are mutually supporting. Not only should the fields of fire of adjacent weapons overlap, but each should be able to assist adjacent positions in the event of a direct attack upon that position. Self-propelled AAA may be placed as far forward as the antitank guns. The less easily maneuvered, towed automatic weapons, whenever possible, should be arranged for a defense in depth.

b. **Selection of position.** (1) In general, good anti-tank positions are found behind and well below the crests

of hills where weapons are concealed from enemy tanks or artillery and can suddenly engage tanks coming over the crest of the hill as well as those which may come around the hill.

(2) In level terrain, guns should be emplaced in depressions in the ground or be dug in to reduce the silhouette of the piece. On such terrain a field of fire several hundred yards greater than the maximum ranges at which fire will be opened is desirable so that targets can be tracked for a few seconds before fire is begun.

(3) Since towed AAA automatic weapons are unable to rapidly occupy successive positions, concealment is of high priority in the selection of positions. Concealed routes to the position materially reduce the chances of enemy observation of the occupation of position. Nearby concealment and cover must be sought for prime movers and other necessary vehicles.

(4) Self-propelled AAA units are able to change position rapidly and even fire on the move. However, due to its high silhouette, the concealment and hull defilade of a self-propelled mount is extremely important.

c. Occupation of position. Positions must be occupied speedily and concealed quickly. To prevent hostile observation, movement into position is made under cover of darkness whenever possible. Prime movers must be returned to nearby concealed positions immediately after towing in the guns.

d. Organization of position. Where natural concealment permits, small parties begin organizing the position prior to the time of occupation so that the position may be field fortified as rapidly as time and materials permit. Concealment is improved by the use of camouflage where necessary. *Fox holes or trenches are constructed for the*

protection of personnel. Disposition of the elements providing local security is made. As time permits, the position is improved by the erection of barriers and emplacements of antitank mines.

e. Local security. Full advantage must be taken of the protection afforded by obstacles, both natural and artificial, and by the location of friendly troops. Local defense of the positions is provided by the caliber .50 machine guns and small arms. It is important that fire units be prepared to defend themselves against attack by small dismounted parties.

f. Position sketch. A rough sketch of the position and the field of fire covering probable avenues of attack is made. Ranges to prominent or critical points are obtained by the most accurate means available and recorded on the sketch. Critical ranges must be memorized by the gun commander and gun pointers.

g. Warning system. In addition to guards for local security of the position, each unit arranges to obtain an early warning of the approach of hostile mechanized vehicles. In a stabilized situation, a tie-in with the general warning system may be sufficient. Under other circumstances, the battery or platoon must post lookouts in commanding positions to observe the probable routes of enemy approach. When desirable the normal AAAIS net can be used as an antitank warning net.

h. Alternate positions. Although it is not normal for AAA automatic weapons (except self-propelled mounts) to move during the actual fire fight, alternate positions must be selected and prepared for movement thereto when the situation demands. When there is reason to believe that the location of a position has been revealed to the enemy, movement to an alternate position must be made.

i. Mobility. (1) The towed automatic weapons possess a limited tactical mobility. The time required to move from traveling to firing position (using on-carriage sights) is from 2 to 3 minutes.

(2) Because of the length of time required to remove the towed automatic weapons, they normally are not used in the first line of the defense, but rather disposed in depth to cover possible break-throughs in the front line. Normally no attempt should be made to move them just prior to or during an engagement.

(3) Self-propelled automatic weapons possess a high tactical mobility. They should be located well forward in the defense, and should take advantage of their ability to accomplish their mission by fire and maneuver.

112. OFFENSIVE COMBAT.

a. Close support of infantry. AAA automatic weapons units assigned the mission of close support of an infantry attack should have missions similar to those of the infantry supporting weapons. Such missions include fires for neutralization or destruction of located and likely locations of enemy automatic weapons, particularly machine guns and strong points of resistance likely to hold up the attacking infantry units. Self-propelled units not only may support the initial attack from prepared positions but with their mobility, can in many cases furnish close and continuous support to the advancing infantry units. Towed units, because of their lack of mobility, are not as capable of furnishing continued close support to the advancing ground elements. However, they may be employed to furnish initial supporting fires for the attack.

b. Tank destroyer role. When used in a tank destroyer role AAA automatic weapons units may assist the supported unit by protecting it against counterattack or by

removing threats against the flanks and rear. Successive positions are occupied as necessary for the accomplishment of the mission by fire and maneuver.

c. Use of automatic weapons as reinforcing regimental antitank weapons. When the infantry regiment moves to attack positions, AAA automatic weapons may be employed to reinforce the antimechanized defense of the leading battalions during the advance to the line of departure and the attack. These weapons, under platoon control, will usually occupy positions in rear of the guns of the regimental antitank company, to reinforce their fires and furnish them mutual support, to limit penetrations made by hostile armored vehicles, to cover approaches on the flanks and rear of attacking battalions, and to maintain continuity of protection of these battalions by timely displacement.

