CHAPTER 11

SPECIAL OPERATIONS

Section I. ATTACK OF A FORTIFIED POSITION

GENERAL

724. a. A fortified position normally will consist of a series of strongly organized localities disposed in great depth and width in such a manner as to be mutually supporting. Exceptionally it may be a single, strongly organized locality. In either case, the main position ordinarily will be composed of a series of mutually supporting major works, consisting of gun emplacements, troop emplacements, tank obstacles, antitank and antipersonnel mine fields with wire entanglements. Chemically contaminated areas may be located in front of and between these major works to cover dead spaces which direct fire weapons cannot reach from the main fortifications. Lightest fortifications may be found in areas possessing difficult natural terrain. Specially trained troops with special equipment may find such areas the easiest for the penetration of the fortified position.

b. The main battle position will be outposted. The outpost system may consist of concrete and steel fortifications, field fortifications, artillery, automatic weapons and troop emplacements, tank traps, and obstacles disposed in great depth to the front and flanks. Mobile reserves will be held under cover pending their use in a counterattack and the position will be served by well developed signal communication systems.

c. Whenever possible, fortified positions are bypassed and later reduced by siege or by an attack from the rear, following an enveloping maneuver by ground or airborne troops. When, because of secure flanks, isolation is impossible by an initial enveloping maneuver, and sufficient airborne forces are not available, fortified positions must be reduced by direct attack against a weak area. The penetration is followed by envelopment of the created flanks to isolate the separate parts.

725. a. The attack of a fortified locality may be divided generally into four phases. In application, related phases may overlap, particularly on weaker parts of the front. Immediate exploitation of the success of each phase is imperative. These phases are—

(1) Reducing the hostile outpost system and gaining close contact with the main position. This is comparable to the development of a defensive position except that the strength of the outpost positions will frequently necessitate a full scale attack.

(2) Breaking through the fortifications at the most favorable point.

(3) Extending the gap by isolating and reducing hostile emplacements on its flanks.

(4) Completing the action by moving mobile reserves through the gap to complete the encirclement and isolation of remaining fortifications while continuing the attack against them from the front, flanks, and rear.

b. Air bombardment should, and the action of airborne troops may, precede or be a part of any of the above phases. For details see FM 31–50.

726. The basic principles involved in the attack of a fortified position are the same as those for any other attack. The principal differences that distinguish the rupture of a fortified locality from the penetration of any other hostile position are—the increased special training and combat superiority required, the thoroughness of preparations, the types of special equipment and troops required, and the comparatively narrow frontage initially assaulted.

727. Air superiority is necessary in operations against a fortified position. The attack of hostile reserves by combat aviation both prior to and during the attack is of material assistance in isolating the area under attack. Under certain circumstances supporting aviation attacks selected areas in close support of the assault. It may also supplement artillery fire on installations in the fortified position or attack hostile artillery or lines of communication. Saturation bombardment of the area of assault immediately prior to the attack may also be employed.

728. a. Reconnaissance must develop detailed, exact information. The extent of the main and outpost positions to include their depth and width, and the location and character of emplacements and their dead spaces must be determined. The location and character of field and antiaircraft artillery positions, observation

posts, tank traps, antitank and antipersonnel mine fields and other obstacles must also be located. The relative advantage of the various approaches must be worked out from the viewpoint of the defender's effectiveness including those areas in rear of the locality which favor attack from the rear once the penetration has been achieved. To obtain the best results the efforts of reconnaissance and combat aviation must be coordinated with those of ground reconnaissance, including engineers.

b. Air photos are taken of the entire locality at successive intervals to determine the initial hostile defenses and the progress of any changes being effected. Important localities are outlined heavily and indicated clearly on the photographs; copies are distributed down to and including the smallest combat units which are to operate in the area covered, together with such intelligence summaries as are needed by each echelon of the command. These reconnaissances are continued throughout all phases of the operations.

729. a. Based on the results of reconnaissance and the task assigned, the commander determines what special troops, equipment, combat power, and training will be needed to break through the hostile system. He organizes his command into its tactical groupings and assigns missions to each.

b. The organization of the command into tactical groupings provides for self-sustaining combat units down to and including battalions, so that each echelon of attacking troops will be able to exploit local successes promptly without reference to the next higher unit, and to facilitate the advance of adjacent units whose progress is not so rapid. Organization and plans must also include provisions for the destruction or sealing of emplacements so as to preclude the enemy regaining their use. Plans must provide for positive means of signal communication at all echelons of command.

730. a. The attacking echelon is made up of specially selected troops and weapons. Normally, this attacking echlon will contain infantry, engineers, flat-trajectory guns with high muzzle velocity, chemical troops, tanks, tanks equipped with flame throwers, and engineer armored vehicles.

b. Engineers equipped with demolition equipment will prepare lanes through mine fields, wire entanglements, tank traps, and other obstacles, and will assist the forward movement of the attacking echelon. Searchlights may be used for illumination during night operations.

c. Chemical troops will lay smoke screens, fire high explosives, incendiaries or other chemicals, and open lanes through contaminated ground.

731. Assault detachments rehearse the contemplated operation on terrain and against fortifications similar to those to be encountered. The size and number of assault detachments needed in the preliminary operations depend on the size and number of emplacements which must be reduced. Assault detachments may be given the mission of reducing one emplacement or a series of emplacements. Each tactical grouping must have enough trained assault detachments with sufficient special equipment to insure the reduction of all emplacements in its zone of action.

732. Adequate reserves are concealed in rear of the attack echelon to insure success and to meet hostile reaction. Sufficient artillery of all calibers required to reduce the outpost system supports the attack echelon. Artillery of the heavier types assists the preliminary operations by constant bombardment of the hostile main position, paying particular attention to hostile artillery positions and emplacements which can bring fire upon troops engaged in preliminary operations.

733. Every effort and means is employed to assure secrecy in the movement to attack positions.

734. All forces not required in the preliminary operations are held concealed beyond the range of hostile medium artillery, and continue training and preparations required for the attack against the main fortifications.

CONDUCT OF ASSAULT

735. The advance through the hostile position is a step-by-step process, determined by the progress of the assault detachments. It must be rapid enough to prevent the enemy from reestablishing the continuity of his front by recoordinating his fires or by counterattack.

736. a. Fire of heavy artillery is directed upon fortified works and obstacles. The fire of ligater, flat-trajectory weapons, and of flame throwers is directed against embrasures to neutralize the hostile weapons. Flat-trajectory artillery with high muzzle velocity, using direct laying, is employed to penetrate emplacements and armored turrets.

b. The assault detachments, screened by smoke and taking advantage of accidents of terrain and dead spaces outside the angles of fire, push through and around emplacements under protection of the fire of all available supporting weapons and other troops in the attach echelon. Close coordination exists in the infantry-artillery-tank-engineer-air team. The assault detachments are protected by fires and smoke placed on other localities from which hostile reaction may interrupt their movement, especially flank positions and troop emplacements not being attacked. These assault detachments utilize special demolition charges to explode mines, create gaps in wire, and reduce concrete emplacements.

737. a. Commanders of attack echelon units must be forward at the localities being attacked to exercise a direct influence. Division or lower commanders are well forward during the attack.

b. The speed of the advance through the outpost system depends in large measure upon the coordination maintained by the assault echelon commander. Alternative measure must be taken promptly when planned details of the assault are unsuccessful. As the gap is widened and the penetration is deepened situations will arise where the initiative, vigor and boldness of subordinates must be allowed full play.

738. Liaison among tanks, artillery, the attacking troops, and cooperating aviation is maintained by all possible means. Extensive radio and wire nets, messengers, visual signal stations, and pyrotechnics are employed to insure timely transmission of information and orders.

739. Emplacements are reduced in scheduled order successively by the assigned assault detachments. When an assault results in prolonged hand-to-hand fighting, local supports are rushed forward to assist the assault detachments. Each assault detachment is provided with reserves and local supports who follow up the advance closely, disposed for rapid passage through the detachment in the event the attack results in serious disorganization of the defense. Any halt is dangerous because of the speed with which a local hostile counterattack can be organized and launched, supported by weapons which are already in position and highly coordinated. Small isolated resistances which have been bypassed are reduced by special mopping-up detachments from general supports and reserves.

740. During the assault, supporting fires are concentrated on those hostile targets which constitute the greatest danger to the success

of the assault and a renewal of the advance; special attention is directed toward locating and bringing fire to bear on any hostile armored or local reserve elements forming for counterattack. When the advance is resumed, supporting fires conform to the movements and needs during the advance to the next emplacements.

741. During the advance to the next emplacements, units are reorganized as completely as time and facilities will permit. Additional personnel, equipment and material required against the next emplacement are brought forward. Essential adjustments are made in groupings and maneuver and fire plans.

THE PENETRATION

742. While the preliminary operations are in progress, preparation for the penetration of the main fortifications is continued. New air photographs of the position and intelligence summaries are issued as necessary. All equipment, weapons, assault detachments, and other troops to be employed are in readiness to move forward to positions under cover of darkness, fog, or smoke by the time the preliminary operations are completed. Concealed routes to positions should be used.

743. The point of initial penetration of the position is selected carefully; it will be determined frequently by the existence of terrain and roads which favor the employment of armored forces in the break-through and exploitation.

744. The width of the front of penetration is limited by the amount and types of artillery and aviation available, the possibility of the employment of armor, and the number of trained assault detachments available.

745. Airborne troops may be landed within and in rear of the larger fortifications on the front of the main attack, to seize, hold or destroy vital installations or areas; to block the movement of reserves; and to assist assault troops by attacking the fortifications from the rear. If airborne troops are used, their operations must be coordinated with all other components of the attacking force. Special attention must be given to coordination with artillery, other supporting arms, and cooperating aviation.

746. a. The amount of ammunition, artillery, and cooperating aviation available, the degree of surprise possible, and the depth of

the fortifications on the front of the penetration will determine the length and intensity of preparatory fires prior to the assault. The bombardment of the whole front by artillery and aviation continues from the opening of the preliminary operations.

b. At some time prior to the hour of attack, the bulk of all supporting fires, ground and air, is concentrated on the fortifications on the front of the initial penetration. Combat aviation attacks hostile reserves, artillery, and sensitive points in the fortifications which artillery cannot, or does not, reach. Heavy and medium artillery is concentrated on points in the fortifications which offer the greatest danger to success of the penetration. The fire of flat-trajectory weapons is directed against lighter obstacles and embrasures in the fortifications. The use of smoke must be carefully coordinated to preclude interference with supporting fires.

