

SMALL WARS MANUAL
UNITED STATES MARINE CORPS
1940

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CHAPTER IX
AVIATION



RESTRICTED

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CHAPTER IX

AVIATION

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SECTION I

INTRODUCTION

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9-1. **General.**—*a.* The opposition usually encountered in small war operations consists of scattered bands of irregular troops, well armed and extremely mobile, but deficient in disciplined morale. Logistical arrangements for such forces are apt to be very primitive and sketchy, offering no substantial target for bombing aviation. Air opposition is usually nonexistent or negligible. The Marine air force is thus able to concentrate almost entirely on the close support of ground units.

b. In order to secure the full measure of cooperation between the air and ground forces, it is necessary that each understands the problems of the other. The aviator must know something of the tactics of the ground patrol, and he must be ready and willing to assume any justified risk to assist the ground commander. On the other hand, the ground commander should understand the hazards and limitations imposed on aviation operating over difficult terrain, and should not expect the impossible.

9-2. **Special air tactics involved.**—*a.* The employment of aviation in small wars is characterized by the operation of many small units, two or three plane patrols, over a wide area. Normal scouting missions will in most cases be modified to search attacks, performed by airplanes of the scouting or observation class armed with light bombs and machine guns.

b. If attack or light bombing units are included in the force, the tactics of their employment will not differ greatly from normal procedure. They should constitute an aerial reserve, to be dispatched only against definitely located targets, and in such force as may be necessary. Occasions will arise where one six-plane division may be ample force for the task at hand; in fact, the employment of small striking units will be frequent, and independent missions for the division the rule rather than the exception. The usual absence of air opposition in small wars gives to an air force a freedom of action, and the ability to employ small units independently, not enjoyed in major conflicts. If air opposition should exist, it must of course be countered by fighters in the normal way.

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c. In the past, Marine air forces have been equipped generally with dual-purpose airplanes of the two-seater type, suitable for observation or scouting, and equipped with the armament necessary for limited ground attack. The observation and light bomber types were so similar that they were used indiscriminately on whatever mission came first to hand. While it is true that such diversion and substitution is still possible for emergency situations, modern design of airplanes and engines is along specialized lines and does not permit the wide latitude of tactical employment practiced with the more simple machines of former years.

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9-3. **Types.**—The composition of an air force organized for small wars operations cannot be definitely prescribed, nor can its comparative strength in relation to the ground force be determined prior to a careful estimate of the situation in each case. Much depends upon the character of the campaign, and upon the nature of the theater of operations. The final choice will be influenced by the type of air units immediately available. The discussion contained in this chapter assumes a typical situation wherein an independent brigade or force is supported by a composite group of aircraft.

9-4. **Reconnaissance aircraft.**—Primary consideration should always be given to reconnaissance types in the organization of a small wars air force. Due to the advisability of operating in small formations and to the frequent calls for air reconnaissance to be expected from the commanders of independent columns and patrols, at least twice the number of observation or scouting airplanes will be required for the support of a force engaged in a campaign of this nature as would suffice for normal operations.

9-5. **Combat aircraft.**—The inclusion of combat types of aircraft in addition to the dual-purpose scouts may be advisable or necessary in many small wars situations. In making a decision as to what types to include in the air force, consideration should be given to the existence of objectives which are beyond the capabilities of the dual-purpose scouting airplane.

9-6. **Transport aircraft.**—This type of aircraft has proven indispensable for small wars operations. The lack of railroads, improved motor roads, and navigable waterways in some of our probable theaters of operation makes the supply and transportation of troops by air more or less mandatory. Two types of transports are standard: the multiengined cabin land plane; and the multiengined cabin

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amphibian. Both should be included in the air force; both are included in the organization of the present utility squadron. The ratio of land planes to amphibians will depend upon operating conditions to be encountered.

9-7. **Organization.**—The present squadron organization of the Marine Corps is satisfactory for small wars operations. The only problem of organization is the selection of the units which are to compose the group. One headquarters and service squadron, one utility squadron, and two scouting squadrons may be considered as the minimum basic force for the support of a brigade or similar unit. To these should be added such additional transports and combat units as the situation demands. The composite group is flexible and can take care of several operating squadrons without additional overhead.

