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FM 4-103

WAR DEPARTMENT

ANTIAIRCRAFT ARTILLERY FIELD MANUAL

EMPLOYMENT OF ANTIAIRCRAFT ARTILLERY WITH AIRBORNE FORCES

30 September 1943

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

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FM 4–103, Antiaircraft Artillery Field Manual, Employment of Antiaircraft Artillery with Airborne Forces, is published for the information and guidance of all concerned.
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ANTIAIRCRAFT ARTILLERY FIELD MANUAL

EMPLOYMENT OF ANTIAIRCRAFT ARTILLERY WITH AIRBORNE FORCES

CHAPTER 1

AIRBORNE OPERATIONS

	Paragraphs
SECTION I. General	1–9
II. Organization of airborne AAA units	10–11

SECTION I

GENERAL

■ 1. GENERAL.—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 powered 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 air landing troops does not differ from those of similar units transported by any other method, except for lack of organic transportation and difficulty of supply. Air-landed troops normally encounter defensive action upon landing and this manual deals with such opposed landings. (See FM 100–5 and FM 31–30.)

■ 2. PLANNING.—*a.* It is necessary to plan air transport operations in great detail and with thoroughness if confusion, delay, and even disorganization are to be avoided.

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.

■ 3. LIAISON.—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.

■ 4. SECRECY.—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 airplanes 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.

■ 5. AIR SUPERIORITY.—Air superiority is essential for a successful aerial troop movement.

■ 6. LANDING.—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.

■ 7. EQUIPMENT AND WEAPONS.—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 6 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.

■ 8. MOBILITY.—The mobility of airborne troops after landing is limited to that of foot troops with a few light vehicles. Airborne troops make every effort upon landing to gain greater mobility by the capture of enemy transportation. The capture of such transportation cannot be depended on and all plans must be based on the organic transportation.

■ 9. 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

ORGANIZATION OF AIRBORNE AAA UNITS

■ 10. AIRBORNE AA BATTALION (T/O 4–275).—The airborne AA battalion consists of a battalion headquarters, a headquarters detachment, three automatic weapons batteries, three machine-gun batteries, and a medical detachment.

a. Battalion headquarters and headquarters detachment (T/O 4–276).—(1) The battalion headquarters is composed of the battalion commander and his staff.

(2) The headquarters detachment consists of a headquarters section and a maintenance section.

b. AA automatic weapons battery (T/O 4–277).—Each AA automatic weapons battery in the battalion is composed of a battery headquarters and two automatic weapons platoons. The platoon consists of a platoon headquarters and two automatic weapons sections. The section consists of a section headquarters and two gun squads. The guns furnished may be either the 37-mm antitank gun or the 40-mm AA gun on an airborne mount.

c. AA machine-gun battery (T/O 4–278).—Each airborne AA machine-gun battery in the battalion is composed of a battery headquarters and three caliber .50 machine-gun platoons. The machine-gun platoon consists of a platoon headquarters and four gun squads.

■ 11. SEPARATE AIRBORNE AA MACHINE-GUN BATTERY.—*a.* The separate airborne machine-gun battery (T/O 44–217) consists of a battery headquarters, including assigned medical personnel, and three caliber .50 machine-gun platoons.

b. The machine-gun platoon consists of four machine-gun squads.

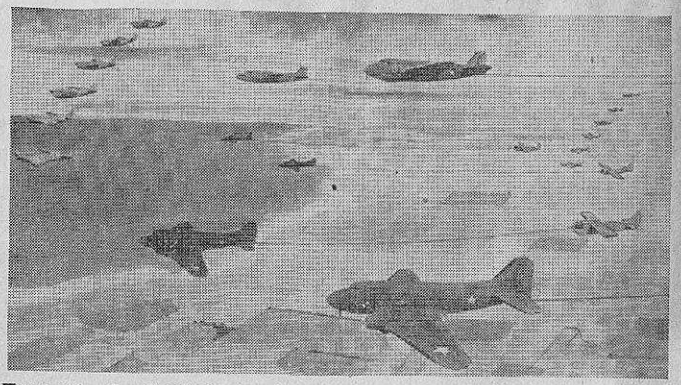
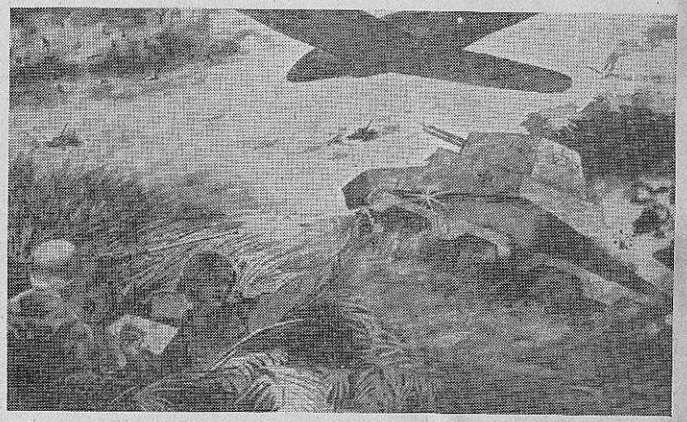


FIGURE 1.—In flight, protection of air-landing troops is provided by combat aviation.



It is important to remember that there is no front in airborne operations and that the AAA may be used against aerial and mechanized targets and against ground troops.

FIGURE 2.—Local security is established in each position.

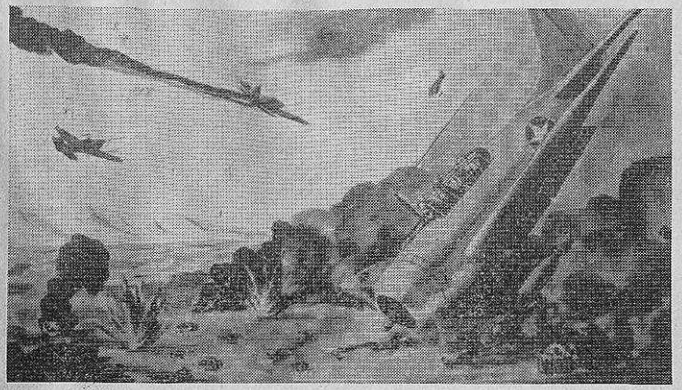


FIGURE 3.—Prior to arrival of airborne troops, the enemy's positions are subjected to heavy aerial bombardment.

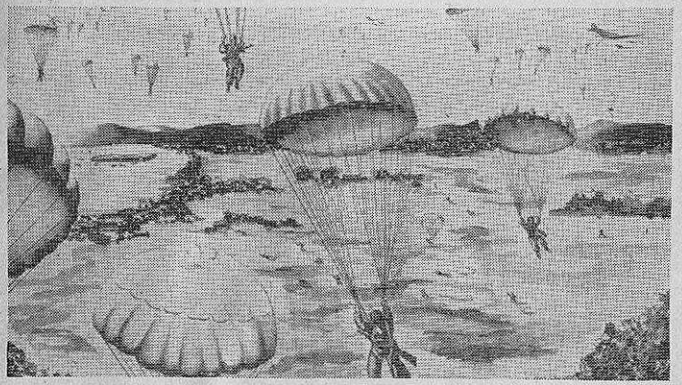


FIGURE 4.—Normally, parachute troops land and take possession of the enemy airfield prior to arrival of air-landing troops..

CHAPTER 2

EMPLOYMENT OF AIRBORNE ANTIAIRCRAFT ARTILLERY

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SECTION I

AIRBORNE ANTIAIRCRAFT BATTALION

■ 12. MISSION.—Airborne AA 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 FM 4–100 and 4–102 are applicable.

■ 13. DISTINCTIVE CHARACTERISTICS OF AIRBORNE ANTIAIRCRAFT 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.

■ 14. ANTIAIRCRAFT COMMANDER.—The antiaircraft 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.

■ 15. PLANNING.—*a.* Detailed plans are made prior to an operation. These plans must be flexible to meet any unforeseen contingency that may arise. Air photos 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 battery commander rides with the leading glider or airplane of his battery, so that he can maintain control and organize his defenses upon landing.

■ 16. CONTROL.—The nature of AA 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

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units under the AA battalion commander's control, is a command decision which must be based on the situation. *Retain batteries under the AA 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 AA and antitank defense.

No protection of any value can be given at single weapons.

■ 17. LOCAL SECURITY.—Local security is established in each position. It is important to remember that there is no "*front*" in airborne operations. 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. Close contact and coordination with adjacent units is necessary for the security of positions.

■ 18. MOTOR TRANSPORTATION.—Motor transportation is limited and careful supervision must be maintained in order to obtain maximum benefit of its use.

■ 19. AIR TRANSPORTATION.—*a.* Normally the airborne AA battalion is transported in gliders.

b. To move an airborne AA battalion, 73 C–47 airplanes or 117 CG–4A gliders are necessary.

(1) Headquarters and headquarters detachment require two C–47 airplanes or five CG–4A gliders for transportation. Personnel must be so divided among the different airplanes or gliders that all the key personnel in headquarters are not lost in case an airplane or glider is lost.

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

(3) Each machine-gun battery requires 18 CG–4A gliders or 12 C–47 airplanes.

(4) Each automatic weapons battery requires 18 CG–4A gliders or 11 C–47 airplanes.

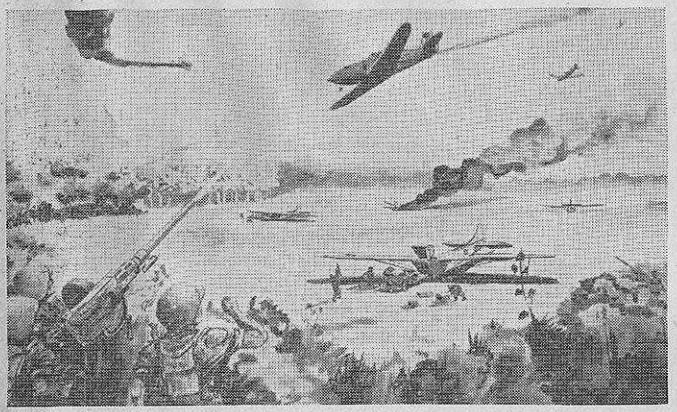


FIGURE 5.—The primary mission of the AA machine-gun battery is to attack all enemy aircraft within range.

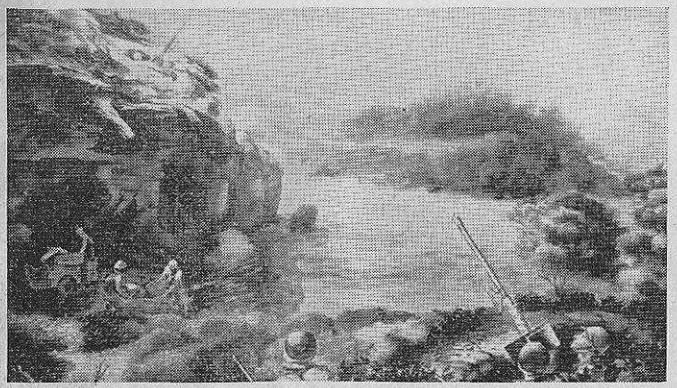


FIGURE 6.—The machine-gun battery may be called upon to provide protection for important supply dumps.

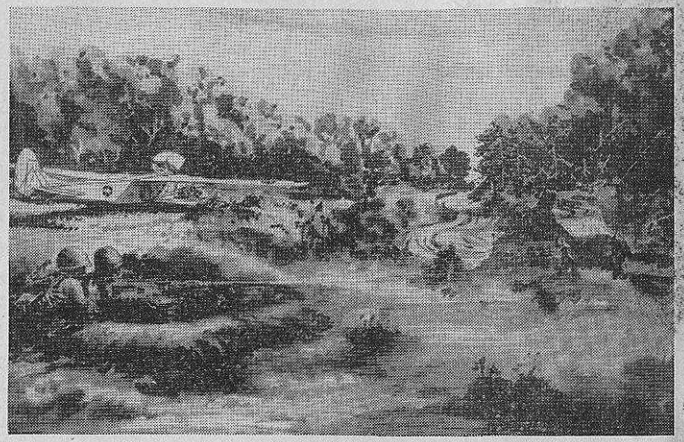


FIGURE 7.—The machine-gun battery may be required to fire upon light armored vehicles.