747. Preparation fires on the front of penetration are lifted on a time schedule or on signal from the commander of the assault force, depending on orders from higher authority. The bulk of the preparation fires then shifts to the next fortifications to be reduced, or is placed to meet hostile reaction to the initial assault. Fires to include smoke are maintained against fortifications not subjected to assault.

748. Once a breach has been effected and the emplacements on the initial front reduced, additional assault detachments are sent into the gap at once. They attack the flanking works in each direction and widen the base of the penetration, while the assaulting force deepens the penetration by advancing and attacking the next fortifications in its zone. Troops in rear of the assault force are pushed rapidly through the gap created.

749. a. The location of the flanking fortifications and troops within or nearby facilitate the rapid organization and launching of a strong enemy counterattack. The strength of fortified positions usually will be augmented by strong field fortifications which must also be taken or destroyed. Enemy reserves frequently will be disposed in strong covered positions for such counterattacks. Delay in attacking the flanking fortifications and reinforcing the advance of the assault force may result in a serious reverse and the loss of the assault force by hostile counterattack. Troops in the zone of the flanking works move to the support of the assault detachments as rapidly as fortifications are neutralized.

b. Unless required by the attacker, captured enemy armament must be removed or destroyed and gun emplacements demolished

to prevent their recapture by the enemy or their use by hostile resistance forces.

EXPLOITATION

750. Based upon prearranged plans, highly mobile forces are prepared to exploit the penetration. These forces usually will include both reserves and units disengaged from the attack. Plans and preparations must include provision to motorize infantry units. When the fortified position has been breached throughout its depth, these forces immediately are pushed through the gap. The shoulders of the penetration are defended against hostile counterattacks. Protection is given to troops passing through the gap by troops holding the shoulders of the penetration, by troops landed by air in rear of the fortifications, and by combat aviation. Armored forces lead the way.

751. **a.** Once through the gap, armored forces spread out fanwise, moving rapidly on all roads leading toward the hostile rear. Armored forces disrupt hostile lines of communications, block the movement of reserves, and complete the demoralization of the enemy. Closest cooperation by and coordination with aviation is demanded. The principal targets for cooperating aviation are hostile reserves, and troops attempting to block the movement of the exploitation forces.

b. Following the lead of the armored forces, the remaining troops in the exploiting force move rapidly to complete the isolation of the remaining fortifications. Such forces also participate in the complete destruction of the hostile field forces.

c. Suitable forces must be assigned to the mission of keeping the gap open against anticipated hostile efforts to close it.

Section II. OPERATIONS AT RIVER LINES

GENERAL

752. Owing to the restrictions which they impose upon movement and maneuver, wide and unfordable rivers exercise considerable influence on military operations. They constitute obstacles to an attack and natural lines of resistance for defensive action. They assist in screening against hostile ground reconnaissance and in providing security against hostile armored attack. The attack across unfordable rivers requires special preparations, both technical and tactical, proportionate to the size of the river and the relative strength of the opposing forces.

753. Reconnaissance of a river line is essential both in attack and defense. The strength of a river line increases with the width and depth of the river and the velocity of the current. Other considerations with a tactical and technical bearing are: the banks, adjacent terrain, islands, and tributaries including cover, concealment, and routes of communication on both sides of the river. The river bottom, approaches to the river bank, practicability of fords, the danger to be expected from ice floes, floating mines, and natural or artificially caused floods also must be considered.

754. Coordination with combat aviation is essential in all large offensive operations at river lines. Local air superiority is gained and maintained during the operation. River crossings sometimes can be greatly facilitated by use of airborne troops.

ATTACK TO FORCE CROSSINGS

755. a. The defense of a river line sometimes can be outflanked. By demonstrations, strong in artillery and air activity, carried out at various points on the river line, an attempt is made to deceive the enemy as to the projected point of crossing, while a strong mobile force makes an unopposed crossing elsewhere and launches an attack to envelop the hostile flank before the enemy can readjust his dispositions.

b. When the enemy is not actually holding a river line, an effort is made to anticipate him in the possession of the necessary crossings. Mobile forces are advanced quickly on a broad front to seize the desired crossings and to occupy the dominating terrain on the far side in order to protect the crossing of the main body. Where river lines cross the lines of advance, orders must emphasize the necessity for speed and aggressive action to secure crossings.

c. Armored divisions and other mobile units effect river crossings by advancing rapidly and boldly to seize the necessary crossings and bridgeheads on the enemy's side of the river. If this is impossible, they effect wide detours to weakly defended or undefended points on the river and then cross. If all crossings are destroyed, armored units may be ferried until bridges can be constructed.

756. Troops transported by air and armored and motorized units may be employed to seize and hold important crossings until the arrival of leading elements of the main forces.

757. a. When the enemy is already in possession of a river line which cannot be turned, the crossing must be forced. Under favorable conditions, a river crossing may be forced by rapid and audacious methods directed simultaneously at a number of possible crossings. This may be accomplished by a bold attack of task forces, including troops transported by air and mobile ground forces strong in armor, amphibious vehicles and other stream crossing equipment.

b. In the absence of such favorable conditions, a more deliberate operation is required. Hostile troops are driven promptly across the river, and systematic preparations to force a crossing are initiated.

758. In an operation involving the crossing of a river, the actual crossing is a means, not the end sought. The immediate purpose is to get across quickly and economically and establish a bridgehead which will protect the crossing of the remainder of the command.

759. a. In establishing a bridgehead in river crossings for a large force there are usually three successive phases—first, elimination of the enemy's capability to place effective direct fire on the crossing front; second, elimination of the enemy's capability to place observed fires on the selected crossing sites; and third, elimination of the enemy's capability for placing any effective sustained fires of ground weapons on the selected crossing sites and on the space required on the enemy's side of the river for maneuver of the command.

b. Attainment of the first objective facilitates crossing by assault on storm boats, foot bridges, and ferries. Attainment of the second objective required for the second phase, coupled with local air supremacy, makes possible the construction of bridges to cross heavier loads. Attainment of the third objective coupled with air supremacy, gives uninterrupted use of crossing means over the river, permits the protected maneuver of troops in the furtherance of their mission, and facilitates the accumulation of supplies on the enemy side of the river. The assignment of river crossing objectives or missions to units must allow sufficient freedom to subordinate commanders so that successes can be exploited.

760. a. Reconnaissance of river lines across the routes of advance is begun by staff and engineer officers at an early stage of the operation. Air photographs showing the nature of the river and the bridge destructions effected by the enemy enable the commander to make an early estimate of the possibilities of crossing

and the means required. Ground reconnaissance of the river line can be executed ordinarily only after hostile covering forces on the near side of the river have been driven across the river.

b. Reconnaissance provides detailed information and furnishes the basis for the final selection of the crossing points and for the execution of the necessary preparatory measures. Based on the results of reconnaissance and on the tactical situation, decision is made as to the front or fronts on which the crossing will be forced.

761. In general, the attacker should operate on a wide front with several determined attacks at separated localities. The main effort will include one or more of those attacks. The defender is thus deprived of the capability of bringing the mass of his artillery, or his main counterattack, on more than one of the crossings. Secrecy in preparation and deception of the enemy as to the time and place of the main crossing are essential. Feints, deceptive use of smoke, or demonstrations are employed to deceive the enemy.

762. a. In the selection of crossing fronts and the crossing points, both tactical and technical requirements are considered. The sites selected as a consequence normally will be based upon the combination of requirements which best fit the specific situation. In this connection the surprise achieved by the selection of an unfavorable crossing front must be weighed.

b. Tactically, the attacker seeks concealment for his movement to the river; concealed assembly areas; a long stretch of river bordered by trees or low hills; undefended crossing points and good avenues for advance, especially roads, on the enemy side of the river. Dominating ground on the attacker's side of the river favors artillery observation and support of the attack by overhead fire. A salient in the river line toward the attacker favors concentration of combat power and flanking fire on enemy troops defending the salient. While the attacker of this type of salient can rest his flanks on the river after crossing, he may be forced to attack on a narrow front to break through a strong defense at the base of the salient

c. Technically, the attacker seeks a moderate current; a water area unobstructed by islands, bars, and reefs; suitable banks; good approaches on both banks; and easy connection to the existing road net. Old bridge sites frequently are advantegeous since they normally afford a road net, good approaches, and sometimes ruins on which to build a temporary bridge.

763. Having selected the fronts on which the crossing is to be made, the responsible commander formulates his plan of action for the crossing.

764. Tactical groupings are assigned to each crossing front and are given instructions regarding time of crossing, objectives, zones of action, assistance to adjacent units, and type and location of bridges to be constructed. Troops also may be assigned to make feints or demonstrations at points other than the main crossing fronts so as to deceive the defenders and to draw them away from crossing fronts. A portion of the command is held in reserve to exploit the most successful crossing.

765. Engineer troops and matériel must be made available early in the planning stage of the operation so that combined training can be accomplished, reconnaissances can be made, and equipment prepared and properly disposed. Nondivisional engineer troops with the necessary stream crossing equipment, normally are attached to, or placed in support of, the leading assault units making the crossing on each front. A reserve of engineer troops and matériel also must be provided to erect bridges or to assemble raft ferries, to reinforce the means of crossing at decisive points, to replace losses, and to do other engineer work such as maintenance and extension of the road net.

766. a. The unit engineer of the responsible commander is charged with all technical preparatory measures for the crossing and for distribution of engineer troops and matériel, the construction and guarding of bridges, and the regulation of traffic thereon.

b. The location of engineer matériel prior to the crossing, particularly ponton bridge equipment, must be carefully concealed. Discovery of its presence may disclose the plans of the commander to the enemy. It forms a remunerative target for both combat aviation and artillery, and should be given protection including antiaircraft defense.

c. The command post of the unit engineer is connected by signal communication with the command posts of the responsible commander and the commanders on each crossing front.