9-8. **Movement to the theater of operations.**—Aircraft should always be flown to the theater of operations whenever distance and the situation will permit. Air units so transported arrive in the minimum of time with less hazard of damage en route and are ready for immediate action upon arrival. This method presupposes available landing fields within the theater of operations protected by Marine detachments from naval vessels, or by friendly native troops. In most cases intermediate refueling stops must also be available, either on foreign airdromes or on board own aircraft carriers.

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SELECTION AND PREPARATION OF BASES

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9-9. **Main airdrome.**—*a.* The main airdrome within the theater of operations should be located within a reasonable distance of Force Headquarters and must be accessible by motor transport or on a navigable waterway. The air commander must be able to maintain close personal contact with the Force staff, and, conversely, the various departments of Force Headquarters should have easy access to the airdrome facilities. The main airdrome should be of such size as to permit heavily loaded transports to operate during adverse weather and field conditions. Existent landing fields which meet all of the requirements will seldom be encountered, and provision must be made for labor and construction materials to clear and prepare landing surfaces.

b. The ground activities of a main airdrome can be conducted under canvas, but the use of permanent or temporary buildings will greatly facilitate shop work and improve the general efficiency of the organization. Provision must be made for the underground storage of bombs and fuzes. Protected areas for the storage of gasoline and oil must be selected, and preferably fenced off from other airdrome activities. Should there appear to be danger of sabotage, it may be advisable to fence off the more vulnerable areas of the airdromes with barbed wire entanglements. Airdrome guards, in addition to those furnished by the air units themselves, may be necessary. Should the opposing forces possess aircraft, antiaircraft protection must be provided for the airdrome. For defense against sporadic air raids which might be expected from a weak and poorly trained opposing air force, the air units would be able to organize their own antiaircraft machine gun crews for emergency protection, provided equipment were made available. In other cases, it would

be necessary to arrange for a stronger defense by regular anti-aircraft units.

9-10. **Auxiliary airdromes.**—In small wars situations the use of Auxiliary airdromes is contemplated, not for the dispersion of air units for protection, but to facilitate the provision of air support for semi-independent commands. Territorial departments are organized and garrisoned by subordinate units of appropriate size. The headquarters of these departments may be situated in isolated regions with indifferent transport facilities, and so remote from the main airdrome as to seriously curtail air support during periods of unfavorable weather. Auxiliary airdromes established in the vicinity of department headquarters, lightly stocked with supplies of fuel, bombs, ammunition, and spare parts, and staffed with skeleton ground crews, enable the air commander to detach small units for the close support of departmental operations. Furthermore, the uninterrupted transportation of troops and supplies by air is dependent upon the existence and maintenance of such auxiliary airdromes.

9-11. **Advanced landing fields.**—Each detached post and outlying detachment camp should have a field of sufficient size to permit the operation therefrom of scout and combat planes. Many of these fields need have no special facilities, other than the landing area, but certain ones in key locations should be provided with storage facilities for limited amounts of fuel, bombs, and ammunition. It may be desirable to have one or more mechanics stationed at such fields. Necessary protection and assistance in handling airplanes on the ground should be provided by the garrison of the station.

9-12. **Emergency landing fields.**—These are merely possible landing places, located, cleared, and properly marked. Their primary function is to provide disabled or weather-bound aircraft with emergency landing places. They may also be useful in making evacuations of sick and wounded men from isolated patrols, or for facilitating air support in unusual situations. As many as possible of these fields should be provided throughout the area of operations.

9-13. **Specifications of landing fields.**—*a.* Under normal conditions current types of military airplanes in taking off and landing usually roll on the ground for a distance of from 500 to 700 yards. This distance will be increased by the load carried, by a rough or muddy surface, by hot dry weather, or where the airdrome is situated at high altitudes. Therefore, in order to allow a reasonable factor of safety in operating airplanes under the varying conditions,

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landing fields should have minimum dimensions of from 700 yards for all combat airplanes up to 1,000 yards for transports. The landing fields should be smooth, of firm surface, and without obstructions within or near its boundaries.

b. If obstacles such as hills, trees, or large structures are near the boundary of a landing field, its dimensions must be increased in order that the airplane may clear the obstacles in taking off or landing. Obstacles near the ends of runways must not have a height greater than one-tenth of their distance from the field, i. e., a tree 50 feet high cannot be closer than 500 feet to the end of the runway.

c. Under varying conditions of terrain it will frequently be impossible to locate or construct landing fields which will permit airplanes to land and take off in all directions. Under such conditions the runways or longer dimensions of the landing field should, if possible lie in the direction of the prevailing wind for that locality.