113. DEFENSIVE COMBAT. **a.** In accomplishing the mission of defense in the ground support role, the AAA automatic weapons will normally be employed to establish or thicken the defense in depth. The mobility of the self-propelled units makes them readily available and particularly suited to furnish fire support to counterattacking units.

b. When AAA automatic weapons units are employed in a tank destroyer role in a defensive situation they normally will be employed as towed tank destroyers to deepen and reinforce the organic antitank defense and will be prepared to meet armored attacks threatening the flanks of the unit involved or penetrating its organized positions. At critical times or in areas definitely threatened by tank penetration, self-propelled weapons may be used as self-propelled tank destroyers.

c. Self propelled units are more suitable than towed weapons in retrograde movements. They may be employed to furnish close support to infantry units in a manner similar to the employment of infantry antitank and tank destroyer units.

114. ASSAULT OF FORTIFICATIONS.

a. **Mission.** Due to its flat trajectory and high rate of fire, the 37-mm and 40-mm AAA guns can be effectively employed to assist in neutralizing fortifications. The caliber .50 machine guns of the automatic weapons fire unit can be most effectively employed against enemy forces outside the fortifications.

b. **Tactical employment.** As the situation permits, each automatic fire unit should open and maintain fire on one embrasure. This provides mutual support between fire units. Once the fire of automatic weapons units has been lifted, they must be held in readiness for immediate resumption of fire if needed by the supported units. Weapons will be displaced forward as the situation requires.

115. SUPPLY, MEDICAL SERVICE, AND EVACUATION.

When AAA automatic weapons battalions are assigned a ground support mission, and are employed as a unit, supply, medical service and evacuation will be accomplished in the normal manner as outlined in chapter 10. It should be borne in mind by commanders concerned that, due to the high rate of fire of automatic weapons and the type of targets engaged in this role, ammunition expenditures will be much greater than in the normal AAA role. In instances where AAA battalions are not functioning as units and separate missions assigned to the batteries or

platoons, supply, medical service and evacuation functions will be performed by the unit to which attached, unless otherwise provided.

116. REFERENCES. Portions of the following field manuals are applicable to the employment of AAA automatic weapons units in the ground support role: FM 7-20, 7-35, 7-40, 18-5, 31-30, 44-51, 44-57, 44-59, 44-60, and 100-5.

Section IV. NAVAL TARGETS

117. MISSION. The secondary mission of AAA automatic weapons disposed on or near water areas in which enemy naval units may operate is fire for the destruction of light hostile naval craft, especially motor torpedo boats.

118. TARGETS. Motor torpedo boats attack at high speed in order to achieve surprise, and depend upon their speed and maneuverability for protection.

119. EMPLOYMENT. **a. Selection of position.** AAA automatic weapons employed against motor torpedo boats must be emplaced at as low heights of site as practicable to take full advantage of the flat trajectory. Directors must never be emplaced below the gun and should preferably be emplaced about 1 to 2 feet above the trunnions of the gun.

b. Coordination. AAA automatic weapons used as antimotor torpedo boat guns will usually be located in a harbor defense where seacoast artillery guns are also used for the same mission. Their employment should, therefore, be coordinated under a single commander. (See FM 4-5.)

CHAPTER 9

RECONNAISSANCE, SELECTION, AND OCCUPATION OF ANTI-AIRCRAFT POSITIONS

Section I. GENERAL

120. GENERAL. The principles in this section govern the selection and occupation of any automatic weapons position for AA fire. Factors that influence this selection due to the type of equipment will be discussed in succeeding sections. This chapter does not discuss the selection of positions for ground fire (see ch. 8, FM 7-35, and FM 18-5).

121. RECONNAISSANCE. **a.** The purpose of reconnaissance is to obtain information about the terrain in which the fire units are to operate. A reconnaissance may be either map or ground. *A ground reconnaissance is always made.*

b. If ample time is available, tentative positions are selected by a map reconnaissance followed by an actual ground reconnaissance by the battery commander, and very likely also the battalion commander.

c. If time is extremely limited, the platoon and fire unit commanders must be relied upon for the ground reconnaissance. Action by the battery and battalion commanders is limited to the selection of tentative positions by map reconnaissance. Consequently every member of a fire unit should know what features of terrain constitute a good position, and should be trained in the actual selection of positions.

d. Ground reconnaissance requires intelligence and initiative. The selection must be based on what exists in the area. Every position is a compromise between the terrain features and the requirements of a good position.

122. SELECTION AND OCCUPATION OF FIRING POSITION.

a. Selection of a firing position entails consideration of two conflicting requirements—field of fire and concealment. Field of fire is the governing consideration.

b. A good position should—

(1) Permit a wide sector of fire. All around fire is desirable.

(2) Allow guns to fire down to lowest elevation.

(3) Afford good ground cover.

(4) Afford maximum concealment possible consistent with the AA mission.

(5) Be situated to take advantage of ground protection afforded by other troops.