767. a. Once a tactical group is assigned to a crossing front, its commander and the commanders of troops supporting the crossing on that front direct staff and subordinate officers to reconnoiter the ground over which they will operate. Routes of approach, assembly areas, actual crossing points, and routes thereto must be located. Plans must be prepared for scheduled fires and

other details of the crossing operation. The volume of reconnaissance involved requires preparation of coordinated reconnaissance plans, including deceptive measures to meet restriction imposed in the interest of secrecy.

b. Signal officers reconnoiter the front of crossing for existing wire lines on the near side of the river and determine the need for additional wire lines. They also determine the possibilities of the extension of these lines on the far side. Prior to the crossing, normal radio traffic must be carefully maintained to preserve secrecy. Radio traffic measures may be included in deception plans. Once the crossing has been initiated, radio usually is relied upon for communicating with units across the river until telephone lines are established.

768. The hour of crossing is determined by the superior commander. It is more difficult to load and cross boats during darkness than during daylight. This difficulty may be more than offset by the security, secrecy, and surprise afforded by darkness. Crossings made under cover of darkness usually are timed to provide some time for reorganization on the far banks prior to daylight. The possibility of using artificial illumination should be considered.

769. Shortly preceding the crossing, the bulk of the troops to make the crossing is placed secretly in concealed bivouacs within easy night marching distance of their crossing fronts. A minimum of artillery may occupy concealed positions and fire for registration. For purposes of secrecy all but normal artillery fires may be silenced. Only covering forces and the necessary reconnaissance parties are permitted to approach the river. Covering forces along the river are designated from troops other than those to make the initial crossing.

770. a. Ordinarily, all supporting troops go into position under cover of darkness on the night of the crossing. Leading assault units move to attack positions where they are met by engineer troops with assault boats, footbridge, or other crossing means.

b. The following characteristics are desirable for these attack positions: accessibility for trucks which bring up engineer matériel, defilade, easy identification, concealment from air and ground observation, and direct and concealed routes to the crossing points.

771. a. The first assault waves on each front carry their boats from the attack position to the water's edge and launch them

on a broad front. Lateral movements and the massing of troops at the river bank are avoided. Measures are taken to regulate traffic and to suppress noise during the movement to the river. Ropes strung across the river will facilitate the crossing and provide additional safety to personnel. Specially trained and equipped patrols may cross in advance of the first assault waves to eliminate hostile listening posts and take over their communication. The movement from assembly areas to the far bank is usually under control of the engineer troops.

b. Departures from the attack positions are timed to permit leading units to cross simultaneously on a broad front, but once these units leave the attack positions they do not halt and no attempt is made to maintain alinement between boats. There is normally no firing from the boats particularly during a night crossing. Amphibious tanks and other amphibious vehicles, or landing craft may be a part of the assault force. The noise of movement may be screened by an air attack or by artillery fire. In the interests of secrecy, caution must be exercised in planning for the movement of heavy vehicles to the near bank prior to the crossing.

772. The engineer crews return the assault boats to the near bank for the second wave, which has moved forward close to the near bank. If the current is swift, allowance for drift must be made in fixing time or place of meeting the boats. If boats are to be reused, allowance must be made for probable losses during the crossing of the first wave. It may be necessary for succeeding waves to carry additional boats, or for engineers to furnish individual ponton boats or raft ferries to carry these waves.

773. Footbridges may be used for crossing first waves over narrow streams. Their construction is difficult, if not impossible, under aimed small arms fire. Ordinarily, they are used to cross succeeding waves of foot troops, particularly after the first objective has been attained. Where the width of the stream and other factors permit, footbridges may be preconstructed to permit spanning the stream without later construction.

774. Ponton raft ferries are provided where necessary to cross vehicles which will be needed before it is practicable to build the ponton bridge. Ferry construction usually is practicable after the first objective has been seized. When the supply of ponton boats permits, ponton raft ferries often are continued in use after the bridge is built to serve as an alternate crossing means and to handle return traffic.

775. Alternate plans are prepared for exploiting success on any crossing front by assigning troops from other fronts, or from the general reserve, to cross on the front where the crossing has been most successful.

776. In addition to the fires of organic weapons, the crossing of tactical groupings is supported by field artillery; the fires of supporting weapons of the general reserve; and by the fires of tanks and antiaircraft artillery when this will not interfere with the execution of their primary mission. During daylight crossings the support of combat aviation and the use of smoke may be decisive factors.

777. Supporting fire may be opened several hours prior to the initial crossing against an enemy prepared to resist in a well-organized position, or may be withheld until after the crossing is discovered, in order to obtain surprise.

778. a. Armored counterattack is a serious threat to the attack particularly during the early phase of the crossing. Every effort should be made to provide protection against such attack.

b. Measures taken may include early ferrying of organic and supporting tanks, provision for antitank fire support from the near side of the river, special priority of bridge construction for armored crossings, and air protection of the crossing and far bank by combat aviation. Assault elements may be equipped with additional individual antitank weapons if such action seems advisable.

779. The artillery gives close and continuous support to the advance. As soon as the assault waves advance from their first objective, the artillery may begin displacement of individual batteries across the river. Later, the mass of the artillery is advanced, the displacement conducted in such a manner as to assure continuity of artillery support. Artillery observers and liaison groups, with the necessary means of signal communication, accompany the assault units during the crossing and advance to the successive objectives.

780. Antiaircraft defense, both by ground units and aviation, is centered around the crossing fronts and particularly the more important tactical bridges. A portion of the automatic weapons of the antiaircraft defense is normally crossed to the far bank by boat or ferry before construction of the bridges is started. Continuous protection for the bridges is maintained as long as required.

781. Smoke, in addition to being used to conceal the actual crossings of the initial waves, may be used in connection with feints and demonstrations. The successful use of smoke facilitates the early construction of ponton bridges and thus expedites the expansion of the bridgehead. The use of smoke places additional importance on the marking of embarkation points and bridge sites and the routes leading thereto.

782. Reorganization is pressed by every available means, including the use of fresh troops, to insure that the attack on the second phase objectives can be continued without delay once the initial objectives have been taken. Since capture of these second objectives will deprive the defender of ground observation of the crossings, considerable resistance may be expected. All possible support, including armored units, should be made available to the assaulting forces to insure that the third objectives are captured in minimum time.

783. a. As soon as the second phase objectives have been taken, or prior to that time if conditions warrant, the responsible commander directs the construction of the bridges. The greater the number of bridges made available, the quicker and surer is the crossing. The construction of bridges from local materials requires much time and labor. Quicker results are obtained from the use of ponton or other engineer bridge equipment.

b. Alternate bridge sites are selected in advance. Transferring operations to an alternate site after the equipment is unloaded at the first site is a time-consuming and difficult operation. Decision for such a move rests with the responsible commander.

c. Immediately after bridges are constructed, protective devices including nets or booms may be placed in the stream to protect them from waterborne demolition activities.

784. Local control during the crossing and advance to the first objectives is mainly a responsibility of the leaders of small units. Capture of these first objectives gives an opportunity for the next higher commanders to resume centralized control and direct the attack on the second objectives. As soon as sufficient means have crossed the river, the commander may direct a coordinated attack on the third and final objectives. The period of delay on each objective is as brief as possible.

783. a. Traffic control measures for a river crossing must be complete and flexible. This is essential to provide for full utilization of the crossings in the exploitation of tactical success. Flexible

arrangements permit rapid adjustment to meet unexpected developments in the situation. Bridges may be damaged or destroyed, or changes may be required in the crossing priorities of units.

b. Traffic control generally is centralized. Traffic posts should be established at all points where serious traffic problems may arise. It usually is desirable to establish holding areas as close to the crossing points as safety and the road net permits. These holding areas are provided with adequate signal communication to the headquarters controlling the crossings. This permits a maximum, but regulated, flow of traffic over the crossings, while still facilitating the prompt readjustment of traffic. A holding area on the far shore performs similar functions in preventing congestion and regulating return traffic by bridge or ferry.

786. A successful crossing should be promptly and aggressively exploited. In one area a successful crossing may permit adjacent units to utilize crossings already achieved to strike the flanks and rear of the enemy forces opposing the adjacent units. A river crossing against resistance may thus be avoided. Under other circumstances the exploitation of a crossing may involve the early use of strong armored forces to strike deep in the hostile rear.

DEFENSE AGAINST CROSSINGS

787. a. An unfordable river may be employed as an obstacle in front of a defensive or delaying position, or as an aid to defensive-offensive action which seeks to strike the enemy while his forces are astride the river. Holding a river line in such force as to leave available insufficient reserves, destroys the flexibility of the defense and exposes the defender to immediate defeat once the river line has been pierced. A river line loses much of its value as an obstacle if the enemy is not forced to make a direct attack; it becomes an obstacle to our own troops if successful counteroffensive action is to be followed by an exploitation.

b. A defensive position located with a river to its rear is equivalent to a bridgehead. The defended position therefore should be located to eliminate ability of the enemy to place any effective sustained fire of ground weapons on the bridge sites and to provide the necessary maneuver space between the battle position and the river. Under certain conditions greater distance from the river may be desirable to permit delaying action during the conduct of the defense. Plans must include provision for withdrawal across the river.

788. The commander must insure the complete destruction of all bridges and fords, which cross the river within his sector, to prevent them from falling intact into the hands of the enemy. The actual destruction is usually a mission of the unit engineer. Unless specifically forbidden by higher authority, any bridge or ford may be destroyed. When it is considered desirable to preserve such crossing until the last possible moment, full authority to complete their destruction is delegated to any member of the bridge or ford guard. In the case of a bridge which is especially important because of size or location, a senior officer may be designated to be responsible for its timely destruction. When it is apparent that the crossing cannot be kept from falling into enemy hands, it must be destroyed. Mines previously set along the approaches must be activated to delay the enemy and cost him casualties in personnel and equipment. A commander also must insure destruction of other means of crossing, such as boats, rafts, and materials which could facilitate a crossing.

789. a. A river may be used as an obstacle directly in front of the battle position when the river constitutes a major obstacle, when adequate forces are available to the defender, and when the enemy is unable to turn the position. In such a situation the river bank positions are held in strength as the forward portion of the battle position. As in the defense of any battle position adequate reserves are provided to intervene at decisive areas.

b. Emplacements are so located that the opposite bank and its approaches are held under fire and the enemy's attempts to cross are frustrated in their beginning. Salients in the river line and open terrain dominated by the enemy are held lightly, but must be readily covered by the concentrated fire of weapons.