9-14. **Minimum size of landing fields.**—

Load	Conditions, land and take-off	Trans-ports	All other types
		Yards	Yards
Light.....	No wind.....	800	700
Do.....	10 miles per hour.....	700	600
Military load.....	No wind.....	1,000	800
Do.....	10 miles per hour.....	900	700

Runways should have a minimum width of 200 yards.

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GENERAL CONDUCT OF AIR OPERATIONS

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9-15. **Control and command.**—*a.* The senior aviator on duty with a command exercises a dual function similar to that of the force artillery commander. He commands the air force and acts as advisor on air matters to the Force Commander. The air commander will generally have an extensive detailed knowledge of the area in which operations are being conducted—first-hand knowledge which may not be available otherwise—and he should maintain close contact with the Force Commander and staff through the medium of frequent conferences. An aviation liaison officer may be detailed to represent the air commander at headquarters during the absence of the latter on flying mission.

b. Normally, all aviation attached to a small wars expeditionary force will operate from the main airdrome under centralized control. However, when distances are great and weather conditions uncertain, it may become advisable to detach aviation units to subordinate commands, to be operated from auxiliary airdromes.

9-16. **Details of operations.**—*a.* At the close of each day's operations the air commander estimates the situation for the following day, and imparts his decision to his staff and unit commanders. Formal operation orders are seldom written in advance, their substance being posted on the operations board and explained to the pilots concerned. The hour for publishing the daily orders will normally be late enough in the day to permit the commander to analyze the day's reports and receive last-minute instructions from the higher command, but should not be so late as to interfere with the crew's rest. Where possible, the board should be made ready for inspection at a given hour each evening—at 7 or 8 o'clock for example.

b. During daylight hours the airplanes and crews not scheduled for flight should be kept in a condition of readiness to take off within 20 or 30 minutes. Small wars situations often require prompt

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action on the part of the supporting air force. Night operations will seldom be required, due to the nature of the support rendered, but should occasion demand, the air units must be equipped to perform night reconnaissance or combat missions. Operations under unfavorable weather conditions will be the rule, rather than the exception, in the average small wars theater. This factor, and the necessity for operating small independent units rather than large formations, requires a large percentage of seasoned and highly trained pilots. At least half of the flight personnel should be in this category.

c. Constant two-way radio communication is desirable between the air patrols and the airdrome operations office. Present equipment will permit such communication within reasonable distances by radio telephone; radio telegraph is available in the same sets for longer range transmission.

9-17. **Reports.**—*a.* Upon the completion of each tactical flight the pilot and observer should compare notes and submit their report on a standard form which will contain a brief chronological record of the flight, including a statement of the mission; time, and place of observation; action taken; comments on the situation; copies of all messages sent or received; weather conditions encountered; ammunition expended; and casualties inflicted or suffered. Reports should be limited to observed facts, and opinions given sparingly. Deductions, except where immediate action is indicated, should be left to the Force staff or appropriate commander. It must be understood, however, that the air observer in small wars operations must be given a greater latitude in estimating a situation on the ground than he would be given in a comparable position in major operations. Often the rapidly moving situation will not permit of delay in the transmission of information to headquarters, but requires immediate positive action on the part of the air patrol commander. In such cases, of course, the written report will eventually be made, with notation of the action taken. In any event, flight reports are submitted immediately upon completion of each mission.

b. In addition to the formal reports submitted upon landing, flight crews may gather information to be dropped to troops in the field, or they may submit fragmentary reports prior to the completion of the flight. Expediency will govern the method of disseminating information, but it is doctrinal for observers to transmit important information without delay to the units most immediately concerned. The airdrome radio station guarding the flight will habitually copy all intercepted messages.