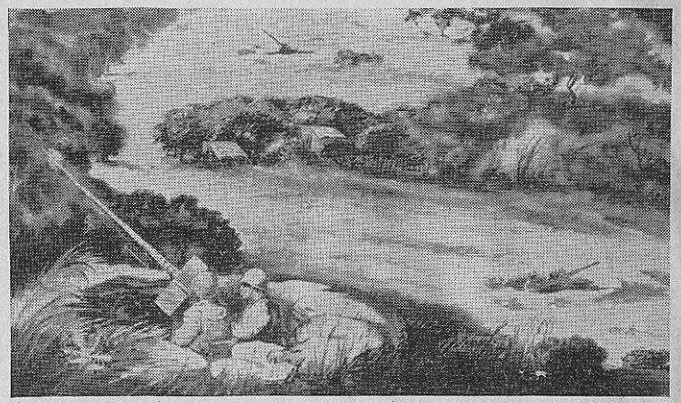


FIGURE 8.—The machine-gun battery may be required to furnish protection of command posts.

SECTION II

AIRBORNE MACHINE-GUN BATTERY

■ 20. MISSION.—*a.* The mission of the airborne machine-gun battery is to attack all enemy aircraft within range, particularly low-flying airplanes, to destroy them, to cause them to abandon their mission, or to decrease the efficiency of their operations.

b. Special tasks assigned to AAA 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.

■ 21. LOADING AND LANDING.—*a. Loading.*—In loading the gliders or airplanes, weapons are transported with the crews that serve them. In addition, the glider or airplane 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 airplane does not seriously hamper the operation. Each glider or airplane must be loaded to full capacity. Ammunition is always added to make up capacity loads.

b. Landing.—In an airborne operation, AA batteries are usually one of the first elements landed at an advanced airfield. Immediately before and during the landing, aerial bombardment of the defender's position is essential in order to neutralize enemy antiaircraft fire and afford protection for the landing. Units of the infantry and artillery are dropped by parachute or flown in by glider to mop up enemy resistance around the landing area. AAA units are flown in as soon as possible by glider or airplane to set up AAA protection for the rest of the division.

c. Coordination between the air force and the AAA is required. Fire must be withheld when it endangers friendly transport airplanes and gliders.

■ 22. DEFENSE OF ADVANCED LANDING AREA.—*a.* The planning of the defense of a landing strip in a forward area necessitates a detailed study of aerial 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.*

b. The average airfield has runways from 3,000 to 7,000 feet in length. Guns must be emplaced in such a way that no hostile aircraft can approach the field, or an airplane on the ground, without coming under the fire of one or more guns before he reaches his objective.

c. Machine guns ordinarily are emplaced not over 500 yards apart and on the outside of the field. Terrain conditions dictate to some extent the distance from the runways that guns may be sited.

d. Advantage is taken of high ground.

e. Guns are concentrated around installations and dispersal areas.

■ 23. EMPLOYMENT.—*a.* Upon landing, the situation may require immediate AA 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 gun 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*

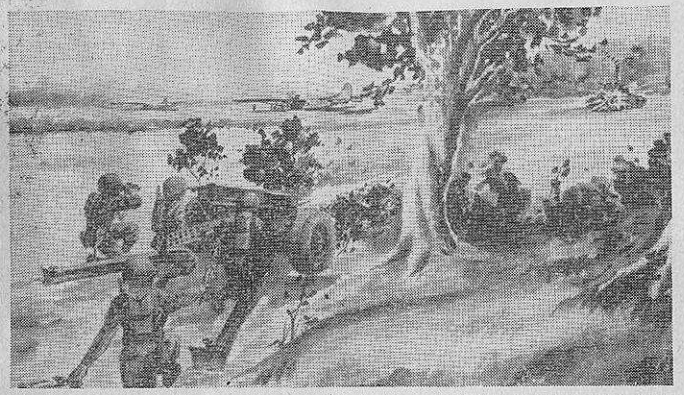


FIGURE 9.—The automatic weapons battery must provide protection against light tanks. Fire must be held until the enemy is within 400 yards range.

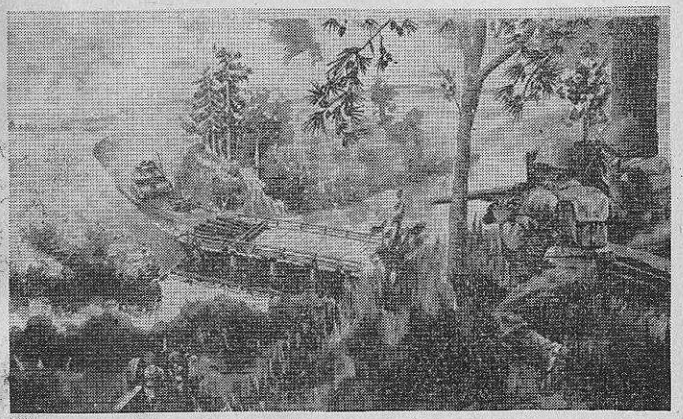


FIGURE 10.—The automatic weapons battery may be required to protect road blocks.

leapfrog the forward guns. The ¼-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 AA protection for the infantry, and to secure the protection afforded by the infantry elements.

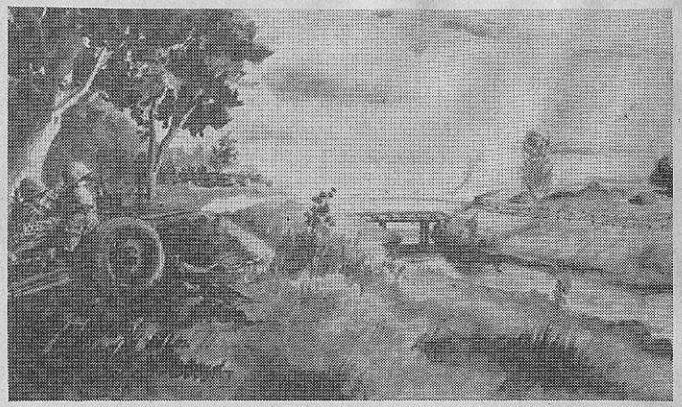


FIGURE 11.—The automatic weapons battery may be assigned the destruction of concrete pill boxes.

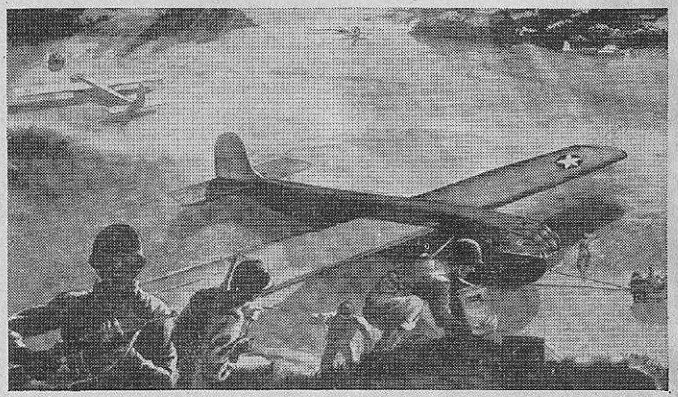


FIGURE 12.—Immediately after landing and unloading, each chief of section moves his glider off the landing area.

SECTION III

AIRBORNE AUTOMATIC WEAPONS BATTERY

■ 24. MISSION.—*a.* The mission of the automatic weapons battery when equipped with the 37-mm antitank gun 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.

■ 25. LOADING AND LANDING.—*a. Loading.*—Each glider or airplane 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 at an advanced airfield.

■ 26. 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 airplane.

(2) Couples the 37-mm antitank gun to the ¼-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 aerial photos before leaving the departure area. This position should

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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 predesignated 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 defiladed 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.

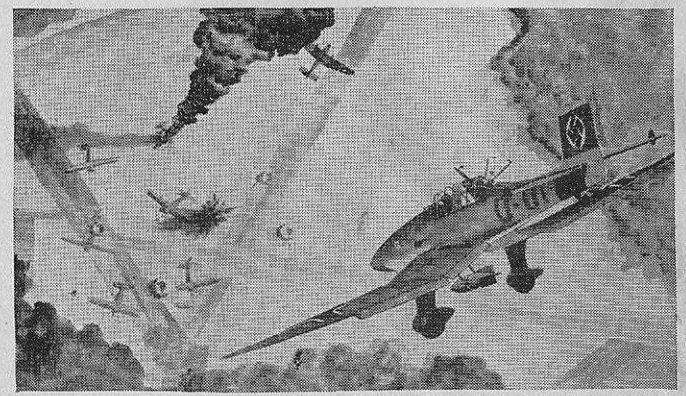


FIGURE 13.—If transport planes are massed on the landing field, they may be subjected to punishing bombardment.

■ 27. SECURITY OF POSITION.—Local security is established in each position. The ¼-ton trucks are used to establish outposts and patrols so as to give warning of an impending attack. Interference by infiltration of hostile light armored elements is especially to be expected.

■ 28. FORWARD DISPLACEMENT.—The division commander decides whether the automatic weapons batteries are to be

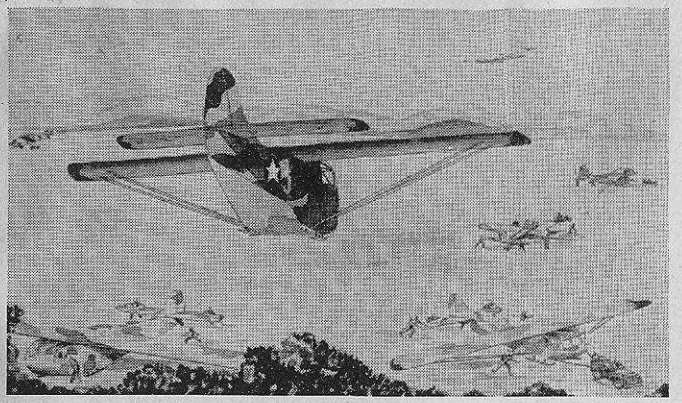


FIGURE 14.—Keep planes and gliders dispersed on the field.

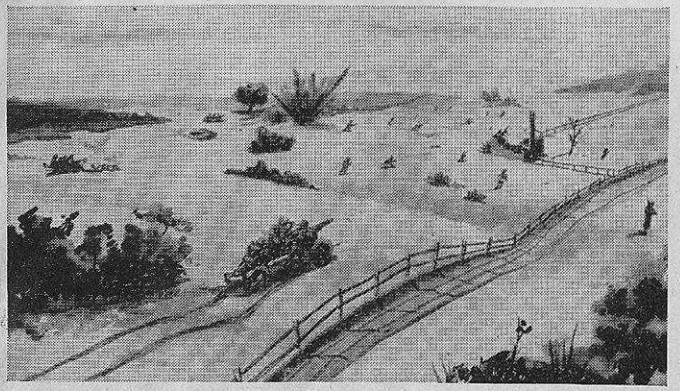


FIGURE 15.—When protecting the infantry in the advance, movement may be made by hand.

employed with the division in forward displacement or remain at the landing area and protect it against mechanized attack.

a. The ¼-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 antitank 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 IV

SEPARATE AIRBORNE ANTIAIRCRAFT MACHINE-GUN BATTERY

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

■ 30. CHARACTERISTICS.—The separate airborne antiaircraft batteries are light, compact units for the establishment of AA defense against strafing and dive-bombing attacks for single important installations. The battery has only enough transportation to handle the administration and supply within the battery. The battery must depend on other units for its supply. It must also depend upon other units for transportation when any movement is to be made outside of its defended area.

■ 31. 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.

■ 32. AIR TRANSPORTATION.—Normally the battery is transported by powered aircraft. The battery must be prepared to move, not only in transport airplanes but also in bombers or any other type of airplanes that may be available. It normally requires eight C–47 airplanes 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 furnished the air transportation.

■ 33. EMPLOYMENT.—*a.* Normally the battery can expect to occupy antiaircraft 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.

■ 34. 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.

■ 35. ADMINISTRATION AND SUPPLY.—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 AA 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.

CHAPTER 3

COMMUNICATIONS

■ 36. GENERAL.—The principles in FM 24–5 governing the employment of communication equipment apply to airborne antiaircraft units. The speed required in the installation of initial communication systems, 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.

■ 37. WIRE COMMUNICATION.—*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. The battalion wire communications are installed under the supervision of the battalion communication officer. Each battery is responsible for establishing the wire communication within the battery. 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.

c. Within a machine-gun battery the simplest system of wire communication is to hook up all gun positions on a single circuit. The use of switchboards within a machine-gun battery is not considered practicable due to shortage of operators, loss of time, and additional wire required.

d. During the landing, movements, and preliminary operations, reliance must be placed on radio, visual means, sound, and messengers as means of communication.