790. a. When adequate forces are not available on the front to be held, or if the enemy can turn or avoid the position, river lines may be defended by defensive-offensive action. The tactics employed are comparable to those of a defense on a wide front except that counterattacks planned are to retain possession of the near bank. The mass of the forces is held in readiness at such distance to the rear that it can intervene promptly at any point where a crossing in force may be attempted. The river line itself then is held by relatively weak detachments. Stronger detachments with local reserves are posted at the most probable areas of crossing.

b. The operations of the advanced detachments are conducted in accordance with the doctrines governing outposts. It is their mission to force the enemy to disclose the full power of his sup-

porting fires, to discover hostile crossings, and to prevent hostile troops from establishing themselves in bridgehead positions before the arrival and counterattack by reserves. As in a defense of a wide front the local protection of artillery and installations must receive special consideration.

791. In defensive-offensive action, some artillery may be attached to the forces initially defending the more probable crossing areas. Enfilade fire on enemy crossing sites by artillery located well forward is very effective. The mass of the artillery is emplaced in such a manner that it can support the action of the main forces. To accomplish this purpose it may be necessary for a part of the artillery to move to previously planned positions after the hostile main attack has been discovered. Since the mass of the hostile artillery still will be on the far side of the river, much importance attaches to the neutralization of hostile air and ground observation directing the enemy's artillery fire.

792. a. In defensive-offensive action, the counterattack of the force reserve is made as soon as the hostile main crossing is recognized. The plan for this action is prepared beforehand. Success depends upon the commander's ability to launch the attack at the proper time and in a decisive direction. It must be launched before the enemy has established himself in a bridgehead position To this end, adequate signal communication must be insured and reserves must be prepared to move promptly and rapidly. Force reserves should aim to strike the main crossing while the hostile main effort is astride the river.

b. Decisive results are promised by the prompt employment of armored units and combat aviation against hostile units which have already crossed the river and by air attack of bridges, of troops engaged in ferrying operations, and those assembled for crossing.

c. In view of the importance of timely action and the distances involved, infantry units in force reserve should be provided motor transportation.

d. Antiaircraft artillery must be prepared to protect both the movement of reserves and of artillery to the counterattack positions as well as during the counterattack.

793. a. In any defense of a river line, security forces remain on the enemy's side of the river until forced to retire to maintain contact with the enemy, delay his advance, and determine his assembly positions and probable crossing places. When forced

to retire, these advance elements withdraw across the river. Timely measures are taken to destroy the crossings after the last elements have withdrawn across the river, or at such earlier time as may be necessary to prevent the crossings from being seized by the enemy. After the security force has withdrawn, contact with the enemy is maintained by use of patrols using boats or the special water crossing equipment.

b. Light armored units are employed initially on reconnaissance and security missions on the enemy's side of the river. Later they protect the flanks or rear of units on the river or are held in reserve.

794. The primary missions of the engineers are to destroy fords, bridges, and matériel which may assist the enemy in crossing; to reconnoiter the terrain along the river; to assist in organizing the ground; and to keep the roads in condition for rapid movement of reserves. Engineers also block with obstacles and mines the hostile avenues of approach to the river, embarking points, and landing points. Floating mines, rafts, and fireboats may be prepared and held in readiness upstream. Preparations are made for illuminating the water area at night. When dams and locks upstream permit the flooding of crossing sites the commander may order such action to be taken before the attacker has established a bridgehead. The effects of such flooding on the current and probable future operations of the defending forces must be considered carefully.

795. Combat aviation, in addition to its normal missions, can operate to prevent ferrying or bridging operations of the enemy by attacking ferrying and bridging equipment before it reaches the river.

796. a. In a retrograde movement when the enemy side of the river line is to be held as a defensive or delaying position, the withdrawing columns cross at the available bridges. If the crossing places are insufficient, the construction of additional bridges or ferries may be necessary. Antiaircraft defense is established on both banks of the river line to protect the bridges and crossing places.

b. Trains, motorized columns, and a part of the artillery cross first. Routes leading to and from the bridge approaches and crossing places are plainly marked. Staff officers with detailed instructions for march sequence and future action direct units to their destinations. Traffic is regulated strictly during the withdrawal across the river. Bridges and fords are destroyed to pre-

vent them from being seized by the enemy. Arrangements are made to ferry the last elements of the security forces.

797. Once it has moved across the river, the artillery which withdrew early is placed in position to protect the crossing places and cover the withdrawal of the remainder of the command. This echelon later is reinforced by the remainder of the artillery after it has crossed the river. At the earliest practicable moment, a plan of artillery defensive fires is prepared which will take advantage of the long range and flexibility of artillery fire to lay down interdiction and counterpreparation fires on the hostile routes of advance and assembly positions.

Section III. NIGHT COMBAT

798. a. Night combat is characterized by a decrease in the effectiveness of aimed fire and by a corresponding increase in the importance of close combat and the fire of fixed weapons laid on definite targets or areas by day; by difficulty in movement, troop leading, and the maintenance of direction, cohesion and signal communication; and by a more highly sensitive morale of the troops.

b. Fog or smoke produces conditions of combat similar to darkness. Because of the uncertain duration of a fog and the amount of ammunition required to establish and maintain smoke concentrations, operations based on concealment provided by fog or smoke require rapid execution.

c. Decrease in the effectiveness of fire permits the use of closer formations without exposure to excessive losses; difficulty in the maintenance of control and direction necessitates limited objectives which may be approached by well-defined routes; the more sensitive morale of the troops increases the effects of surprise obtained by the offense and the importance of security measures on the part of the defense.

799. An unexpected collision of troops at night, or combat which extends into the night, usually develops into a static fire fight and a suspension of movement. As a rule, night combat can be conducted successfully only when there is time for the preparation and distribution of a well-conceived plan and for thorough reconnaissance by all leaders during daylight.

800. The ability of unit commanders to control their troops during night combat is greatly diminished. Tactical operations and

troop leading are accomplished with greater difficulty than in daylight. These difficulties can be largely overcome by training and prior planning.

801. Searchlights, illumination projectiles, and flares may be employed to provide artificial illumination. Light approaching bright full moonlight is obtained up to 5,000 yards from searchlights under conditions of low clouds. Since shadows are cast in the direction of the enemy, infantry troops can move forward undetected by taking advantage of concealment provided by these shadows.

802. Night raids may be used to capture personnel, obtain identifications and determine details of the hostile position, and especially any major changes in the enemy dispositions. When a raiding force has accomplished its mission, it withdraws on a previously arranged signal. A route of withdrawal other than that employed for the advance is used if practicable. During the withdrawal, the reserve of the raiding force is utilized to cover the withdrawal, and to protect its more vulnerable flank. Fires of the artillery and other supporting weapons are employed to neutralize the enemy advance elements and supporting weapons. The artillery neutralizes located hostile artillery.

NIGHT ATTACK

803. a. Night attacks are made to complete or exploit a success, to gain important terrain for further operations, to avoid heavy losses which would be incurred by attack in daylight over open terrain, or to capitalize on the surprise inherent in night combat.

b. Despite the difficulty of control during night attacks, such attacks, by their surprise and shock to the defender, and the reduction of the effectiveness of his defensive measures, offer exceptional opportunities for success. Aggressive leadership, careful planning, and thorough training and rehearsal of attacking forces of high morale will more than offset control difficulties. Night attacks have proved highly successful where daylight attacks have proved unsuccessful or excessively costly. The advantages of night attack must be exploited.

804. Simplicity of plan, careful preparation, including training, secrecy, surprise, definite and easily identified objectives, and cohesion in execution are the governing principles in a successful night attack.

805. Surprise is an essential feature of night attack. Preparations for night combat, whether made during daylight or darkness, must avoid betraying the locations or intensions of the troops. The attack itself may be made by stealth or by full use of all available fire power.

806. The difficulties of night attacks increase with the size of the command. They may be made successfully with any size unit but the objective assigned any assault unit should be limited. To the extent that detailed plans can be completed in advance, deeper objectives can be reached by a succession of limited objectives attacks. Each attack is launched from the objective of the preceding one. To the degree that artificial illumination eliminates the difficulties of control and movement, deeper objectives can be assigned. Night attacks are made preferably by fresh troops, or by reserves of troops, in contact with the enemy.

807. a. An attack launched during the first hours of darkness may anticipate possible night operations on the part of the enemy. It may be delivered after successful combat in order to frustrate the enemy's attempts to organize a withdrawal at nightfall or to consolidate a position for defense. When the enemy is attempting a retrograde movement to a new position it may strike him before he can organize the position or his fire support.

b. An attack during the last hours of darkness may be advantageous as a preliminary to a general attack at daybreak because it gives the defender no time to reorganize. The attack usually should be launched to give the attacker sufficient time on the objective during darkness to organize the position to resist counterattack and prepare for further operations prior to continuing the attack at daybreak. Antitank measures are taken to include the emplacement of tanks and other antitank weapons. Tanks are moved forward and immediately made available to assist in repulsing a counterattack.

808. The decision to attack should be made while there still is sufficient daylight to make all preliminary reconnaissances and preparations. Reconnaissance should include observation of the terrain at dusk, so that both the day and night aspects may be studied. Easily identified direction points are located. Provision may be made for marking direction points, including objectives by machine gun tracer and artillery fire.

809. Subordinate commanders are instructed carefully concerning the terrain, the objective, and the direction of attack. Routes

of approach to the line of departure are marked carefully, guides are provided, compass directions are given, and watches are synchronized.

310. a. Orders for night attacks are formulated with more than usual detail. Routes of approach, assembly areas and attack positions, line of departure, and objectives are designated with the utmost exactness. Orders include the rate of advance; the formations to be employed; means for mutual identification of troops, measures for flank protection and for maintenance of direction and contact; the composition, assembly area, and mission of the reserve. Also required are the course of action to be followed in case of success; the signal for withdrawal if the attack fails; and an assembly area for each subordinate unit in case of withdrawal. The time of attack may be included in the order or may be announced later.

b. Detailed instructions for maintaining secrecy are issued; orders include detailed instructions governing reconnaissance and the conduct of artillery and other supporting fires to preserve secrecy.

c. Many of these control measures are unnecessary when artificial illumination is employed.