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c. The air operations office consolidates the information contained in the individual flight reports into the operations report, which is submitted daily to Force Headquarters. The air force commander is responsible for the accuracy of these reports and for their immediate transmission when urgent action is required. Normally, a brief summary of important or unusual information is telephoned to Force Headquarters immediately, or the air commander calls in in person to discuss the results of important flights. Radio reports received from airplanes in flight should be handled in the same manner, unless Force Headquarters also maintains a radio watch on the aviation frequency. Standard procedure will govern as to the priority of transmission. Formal reports are intended as a summary of the day's operations; vital information should never be withheld pending their preparation.

SECTION V

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9-18. **General considerations.**—*a.* The employment of reconnaissance aviation in small wars situations follows generally the tactics prescribed for major operations. The principal difference lies in the common usage in small wars of the reconnaissance airplane in the dual missions of scouting and attack operations against ground targets. The habitual employment of scouts in pairs or small formation, primarily for mutual protection, favors the dual mission for this type.

b. Reconnaissance may be classified as strategical or tactical as to mission; visual or photographic as to method. Visual reconnaissance will be the principal method of obtaining information in the typical small wars operation. The type of country, unusually densely wooded, and the fleeting nature of the contacts to be expected with hostile forces, will probably limit the use of photographic observation to mapping operations.

c. The effectiveness of air reconnaissance is dependent upon: the nature of the terrain, whether open or densely wooded jungle; the habits of the opposing forces with respect to concealment from aircraft; and, to a greater extent than any other factor, upon the skill and training of the observer. Generally speaking, a trained observer will detect the movement in open country of small groups, while in densely wooded country he will have great difficulty in locating a force the size of a company or larger. However, it will be very difficult for a hostile force of any considerable size to move in daylight without disclosing some indication of its presence, while the mere presence of airplanes in the area will be a deterrent to guerrilla operations. Intensive low altitude reconnaissance over restricted areas will seldom fail to discover the presence of hostile forces, although aviation cannot be expected to always furnish reliable nega-

tive information with respect to the hostile occupancy of dense woods, towns, and villages. In small wars, as in major ones, air reconnaissance supplements but does not replace, the normal measures of security.

9-19. **Strategical reconnaissance.**—*a.* Prior to the initiation of the land campaign, the commander should dispatch such reconnaissance aircraft as may be available to make a general air survey of the proposed theater of operations. This mission may include aerial mapping, verification of existing maps, the location and disposition of hostile forces, their methods of operation and supply, location of airdromes and bivouac sites, and the scouting of possible routes of advance into the interior. During this period the flying personnel will familiarize themselves with the terrain and climatic conditions of the country.

b. Strategical reconnaissance may precede the initial landing of troops, if patrol seaplanes, shipbased seaplanes, or carrier-based aircraft are available. Where time is an important factor, much strategical information can be secured in a single flight, although a period of several days may be needed for a comprehensive air survey. Landplanes or amphibians should be used for inland reconnaissance when available, although the urgency of the situation may require the dispatching of seaplanes on such missions. In any event, the importance of a thorough air reconnaissance prior to the advance inland will justify the employment of whatever type of aircraft might be available.

9-20. **Tactical reconnaissance.**—*a.* After a general picture of the situation has been obtained and the ground forces have started their movement inland, reconnaissance becomes more tactical in nature. When contact becomes imminent, reconnaissance aviation maintains a close surveillance over local hostile activities, keeps the ground commanders constantly informed, and furnishes such combat support as may be urgent. The principal task of aviation operating in close support of an advancing column is to supplement the normal security measures taken by the ground forces against the possibility of surprise. Ambush by guerrilla bands is a constant menace. Airplanes should reconnoiter ahead of the ground columns, paying particular attention to those localities recognized by the skilled observer as being dangerous ambush sites. This precaution will protect the ground units from surprise by a *large* force. It must be remembered, however, that detection of *small* forces of irregulars, not in uniform and with no distinctive formation, in heavily wooded country, or in a

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jumble of mountain boulders, is extremely difficult and largely a matter of luck for even the most skilled air observer. The habitual presence of airplanes in the vicinity of our column will discourage operations of guerrilla forces, even though they escape detection, hence it is advisable to conduct more or less continuous reconnaissance throughout the hours of daylight over the area occupied by our advancing forces. Flights at irregular intervals may accomplish the same purpose with more economy of force.

b. Tactical reconnaissance immediately prior to combat becomes more intensive and is centralized to a definite locality. Detailed information of the hostile positions, strength, movement, and dispositions will be sought out by aircraft and communicated to the friendly ground units without delay. Ground observation will usually be very limited because of the nature of the terrain, and observation of the enemy position from the air may be absolutely essential for the formulation of plans and for the conduct of the action. Airplanes engaged in close reconnaissance missions may participate in combat by employing bombs and machine-gun fire against objectives particularly dangerous to ground troops, especially when requested by the ground commander. It should be borne in mind, however, that combat is secondary to reconnaissance, and attacks which are not coordinated with the ground force action should generally be avoided.