(6) Be situated so that the equipment can be moved out quickly.

(7) Be mutually supporting with neighboring fire units.

c. The manner in which a position is occupied is the problem of the fire unit commander. If time permits, study the position and determine how it can be occupied with minimum damage to the existing terrain features. Emplacement of weapons is the first consideration. Improvement of positions and camouflage is a continuing process thereafter. In going into position use covered routes. Every scar made on the terrain must be removed by camouflage. Brush out tracks. They will disclose your position. Hide or disperse the vehicles as quickly as possible. Strictly enforce camouflage discipline.

123. FIELD FORTIFICATIONS. a. Field fortifications must be designed for the protection of material and personnel from HE demolition bombs, antipersonnel bombs, strafing attack, and artillery fire.

b. Fortifications may be dug-in, built-up, or a combination of both, but in any case, fortification of the automatic weapons must be up to the gun trunnion height. The decision must be made based on various factors. (See FM 5-15.)

Section II. MOBILE, SEMIMOBILE, AND AIR-TRANSPORTABLE UNITS

124. BATTERY COMMANDER'S RECONNAISSANCE.

a. **Purposes.** The automatic weapons battery contains eight fire units which, in many situations, may be widely separated. It is probable that in most cases the battery commander will be unable to visit all gun positions before their occupation, and will have to rely on his platoon commanders and section chiefs to select them on the ground. The battery commander selects locations for his fire units from a map, or assigns the defense of certain objectives to his platoons, in accordance with the requirements of his mission and orders from higher authority. When the two platoons are within supporting distance of each other, or are both a part of a single defense, the battery commander coordinates the positions of the fire units in the two platoons and the direction of their fields of fire, so that the "dead area" of each fire unit is covered by at least one other fire unit. The battery commander also selects the position for his command post, motor park, maintenance section, and bivouac area.



Figure 19. Do not move into a position by skyline route.



Figure 20. Use a covered route going into position.

b. Procedure. When the battery is marching as a unit, the battery commander, before proceeding on his reconnaissance, informs his executive of the situation and instructs him as to the route of march, and the time and place where further orders will be issued. If the column is to break up before his return, he specifies the break-up point. The battery commander's party normally includes the platoon commanders, communication sergeant, and one or more privates as guides and messengers.

125. PLATOON COMMANDER'S RECONNAISSANCE.

a. Purpose. The platoon commander on his reconnaissance selects—

- (1) Position for each firing unit and its field of fire.
- (2) Routes to positions.
- (3) Location of platoon command post and OP.

b. Unit positions. The platoon commander also determines positions for the following elements of each firing unit, assisted by his fire unit commanders:

- (1) Positions for the gun, director, and power plant.
- (2) Position for the machine guns.
- (3) AA lookouts.
- (4) Truck park and bivouac.
- (5) Ammunition storage.

c. Procedure. When sufficient time is available, the platoon commander accompanies the battery commander on reconnaissance. All positions are visited and fields of fire coordinated. When time is limited, the platoon commanders, accompanied by their fire unit commanders, make the reconnaissance and select and lay out the positions in accordance with the orders received from the battery commander. In extreme cases, the platoon commander may designate the positions and general lay-out for the fire

unit, while the actual selection of positions on the ground is made by the fire unit commanders. Fire unit commanders guide their units into position and supervise the occupation of position.

126. BATTERY COMMAND POST. The battery command post is located at a point which facilitates the establishment of communication with the platoons. If the battery is attached to another unit, its command post is at or near the command post of the unit to which it is attached.

127. PLATOON COMMAND POST. The platoon command post is located at a point which affords observation of the fields of fire of the guns of the platoon; usually about 50 yards from one of the fire units. If the platoon is attached to another unit, its command post is at or near the command post of the unit to which it is attached.

128. CONSIDERATIONS AFFECTING SELECTION OF POSITIONS FOR AUTOMATIC WEAPONS.

a. Field of fire and observation. (1) 40-mm guns are located where they have a clear all around field of fire against both air and ground targets. Where all around visibility to these limits cannot be secured, AA lookouts are placed on the far side of obstructions and communications established.

(2) Each automatic weapons fire unit is given a normal and contingent zone both for surveillance and for fire action, so that, regardless of the direction of approach of enemy airplanes, they can be observed and fired on. All units maintain constant observation over their normal sectors regardless of the sector in which their weapons are engaged.



Figure 21. Do not occupy a firing position on the crest of a hill. Concealment is very difficult and the position is exposed to destruction by tank fire.



Figure 22. Select a level position behind the crest if practicable. Such a position is also good for antitank firing.

(3) The principal function of the multiple machine gun mount in the automatic weapons fire unit is to supplement the fire of the 40-mm gun. It may be employed to defend the dead arc of the 40-mm gun or, as is more usual, it may be employed as a separate unit in the defense.

(4) The director is emplaced 13 to 15 feet from the gun in order to minimize parallax. The director must never be emplaced at a lower level than the gun level and preferably should be emplaced 1 foot, and not more than 2 feet higher than the gun.