311. a. In the conduct of night attacks, only the simplest formations are employed. If the attacks are to be made by stealth, the smaller units advance in column until close to their objectives, when skirmish lines are formed and the enemy is rushed with the bayonet without firing. Each column is given a definite direction and objective. Contact is maintained between columns and every precaution is taken to avoid their collision. The assaulting columns are followed closely by their supports and local reserves.

b. The supporting weapons of the attacking force may be placed in position for flank protection of the initial assault. When the terrain is favorable for overhead fire, they may be emplaced in a rearward position to support the attack on signal or to cover a withdrawal. General reserves are held generally well in rear prepared to move promptly to the objective or to cover a withdrawal.

312. The particular circumstances attending each situation usually will indcate whether or not the assault should be preceded by artillery fire. Where preparation fires are indicated, a short but violent preparation generally will suffice. This preparation is lifted on call, or on a time schedule. The artillery holds itself in

readiness to intervene promptly and energetically in accordance with a prepared plan of fire to box off the zone of attack or to cover a withdrawal. The artillery neutralizes located hostile artillery.

813. On capturing their objectives, units are reorganized and promptly disposed to meet a counterattack. Their further conduct is prescribed in the attack orders.

DEFENSE AT NIGHT

814. In night combat, the defense has the advantages of better knowledge of the terrain and of organized defensive fires covering the principal avenues of hostile approach.

815. a. The best defense against night attack is the aggressive spirit of the defense. This is inculcated by training which builds up the confidence of the defense forces in their ability to operate effectively at night.

b. Constant aggressive patrols, rehearsed night counterattacks, planned measures to organize rapidly and move to meet attack all tend to overcome the timidity which is inherent in lack of familiarity with night operations. The individual soldier must feel that he is superior to the enemy under any conditions, by night as well as by day. Units must feel that the area to the enemy front lines belongs to them and they must operate between the lines nightly.

816. Electronic devices, mine fields, vigilant outguards, active patrolling well to the front, and illumination of the foreground must be relied upon to give timely warning of attacks. Gaps that cannot be covered effectively by fire from adjacent units are occupied at night by elements in support. When a hostile attack is suspected or known to be in progress, supports and local reserves are brought closer to the main line of resistance.

817. Obstacles and the fire of fixed weapons are the principal means used in breaking up the assault. Artillery fires on prearranged areas supplement these fires. Small-arms fire is opened as soon as the alarm is given and combat outposts have been withdrawn.

818. As a rule, delaying action at night can be executed only by small units or detachments which operate and withdraw along well-defined routes. Retrograde movements are regulated carefully to avoid losses by fire from friendly troops in rear. Disorganization and delay of advancing hostile ground columns may be accom-

plished by the attack at night of small groups against marching columns, bivouacs, billets, or motor parks.

Section IV. COMBAT IN TOWNS

819. Towns offer concealment for troops and weapons if they are of substantial construction and provide protection from air and armored attack and the fire of weapons. Consequently, they are often naturally strong defensive areas. On the other hand, they are conspicuous topographical features of which exact details are either available or readily obtainable. Fires started by hostile incendiary ammunition may make towns untenable.

820. Combat within the limits of a town is characterized by reduced effectiveness of fire and observation, by increased importance of close combat, and by difficulty in control of troops. Smoke grenades provide local screens to permit operations in streets and roads exposed to sniper fire. Fighting is at close range; the outcome depends therefore largely upon the initiative and aggressive leadership of subordinate commanders.

821. *a.* A town strongly held by the enemy may be taken by fixing the garrison with a holding attack while so directing the main attack as to isolate the town from the support of neighboring defensive positions. When immediate capture of the town is essential, the main attack is directed against the flank or rear of the town in order to secure the advantages of enveloping attack. When frontal attack cannot be avoided, the attacker initially concentrates on the capture of the near edge of the town by the methods applicable to the attack of any organized positions. He then continues the advance through the town.

b. The action within the town necessarily is decentralized to subordinate leaders, since lack of observation of the action precludes satisfactory centralized control. The attack through the town is usually methodical and thorough. Designated key objectives within the town may be seized initially to prevent destruction. Clearing up of bypassed resistance may be carried out by assault units or by specially detailed follow-up units as the situation dictates.

822. The larger the town and the longer it has been held by the enemy, the more thorough must be the preparations for attack. Visual and photographic reconnaissance determine the defensive organization of the area and the nature of defensive works, and furnish pertinent data to all elements participating in the attack.

After a town has been bombed or shelled or otherwise reduced to rubble it is extremely difficult to determine defensive works by means of air photos. These must be augmented by other means of reconnaissance.

823. a. When the enemy has organized the town into a strongly fortified position which cannot be avoided or outflanked, the advance may have to be made frontally, strongly supported by artillery, flame throwers, individually carried and mounted on tanks, other supporting weapons, and aided by combat aviation. When the fire of the supporting artillery and other supporting weapons is lifted, the assault echelon pushes through the defensive area in a series of bounds; supports and reserves mop up and organize the area for defense against hostile counterattack.

b. The attack is continued through the town to the far side in a similar manner. Strongly defended towns rarely present opportunities for tanks to exploit their mobility due to the restrictions of barricades, debris, streets, cellars, and short range antitank measures. However, opportunities will present themselves frequently where the support of tanks in such situations becomes desirable. In such cases small infantry-tank teams are particularly effective. Tanks are capable of breaking through light and medium-heavy construction. This, coupled with their ability to penetrate heavy walls with armor piercing shells and to attack enemy personnel with high explosive shells and machine-gun fire, makes them an effective combination with infantry for fighting inside a town. If strongly defended, large towns are not normally assigned as objectives to armored units operating alone. If defended only lightly, they are particularly vulnerable to attack by armored units.

824. In organizing a town for defense, defense areas are established. Fields of fire are cleared and the defensive capabilities of the town are developed by the laying of extensive mine fields and barricades, strongly protected by the fire of automatic weapons, mortars, antitank guns, and artillery. Antipersonnel mines and booby traps should be used liberally throughout the barricades. The concept of defense should be one of thorough all around defensive preparation, with outlying buildings organized to form salients from which the front or flanks of the town can be covered by flanking fire. Reserve units should be located within the town so as to facilitate movement to threatened areas.

825. Security detachments are posted at all important public service installations, such as water reservoirs, pumping stations, or

electric power plants. Such detachments protect these installations from damage by small hostile groups or individuals who are able to penetrate the defense of the town.

826. The outer defense is supplemented by defensive organization in depth throughout the area of the town. Obstacles are constructed and bridges are mined to prevent penetration of hostile armored elements. Buildings and cellars are fortified as firing positions to cover favorable avenues of approach from all directions within the town. Provisions are made to counter enemy attempts to set fire to the town by incendiary munitions.

827. To prevent the bypassing or isolation of the town and its eventual capture by hostile forces, through cutting off all supplies from the rear, a reserve, strong in armor, is held outside the town in concealed positions, prepared to break up the enemy's outflanking maneuver.

828. Towns are favorable to delaying action.

Section V. COMBAT IN WOODS

829. Combat in woods, in many respects, is similar to that in towns. Often, in combat in woods, observation and control of troops are even more difficult than in towns. Some woods, owing to their size or location, are naturally strong defensive areas. Others, however, may have little or no defensive value, and may even be advantageous to the attacker by providing concealed routes of approach into the defensive position. Small wooded areas are avoided as they are conspicuous and draw fire.

830. The attack usually seeks to avoid isolated wooded areas included in the enemy's defensive position by passing them on either one or both flanks while neutralizing their edges by fire or smoke. The artillery blinds the enemy's observation by smoke and neutralizes the hostile weapons that are capable of delivering flanking fire against the attack. During dry weather, incendiary bombs may be highly effective. Small wooded areas may be neutralized with chemical agents. Combat aviation may be employed in support of the attack, particularly in a preliminary bombardment of the woods.

831 .a. If avoiding the woods is impracticable and their possession is necessary, the attacker seeks to capture the woods by enveloping action. When enveloping action is inexpedient, the woods

are attacked frontally. The near edge of the woods is assaulted as is any other position, and then is used as a line of departure for the advance through the woods.

b. The dispositions to be taken for this phase of the attack depend largely upon the type of the woods. In sparse woods, formations are employed resembling those on open ground, but with greater density in the leading echelon. In dense woods, small columns are more effective in the leading echelon. Measures are taken to insure direction, cohesion, and signal communication between the columns. Supports are formed in column and closely follow the assault units. The vulnerability of the flanks to attack requires special measures for their protection.

832. All commanders must be watchful to prevent combat groups from assembling on or near roads and trails since these will be covered by the enemy's system of defensive fires. The enemy's strong points are outflanked by an advance straight thru the woods off the roads and trails. To avoid confusion and to prevent friendly troops from firing into each other, it may be necessary to regulate the advance by bounds. Reserves are disposed so that they will not become involved in the fighting of the assault echelon and can be employed where the greatest progress is being made.

833. Before emerging from the woods and while still far enough from the edge to be concealed from the enemy's view, the command is disposed for fighting on open ground. Arrangements are also completed for support by the artillery and other weapons. As the edge of the woods presents a well-marked target for hostile fire, the attacking forces make their exit rapidly to seize an immediate objective beyond the edge of the woods. Whenever possible, this objectve should mask the edge of the woods from hostile gorund observation and small-arms fire.

834. a. As a defensive position, woods have the objection of presenting a clearly defined target to the attacking forces. Since a position in the interior of the woods has the disadvantage of restricted view and limited field of fire, the observation elements of the outpost are advanced close to the edge of the woods. The main line of resistance must be back from the edge of the woods. Positions selected should be provided with overhead cover against tree and other air bursts. Cutting of trees must not divulge the position. Routes for messengers, supplies, and reserves must be known and marked for night use. The routes forward and to all positions in rear are reconnoitered and made known to all concerned.

b. While holding up the attacking units by means of obstacles, the defense seeks to break up the cohesion of the attacker's dispositions, lead him into false directions, and take the attacking troops under flanking fire. Natural or cleared lanes through the woods assist greatly in the development of flanking machine-gun fire and in detecting and holding up a hostile advance. Even when lanes have not been cleared, machine-gun and other automatc fire sited to ricochet from trees is effective and particularly demoralizing to an advance.

c. In wooded areas, close support by artillery becomes difficult. Fields of fire of all flat-trajectory weapons are extremely limited. The fire of high-angle weapons is not equally affected; a little clearing will permit howitzers and mortars to be used. Mines, defensive wire, and other obstacles are placed outside the woods so that the full effect of artillery and other defensive fires can be utilized.

d. Mines planted thickly within woods are particularly effective in slowing up the progress of the attacker and forcing him to use trails and mine detection methods. Care must be taken, however, to insure that friendly troops will not be injured. Defensive wire within woods is effective also in delaying the advance, particularly in conjunction with antipersonnel mines.