■ 38. RADIO COMMUNICATION.—Radio communications in airborne AA units follow standard radio procedure. The battalion requires two frequencies so that the AA and the antitank units may be placed in the same or in separate nets. When an aircraft warning net is set up, provisions are made for the battalion to become a station in the division air warning net.

■ 39. COMMAND POSTS.—The battalion command post is centrally located with respect to all units of the battalion. When defending an airfield from which our airplanes are operating, the battalion CP is located within the immediate vicinity of the operations office. Subordinate command posts are located so that the closest contact possible may be maintained with the firing sections.

■ 40. WARNING SIGNALS.—*a.* Definite alert signals must be arranged. The alert signals selected are such that they may be transmitted by radio, telephone, sound, and visual means.

b. In order to eliminate the possibility of the transmission or reception of false orders, simple means of recognition and identification must be established.

CHAPTER 4

SUPPLY AND EVACUATION

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SECTION I

SUPPLY

■ 41. GENERAL.—*a.* 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.

b. 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.

c. 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.

d. 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.

■ 42. 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 transported 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.

■ 43. ANTIAIRCRAFT BATTALION SUPPLY.—*a.* All AA units carry in their organic tactical loads an initial supply of ammunition for every weapon to be used. Six rounds per rocket launcher, 60 rounds per carbine or .30 caliber rifle, 100 rounds per 37-mm antitank gun, 7 rounds per .45 caliber pistol, and 3,000 rounds per .50 caliber machine gun are considered the minimum requirements for organic tactical loads. This initial supply carried by the tactical AA units is obviously limited, and can be expected to suffice for a short time only.

b. 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.

SECTION II

EVACUATION

■ 44. EVACUATION.—*a.* Evacuation of casualties within the division is to a treatment section located near the destination area and follows normal procedure.

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.

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CHAPTER 5

TRAINING

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SECTION I

GENERAL

■ 45. TRAINING.—*a.* Airborne antiaircraft artillery troops must receive the same training accorded other AAA troops. Their instruction in such subjects must not be neglected in order to cover the purely airborne subjects. Only when they are competent antiaircraft artillery troops can the majority of time and emphasis be placed upon the phases of airborne training.

b. Special instruction of airborne AAA includes computation of loads, use of parachutes, airplane discipline and loading, lashing, and unloading of airplanes and gliders.

SECTION II

MOCK-UPS

■ 46. GENERAL.—*a.* Mock-ups are wooden models of the loading compartments of an airplane or glider, and are built to correct dimensions. The size of the loading door, the slope of the floor, and positions of the tie-downs correspond exactly to those of the airplane or glider.

b. Mock-ups are invaluable as practical aids in training crews in loading, lashing, and unloading airplanes, and gliders. Teamwork, speed, and exactness can be obtained by continuous practice on these mock-ups. Team procedures

can be worked out and experimentation done without damage to actual aircraft. Advantages of mock-ups are:

(1) Their availability over actual airplanes and gliders.

(2) They may be located in the battery area.

(3) The attention of the men is not distracted by activities around an airport.

(4) The amount of damage to actual airplanes or gliders is reduced.

■ 47. TYPES.—*a. Low mock-up of the C–47.*—The low mock-up is a wooden construction of the loading compartment, built to exact dimensions of the C–47, including tie-downs. (See figs. 16 and 17.) The aft end of the loading compartment rests on the ground, while the forward end is raised on stilts, or a bank of earth, to give the correct slope of the floor. The right side of the mock-up extends up from the floor about 3 feet, and includes the banks of collapsible seats. The left side is open so that activities going on inside the mock-up can be witnessed by men learning to load and lash. The door of the mock-up is made of wood, and is of the same dimensions as the door of a C–47. The low mock-up is used to—

(1) Demonstrate the placement of equipment.

(2) Teach lashings to a group of men.

(3) Teach the duties of each man in loading and lashing.

b. High mock-up of C–47.—(1) The high mock-up has the aft end of the loading compartment raised so the loading door is 57 inches from the ground. The forward end of the compartment is raised still higher to keep the angle of the floor the same as in the C–47. (See figs. 18 and 19.) Tie-downs are placed in the floor to correspond exactly with those in the airplane. Both sides of the mock-up are extended up 3 feet and wooden folding seats installed on each side. When crews learn where and how equipment is lashed in a low mock-up, the high mock-up is used to teach them how to load heavy wheeled vehicles up a ramp.

(2) Men work on these mock-ups until confidence, exactness, and speed are developed. When actual C–47's are obtainable, crews are able to load, lash, and unload equipment without damage to the airplane.

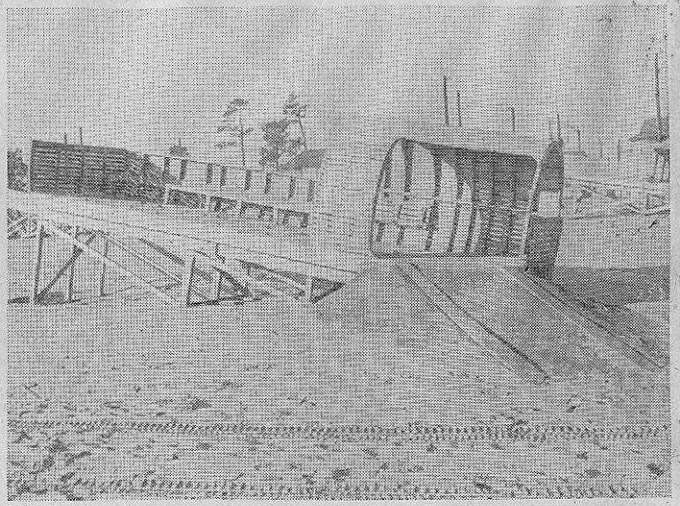


FIGURE 16.—Low mock-up of C–47 airplane.

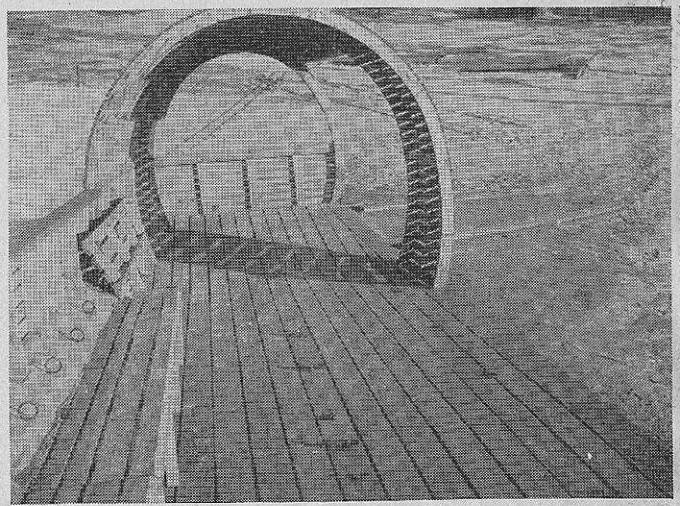


FIGURE 17.—Interior view of low mock-up of C–47 airplane.



FIGURE 18.—High mock-up of C–47 airplane.

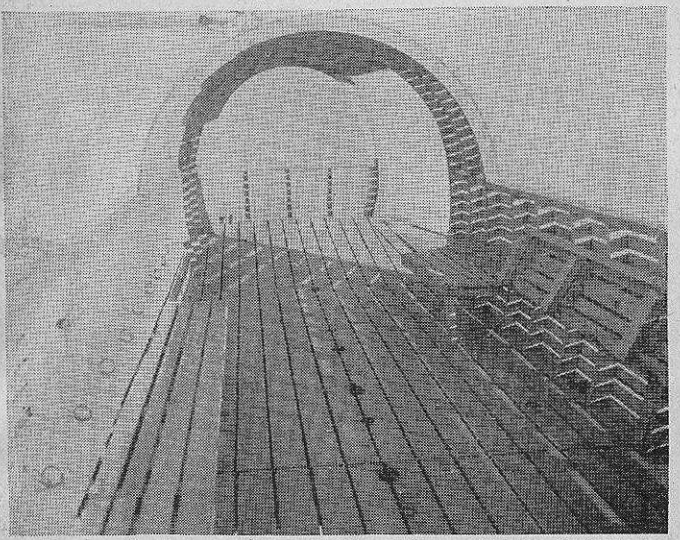


FIGURE 19.—Interior view of high mock-up of C–47 airplane.

■ 48. GLIDER MOCK-UPS.—*a.* A glider mock-up consists of a wooden frame with the exact dimensions of the loading compartment of a CG–4, including the tie-downs, and a loading door that can be raised and latched. The loading floor is raised off the ground and placed on a pivot, so the practice of raising and lowering the tail may be included in the training. (See fig. 20.)

b. Actual gliders are very easily damaged by inexperienced crews. Loading must continue on the mock-ups until all personnel can load with precision and safety.

SECTION III

LASHINGS

■ 49. GENERAL.—Rope is ordinarily used for all lashings. Strap or cable, however, may be used. When rope is used, the tie-down is prepared by tying the rope to the tie-down ring by means of two half-hitches. The knot used to complete the lashing is a baker bowline with a slippery half-hitch used to secure the baker bowline. Every member of the loading crew must be able to tie these knots.

SECTION IV

LOAD COMPUTATION

■ 50. GENERAL.—The men who actually load and lash equipment in aircraft need not know the basic principles of the computation of safe loads, but those who decide *where* the equipment is to be loaded and lashed in the aircraft must understand these principles. The basic principles of computing load safety are given in FM 31–40.

SECTION V

PARACHUTE INSTRUCTION

■ 51. GENERAL.—The parachute as used by air-landing troops is purely a safety precaution. It is not contemplated that air-landing troops make prearranged parachute jumps. It is necessary, however, that each man be familiar with the operation and use of his parachute so that when an emergency arises he may use it with complete confidence.

■ 52. TYPES.—*a.* Air-landing troops are at present concerned primarily with three types of parachutes: S–1, S–2, and B–7. These are free type parachutes and are operated manually by pulling the rip cord.

b. The "S" type parachutes are similar except for size. The S–1 has a 24-foot canopy and is recommended for personnel under 180 pounds, while the S–2 has a 28-foot canopy and is recommended for personnel over 180 pounds. Both chutes are of the seat type as indicated by the S before the model number. This type provides a seat and back pad and is recommended for use in the C–47 airplane.

c. The B–7 is a back type parachute with a canopy of 24 feet in diameter and is recommended for glider troops.

■ 53. JUMP TECHNIQUE.—*a.* It is not practical to establish set rules for use of the parachute in an emergency because the position, speed, and altitudes of an airplane or glider cannot be foreseen. Therefore, each man must be familiar with the

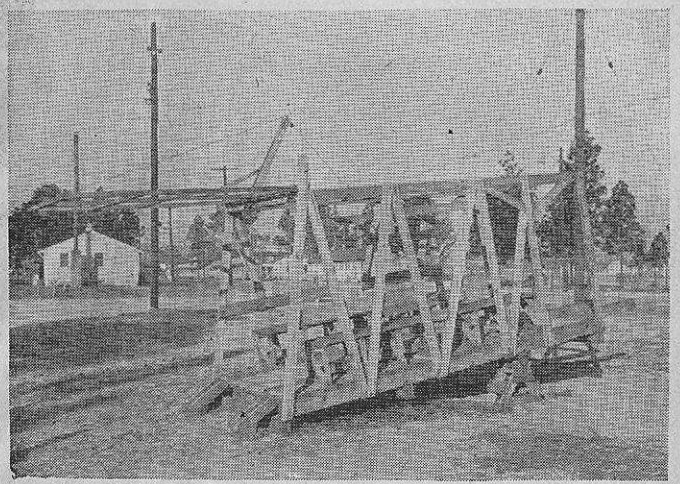


FIGURE 20.—CG-4A glider mock-up.

limitations and capabilities of his parachute. The use of the free type parachute is impractical at extremely low altitudes, but at high or normal altitudes it is a safe, practical means of getting to the ground safely. The pilot is the best judge of where or when to use the parachute.

b. From the glider, the jumper leaves by either the personnel door or emergency door located in the middle of the loading compartment. The personnel door, because it is larger, is the preferable exit. When leaving the door of either a glider or an airplane, the jumper, to prevent rapid somersaulting of the body before the parachute can be released, should avoid drawing up his legs. Rapid somersaulting may cause the parachute to be released at the moment it is under the wearer. If thus released one or more suspension lines may be pulled violently over the canopy, burning the silk.

c. Confusion is avoided in the airplane by a prearranged plan of exit. Every man must know the order of his leaving. Extreme discipline is exercised so that all men can leave the airplane quickly and safely.

d. The rip cord grip, on the left breast, is never pulled before the jumper clears the ship. A premature opening may cause the parachute to foul the tail of the airplane, not only endangering the jumper, but also the remaining occupants of the airplane. The rip cord grip itself is not touched until the moment the jumper has cleared the airplane. Then the rip cord is jerked entirely clear of the housing. A quick jerk is better than a slow, steady pull. When the rip cord is jerked the pack springs open and the canopy is fully extended in less than 3½ seconds.

e. As soon as the parachute opens, the canopy and suspension lines are checked for possible twists and to determine that no suspension lines pass over the canopy. If any twists are noted, they are corrected immediately by pulling suspension lines into their proper places. The jumper faces the direction of drift. A body turn to the right may be executed by placing the left arm in front of the face and grasping the right group of risers with the left hand. The right hand is placed behind the head and grasps the left group of risers. The head is held forward and slow, gradual pressure exerted on the risers by bringing both hands together behind the

head. By reversing the hands, a turn is executed in the opposite direction.

f. To absorb the shock of landing, the feet are held the width of the jumper's hips apart and on line. The legs are partly flexed with the feet hanging naturally so that the balls of the feet will come in contact with the ground. Just before landing, both risers are grasped and pulled vigorously down to the chest to further reduce the shock of landing.

g. If a water landing is necessary the jumper settles back in his harness, draws up his legs, pushes the cradle of the harness well under him, and unfastens his leg straps. As he nears the water he unfastens the breast strap. When within 4 or 5 feet of the water, the jumper raises his arms, straightens his legs, and falls free of the harness.

h. If he lands in a high wind, the jumper runs toward his parachute and collapses it by pulling hand over hand on one group of risers.