(5) The power plant has a connecting cable which permits an offset from the gun of about 225 feet for security.

b. Firm and level ground for emplacing gun and director. The gun and director should be located on ground that permits considerable firing without changing the orientation or level of the gun. Rocky or hilly ground is avoided and firm, level ground chosen. Level ground permits rapid and accurate initial leveling without grading. Firm ground prevents the gun from changing level while firing.

c. Concealment from ground and air observation. Whenever possible, camouflage is installed before the position is worked on or occupied.

d. Protection from artillery fire. Positions in the immediate vicinity of road intersections or other points subject to interdiction and harassing fire by hostile artillery are avoided where possible. When it is suspected that the enemy is aware of the present location, movement to an alternate position is made.

e. Cover. Immediately after a position has been selected steps are taken to provide cover for the protection of personnel and materiel from enemy action. Fox holes or trenches will be dug by all personnel not actually en-

gaged in manning the guns. Gun crews will man their weapons and depend upon the fortification for protection. Fox holes should, however, be dug for the protection of automatic weapons crews, when operating within range of hostile artillery fire.

f. Defense against mechanized attack. Where it can be done without interfering with the performance of the primary mission, guns will be sited so that they can be employed against mechanized attack.

g. Elevated sites. In defending objectives in and about urban centers, it will often be impossible to find positions on the ground which provide the required fields of fire for the guns. In such cases, suitable sites may be found on the tops of buildings of heavy construction. When units are placed on buildings or other structures, shock absorbing platforms for the director must be provided to prevent interference by gun vibrations. In residential districts, towers can be constructed and the equipment placed on the platform by a ramp or crane. When using towers, the multiple machine gun mounts are placed on separate towers. The power plant is concealed on the ground. The bottom of the tower may be closed in to provide clip loading facilities and housing for the troops. The entire structure is then camouflaged to conform to surrounding structures. The tower should be high enough to give the desired field of fire. Disadvantages of weapons located in towers are that they cannot fire on enemy aircraft at minimum altitude, and that they become immobile.

129. OCCUPATION OF POSITION. Occupation of position is directed and supervised by the fire unit commander. The platoon commander issues instructions to each fire unit commander, giving the position for the gun

WRONG



Figure 23. When making short balts near trees, do not balt in the sun.



Figure 24. Halt in the shade and move the gun as shade moves.

and its dead area, time and rate of march, and other instructions necessary to insure timely arrival and employment of the fire unit.

Section III. SELF-PROPELLED UNITS

130. BATTERY COMMANDER'S RECONNAISSANCE.

Self-propelled batteries in practically all situations will be widely scattered. The battery commander is not able to make the desired personal reconnaissance of all gun positions. He must rely on his platoon commanders and section leaders to select the positions on the ground. The battery commander selects objectives from a map and assigns them to the platoons. He coordinates the operations of the units to protect the assigned objectives by map study of routes and areas. Future objectives are obtained from the force commander and assigned to the platoons as a result of map reconnaissance.

131. PLATOON COMMANDER'S RECONNAISSANCE.

The platoon commander on his reconnaissance selects—

- a. Position for each fire unit.
- b. Routes to positions.
- c. Location of security outposts.
- d. Location of platoon CP.
- e. Location of platoon ammunition supply point.

132. SECTION LEADER'S RECONNAISSANCE. The section leader, whenever possible, reconnoiters his positions before moving in the vehicles. He determines—

- a. Exact location of each position.
- b. Route to the position.

- c. Routes away from the position.
- d. Location of antitank position.
- e. Concealment for ammunition trailers.
- f. Means of camouflage.

Section IV. AIRBORNE UNITS

133. RECONNAISSANCE. Reconnaissance for airborne units is accomplished by detailed study of all available material on the terrain in which the unit will operate. This includes a study of maps, air photographs, and table reproductions of the area, and all available intelligence. Each squad is given detailed instructions regarding the position it will occupy on arrival. This requires that the plan be very detailed and complete in every phase.

134. OCCUPATION OF POSITIONS. Upon arrival at the objective, speed is the primary requisite. The carriers must be unloaded quickly. The squads determine their positions and move into them as rapidly as possible. The weapons are emplaced first. As time permits, the positions are improved for protection and camouflaged.

135. ANTIMECHANIZED POSITIONS. Airborne weapons include 37-mm antitank and caliber .50 machine guns. Whether antimechanized or AA defense, or both, are being provided, all fire unit positions must be coordinated. An antimechanized defense must be organized in depth along the flanks. Concealment, so as to provide surprise, is of primary importance in antitank defense.

136. ALTERNATE POSITIONS. Airborne units must have alternate positions. They must always be prepared to move to an alternate position which will permit antiaircraft and ground fire.

CHAPTER 10

SUPPLY AND EVACUATION

Section I. SUPPLY

137. GENERAL. This section covers the supply of all automatic weapons units. Basic supply procedures and definitions are contained in FM 100-10 and 101-10.