9-21. **Infantry mission.**—*a.* In small wars there does not exist the same line of demarcation between the tactical reconnaissance mission and the infantry mission as is prescribed in air tactical doctrine for major operations. The functions of each merge into the other. Perhaps the best definition of the term "Infantry mission," as understood for small wars, refers to a daily or periodic air patrol which flies over a given area and contacts all the ground patrols and station garrisons located within this area. Tactical reconnaissance is conducted by these air patrols incident to their passage from one ground unit to another, and they are prepared to attack hostile ground forces upon discovery. Their primary mission, however, is to maintain command liaison with detached units of friendly ground forces, and to keep these forces informed of the situation confronting them. The infantry airplanes may be used for the emergency transport of men and supplies, or they may be called upon to assist some ground patrol in a difficult situation by attacking the hostile ground force. In short, the airplanes assigned to the infantry mission, operating habitually in pairs, support the ground forces in whatever manner is expedient, regardless of their normal function in major warfare.

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b. Occasions may arise where it is desirable to dispense with air support for some special operation. Considerations of secrecy of movement for some ground unit may justify the responsible commander in making such a decision. Should it be decided that air support will not be furnished a ground patrol, the patrol commander should be so informed, and pilots instructed not to communicate with this unit, nor to disclose its presence in any way. However, to avoid being fired on, the ground patrol should display an identification panel whenever possible. While the infantry airplanes may disclose the position of a ground patrol to the enemy through efforts to establish a contact, it is likewise possible to deceive the enemy as to the true location of our forces by having the airplanes simulate contact with fictitious units in various other places.

c. Contacts between the infantry airplane and ground units are established by means of panels and drop messages, and where open ground is available, by message pick-ups. The use of radio will be more prevalent in the future than has been the case in the past.

9-22. **Special combat missions.**—Airplanes engaged in reconnaissance missions will be prepared to attack hostile ground forces, in order that emergency combat support may be rendered friendly ground units without delay. In small wars operations targets are apt to be fleeting and time may not permit the dispatch of regular attack units. If the enemy is to be struck while he is most vulnerable, he must be attacked immediately by the air patrol which discovers him. When time permits, a contact report should be made, but the patrol leader must make the decision in each case. This doctrine is applicable mainly to jungle warfare, against small groups of irregulars, where the offensive power of a pair of scouting airplanes would be of some avail. In more open country, against larger and better organized forces, search-attack missions by small air units are not generally recommended. In any event, it must be remembered that the primary mission of reconnaissance airplanes is not combat, but the procurement of information, and the mere existence of offensive armament should not encourage their needless diversion to combat tasks.

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9-23. **General discussion.**—The primary mission of combat aviation in a small war is the direct support of the ground forces. This implies generally that all combat aviation will be used for ground attack. Air opposition will usually be nonexistent or weak, and friendly aviation should be able to operate against hostile ground troops at will. Fighting squadrons, if included in the force, may be employed as light bombers; while the bombing squadrons will find more use for their lighter bombs and offensive machine guns than they will for their major weapon—the heavy demolition bomb. Attack aviation, or its substitute, the dual-purpose scout, is the best type to cope with the targets likely to be encountered in small wars. Troop columns, pack trains, groups of river boats, occupied villages of flimsy construction, mountain strongholds, and hostile bivouac areas are all vulnerable to the weapons of the attack airplane—the light bomb and machine gun. Occasionally, targets of a more substantial nature may require the use of medium demolition bombs. As the type of campaign approaches the proportions of a major conflict, so will the employment of the different types of combat aviation approach that prescribed for major warfare. For the typical jungle country small war, the division of missions between the different types is not so clearly marked.