■ 54. PRECAUTIONS.—When handling parachutes the following precautionary measures are observed:

a. Do not allow the parachute to come in contact with water, acid, oil, or grease.

b. Do not lay a parachute down with the pack next to the ground.

c. Do not pick up a parachute by the ripcord or where the riser webs cross the back.

d. Do not tamper with the ripcord seal.

e. Do not use a parachute with a broken ripcord seal.

f. Do not wear a parachute in flight unless it is properly adjusted.

g. Do not attempt to adjust any part of the parachute except the leg straps.

SECTION VI

FLIGHT DISCIPLINE

■ 55. GENERAL.—In an airborne movement or operation, it is imperative that absolute discipline is maintained at all times. Measures of control are determined by the commander of the force concerned, and are enforced through the chain

of command. Flight discipline refers not only to control measures in the air, but on the departure field during and prior to the enplaning phase.

■ 56. SAFETY MEASURES.—No specific rules can be laid down to cover every situation but there are some general rules applicable to every airborne operation.

a. Prior to enplaning.—(1) No smoking is allowed within a specified distance of the aircraft.

(2) Parachutes are not donned, nor planes boarded, until so ordered by plane commanders.

(3) No one walks in front of a plane when the engines are running, nor near the propeller arc at any time.

(4) Loading begins upon the command of the airplane commander.

b. Enplaning.—Loading and lashing is done under the direct supervision of the airplane commander.

c. In flight.—(1) When in flight, there must be no movement within the airplane, and under no circumstances will any enlisted man go forward into the pilot's compartment.

(2) The airplane commander normally goes forward to the pilot's compartment just before landing to orient himself on the landing field.

(3) Safety belts must be worn on all take-offs, on all landings, on all night flights, and in all bad weather.

CHAPTER 6

LOADING C–47 AIRPLANE

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III.	To load ¼-ton trailer	65–67
IV.	To load 37-mm antitank gun	68–71
V.	To load caliber .50 AA machine gun	72–75

SECTION I

GENERAL

■ 57. PRELIMINARY PREPARATION.—Before heavy wheeled equipment can be loaded in the C–47, certain preliminary preparations are made.

a. The loading door of the airplane is fully opened. If the aft door has not been removed, the loading squad assists the crew chief of the airplane in removing the door. The forward door is opened and fastened in place by the airplane crew chief.

b. The ramps are installed and checked for safety.

c. The floor tie-down rings are screwed into the sockets at all the places needed for the particular load.

d. The hinged bank of seats is lowered.

e. Parachutes and other loose equipment are placed so as to leave a clear passage for the loading operation.

■ 58. RAMPS.—A loading ramp is organic equipment with the C–47. It is built in sections facilitating handling and installation by the loading crew. Parts include two treadways, a center section, and a triangular section. Holes are drilled in the doorway in which the two treadways are placed.

■ 59. TIE-DOWN RINGS.—Lashings are made to tie-down rings screwed into the floor. C–47 airplanes are equipped with eight tie-down rings, which are placed in a canvas pocket on the rear bulkhead of the cargo compartment. The floor fittings take either 200, 500, or 1,500 pounds applied load. The

1,500-pound tie-downs in the airplane may be identified by three rows of rivets parallel to the length of the floor at the ring socket (see fig. 37). The floor tie-downs are referred to by numbers from 1 to 12, counting from front to rear. Necessary ropes for lashing equipment and weapons are carried in each C–47 airplane.

■ 60. STATION NUMBERS.—Station numbers are marked on the inside of the main cargo compartment. The fuselage station numbers are painted on the traverse ceiling beams. These numbers represent distance in inches from the nose of the airplane. (Cargo station numbers painted on the side walls indicate distance in inches from the main cabin forward bulkhead.) Fuselage station numbers are normally used by airborne units in computing loads. All cargo is positioned and lashed at a specific station number.

SECTION II

TO LOAD ¼-TON TRUCK

■ 61. GENERAL.—To load the ¼-ton truck in the C–47, a loading squad of six men is normally used. Necessary equipment includes ten ropes for lashing the truck, two ropes for lashings the ramps, and two wheel chocks for chocking the wheels of the truck.

■ 62. PROCEDURE.—*a.* First the lashings are prepared in the C–47. Then the truck is driven up the ramp under its own power. As the truck enters the door of the airplane the wheels are cut sharply to the left. The rear end is shifted manually to the right by the loading crew until the truck can continue into the airplane. The truck is driven forward close against the left wall until the rear axle is just forward of the desired station number.

b. The lashings previously prepared are completed as follows (see figs. 22 and 23):

(1) Two ropes back to the rear axle.

(2) Two ropes back to the front axle. (These are tightened by allowing the truck to drift to the rear.)

(3) Two ropes forward to the front axle.

(4) Two ropes forward to the rear axle.

(5) One rope vertical to the front bumper.

(6) One rope vertical to the trailer hitch.

c. The ramp is then loaded on the plane and lashed on top of the truck or at some other designated place. The reverse procedure is followed for unloading.

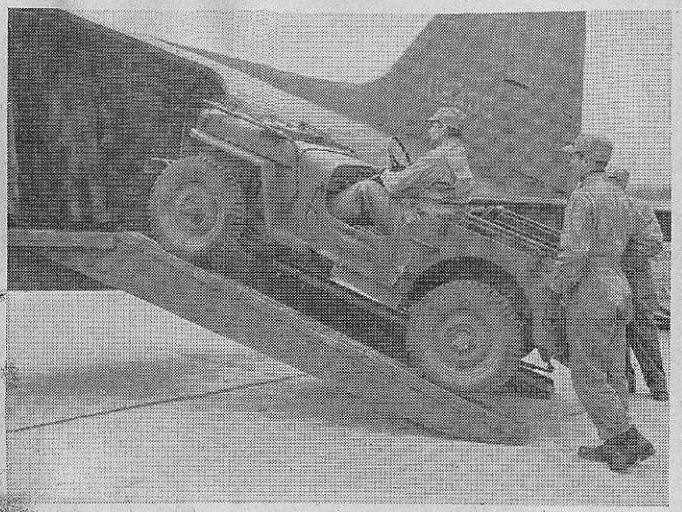


FIGURE 21.—Loading ¼-ton truck up ramp of C–47 airplane.

■ 63. POSITIONS.—The ¼-ton truck is usually loaded in one of three positions in the C–47; with the rear axle at Station No. 283, 330, or 414. When bolero tanks (extra gasoline tanks placed in the loading compartment) are in place, the truck is loaded at Station 330. Station 414 is used when the truck is loaded in rear of another ¼-ton truck. Different tie-downs are used for each position. Floor tie-downs are used exclusively. Tie-downs are numbered consecutively from front to rear and from 1 to 12.

With rear axle at fuselage Station No.	*Use tie-downs—*
283	1, 2, 3, 4, 7
330	3, 4, 5, 6, 9
414	7, 8, 10, 11, 12

■ 64. REFERENCES.—For further information on loading of the ¼-ton truck in C–47 airplanes see FS 7–79 and FS 7–83.

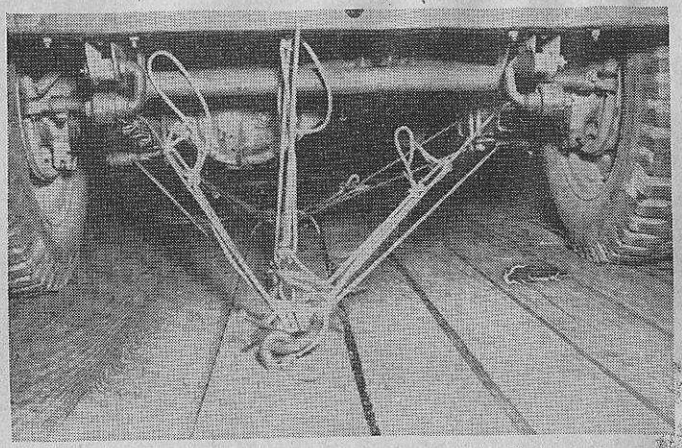


FIGURE 22.—Front lashings on ¼-ton truck in C–47 airplane.

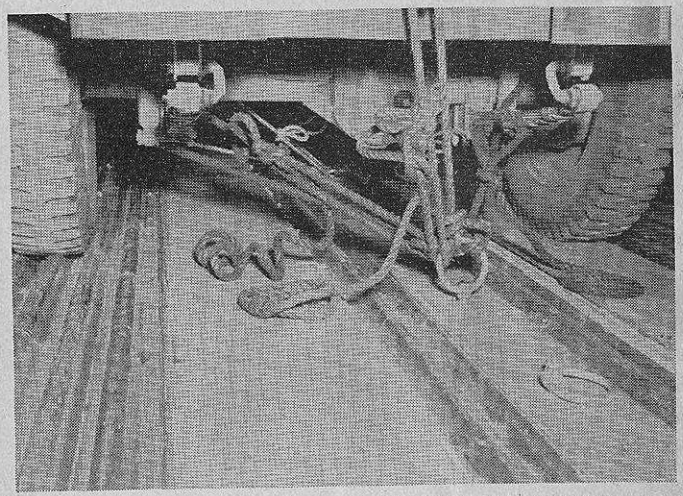


FIGURE 23.—Rear lashings on ¼-ton truck in C–47 airplane.

SECTION III

TO LOAD ¼-TON TRAILER

■ 65. GENERAL.—To load the ¼-ton trailer in the C–47 airplane, a loading squad of six men is normally used. Necessary equipment includes eight ropes for lashing the trailer, two ropes for lashing the ramp, and two wheel chocks for chocking the wheels of the trailer.



FIGURE 24.—Loading ¼-ton trailer into C–47 airplane.

■ 66. PROCEDURE.—*a.* First the necessary lashings are prepared in the C–47. Then the trailer is pushed up the ramp and into the cargo compartment. The lunette of the trailer enters first. The trailer is stopped when the axle is just forward of the desired station number.

b. The lashings previously prepared are then completed as follows (see figs. 25 and 26):

(1) Two ropes back to the axle. (These are tightened by allowing the trailer to drift to the rear.)

(2) Two ropes forward to the axle.

(3) One rope vertical to the axle.