138. SUPPLY AGENCIES. a. Mobile, semimobile, self-propelled, and air-transportable battalions have the personnel and transportation required to draw and deliver all classes of supply. AAA groups do not carry supplies for the battalions, but do coordinate the supply activities of subordinate units. The supply section of an AAA group headquarters battery draws and delivers supplies for the group headquarters battery only.

b. All supplies which are procured by requisition are first requisitioned by the batteries. The battalion supply officer consolidates these requisitions and forwards them through appropriate supply channels. When the battalion is under an AAA group, a copy is sent to the group headquarters for follow up and information.

c. When requisitioned supplies become available, each supply unit is notified in turn down to the battalions. The drawing of and distribution of the supplies are covered by the supply plan of the higher echelon. The battalion supply sections distribute supplies to subordinate units.

139. CLASS I SUPPLIES (RATIONS). The forward flow of rations normally is automatic, based on daily battalion (or group) consolidated reports of actual strength. A daily train carrying the needed supplies from depots in the communications zone is sent forward for each division and for corps and army troops. Upon arrival at the railhead, the rations are picked up by the battalion supply sections.

140. CLASS II SUPPLIES (SUPPLIES AND EQUIPMENT PRESCRIBED BY T/E). These supplies are requisitioned, drawn, and distributed as described in paragraph 138.

141. CLASS III SUPPLIES (GASOLINE AND OIL). The army quartermaster establishes gasoline and oil supply points at all railheads and depots or at convenient locations, such as civilian gasoline filling stations on the main supply routes. Each vehicle sent to an army supply point replenishes its supply at a convenient gasoline supply point at or en route to the army supply point. Vehicles remaining in the forward areas are resupplied by exchanging empty containers for full ones brought forward from gasoline and oil supply points by unit transportation.

142. CLASS IV SUPPLIES (ARTICLES OF MISCELLANEOUS NATURE). Supplies such as construction material normally are requested through special requisitions. The receipt and delivery of such supplies are the same as for class II supplies.

143. CLASS V SUPPLIES (AMMUNITION). a. For replenishment of ammunition, battery commanders submit periodic expenditure reports to the battalion munitions

officer. A consolidated report is transmitted to the group or other higher echelon munitions officer who forwards it to the proper requisitioning or procuring authority. The unit reports are made by telephone, if possible, and later confirmed by written reports. Extra ammunition normally is ordered forward by higher authority whenever an increased supply appears necessary.

b. The battalion ammunition section is employed to draw and distribute ammunition from the supply point to battery positions. However, when ammunition expenditure is rapid or the distance to the supply point great, the battalion ammunition section vehicles may be used to bring ammunitions to an intermediate supply point from which the battery vehicles supply the batteries.

144. VARIATIONS IN SUPPLY CAUSED BY TACTICAL EMPLOYMENT. When automatic weapons batteries and platoons are given separate missions and attached to other units, supply functions are performed by the unit to which attached unless otherwise provided (par. 115 and FM 44-1 (when published)).

145. SUPPLY FOR AIRBORNE AAA UNITS.

a. **General.** (1) The supply of airborne units follows normal procedure in that higher headquarters is responsible for the delivery of supplies to troops who have been landed by air. Until ground troops have effected a junction with airborne troops, supplies for airborne troops must be transported by air. See FM 31-40 for detailed information.

(2) The supply plan for an airborne operation includes the determination of a stockage level of all classes of supplies to be concentrated on rear airdromes. A balanced

portion of all classes of this stockage is packed for parachute delivery to be available upon call for supply by parachute to any unit for which no other method of supply exists.

(3) A quartermaster depot supply company, trained in aerial supply, prepares these supplies for movement by transport plane or for delivery by dropping. This unit handles all classes of supply.

(4) Additional labor and transportation for the assembly of supplies at the departure airdromes and their preparation for delivery by air are made available from quartermaster service battalions and quartermaster truck regiments.

b. Supply within airborne division. Upon the arrival of supplies at the destination landing area, the division supply services assume control, and the distribution of supplies within the airborne division follows normal procedure. The limited transportation which can be effected by air demands the use of all tactical transportation within the division, and all captured enemy vehicles, to effect prompt distribution of supplies. Units within the division normally dispatch transportation back to the division supply points near the destination area for all classes of supplies.

c. Antiaircraft battalion supply. (1) Airborne AAA units carry in their organic tactical loads an initial supply of ammunition for every weapon to be used. This initial supply is computed in units of fire. It is determined by the task force or theater commander, and depends upon the mission of the unit and the number of aircraft allotted for the mission. Supplies carried by the airborne AAA units are limited, and can be expected to suffice for a short time only. Personnel must be trained to use all

supplies sparingly, especially in the preliminary stages of an airborne mission when resupply is normally extremely difficult.

(2) An initial supply of rations, water, and gasoline is also included in the tactical loads of the units. Rations are carried by the individuals. Water is carried by the individual and supplemented by the supply carried in unit loads. Gasoline is carried in the unit loads.