Section VI. MOUNTAIN OPERATIONS

GENERAL

835. Mountainous terrain offers no insuperable obstacles to the conduct of military operations, even in cold weather, if troops are properly equipped, clothed, supplied, and trained. In fact, such troops by accepting the natural hardships inherent in maneuver through mountain terrain frequently achieve surprise which results in success with relative ease and few casualties. The infantry division is capable of operating in most mountains, though it may be necessary to resort to pack animals and manpower for the movement of equipment and supplies. Troops that are required to operate at high altitude under conditions of low temperature, high winds, ice, and snow must have specialized training and equipment. In general, mountain operations retard and restrict mobility, reduce firepower and effect of fire, and make signal communications and supply more difficult.

836. Mountain warfare is characterized primarily by difficulties which terrain offers to movement. The restricted nature of

narrow valleys and defiles limits the strength of forces which can operate efficiently therein. The inadequate road net found in sparsely settled mountain areas enhances the military value of existing roads, adds importance to heights which dominate them, and slows down the operations. Critical terrain features consist of heights which dominate valleys and lines of communications with observation and fire; passes which permit movement through mountains; and roads and railroads which must be secured for supply purposes.

837. a. In mountain combat, the commander is limited by terrain as to the means which he may employ. Success depends more upon proper adaptation of available means to the terrain than upon their power. Maneuver of small units, and the initiative and leadership of subordinate commanders, are of the highest importance in mountain warfare. Small units are favored by the concealment which is available for movement, by the diminished effect of hostile firepower resulting from defilade, and by facilities for observation.

b. The plan of maneuver for the force as a whole is more closely subject to considerations of terrain than in ordinary regions. The problem often resolves itself into a matter of striking hostile routes of communications, and of defending one's own routes. The actions of small semi-independent units in seizing or defending heights which dominate lines of communications, or of fighting to seize or block passes and other defiles on routes of communications, become of increased importance.

838. It is essential that all commanders have a thorough understanding of the capabilities of mountain-trained troops. It is likewise vital that the staffs of higher echelons charged with logistical planning for operations in mountainous areas include experts on clothing and equipment, to insure that the proper amounts and most advanced types of these items are made available. All commanders must be fully instructed in the proper use and maintenance of this special equipment.

839. When formulating plans for operations, possibility of sudden changes in weather must be considered. Arrangements are made for frequent periodic weather reports. Meteorological equipment with personnel to operate it is desirable. Alternate plans are prepared to provide for changed weather conditions.

840. a. The commander of the theater in which the forces are to operate must specify special equipment and special training to

fit into the climate, the character of the terrain, and the type of hostile forces to be encountered. Troops operating in mountains should ordinarily have a preponderance of high-angle weapons; of attached pack transportation, and additional signal equipment. Mountain warfare often necessitates the substitution of lighter weapons for some of the heavier ones, or elimination of some of the supporting weapons, because of the limitations on supply.

b. Small units may be required to operate for several days without resupply. Necessary specialized training includes: use of skis and snowshoes; visual signaling; use of both pack and motor transportation, including snow vehicles; mountain climbing; special evacuation techniques for medical units; and specialized engineer techniques. Physical hardening is essential. Supply by air may be required.

841. Although decentralization of operations is characteristic of mountain warfare, and tactical groups usually operate semi-independently in the capture of terrain objectives, the scheme of maneuver from the force as a whole is based upon detailed planning to insure unity of effort and adequate logistical support. The operations of a force operating within a single valley corridor however wide can frequently be centrally controlled through skilled employment of signal communication means.

842. Close support by artillery and air normally is difficult to provide in mountain operations. Special effort must be made to provide the required close supporting fire.

843. Detailed reconnaissance is required to find locations from which machine guns can deliver grazing fire; very seldom will the full grazing effect be possible. The sharp relief offers opportunities to support advancing infantry with overhead fire. Mortar fire and grenades have increased importance due to the amount of defilade. Recoilless weapons will supply much of the heavy fire power where direct fire is possible. Horse cavalry reconnaissance units may be a part of the mountain organization, or may be attached to it for the mountain operation. Armored cavalry reconnaissance units generally are not suited to mountain operations.

844. a. The howitzer is best adapted for artillery support in mountainous terrain. Ordinarily flat-trajectory cannon can be used only at long ranges because of the necessity of clearing masks and reaching targets defiladed by steep slopes. Motorized artillery units are emplaced near the roads; pack artillery is capable of follow-

ing foot and mounted elements and taking defiladed positions in the more difficult terrtain overlooking the valleys. Frequently the situation may require that the control of at least a portion of the artillery be decentralized.

b. Because of inclement weather, the hazards of flight, and the difficulty of providing suitable landing areas for combat aircraft, greater dependence may have to be placed on ground observation and organic light aircraft in mountainous terrain. Observation posts must be reconnoitered and established early, and provision made for observers with the forward echelons to insure close and timely support. Artillery forward observers must receive the same specialized training as mountain infantry.

c. The effectiveness of counterbattery fires is diminished because of the difficulty of locating hostile batteries. The effectiveness of interdiction fires is increased because of the number of definite points which the enemy is compelled to pass.

845. The importance of engineers increases with the difficulties of the terrain. Maintenance of existing roads, and construction of new roads and trails for light motor transportation, are of primary importance. The existence of numerous sensitive points on the few highways facilitates demolition in defense, and increases the difficulty of retaining mobility in the attack. The difficulties of access to certain positions frequently necessitate use of aerial tramways in a stabilized position. Rocky soil may require employment of explosives for constructing even the simplest of intrenchments. Light, portable, bridging equipment is necessary in mountain operations.

846. Even though the hazards of flying in mountainous regions place some limitations on the use of low-flying combat aviation, the restricted road net often offers a favorable opportunity for combat aviation to attack critical road junctions and troops in defiles. Combat aviation may be effectively employed against hostile artillery positions and reserves on the reverse slopes.

847. Occasions may arise for employment of airborne troops. Such occasions include seizure of an important terrain feature, a hostile rear installation, and the quick movement of a force to operate against the hostile flanks or rear.

848. Maneuver of armored units in mountainous terrain generally is so restricted that their effective employment is very limited. However, in stabilized positions, armored vehicles can be brought

into camouflaged positions from which they can deliver accurate direct fire up to extreme ranges. From these same positions they can support, by overhead fire, the opening phase of an attack.

849. Antitank weapons are especially effective in the mountains as the routes of approach of the enemy armor are canalized and, except for the self-propelled armored vehicles, the weapons are easily placed and hidden.

850. a. The operations of the signal units are affected by the scarcity of commercial wire lines, by difficulties of laying wire, by "dead spaces" in radio reception, and by terrain barriers between adjacent corridors in which troops are operating. Dead spaces in radio reception may be obviated by establishing relay stations. Additional radio equipment is desirable.

b. Other methods to be used when wire and radio are inadequate include messengers, messenger dogs, and visual signaling. Experience has shown that the number of telephones needed in defense in mountains is large. Telephones at individual gun emplacements are desirable. Organic light aviation is useful for both observation and communication. Pigeons are of value for emergency communication. Conditions may permit the laying of wire by plane.

RECONNAISSANCE

851. Mountainous regions are seldom as fully or as accurately mapped as other terrain. Numerous important irregularities of the ground cannot be shown on maps because the contour interval is usually large. A study of the maps of mountain areas seldom will give a true appreciation of the ground. This appreciation can be gained only by a study of the ground itself, by detailed reconnaissance, supplemented by a study of aerial photographs.

852. a. While reconnaissance in mountain warfare is facilitated by the restriction of enemy movements to the available road net and by numerous defiles, active patrolling is hazardous and fatiguing. Dismounted patrols will bring in much information of the terrain and of the enemy, but they will be handicapped by rugged terrain, sudden, violent changes in the weather, and by the possibility of ambush. These patrols are equipped with radio, means for visual signaling, and night vision devices. Local guides, if sympathetic, can be of great assistance.

b. Aggressive reconnaissance executed by specially trained patrols operating in difficult areas which often are weakly guarded, will produce excellent results. The capabilities for reconnaissance

and counterreconnaissance by small elements operating with boldness should not be overlooked.

853. Ground observation is unusually important in mountain operations. Some observation posts offer very distant views and afford opportunity for extended lateral observation. Observation is subject to sudden blinding due to atmospheric changes. For this reason, observation posts are echeloned in altitude as well as in width and depth. Since even excellent observation may fail to disclose critical obstacles, a physical reconnaissance of prospective routes should be made prior to initiating cross-country movements.

854. Reconnaissance aviation will be the principal means of obtaining information of terrain, hostile dispositions, installations, and troop movements in rear areas. Local commanders should use organic light planes for surveillance of enemy forward areas.

MARCHES

855. All available roads and trails are used for movement. Since displacements within tactical groups or columns are difficult during the march, the march order of units must be such as will facilitate their entry into action.

856. a. The rate of march in mountains is influenced by the weight being carried by the troops, the elevation above sea level, steepness of slopes, character of the footing, and weather conditions. The rate of maching and the rate of climbing of well-seasoned troops is not greatly affected by changes in elevation of less than 5,000 feet above the altitude to which they are accustomed, up to an altitude of 8,000 feet. Over this altitude lesser changes must be considered. Altitudes over 5,000 feet cause sharp reductions in marching and climbing rates. Climbing steep slopes requires additional energy. Proper methods to conserve this energy must be used. The marching commander is the only one qualified to decide the pace and the time and place for halts. His decision is based on the mission, the difficulties of the march, and the condition of the troops.

b. The total time required in marching and climbing under favorable conditions on fair roads and trails is approximately the time required for marching the map distance plus 1 hour for each 1,000 feet of ascent or 1,500 feet of descent.

c. When frequent steep slopes are encountered, greater distances between elements and individuals are required. At a distance from

the enemy, effort is made to utilize favorable routes in valleys in order to reduce fatigue of troops.