9-24. **Fighting aviation.**—This class of combat aviation will be included in the small wars air force when there exists a possibility that opposition will be provided with military aircraft. The fighting squadrons should be used to neutralize the hostile air force early in the campaign. Thereafter, the fighting units could be made avail-

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able as a part of the general air reserve to be employed for ground attack against particularly favorable targets.

9-25. **Attack aviation.**—The employment of attack aviation (or dual-purpose scouts acting as such) differs little in tactics or technique from the doctrine prescribed for major operations. Such units as are available should be held in central reserve to be dispatched only against definitely located targets. The six-plane division, instead of the squadron, will usually be ample force to employ against the average small wars objective.

9-26. **Bombing aviation.**—The medium dive bomber is a versatile weapon, and although there will probably be little call for the employment of the 1,000-pound bomb against small wars objectives, this type of aircraft can also carry the lighter demolition and fragmentation bombs, and is armed with offensive machine guns. Bombing units may thus be employed against personnel and the lighter material targets usually assigned to attack aviation. Legitimate targets for bombing units include forts, village strongholds, railroad rolling stock, motor trains, and the larger supply boats; secondary targets are troop columns and pack trains. When attack units are available for strafing missions, the bombing squadrons should, like the fighters, be considered as part of the general air reserve, and their use against unsuitable targets avoided.

9-27. **Attacks on troop columns and trains.**—*a.* Troops and animal trains marching in close formations on roads or trails are extremely vulnerable to surprise air attack. Such attacks should be carefully timed to hit columns as they pass through narrow defiles formed by the hills or jungle growth. If the terrain permits, a low altitude strafing attack is preferable, as it favors surprise, and permits a more effective employment of air weapons. An attempt should be made to enfilade the column with machine-gun fire and with fragmentation bombs dropped in trail, repeating the attack as required. Should the hostile column be encountered in very mountainous country it may be necessary to employ the diving attack, each airplane in the column selecting a part of the target, in order to cover the whole effectively on the first assault. Surprise will be more difficult to obtain when the diving approach must be used, although a skilled leader should be able to launch an effective assault without giving the enemy more than a few seconds' warning. Repeated diving assaults are made as required, although the objective may be much less vulnerable after the first surprise attack. In the attack of a long column which cannot be covered in one assault by

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the air force available, the head of the column should always be chosen as the initial objective, regardless of the method of attack employed. This will ensure the maximum of delay and confusion, and facilitate repeated assaults.

b. The successful attack of a column by an organized air unit is dependent upon the prompt transmission of information by the reconnaissance agency which makes the discovery. Small columns of mobile troops will usually be attacked on the spot when discovered by reconnaissance patrols. If the importance of the target and the nature of the terrain appears to warrant the delay necessary to launch a concentrated attack, the hostile column should be kept under surveillance, *if it can be done without sacrifice of surprise*, and a full report be made by radio to the air commander. Upon the receipt of such a message the air commander should communicate with the Force Commander while airplanes are being prepared, advising him of the contemplated action. Speed of movement and surprise of execution will be the essence of success in the air attack of a column.

9-28. Support of a marching column.—*a.* When the size of a column, or the hazardous nature of its advance makes the assignment of combat aviation advisable, two methods of general support are possible. A division of airplanes can be kept continuously in the air over the column; or the column can be contacted at short intervals by a combat patrol of appropriate size. In most cases the latter form of support will suffice, bearing in mind that the column would normally have a pair of infantry planes with it at all times. The reconnaissance airplanes seek out ambushes and enemy positions along the route of march; the air combat units assist the ground forces in routing hostile opposition. Air attacks may be coordinated with the ground attacks if communication facilities and the tactical situation permit, or they may be launched independently to prevent hostile interference with the march of the supported column.

b. Ground commanders supported by aviation should be careful when in action to mark the position of their advanced elements by panels, and where the force is held up by fire from a given locality they should also indicate by the proper panel signal the direction and estimated distance to the enemy position. The ground commander should also indicate, by whatever means is expedient, just when and where he wishes the fire of aviation to be concentrated. In short, he requests fire support in the same manner as he would from artillery. In addition to complying with these requests, the air commander will be constantly on the lookout for the location and move-

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ment of any enemy forces in the vicinity, and will be prepared to exploit any success of the ground forces by the immediate pursuit of retreating hostile troops.