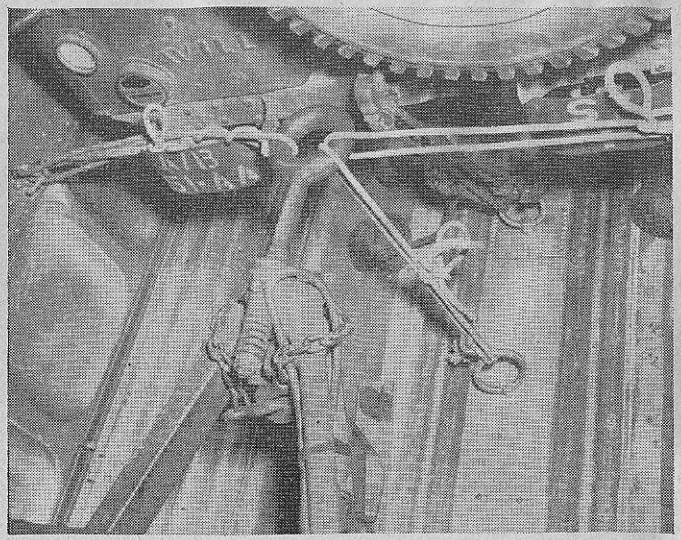


FIGURE 25.—Front lashings on ¼-ton trailer in C–47 airplane.

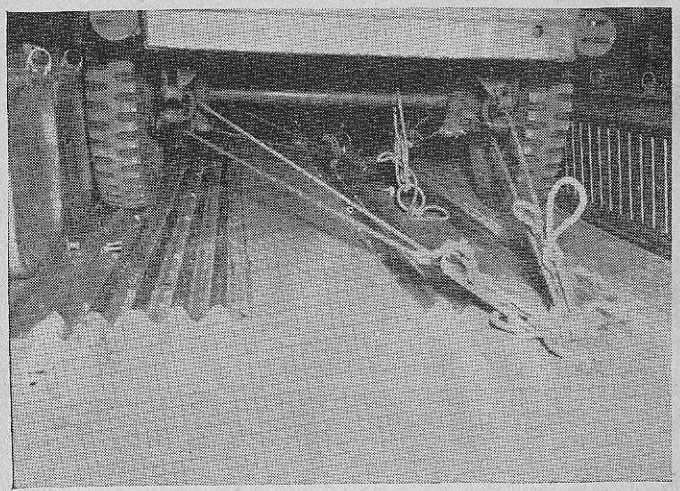


FIGURE 26.—Rear lashings on ¼-ton trailer in C–47 airplane.

(4) One rope vertical to the lunette.

(5) One rope laterally from the right safety belt ring to the lunette.

(6) One rope laterally from the left safety belt ring to the lunette.

c. The ramps are then loaded in the airplane and lashed on top of the trailer or at some other designated place. For unloading, the reverse procedure is followed.

■ 67. POSITIONS.—The ¼-ton trailer is usually loaded in one of three positions in the C–47, with the axle at Station No. 255, 309, or 391. When bolero tanks are in place, Station 309 is used. Station 391 is used when the trailer is loaded in rear of the ¼-ton truck. Different tie-downs are used for each position. Safety belt rings for lateral tie-downs are designated by Station numbers.

With axle at fuselage Station No.—	*Use tie-downs—*	*With safety belt rings at Station No.—*
255	1, 2, 4, 7	217
309	3, 4, 7, 9	274
391	8, 9, 11, 12	354

SECTION IV

TO LOAD 37-MM ANTITANK GUN

■ 68. GENERAL.—To load the 37-mm antitank gun in the C–47, a loading squad of six men is normally used. Necessary equipment includes eight ropes for lashing the gun, two ropes for lashing the ramp, two chocks for chocking the wheels of the gun, and a flat board to place under the trail spade.

■ 69. PROCEDURE.—*a.* First the necessary lashings are prepared in the C–47. Then the gun is rolled up the ramp and into the airplane muzzle first. When the left wheel clears the forward door jam, the trail is cut to the right. The gun is rolled forward in the cargo compartment until the axle of the gun is just forward of the desired station number. A board is placed under the trail spade and the wheels are chocked.

b. The lashings previously prepared are completed as follows (see figs. 28 and 29):

(1) Two ropes back to the axle. (These are tightened by allowing the gun to drift to the rear.)

(2) One rope vertical to the axle.

(3) Two ropes diagonally up and over the center of the trails.

(4) One rope vertical to the lunette arm.

(5) One rope laterally from the left trail handle to the 200-pound tie-down ring at the left.

(6) One rope laterally from the right trail handle to the 200-pound tie-down ring at the right.

c. The ramps are loaded and lashed beside the gun or at some other designated place. For unloading the reverse procedure is followed.

■ 70. POSITIONS.—The 37-mm antitank gun is usually loaded in one of three positions in the C–47, with the axle at Station No. 216, 298, or 351. When bolero tanks are in place, the gun is placed at Station 298. Station 351 is used when the

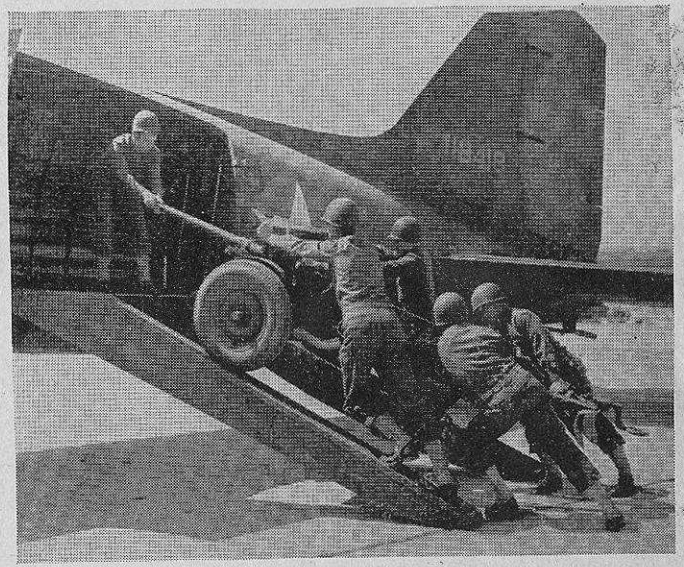


FIGURE 27.—Loading 37-mm antitank gun into C–47 airplane.

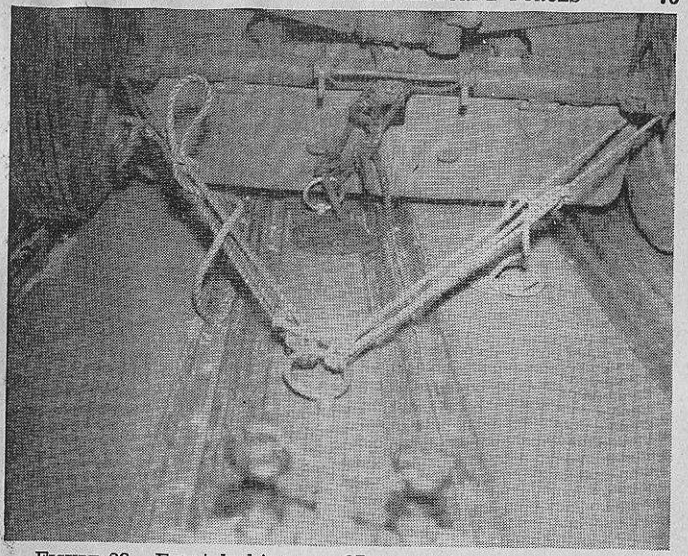


FIGURE 28.—Front lashings on 37-mm antitank gun in C–47 airplane.

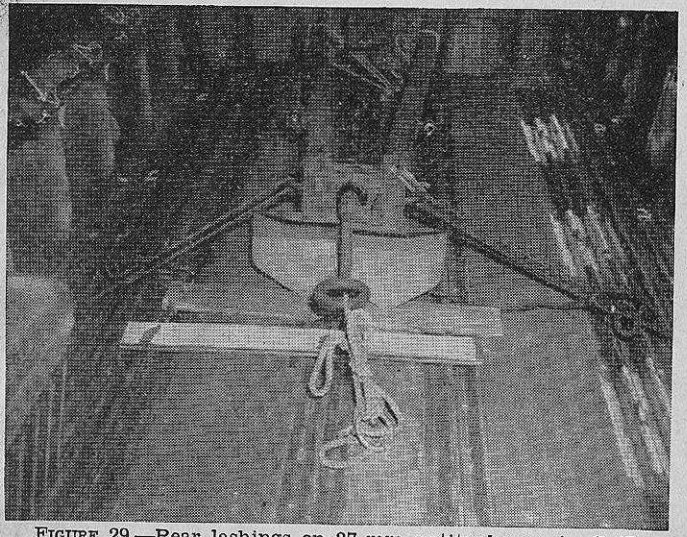


FIGURE 29.—Rear lashings on 37-mm antitank gun in C–47 airplane.

gun is loaded in the rear of a ¼-ton truck. Different tie-downs are used for each position.

With axle at fuselage Station No.—	*Use tie-downs—*	*With 200-lb. tie-downs at Station No.—*
216	1, 2, 3, 6	294
298	4, 6, 9, 11	372
351	7, 9, 11, 12	450

■ 71. REFERENCES.—See FS 7–80 for further detail

SECTION V

TO LOAD CALIBER .50 AA MACHINE GUN

■ 72. GENERAL.—The machine guns of the machine-gun battery of the airborne battalion are loaded partly in trailers which are then loaded in the airplane as described in section III and partly behind the ¼-ton truck. The machine guns of the separate machine-gun battery are loaded two machine guns to an airplane.

■ 73. LOADING IN TRAILER.—*a.* To load and lash the machine gun in the ¼-ton trailer a crew of five men is used. Five ropes are necessary for the lashing.

b. First place two full ammunition boxes and two ammunition chests along the left side of the trailer. The gun, in a packing box, is placed on top of the ammunition boxes. The pedestal legs are placed on top of the gun box. A rope is used to circle each end of the legs and to lash them to the side of the trailer. A third rope, tied to one side of the trailer, circles the legs and the gun box and is lashed to the opposite side. The pedestal and cradle together are placed in the right side of the trailer. A rope is used at each end of the pedestal and cradle to lash them to the trailer. The rope extending over the top of the trailer aids in holding the cradle and pedestal down (see fig. 31).

c. The trailer itself is then loaded and lashed in the C–47 as described in section III.

■ 74. LOADING IN REAR OF ¼-TON TRUCK.—*a.* To load the machine gun in the C–47 behind the ¼-ton truck a crew of five men is used. Nine ropes for lashings and four small boards to be placed under the legs, pedestal, and cradle are necessary.

b. The pedestal legs are placed between tie-downs Nos. 7 and 8 and perpendicular to the long axis of the cargo compartment. They are lashed to tie-downs Nos. 7 and 8 with one rope. A rope is used at each end of the legs and lashed diagonally to the 200-pound tie-down rings at Station No. 333 (see fig. 32). The gun, in its packing box, and the ammunition boxes and chests are lashed between tie-downs Nos. 8 and 9. Each end of the gun box is circled and lashed diagonally to 200-pound tie-down rings at Station No. 333.

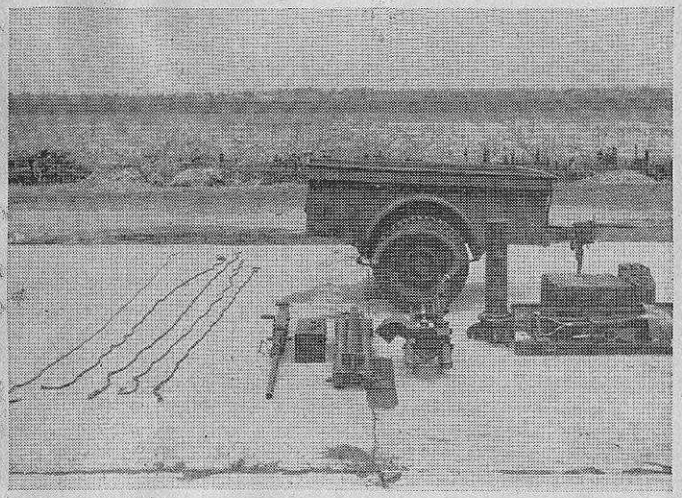


FIGURE 30.—Caliber .50 machine gun and equipment before being loaded in ¼-ton trailer.

The pedestal and cradle are lashed between tie-downs Nos. 9 and 10. A rope is used on each end of the pedestal and cradle to lash them diagonally to 200-pound tie-down rings at Stations Nos. 333 and 372 (see figs. 32 and 33).

c. Additional ropes are used to secure the ammunition in place.