857. a. The unit usually moves on several roughly parallel routes to avoid the greatly overextended columns of troops marching in single file, to reduce delays caused by bottlenecks, to increase the readiness of units for combat, to decrease the effect of aerial attack, and to reduce the fatigue and strain of the march.

b. In winter, travel may be possible only for specially equipped and specially trained foot troops; with snow vehicles used in place of the animals of the pack artillery and pack trains. Under these conditions, combat aviation may be an effective substitute for artillery, and transport aviation may be used to supply marching columns by means of air drop.

858. Because of the distant observation which may be available to the enemy, slowness of movement, increased possibilities of surprise by ambush, and terrain restrictions on the movement of flank security detachments, security on the march calls for special measures. Tactical groups usually will march separated by terrain obstacles which deprive them of mutual support. Establishment of all around security for each tactical group is necessary.

859. Special measures which afford security in mountains include—movement by bounds of the main body and the advance guard; seizure of the opposite and the lateral crests previous to the entry of a column into a valley; dispatch of detachments, including airborne troops, to seize critical points of the terrain to assist the advance through the mountains; utilization of darkness and fog; utilization of defilade in the area subject to hostile observation and fire; employment of rear guards even during an advance; and employment of combat aviation.

860. Because of the difficult routes followed by flank security detachments and the fatiguing nature of their operations, it is usually necessary to provide relieving detachments at frequent intervals. Consideration must be given to the fact that such detachments should start 1 to 2 hours ahead of the main body and ordinarily are unable to rejoin their units until after the completion of the march.

861. When contact becomes imminent, advance guards, exploring all routes in their zones of action, endeavor to seize terrain objectives which will cover the deployment of the main bodies. Because of slowness of movement of troops, developing for com-

bat, advance guards will act independently for longer periods of time than is the case on more normal terrain. For this reason, advance guards will have more artillery and engineers than normally and the heavy weapons will be pushed farther forward in the formations.

862. a. It is difficult to obtain security at the halt with a continuous screen of outposts. A more effective method is to send out detachments to occupy heights in the principal directions from which the enemy might fire on the main force. It is advantageous to send small groups far out to occuy dominant observation posts and defiles. Occupation of these forward positions will make possible the discovery of the enemy from afar. Information of the enemy's strength can thus be gained in time to be of value to the commander. The mountainous terrain enables these detachments to effect greater delay than in normal terrain.

b. The interior guard of all camps and bivouacs is arranged with special care. Enemy detachments may infiltrate through security dispositions in areas which are difficult to guard.

OFFENSIVE COMBAT

863. In difficult mountain terrain, the reinforced battalion is ordinarily the largest unit which can be employed as a unit in the attack. The irregularities of the ground break the attack into relatively isolated actions which demand the highest initiative and leadership of all subordinate commanders.

864. The main effort of the unit is directed against the critical terrain features which offer the best opportunities for flanking action by small units, effective supporting fires, and the most advantageous approach to a decisive objective. Decisive objectives are usually terrain features, such as passes or heights, which control hostile lines of communications or from which the enemy can dominate friendly lines of communciations by observation and fire.

865. Surprise is facilitated by the exceptional defilade and dead space which the mountains afford and which frequently permit a debouchment at a short distance from the enemy. Surprise is completed by action of small detachments operating in areas which are difficult to traverse and appearing on the flanks or in the rear of the hostile position. The possibilities of employing airborne troops for this purpose should be considered. When other

factors permit, full advantage should be taken of darkness or fog, snowstorms, and drifting snow to launch attacks.

866. The designation of boundaries follows normal procedures. However, boundaries between tactical units may not be designated because of the extended intervals separating units. Instead, subordinate units may be given axes of advance and special measures are taken to insure contact and coordination and to provide for the elimination of pockets of resistance.

867. a. Each tactical group makes its main effort by a combined advance along heights and valleys. It is particularly important that early possession of the heights on each side of the defile insure protection to troops operating within the defile. Tanks may be of great assistance within the defile and upon debouchment therefrom.

b. Infantry units advance by bounds, employing infiltration and enveloping action. They seek to outflank and capture hostile strong points on successive spurs and ridges. Supporting weapons of both infantry and artillery direct their fire to neutralize the enemy's observation and strong points.

868. Terrain obstacles should not be considered complete flank protection for tactical groups. Obstacles must be supplemented by flank combat patrols or by connecting groups which operate with adjacent units.

869. In addition to the possibilities of surprise which they offer, night attacks present special advantages. They avoid losses which would be incurred by attacks in daylight across difficult terrain under observed fires of the defense, and compensate for the deficiency of supporting fires in mountain terrain. The sharpness of relief lines facilitates maintenance of direction in the night attack.

870. a. The success of each tactical group is exploited. When the location of the reserves and the terrain permit, task forces are formed which push rapidly and deeply in the designated direction and initiate lateral movement against hostile forces which are holding up adjacent tactical groups. It is this flanking action against the lines of communications of the enemy which will cause the withdrawal of the enemy to become general and change the action from exploitation of a local success by one tactical group to a pursuit by the whole force.

b. In addition to direct pressure exerted on the withdrawing enemy, every effort is made to delay and harass his retreat by combat aviation and to block him by the action of encircling forces to secure terrain objectives which bar the hostile avenues of retreat. Encircling forces must be highly mobile. Critical terrain features on the enemy's route of withdrawal may be suitable objectives for airborne troops.

DEFENSIVE OPERATIONS

871. In defensive operations, dispositions are based on the mission, on the routes of advance open to the enemy, and on the possibilities offered by a combination of difficult terrain and fire effect for breaking up the hostile attack. The defense must retain heights which dominate, by observation and fire, hostile routes of communications and approach. It must also deny the enemy access to passes or other defiles which, if lost, will render defended heights untenable. The strength of terrain may permit assignment of broader frontages to units than are usual in rolling terrain.

872. In defending passes or valleys, the defense rests its flanks on strong obstacles on adjacent heights. It takes full advantage of observation from these heights and pushes the flanks well forward along the heights to gain flanking fires in front of the position. The spurs extending to the front should be occupied to provide flanking fires and to deny their use by the enemy in reaching the heights. Two successive crests may be included in the position. Tanks protected by artillery fire and supported by infantry may be emplaced in concealed positions on the enemy's side behind minefields to prevent a surprise thrust by enemy armor.

873. Demolitions and chemical agents assume increased importance to the defense in mountains. In mountain passes and other defiles, contaminating demolitions are capable of blocking the advance of all except those forces capable of cross-country movement. Their effect may endure for long periods of time.

874. a. The outpost of a defensive position usually has good routes of withdrawal which do not mask fire from the battle position. Security elements are pushed out in front of the outpost position with the missions of gaining contact with the enemy at the greatest possible distance, and of gathering information which will assist the commander in disposing the elements of his command, particularly in locating his reserves advantageously.

b. It is important to delay the enemy as far in front of the position as possible. The more difficult the prospect of the defense of the battle position, the more important becomes this delay.

875. Even though it may contain areas which are difficult for the attacker to approach, the battle position is organized to provide prearranged fires across the entire front. No terrain can be considered impassable, and no area inaccessible, to a determined attacker possessing troops trained in mountain operations. Planned ambushes and an integrated system of road blocks form an integral part of the defense.

876. a. The distant observation available to the defense offers opportunities for long-range interdiction fires by both artillery and other supporting weapons. Such fires complement planned demolitions and must be coordinated with them by having the weapons register on the demolition sites while observation of them is still available.

b. Counterpreparation fires may be applied in mountains with unusual effect, since careful study of the terrain will indicate, almost conclusively, areas in which the enemy will form for attack.

877. Combat aviation is particularly effective in preventing or delaying the maneuver of hostile reserves, particularly in their passage of defiles.

878. From the beginning of the action, the defense must plan to maintain the integrity of its position by local counterattacks in case the enemy penetrates between adjacent defense areas. These counterattacks are prearranged as to direction, objective, and supporting fires so that they can be launched on short notice when the enemy is exhausted and disorganized. Because of the local nature of combat, a general counterattack is seldom possible. The reserves ordinarily will be held well forward and may be divided to cover two or more critical areas.

879. The rear areas of a defensive position may be subjected to harassing attacks by mountain or airborne troops. Protection against such attacks is afforded by placing security elements in positions which command areas in which hostile approach is at all probable.

880. In delaying action, blocking passes between valleys is emphasized.

381. In a withdrawal, the breaking of contact is simplified by the sharp relief which affords defilade and cover from hostile observation and fire.

Section VII. COMBAT IN SNOW AND EXTREME COLD

GENERAL CONSIDERATIONS

382. Military operations conducted under conditions of extreme cold and deep snow demand special equipment and training for troops designated to conduct such operations. Small bodies of troops so trained and equipped are well suited for use as patrols or raiding parties against the hostile flanks, rear, and lines of communications. Large bodies of troops so trained and equipped may operate as a major force and conduct extensive operations. Administrative and tactical plans must be developed concurrently, each adequate to support the other. Problems which must be overcome to conduct operations successfully in extreme cold and deep snow include—the retention of body warmth in men and animals, providing equipment and transportation which facilitate movement over snow and ice; the transportation and preservation of supplies and equipment; evacuation; and insuring the functioning of transportation, weapons, and equipment. Ice fog, resulting from the firing of weapons, may necessitate frequent changes of position for direct fire weapons during periods of extreme cold and calm.

383. Infantry trained in the use of skis, snowshoes, and snow vehicles can operate under conditions which normally would immobilize foot troops. Units usually are organized into light, self-sustained, tactical groupings from which all weapons and equipment unsuited to the operation have been removed. In very severe weather the proportion of the infantry component of any force must be increased to permit unit rotation and to provide an increase in unit strength. Unit rotation is necessary as exposure to extreme cold and deep snow results in reduced mental and physical alertness and consequent reduction in unit combat efficiency. Unit overstrength is necessary to offset the reduced working capacity of individuals.