9-29. Attack on hostile positions.—Combat aviation may be used as a substitute for artillery in the organized attacks of hostile strongholds. As such it provides for the preliminary reduction of the hostile defenses by bombing, for the interdiction of lines of communication and supply, and for the direct close-in support of the attacking infantry by lying down a barrage of machine-gun bullets and fragmentation bombs on the enemy front lines. All these missions cannot of course be performed by one air unit; schedules of fire must be worked out, timed with the infantry advance, and executed by successive waves of aircraft. Details of this form of air support are worked out by the air commander, using such numbers and types of air units as are available and necessary. The ground commander must submit a definite plan if air attack is to be coordinated; otherwise, the air commander on the spot must use his force as opportunity offers. In minor attacks the latter procedure will probably be the rule.

9-30. Attacks on towns.—When hostile forces seek the shelter of occupied towns and villages, air combat support cannot be given the attacking troops without endangering the lives of noncombatants. However, it may be feasible to drop warning messages to the inhabitants, and allow them sufficient time to evacuate before initiating an attack. Once the attack is decided upon, aviation again performs the role of artillery. One bomb, penetrating the roof of a small house before exploding will effectively neutralize all occupants; those not being killed or wounded will immediately escape to the streets to become targets for machine guns. Continuous bombing forces the defenders from their shelters and facilitates their capture or defeat by the ground forces. The tactics and technique involved in the air attack of a town do not differ materially from those used against any defended position, except that medium dive bombers may be used here to better advantage than they could be in most small wars situations. Care must be taken not to endanger advancing friendly troops.

9-31. Aviation as a mobile reserve.—The employment of aviation as a reserve for infantry in battle is merely an application of the principle of quick concentration of superior force at the decisive point. The mobility and striking power of combat aviation favors such employment in minor operations.

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AIR TRANSPORT

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9-32. **General considerations.**—*a.* The transportation of troops and supplies becomes of increasing importance as the ground forces in a small wars campaign work inland, away from the navigable waters and railroads usually found in the coastal regions of tropical countries. Roads for wheeled transport are apt to be poor or non-existent, and dependence for supply of certain units may have to be placed on slow animal transport. As distances from the base of operations increase, this form of supply tends to break down, especially during rainy seasons, and the most advanced of the ground forces may be partially or altogether dependent upon air transport for months at a time. The air force, then, should include a much greater percentage of transport aircraft than is required for the normal needs of the air units themselves.

b. Air transportation is justified only when more economical forms of transport will not serve; it should be considered only as an emergency supplement for land transportation, and its use rigidly controlled by Force Headquarters. Factors which may influence the decision to use air transport are: unfavorable condition of roads and trails; long distances through hostile territory necessitating the provision of strong escorts for land transport; and emergency situations requiring immediate action. When air transport is planned, the air force will usually establish regular schedules for transport airplanes. Force Headquarters will arrange for routine and priority listing of supplies and replacements to be forwarded to outlying stations. Routine evacuation of the sick and wounded is accomplished on the return trips, and only occasionally should the necessity for emergency flights arise. The air force should generally have priority in the use of air transport for its own requirements. Where small air units are maintained and operated on outlying auxiliary fields, the

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problem of supplying fuel, ammunition, bombs, and other supplies becomes a considerable task.

9-33. Troop transportation.—*a.* Possibilities for the transportation of troops in airplanes are limited only by the number of transport aircraft available and the existence of suitable landing fields. In small wars operations, the ability to concentrate forces quickly in any part of the theater, through the medium of air transport, may materially influence the planning of the campaign, and offers a solution to the grave difficulties of moving forces through a country devoid of communication facilities. Small forces, not to exceed a battalion, can be transported and supplied by air everywhere within the operating radius of the aircraft, provided landing facilities are available. The utility squadron of eight transports will carry approximately one rifle company per trip, including combat equipment. While these figures indicate the maximum troop movement possible with the amount of air transport normally provided, they by no means imply that movements on a larger scale are impractical. In the typical campaign of this nature, the movement of a force larger than a company will be exceptional.