■ 75. LOADING TWO MACHINE GUNS IN C–47 AIRPLANE.—*a.* To load and lash two guns a crew of 11 men is used. Nine ropes for the guns, two ropes for the ammunition and water

chests, two ropes for the ramps, four small boards on which to place the legs, pedestals, and cradles, and one board about 4 feet long to place on top of the ammunition, are required.

b. One gun squad passes equipment into the airplane, while

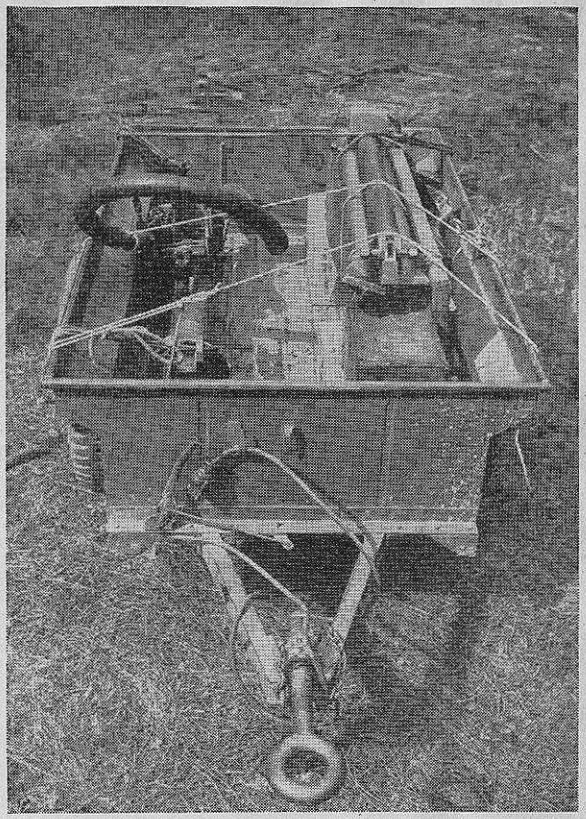


FIGURE 31.—Caliber .50 machine gun lashed in ¼-ton trailer.

the other places and secures equipment in the specified places. Ammunition and water chests are lashed against the foorward bulkhead of the loading compartment, using safety belt rings and 200-pound tie-down rings. Ammuni-

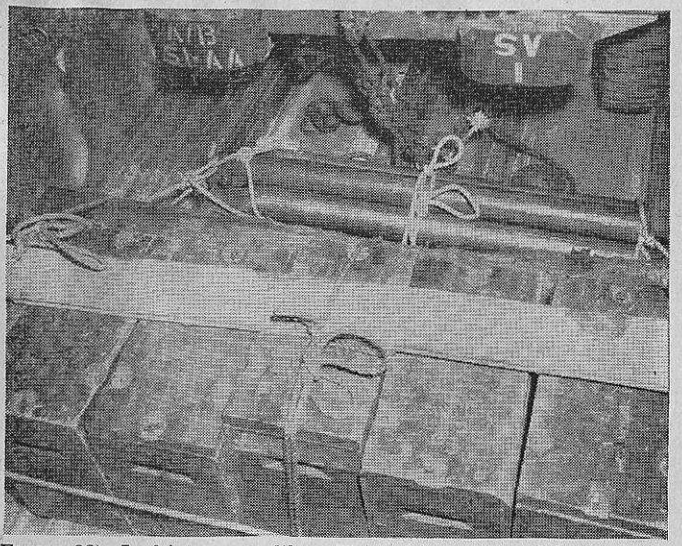


FIGURE 32.—Lashings on caliber .50 machine gun and legs behind ¼-ton truck.

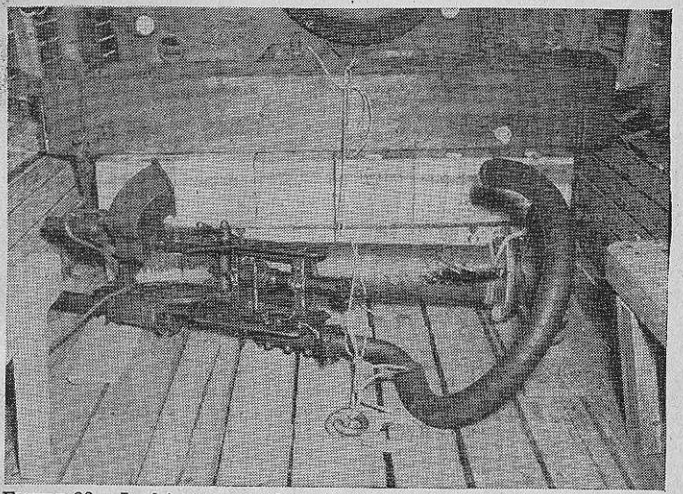


FIGURE 33.—Lashings on pedestal and cradle of caliber .50 machine gun behind ¼-ton truck.

tion boxes and guns (in packing boxes) with a board on top of the ammunition are lashed by three ropes between tie-downs Nos. 2 and 3 (see fig. 34). The legs are placed on two small boards and secured by a rope between tie-down rings Nos. 3 and 4. Each end of the legs is lashed diagonally to the 200-pound tie-down rings located at Station No. 217 (see fig. 35). The two pedestals and cradles are placed on boards between tie-downs Nos. 4 and 8, cradles

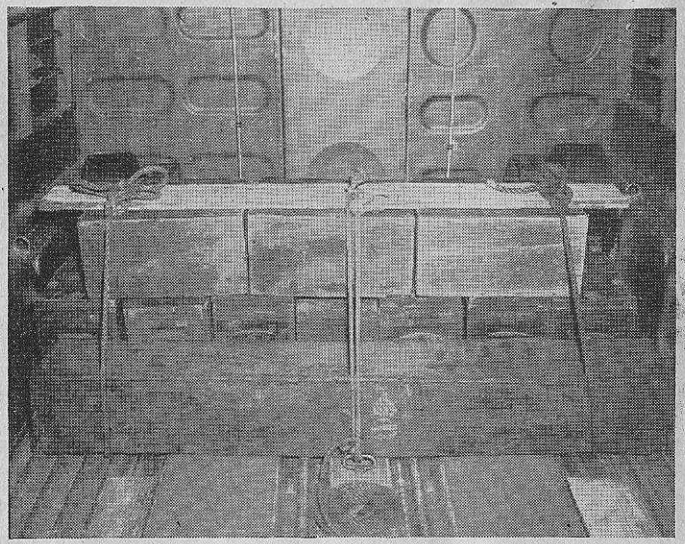


FIGURE 34.—Lashings on two caliber .50 machine guns and ammunition in C–47 airplane.

to the rear. One rope lashes the base of the pedestals to tie-down ring No. 4. A second rope circles the center of the pedestals and lashes them vertically to tie-down ring No. 6. A third rope forward from tie-down ring No. 8 is lashed to the cradles (see fig. 36). Ramps are taken into the airplane and lashed. To unload, the reverse procedure is followed.

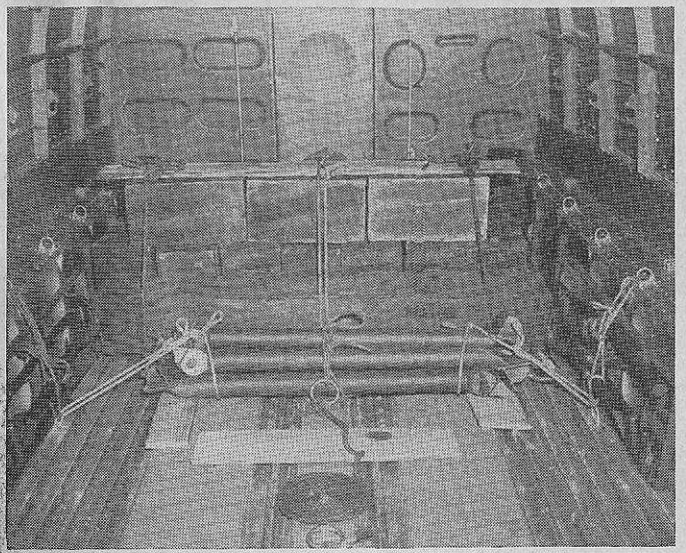


FIGURE 35.—Lashings on legs of two caliber .50 machine guns in C–47 airplane.

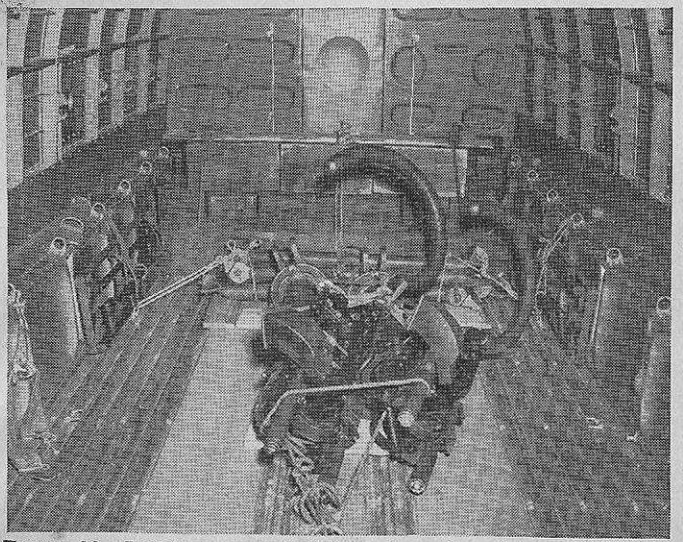


FIGURE 36.—Lashings on pedestals and cradles of two caliber .50 machine guns in C–47 airplane.

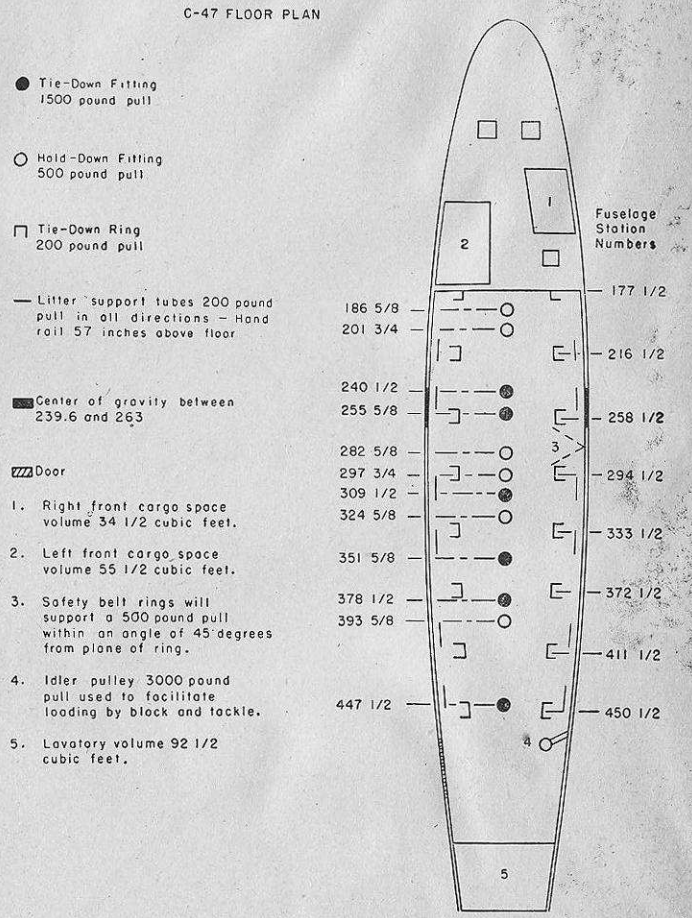


FIGURE 37.—C–47 floor plan.

CHAPTER 7

LOADING CG–4 GLIDER

		Paragraphs
SECTION I.	General	76–79
II.	To load ¼-ton truck	80–82
III.	To load ¼-ton trailer	83–85
IV.	To load 37-mm antitank gun	86–88
V.	To load caliber .50 AA machine gun	89–90

SECTION I

GENERAL

■ 76. PRELIMINARY PREPARATION.—For the loading and unloading of heavy equipment, the tail of the glider CG–4A must be raised so that the front skids are firmly placed on the ground, and the nose is opened (see fig. 38). The personnel riding in each glider are sufficient to perform both operations.

a. Raising tail.—The brakes of the glider are locked and chocks are securely placed both forward and aft of the glider's

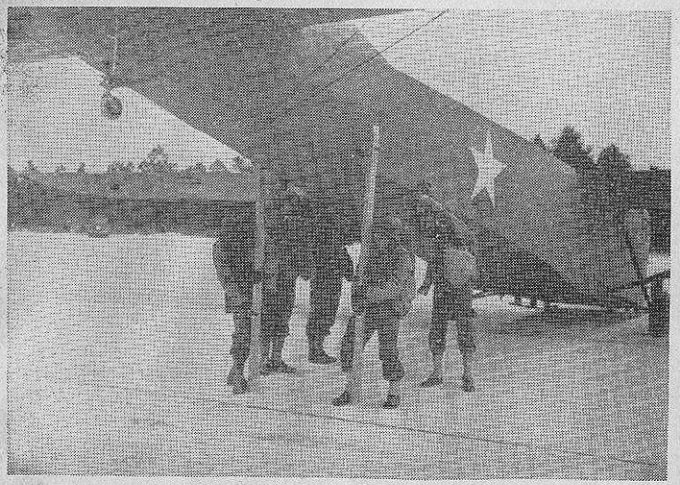


FIGURE 38.—Men lifting the tail of a CG–4A glider.

wheels before the tail is raised. A simple expedient for propping the tail in its raised position may be formed by two long pieces of 2 by 4 and a piece of 1-inch pipe. The pipe is passed through the opening formed by the hand grips from one side of the tail to the other. The 2-by-4 props are then pushed under the pipe to hold the tail in its raised position (see fig. 39).