146. ADMINISTRATION AND SUPPLY FOR SEPARATE AIRBORNE AAA BATTERIES.

Separate airborne AAA batteries are attached to larger units for administration and supply during operations. This insures the necessary flow of supplies and ammunition. During training and preparation for combat, separate airborne AAA batteries may be attached to larger units for this purpose, or several batteries may be formed into a provisional battalion. In the latter case, a provisional headquarters and headquarters battery must be organized. At advanced airfields, supplies are obtained through the air units located at the defended airfield.

147. SUPPLY FOR AIR-TRANSPORTABLE AAA UNITS.

a. General.

(1) The supply of air-transportable units follows normal procedure in that the higher headquarters is responsible for the delivery of supplies to troops who have been air transported. Until the units can be supplied by ground means, supplies for the air-transportable AAA units must be transported by air. See FM 31-40 for detailed information.

(2) The supply plan in general will follow that outlined in paragraph 145a.

b. Supply within the air-transportable AAA automatic weapons battalion. Upon arrival of the supplies at the destination, the airdrome (or other unit) supply service assumes control and distribution thereafter follows normal practice. AAA units normally dispatch transportation back to the supply point set up for the area to pick all classes of supplies.

Section II. EVACUATION

148. GENERAL. For more complete information see FM 100-10, FM 8-5, and FM 8-10; also FM 44-1 (when published).

149. MEDICAL PERSONNEL ATTACHED TO AAA UNITS. There is no medical detachment with the headquarters and headquarters battery of the AAA brigade or group, but each battalion has attached medical personnel. For command purposes, and for administration and supply, the battalion medical detachment is an integral part of the battalion.

150. ORGANIZATION DURING COMBAT. **a.** The battalion aid station detail supervises the medical service of the battalion. It is organized to provide an administrative, supply, and evacuation service for the battery aid details; for establishment and maintenance of battalion aid stations and dispensaries; for care and treatment of troops located in the vicinity of battalion headquarters; and for direction and supervision of the dental service of the battalion.

b. A battery aid man is attached to each battery to provide dressings and first aid.

151. FUNCTIONING DURING COMBAT. **a.** In general, the tactics employed by combat units determine the medical service plans to be employed by attached medical units.

b. In the field, the battalion aid station is established at or near the AAA battalion headquarters. From this position, the surgeon maintains contact with battalion headquarters and with each battery aid detail, supervising, reinforcing and, to a limited degree, supplying these latter units with medical supplies and materials.

c. Aid stations must not be established near ammunition supply points nor in proximity to the designated parking places for artillery vehicles. They may be established near roadways, but never at important points such as road intersections and crossroads. A road in the immediate vicinity of an aid station facilitates evacuation by ambulance.

d. During periods of activity the battery aid men live with the batteries to which attached, and return to their sections only at such times as the battalion is brought together for rest or training. When a battery remains in one position for a considerable period of time, battery aid men obtain a small surplus of medical supplies with which to establish local aid posts near the battery positions. Battery aid men care for the casualties occurring in the battery and take post in the vicinity of the guns when the battery is firing or receiving hostile fire. Casualties are promptly removed to a place of safety, given medical aid, and carried or directed to an aid station. Evacuation from the battalion is as directed by higher headquarters. In stabilized or partially stabilized situations, the battery aid men are required to report at least once daily to the battalion aid station for the purpose of giving information and receiving instructions.

152. AIRBORNE AND AIR-TRANSPORTABLE AAA UNITS.

a. A major portion of the minor casualties and ailments are handled by the aid men of the individual batteries. It is their duty to tour the gun positions and render the needed medical aid. The aid men are usually placed with the platoon command posts in order to treat emergency cases. If the aid men are not quartered at the platoons, they should be located at battery headquarters, and be available for call at a moment's notice. When individuals require the attention of a medical officer, if practical, one of the aid men accompanies the individual to the battalion aid station, or the nearest treatment station. Separate airborne machine gun batteries have no medical officers, and must make arrangements with higher headquarters or adjacent units for the required medical attention. After the casualties have been removed to the treatment station, normal procedure of evacuation follows.

b. Walking casualties are placed aboard any returning aircraft for evacuation to the rear.

c. Litter casualties are periodically evacuated by aircraft equipped with litter installations, and are taken over by air evacuation units of the troop carrier command. (For further information on evacuation by air see FM 31-40.)

APPENDIX

ESTIMATES, PLANS, AND FIELD ORDERS

Section I. ESTIMATES AND PLANS

1. FORM. For a form for an AAA commander's estimate of the situation and plan see appendix I, FM 44-1 when published.

Section II. FIELD ORDERS

2. GENERAL. For general information on orders and annexes, as well as for the technique of preparation of a field order, see FM 101-5. Ordinarily AAA commanders issue either oral or dictated orders which may later be confirmed by written orders. In the paragraphs below are given check lists which may be used as reminders in the preparation of AAA field orders, for units assigned or attached to the field forces. It is not to be inferred that all items listed must be included nor that other items are unnecessary. However, those items which are included should be expressed in the proper sequence. A trained commander or staff officer prepares an order to fit the situation, not a form.