b. Troop commanders of units ordered to move by air should be advised in advance of the weight limitations per man, in order that excess equipment may be stored before embarkation. Movement orders should be specific as to time of arrival on the airdrome; details of loading will be supervised by a representative of the air operations officer, who will be guided, insofar as possible, by the principle of tactical unity in the assignment of troop spaces. On outlying airdromes, the senior aviator present is charged with these details and is responsible that safety limitations are observed. While in flight, the regularly assigned pilot of the aircraft exercises command analogous to that of the commander of a surface vessel on which troops are embarked.

c. A general policy classifying persons and articles considered eligible for air transport, with priority ratings, should be adopted and published by Force Headquarters. Permits for air travel should be issued by Force and Area Commanders, and passages coordinated with scheduled or emergency movements of transport airplanes. Requests for special airplanes should be rigidly controlled by Force and Area Commanders.

9-34. Transportation of supplies.—*a.* Generally speaking, the transportation of bulky supplies by air is economical only for long hauls in regions of poor communication. Questions of tactical expe-

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diency will often outweigh those of economy, however, and where air transport is available it will normally be used to capacity.

b. In order to handle properly the many calls for air transportation of supplies, regulate priority, and expedite the more urgent shipments, a special shipping office, under the control of the air commander, should be maintained at the base airdrome. This agency acts as a regulating depot between the rear echelon and the units in the field. It receives and prepares shipments, loads and unloads the airplanes, and arranges for the storage and delivery of incoming shipments. Adequate storage and transportation facilities should be made available. Shipping agencies should also be provided at the more important auxiliary airdromes if the volume of supplies appears to warrant such installations. Personnel for these regulating stations is supplied by the Force Quartermaster, as requested by the aviation supply officer who is responsible for the preparation and loading of all air shipments. The air operations officer is kept informed at all times regarding amounts and priorities of shipments, and will issue the necessary instructions for the actual loading of the airplanes.

9-35. **Dropping of supplies.**—*a.* Supplies transported by air may be delivered by landing, or by dropping from the airplane while in flight at low altitude. To avoid undue loss by breakage, articles to be dropped must have special packing. Skilled personnel can wrap almost any article so that it will not be injured by contact with the ground after being dropped. Explosives, detonators, liquid medicines, etc., may be swathed in cotton and excelsior and dropped safely; water in half-filled canteens may be dropped from low altitudes with no protection other than the canvas cover; dry beans, rice, sugar, and similar supplies may be dropped by enclosing a half-filled sack in a larger one. The governing principle in packing is to arrange for cushioning the impact and for expansion within the container. Machine guns and similar equipment should be disassembled prior to packing for air drops, although in emergency such loads could be dropped intact by using parachutes. In short, it is possible to drop safely any article of supply provided it is properly packed.

b. The dropping ground should have a clear space at least 100 yards in diameter, with no obstructions which would prevent the airplane from approaching at low altitude and minimum speed. An identification panel should mark the center of the area. Men and animals must be kept clear, or casualties will occur from men being struck by heavy falling articles.

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c. Emergency supplies of medicines, food, small arms ammunition, clothing, money, and mail are usually transported to detached units in the field by the daily air patrols. The observers stow the articles in their cockpits and drop them when contact is established. The standard scouting airplane will safely handle an overload equivalent to the weight of an extra man, provided room can be found for stowage near the center of gravity of the plane. Unless a landing can be made, however, the load is limited to what the observer can stow in his cockpit.

9-36. **Evacuation of sick and wounded.**—The evacuation by air of the sick and wounded personnel reduces the percentage of permanent casualties, relieves the units in the field of responsibility for their care, and enhances the morale of troops engaged in patrolling or garrisoning remote areas. Air ambulance service should have priority over all utility missions, and should be second only to urgent tactical requirements. The normal flow of sick and slightly wounded personnel are handled on the return trips of regularly scheduled transports, or by smaller airplanes from the more remote districts where no transport fields exist. When it is known in advance that casualties are to be evacuated, a medical attendant should accompany the transport or ambulance plane on its outbound trip in order that medical escort will not have to be provided by the unit in the field. Emergency cases will be handled by the senior aviator present without waiting for formal authority for the flight. Stretcher cases can be moved only by transport or ambulance planes; the patient must be able to sit up if evacuation is to be effected from a small field by a two-seater scout.