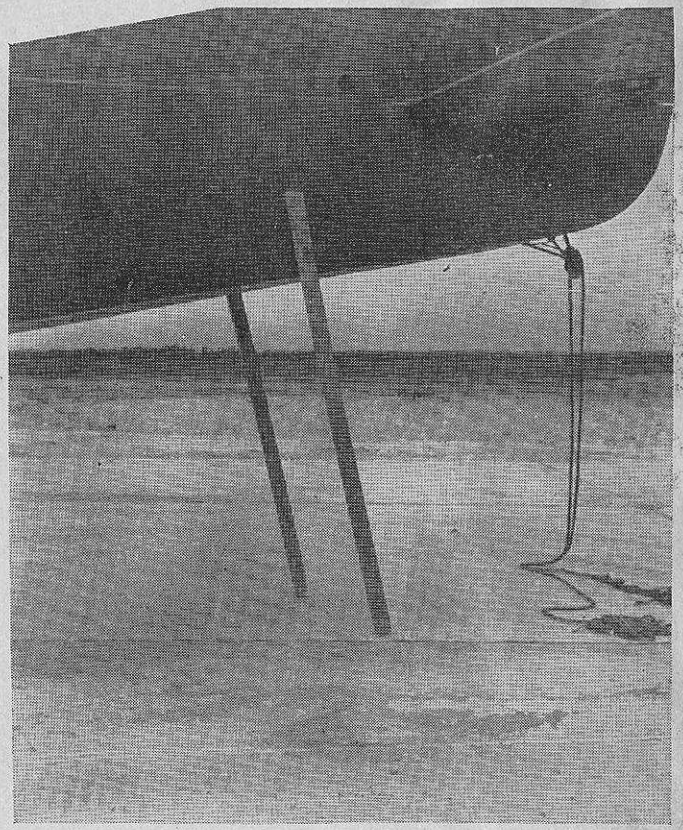


FIGURE 39.—Tail of CG–4A glider held in the raised position, using improvised props.

b. Raising nose.—In lifting the nose, one man, inside the glider, unlatches the nose. Three men then lift the nose (see fig. 40). As soon as the nose is raised, the man inside the glider pushes the nose lock all the way to the rear, securing the nose in an open position (see fig. 41).

■ 77. RAMPS.—Ramps for loading wheeled vehicles are part of the glider equipment and are attached to the floor of the loading compartment by two wires which allow the ramps to be raised and lowered.

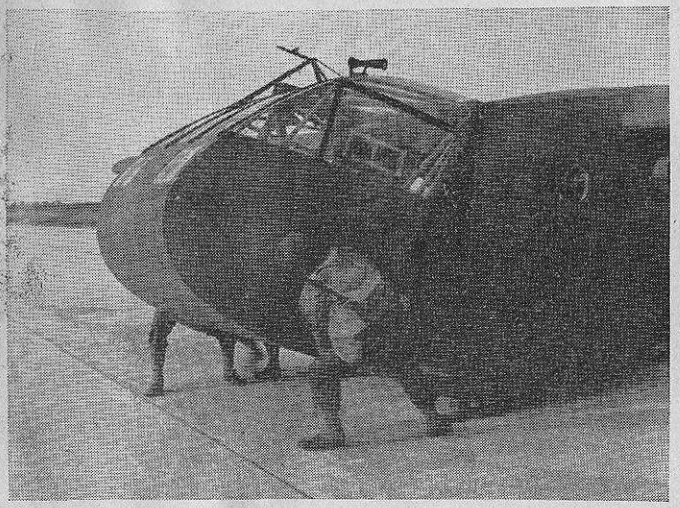


FIGURE 40.—Three men lifting nose of CG–4A glider.

■ 78. TIE-DOWNS.—Ropes for tying down equipment and supplies are fastened at points where the steel tubing in the sides join the floor. There are six tie-down points on each side numbered from front to rear and designated right and left 1, right and left 2. Right and left are determined from a position in the cargo compartment facing forward toward the nose of the glider. A front tie-down is available where a number of steel tubes come together at a central point. There is also a point at the rear of the glider where

the tubing comes together to form a rear tie-down (see fig. 51).

■ 79. STATION NUMBERS.—No station numbers are painted on the loading compartments of the CG–4A as in the C–47, but the station numbers at the location of each tie-down are known, and are used in computing loads.

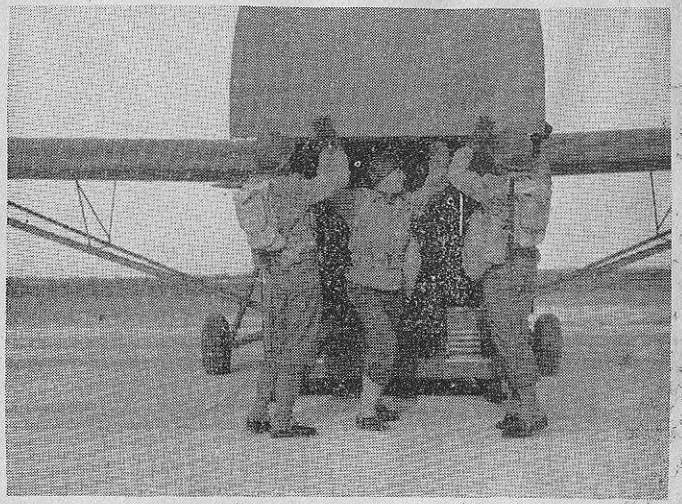


FIGURE 41.—Nose of CG–4A glider in raised position.

SECTION II

TO LOAD ¼-TON TRUCK

■ 80. GENERAL.—To load the ¼-ton truck a loading squad of four men is normally used. A minimum of seven lashing ropes are needed, five for the truck and two for the tail props.

■ 81. PREPARATION.—Ropes are placed on the following tie-down rings in preparation for loading the ¼-ton truck:

One rope at front tie-down.
One rope at right 5.
One rope at left 5.
One rope at right 6.
One rope at left 6.

■ 82. PROCEDURE.—*a.* First raise the tail, open the nose, take out the removable banks of seats, and prepare the lashings. The truck is backed into the glider until the front hub cap is just in front of tie-down No. 2.

b. The five lashings previously prepared are then completed as follows:

(1) The nose lifting and locking device is attached to the

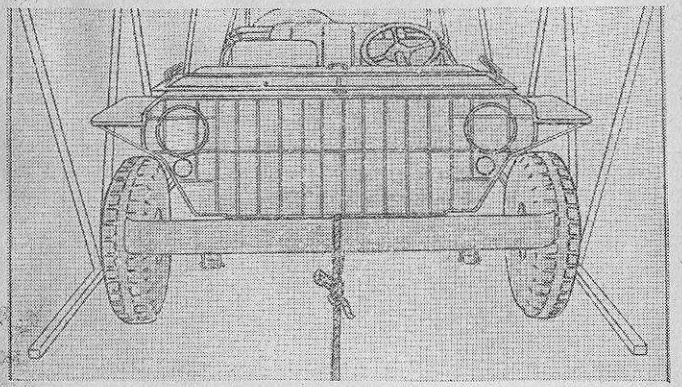


FIGURE 42.—Front lashings on ¼-ton truck in CG–4A glider.

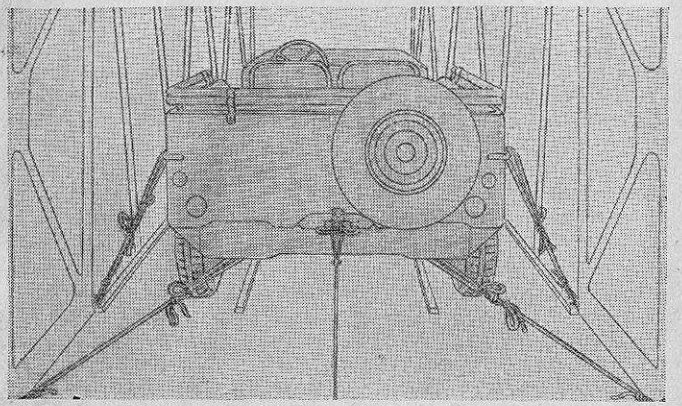


FIGURE 43.—Rear lashings on ¼-ton truck in CG–4A glider.

trailer hitch. (Cable is made taut by allowing the truck to drift forward.)

(2) One vertical tie to the front bumper.

(3) Two ropes forward to rear axle.

(4) Two ropes vertical to lifting handles on rear of truck.

c. The ramps are then raised, the nose lowered and locked, and the tail lowered. Some gliders are supplied with three cables for lashing, one vertical on the front bumper and two vertical for the lifting handles. Tail props are lashed in the glider. For unloading, the reverse procedure is followed (see figs. 42 and 43).

SECTION III

TO LOAD ¼-TON TRAILER

83. GENERAL.—To load the ¼-ton trailer a crew of five men is normally used. Six ropes for the trailer, two ropes for the tail props, a flat piece of wood to place under the trailer stud, and two chocks for chocking the wheels are required.

84. PREPARATION OF TIE-DOWNS.—Ropes are placed as follows:

One rope on right 1.
One rope on left 1.
One rope on right 3.
One rope on left 3.
One rope on right 6.
One rope on left 6.

85. PROCEDURE.—*a.* First raise the tail, open the nose, remove the two forward banks of seats, and prepare the lashings. The trailer is moved into the glider and stopped when the tail gate is about 7 inches from the forward edge of the cargo compartment. The nose is lowered.

b. The six lashings previously prepared are then completed as follows:

(1) Two ropes back to the axle. (These are tightened by lowering the tail and allowing the trailer to drift to the rear.)

(2) Two ropes running over top of trailer and tied at the top.

(3) Two ropes forward to the lunette. The tail props are brought into the glider and lashed to the top of the trailer. For unloading, the reverse procedure is followed (see figs. 44 and 45).

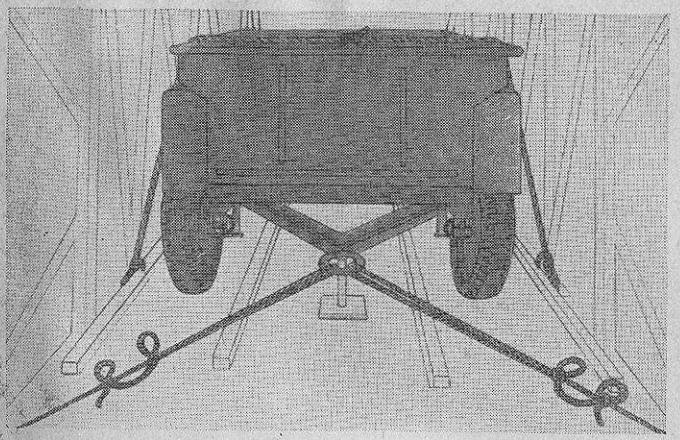


FIGURE 44.—Front lashings on ¼-ton trailer in CG–4A glider.

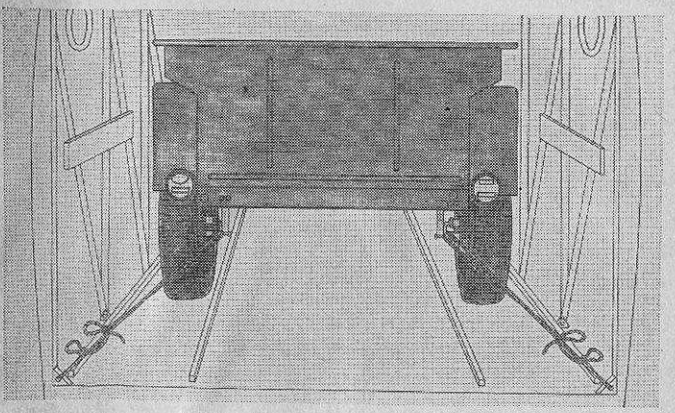


FIGURE 45.—Rear lashings on ¼-ton trailer in CG–4A glider.