3. STANDING OPERATING PROCEDURE. In every unit standing operating procedure is prescribed by the commander whenever possible. This procedure covers those

features of operations which lend themselves to a definite or standardized procedure without loss of effectiveness. The adoption of such procedures saves time in the preparation and issuance of orders, minimizes the chances of confusion and errors when under the stress of combat, and greatly simplifies and expedites the execution of operations in the field. (See FM 44-1 when published.)

4. INSTRUCTIONS FOR AAA IN A FIELD ORDER. Instructions of AAA in a field order normally are given in paragraph 3, under the heading "Antiaircraft Artillery Units". These instructions include the missions of the AAA, directing particular attention, if necessary, to those bodies of troops, installations, or critical points considered of vital importance. Instructions are also included governing all attachments of AAA to subordinate echelons, directing the protection of such troops or installations of the higher headquarters located in subordinate echelon areas; and insuring coordination between AAA of the higher and subordinate echelons, among the AAA of subordinate echelons, and with AAA of adjacent forces.

5. BRIGADE CHECK LIST. See FM 44-1 (when published).

6. GROUP CHECK LIST. See FM 44-1 (when published).

7. AUTOMATIC WEAPONS BATTALION CHECK LIST.

"1. a. Enemy situation. Information of hostile air activity to include types of aircraft, character and method of attack, locations of airdromes, landing fields, and probably routes of approach.

b. Plan of action of supported unit, including zones of action, sectors, or bivouac areas, and missions of subordinate units; locations of troops and establishments requiring protection; plans of friendly aviation as they affect the employment of the organic fire units; location of adjacent AAA, balloon barrages and aviation units, if known; group plan of action and mission of adjacent AAA battalions.

"2. Decision of the battalion commander—to provide protection for certain units, areas, or establishments.

"3. Position, route, mission, normal and contingent sectors, detachment of units or reversion to battalion control of detached units.

x. Instructions applicable to more than one battery—time when ready to go into action; restrictions of fire, to include protection to friendly ground troops and aircraft; withholding action; instructions as to control; camouflage, instructions to accomplish coordination with aviation, with balloon barrages and with adjacent AAA units; secrecy; restriction of movement; priority of targets, priority on roads.

"4. Location of service elements if it can be prescribed at the time and instructions relative to rations; location of and instructions for ammunition train when applicable; location of aid station, or instructions covering evacuation.

"5. Plan of signal communication.

Special instructions relating to the AAAIS.

Axes of signal communication for the battalion, when applicable.

Command posts of the battalion and each battery, when applicable."

8. BATTERY CHECK LIST.

"1. Enemy situation—special information regarding

enemy air tactics. Battalion commander's plan, plan of action of supported unit, including zones of actions, sectors, or bivouac areas, and missions of supported units; location of troops and establishments requiring protection; plans of friendly aviation as they affect employment of the battery; location of balloon barrages; location of adjacent and/or other AAA units.

"2. Decision of the battery commander based on his mission.

"3. Position for the battery, and instructions for its internal protection.

Instructions on special employment of particular matériel.

Routes to positions.

x. Special instructions as to fire control—sectors of fire; method of occupying position; secrecy; camouflage; cover; restriction of movement; local defense; when to be ready to go into action; priority of targets; restrictions on fire, to include protection to friendly troops and aircraft; withholding action; priority on roads; alternate position.

"4. Ammunition and other supplies; aid station, or instructions covering evacuation.

Location of trucks not required at positions.

Location of maintenance section.

"5. Plan of signal communication, including at least one alternate.

Location of spotting stations.

Special instructions relating to the AAAS.

Command post or posts (platoon)."

9. MARCH ORDERS. All march orders should follow the prescribed form of the five-paragraph field order. If the convoy is large or if the march is to require several days, the march order may be accompanied by a march table. (See FM 101-5.) In a small unit such as a

battalion, especially when part of a larger command, the battalion commander's order may be quite brief and may be issued orally. Check list for march orders, follows:

"1. Enemy and own situation.

"2. Order of march.

Time of departure.

Initial point.

Exact route to be followed (use map or overlays).

Statement as to maximum allowable speed.

Destination of unit or daily run.

"3. Instructions for various organizations of the convoy.

Instructions applicable to all organizations are included in the last subparagraph lettered "x".

"4. Administrative details, such as supply and messing.

"5. Information and instructions as to means and maintenance of communication between units of the convoy.

Time of closing old command post and of opening the new one, and positions enroute."

10. WARNING ORDERS. A warning order should precede the march order. It should be issued as soon as information of a move is received. The proper use of warning orders will allow subordinates time to prepare for a contemplated move and will avoid keeping them alerted over an extended period.