SECTION IV

TO LOAD 37-MM ANTITANK GUN

■ 86. GENERAL.—To load the 37-mm antitank gun a crew of five men is normally used. Seven ropes for the gun, two ropes for the props, a flat board to place under the trailer spade, and two chocks for chocking the wheels are required.

■ 87. PREPARATION OF TIE-DOWN.—Ropes are placed as follows:

One rope on right 1.
One rope on left 1.
One rope on right 2.
One rope on left 2.
One rope on right 6.
One rope on left 6.
One rope on center rear.

■ 88. PROCEDURE.—*a.* First raise the tail, open the nose, remove the two forward banks of seats, and prepare the lashings. The gun is moved into the glider until the lunette is about 6 inches from the rear tie-down. The nose is lowered.

b. The seven lashings previously prepared are then completed.

(1) Two ropes back to the axle. (These are tightened by lowering the tail and allowing the gun to drift to the rear.)

(2) Two diagonal ropes to the gun barrel.

(3) Three ropes forward to lunette. The tail props are brought in and lashed to the gun trails. For unloading, the reverse procedure is followed (see figs. 46 and 47).

SECTION V

TO LOAD CALIBER .50 AA MACHINE GUN

■ 89. GENERAL.—To load the machine gun a crew of five men is normally used. Ten ropes for the gun and two small boards on which to place the legs are required.

■ 90. PROCEDURE.—*a.* First open the nose of the glider (it is not necessary to raise the tail to load or unload), remove

the two right banks of seats and left front bank of seats, and prepare lashings.

b. One box of ammunition is placed between right tie-downs Nos. 2 and 3, another ammunition box is placed between right tie-downs Nos. 3 and 4.

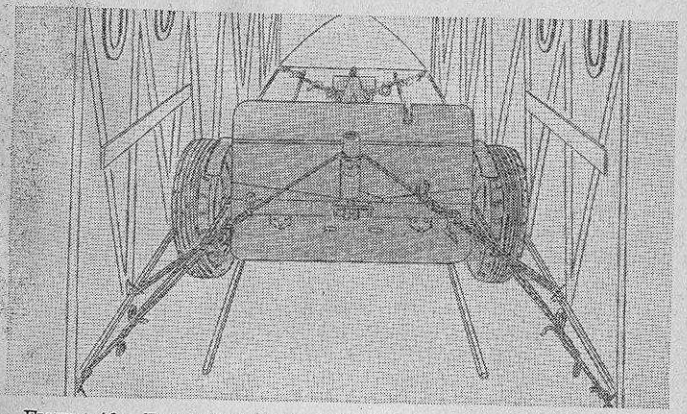


FIGURE 46.—Front lashings on 37-mm antitank gun in CG–4A glider.

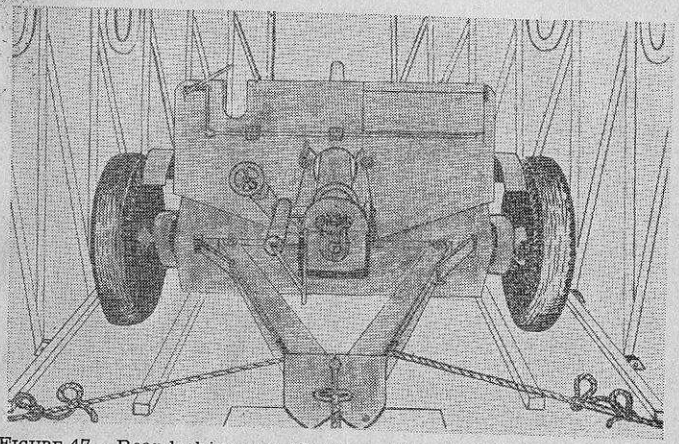


FIGURE 47.—Rear lashings on 37-mm antitank gun in CG–4A glider.

c. Lashing legs.—The legs are placed at the rear of the loading compartment and lashed (see fig. 48).

(1) One rope forward from left 6 tie-down ring to the end of the legs.

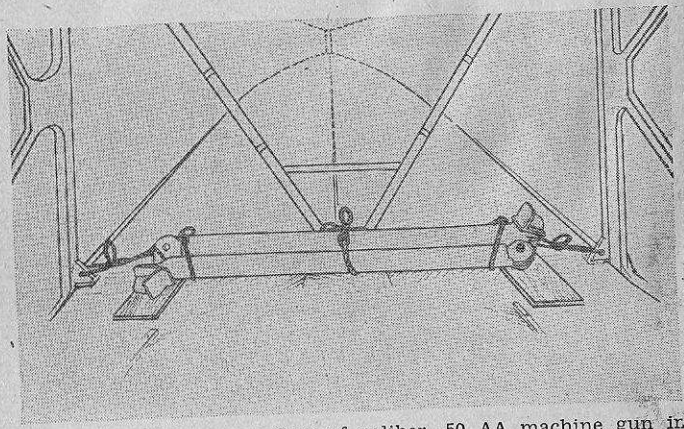


FIGURE 48.—Lashings on legs of caliber .50 AA machine gun in CG–4A glider.

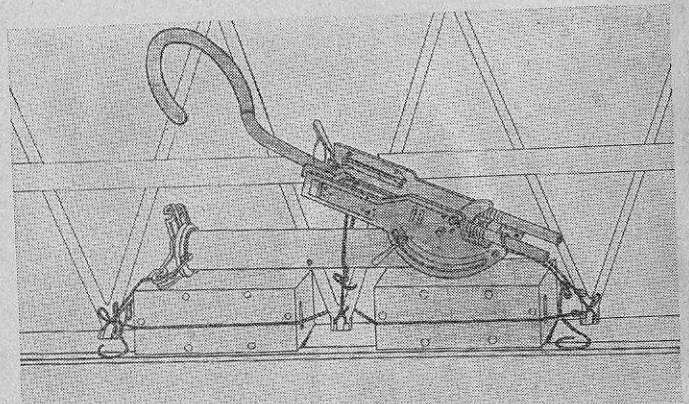


FIGURE 49.—Lashings on pedestal and cradle of caliber .50 AA machine gun in CG–4A glider.

(2) One rope forward from right 6 tie-down ring to the other end of the legs.

(3) One rope forward from the rear tie-down to the center of the legs.

d. Lashing cradle and pedestal.—The cradle and pedestal are placed upon the two ammunition boxes with the cradle to the rear, and lashed (see fig. 49).

(1) One rope rearward from right tie-down ring 1 to the base of the pedestal.

(2) One vertical rope around the pedestal to right tie-down ring 3.

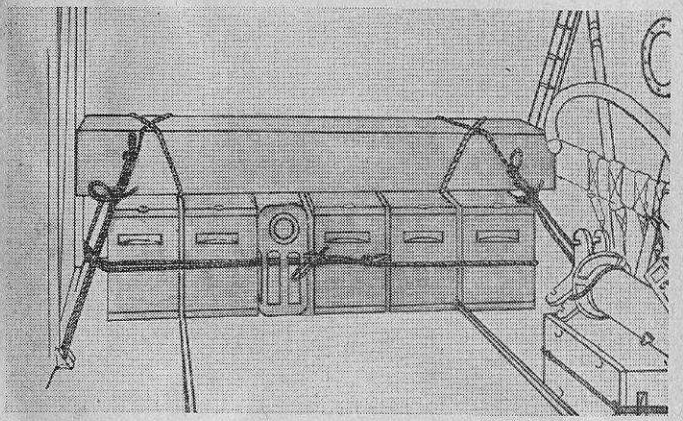


FIGURE 50.—Lashings on caliber .50 AA machine gun and ammunition in CG–4A glider.

(3) One rope forward from right tie-down ring 4 to the cradle.

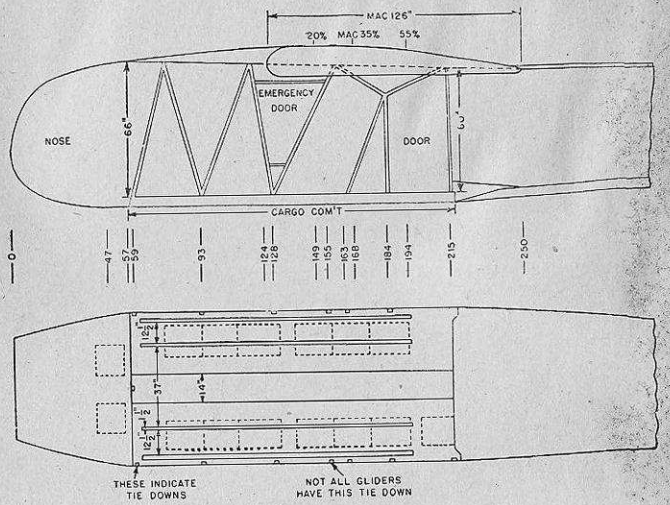
(4) One rope rearward from right tie-down ring 2 around one ammunition box to right tie-down ring 3, and continuing around second ammunition box to right tie-down ring 4, and secured.

e. Lashing gun.—The gun (in its packing box) and the ammunition are placed at the front of the loading compartment and lashed (see fig. 50).

(1) One rope from right tie-down ring 1 to left tie-down ring 1 (to prevent rearward movement).

(2) One rope from right tie-down ring 1 circling the gun box to right tie-down ring 2.

(3) One rope from left tie-down ring 1, circling the gun box to left tie-down ring 2.



Elevation and plan of cargo compartment of CG-4A, showing station numbers for tie-downs and for safe load computations. Broken lines indicate seats.

FIGURE 51.—CG-4A floor plan.

	Paragraph	Pages
Airborne antiaircraft battalion:		
Characteristics	13	6
Control	16	7
Local security	17	8
Mission	12	6
Planning	15	7
Supply	41	22
Transportation:		
Air	19	8
Motor	18	8
Airborne antiaircraft machine-gun battery:		
Administration	35	19
Characteristics	30	18
Employment	23, 33	12, 19
In defense of advanced landing area	22	12
Loading and landing	21	11
Mission	20, 29	11, 18
Planning	31	18
Security	34	19
Separate	29–35	18
Supply	35	19
Transportation, air	32	19
Airborne antiaircraft units:		
Antiaircraft artillery battalion, airborne	10, 12–28	3, 6
Machine-gun battery, separate airborne	11, 29–35	3, 18
Airborne automatic weapons battery:		
Forward displacement	28	17
Loading and landing	25	15
Mission	24	15
Security	27	17
Selection of position	26	15
Airborne operation, general	1–9	1
Caliber .50 antiaircraft machine gun, loading	72–75	42
CG-4A glider:		
Loading	76	49
Mock-up	48	28
Command posts	39	21
Communications	36	20
Employment:		
Airborne antiaircraft battery, separate	29–35	18
Airborne antiaircraft machine-gun battery	21–23	11
Equipment and weapons	7	2
Evacuation	44	23
Forward displacement, airborne automatic weapons battery	28	17
Flight discipline:		
General	55	31
Safety measure	56	32
Glider:		
Loading	76	49
Mock-up	48	28
Instruction, parachute	51–54	28
Jump technique	53	29

	Paragraph	Pages
Landing, airborne operations	6	2
Lashings	49	28
Load computations	48	28
Loading:		
C–47 airplane	57–75	33
CG–4A glider	76–90	49
Caliber .50 machine gun	72–75	42
	89–90	56
¼-ton trailer	65–67	37
	83–85	54
¼-ton truck	61–64	34
	80–82	52
37-mm antitank gun	68–71	39
	86–88	56
Machine-gun battery, separate airborne	11, 29–35	3, 18
Missions, airborne forces	1	1
Mock-ups:		
Glider	48	28
Transport plane	47	25
Parachute instruction:		
General	51	28
Precautions	54	31
Types	52	29
Planning:		
Airborne antiaircraft battalion	15	7
Airborne antiaircraft battery, separate	31	18
Airborne operations	2	1
Preliminary preparation for loading:		
CG–4 glider	76	49
C–47 airplane	57	33
Radio	38	21
Ramps:		
C–47 airplane	58	33
CG–4 glider	77	51
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Airborne antiaircraft battalion	17	8
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Station number:		
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CG–4 glider	78	51
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Transportation:		
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