INDEX

	<i>Paragraph</i>	<i>Page</i>
AAAIS	5	6
AAOR	5	6
Airborne:		
AAA units, employment	65-99	72
AAA units, organization of	4	5
Airdrome defense	52, 99	51, 88
Air-transportable:		
AAA units, employment of	100-104	90
AAA units, organization of	4	5
Amphibious operation	64	69
Antitank mission	105	93
Area defense	43	41
Armored units, employment with	56	54
Automatic weapons, range limits	12	14
Barrage Fire	24-27	25
Barrage Point, selection of	27	26
Barrage:		
Sun	25	25
Unseen	26	26
Battalion:		
Commander	5	6
Organization	4	5
Staff	6	7

	<i>Paragraph</i>	<i>Page</i>
Battery:		
Commander	3	3
Organization	1	1
Bivouac, defense of	58	58
Changing targets	21	24
Characteristics of—		
Air-transportable weapons	14	17
Automatic weapons	11-16	12
Fire Control systems	16	19
Land targets	110	97
Machine gun	13	16
Self-propelled carriages	15	19
40-mm gun	13	16
37-mm gun	13	16
Towed mounts and carriages	14	17
Check list, battalion and battery	App. 129,	130
Classes of fire	23	25
Command Posts	126, 127	111
Communications, general	28-31	28
Radio	32-36	29
Wire	37-38	36
Concentrations, defense of	58	58
Conduct of fire	17	22
Control	22, 55, 81, 110	24, 53, 81, 97
Coordination of dead areas	47	47
Cover	128	111
Dead areas, coordination of	47	47

	<i>Paragraph</i>	<i>Page</i>
Defense of—		
Airdromes	52, 99	51, 88
Amphibious operations	64	69
Armored units	56	54
Bivouacs, concentrations	58	58
Field artillery	57	56
Retrograde movements	63	67
Troop movements	59	59
Defensive operations	62, 113	65, 102
Definitions of terms	17	22
Duties of:		
Battalion commander	5, 79	6, 79
Battalion staff	6	7
Battery commander	3	3
Employment:		
Against ground and naval targets	105-119	93
Amphibious operations	64	69
Basis for	45, 55	44, 53
Concentrations and bivouacs	58	58
Defensive	62	65
During smoke screen operations	49	48
Elements effecting	44	42
Forward airdrome defense	52, 99	51, 88
Limitation of, in ground support role.....	106	94
Mobile	54-64	52
Nature of	40	39
Of airborne AAA battalion	77-84	78
Of airborne automatic weapons battery.....	88-92	84
Of airborne machine gun battery	85-87	82
Of air-transportable AAA automatic weapons battalion	100-104	90

	<i>Paragraph</i>	<i>Page</i>
Of separate airborne AAA machine gun battery	93-99	87
Pursuit	61	65
Retrograde movements	63	67
Static	50-53	49
Tactical	39-49	38
The offensive	60	63
Troop movements	59	59
With airborne forces	65-76	72
With armored units	56	54
With field artillery	57	56
With searchlights	48	48
Enemy tactics	42	40
Evacuation	115, 148-152	103, 125
Field:		
Fortifications	123	107
Orders	App.	128
Fire:		
Barrage	24-27	25
Classes of	23	25
Control	17, 109	22, 95
Direction	18	22
Fire unit, automatic weapons	1	1
Ground support role	110-116	97
Group organization	7	8
Land targets	105	93
Limits, range of automatic weapons	12	14
March orders	App.	131

	<i>Paragraph</i>	<i>Page</i>
Medical detachment	148-152	125
Medical service	115, 148-152	103, 125
Mission:		
Primary	8	9
Primary vs. secondary	10	9
Secondary	9	9
Mobile employment	54	52
Naval targets	118	104
Objective, type of	43	41
Occupation of position	129	115
Offensive operations	59, 112	59, 101
Opening fire	20	24
Organization:		
Battalion	4	5
Battery	2	3
Group	7	8
Priorities	19	23
With armored units	56	54
Pursuit	61	65
Radio communications	32-36	29
Range limits of automatic weapons	12	14
Rates of fire:		
Air	13	16
Ground	107	94

	<i>Paragraph</i>	<i>Page</i>
Reconnaissance	120-136	105
Battery commander	124, 130	107, 118
Platoon commander	125, 131	110, 118
Section leader	132	118
Searchlights, employment with	48	48
Selection of:		
Barrage point	27	26
Targets	19	23
Selection of and occupation of firing positions	111, 120-136	98, 105
Siting of weapons	46	46
Smoke screen operations	49	48
Static employment	50	49
Supply	137-147	120
Tables of organizations	2, 4, 7	3, 5, 8
Tactical employment	39	38
Tactics of enemy	42	40
Targets:		
Changing	21	24
Selection of	19	23
Tank destroyer role	112	101
Terrain	44	42
Transportation, air	74, 84, 97, 104	78, 81, 88, 92
Types of objective	43	41
Warning orders	App.	132
Wire communications	37-38	36