384. *a.* The mobility of artillery is dependent upon the severity of the weather and surface conditions encountered. Artillery may be self-propelled, tractor drawn, towed by over-snow vehicles or towed on sleds. Reindeer, horses, and mules may be used to tow sleds. Pack artillery may be dismantled and carried in over-snow vehicles. When operating on icy roads or in icy areas special traction equipment may be necessary to prevent slipping.

b. The difficulties of providing artillery surveys are increased by extreme cold and deep snow. Adjusting and sensing of fire is likewise more difficult due to the dampening effect of snow and the limited contrast afforded by snow covered terrain. Time fire and white phosphorus may be used to better advantage than contact bursts both for sensing and in fire for effect.

c. In deep snow, artillery pieces must be equipped with snow spades to prevent excessive recoil, or dug in to ground level and cushioned with logs, as the frozen ground provides no cushioning effect.

d. Ice fog will necessitate frequent changes of position if direct fire is conducted during periods of extreme cold and calm.

885. Full tracked armored vehicles will experience little difficulty operating on frozen ground or on ground covered with not more than 12 inches of snow. When snow approaches 20 inches in depth, range and mobility are retarded. In snow over 30 inches deep, armor is restricted to roads and prepared trails. Streams and other bodies of water present serious obstacles except when frozen to a sufficient thickness to carry the weight of vehicles. Expedients are frequently required to reinforce ice surfaces prior to armored crossings. In planning armored operations the need of special traction equipment to prevent slipping and the probability of ice fog must be taken into consideration.

886. Due to the increased problems in facilitating the forward movement of combat troops, maintaining lines of communications, and constructing shelter, engineers normally require augmentation in strength and equipment. Snow removal equipment is required to meet the constant task of keeping roads and airstrips unobstructed; water supply problems require special attention; increased use of explosives is necessary for the construction of field fortifications and other facilities; increased stress must be placed on the training in field engineering given to all arms. Telpherage (cableways and tramways) may be necessary in extremely rugged areas to assist in problems of supply and evacuation. Pipe lines may be necessary to facilitate the supply of liquid fuels.

887. Medical service varies little from that in temperate climates except that casualties must be removed rapidly to prevent freezing. Special over-snow equipment is required since litters are difficult to carry over snow and ice. Front-line evacuation is performed by hand-drawn sleds, snow boats, or similar expedients; field ambulances or other vehicles used for evacuation in forward areas must have over-snow properties. Air evacuation from advanced

landing fields may be essential and may include helicopter lift from advanced posts or rugged terrain. Heated shelters are mandatory along the route of evacuation, and must have sufficient space to permit emergency treatment. These shelters must be readily transportable, easily erected and disassembled. Aid stations are placed as far forward as the tactical situation permits. They are provided with radio communication so that casualty locations may be rapidly indicated by unit command posts.

888. Air participation in operations is reduced by shorter periods of daylight and a higher percentage of unfavorable weather. Airfields may be distant from the units supported with a consequent reduction in usable aircraft load. However, for aircraft equipped with skis or tracked landing gear and for light aviation particularly, many suitable natural areas on snow or ice will be available. Troops and supplies may be flown to such areas. Supplies may be delivered by free drop, parachute drop, or by glider.

889. a. Full use is made of existing commercial signal communication.

b. Radio is extremely important but is subject to increased technical and operational difficulties. Technical difficulties encountered include reduced battery efficiency caused by cold, and icing of microphones caused by the condensation and freezing of moisture from the breath. Operational difficulties are increased by auroral phenomena. These increased technical and operational difficulties reduce radio efficiency and limit the extent of its employment.

c. Wire lines should be hung in trees or on poles whenever possible to prevent their freezing to the snow or ground and to avoid damage by individuals and over-snow vehicles.

890. Most chemical agents are effective in extreme cold, therefore protective measures must not be neglected. Contaminated clothing and equipment will result in casualties if brought into a warm shelter.

891. a. Horses and mules can be used in snow up to 14 inches in depth but require an excessive amount of care and their use is limited. Horses are more useful than mules, because the latter's small hoofs have less flotation in snow. Shelter must be provided in extreme cold.

b. Reindeer are found in arctic regions of North America, Europe, and parts of Asia. Reindeer are sturdy draft animals and

require less attention in cold weather than horses but are not as strong. They should be retained in their natural habitat and managed by natives.

c. Dogs are best adapted for light hauling operations on prepared routes over packed snow. In addition they are valuable aids to sentinels and may be used for scout or messenger duties.

892. a. Difficulties of maintenance are increased as conditions become severe. Special lubricants must be used in matériel, vehicles, weapons, and aircraft. For successful operation of motor powered equipment, special means for starting and operating engines must be provided.

b. Training in and enforcement of supply discipline is of extreme importance. Because of difficulties of supply, all clothing and equipment must be conserved to the maximum degree. From the standpoint of the indvidual, careless or poor supply discipline may result in the loss of life.

893. The morale factor in areas of extreme cold, long nights, and scare population is a major concern. The problem is not acute for troops engaged in operations of short duration, but may become acute during extended periods of relative inactivity. A study of recreational facilties and possibilities of the area should be completed prior to operations. Based on the study, commanders should take positive action to secure suitable facilities and appoint qualified officer personnel to care adequately for this important factor. Imagination and improvisation in the arrangement for and construction of recreation facilities may be required.

894. a. In many areas subject to extensive periods of extreme cold the terrain will present varied and difficult transportation problems during the break-up, open and early freeze-up periods.

b. A layer, "permafrost", frequently exists at varying depths below the surface, which prevents surface waters from draining into the subsoil. In relatively flat areas, where surface drainage is limited, this condition results in a soft spongy surface interspersed with numerous lakes and ponds which makes land transportation extremely difficult if not impossible. In such areas water transportation may effectively be utilized during the open water periods but no effective means of land transportation has been developed that can be depended on to traverse the muskeg and tundra.

c. Under certain conditions it may be necessary to move in sufficient supplies during the period of hard freeze to last until the next period of hard freeze.

d. In some instances stocks may be augmented by water transportation during the open water season. Where rivers traverse the area of operations, supplies may be moved in by barge or river boat during the open water season and dispersed to required locations by surface transportation during the hard freeze period.

e. Extensive use of air supply may be necessary. Delivery to established fields will present relatively few difficulties regardless of the season of the year. Where airfields are not available, planes equipped with skis or tracked landing gear may be utilized during the period of snow cover and float planes during the open water season.

f. Commanders must insure that adequate logistical measures have been taken to support operations during the periods of break-up and freeze-up.

CONDUCT OF OPERATIONS

895. Plans for tactical operations to be executed during rigorous winter weather require a careful consideration of all problems previously enumerated. Tactical plans must be flexible to provide for the many contingencies which may result from variable weather and surface conditions in the projected area of operations. Logistical plans must be developed concurrently and must be adequate to support the proposed operation under all the varying conditions that may exist.

RECONNAISSANCE

896. In deep snow and extreme cold, distant reconnaissance is performed by air units. Light aviation may be used for close-in air reconnaissance. Air reconnaissance is subject to the conditions imposed by bad weather and short periods of daylight. Even though the air is clear, wind blown snow may conceal ground activity from aerial observation. Normally, ground reconnaissance is best performed by ski and snowshoe patrols. When the terrain is favorable, this reconnaissance can be extended by the use of special snow vehicles, which are employed either independently or in conjunction with light aviation, ski and snowshoe patrols.

MARCHES

897. a. Marches in snow and extreme cold are executed on foot, on skis, on snow shoes, by normal transport, by special snow vehicles, or by a combination of these methods. Except by well

trained ski troops, the distance covered ordinarily will be less than that expected under more favorable climatic conditions. Commanders must realize that the pace should be slow so that troops do not overheat and perspire; otherwise they will freeze during periods of inactivity. They also must realize that men must remove outer clothing at their own discretion. To insist on uniformity of dress is a mistake which may have serious consequences in the physical results on personnel.

b. The principal problem for foot or animal elements in snow is that of breaking the trail. Trail breakers are relieved frequently. The trail may be broken by men on skis, or snowshoes, by tractors, by tanks, by snow plows, or by special snow vehicles.

898. Trained skiers are the most mobile troops on firm snow in open terrain. The rate, depending on the type of terrain and snow conditions, varies from about 1½ to 3½ miles an hour. For short distances with trained men, the rate of march may reach 6 miles an hour. Under favorable conditions, skiing is very exhausting and the usual system of halts is insufficient. The number and length of halts must be determined by the conditions encountered.

899. Under certain conditions (brush or heavily wooded areas or "rotten" snow) the speed of snowshoers may exceed that of skiers. Normally the rate of movement on snowshoes will not exceed 1½ to 2½ miles per hour. The use of snowshoes is fatiguing, and marches over considerable distances can be performed only by men trained and accustomed to their use.

900. Movement by motor transport is dependent on the depth of snow. In 3 inches or less, wheeled vehicles without special equipment can move at reduced speeds. In snow up to 18 inches deep, wheeled vehicles can move on roads if equipped with chains, and leading trucks are equipped with lugs. In snow over 18 inches deep, a snow plow is necessary. When shuttling is contemplated, adequate provision should be made for cleared turn-arounds.

SECURITY

901. Security is facilitated by the limitations which snow and ice impose upon the movement of large enemy forces, and by excellent observation for long distances over snow covered terrain in dry, cold weather. Unfavorable weather may limit air and ground observation of the enemy during which special security measures against raids by ski troops are always necessary.

902. Where snow impedes movement, security forces of troops on the march ordinarily consist of patrols on skis, snowshoes, or special snow vehicles. Advance and flank guards should be relieved frequently, since their missions are fatiguing. Advance guards should be relieved by leapfrogging at halts; flank guards should be assigned phase lines between which they secure the flank and then rejoin the tail of the column. In rugged terrain flank guards must be dispatched in advanced to secure the high points adjacent to the line of march, prior to departure of the main body. Light aircraft may be employed to observe for signs of enemy activity to the front, flanks, and rear.

903. Security at a halt is affected by the fact that enemy movement in heavy snow, except for units on skis, snowshoes, or special snow vehicles is limited to roads. This indicates the need for strong detachments posted on roads; however, normal security measures for protection of the front, rear, and flanks must be taken during all halts.

904. Security measures for bivouac areas must include strong outguard positions around the perimeter. Patrols operate between the outguard and bivouac area as well as between posts of the outguard. The tour of duty sentinels, under severe conditions may be for periods as short as 20 minutes. Surrounding areas should be checked carefully from the air just prior to dark to discover any enemy movement in the vicinity of the bivouac area.

905. Antiaircraft security measures must be intensified because the canalization of lines of communications makes them particularly vulnerable to air attack. Since the operations of ground troops, not specially trained and equipped, are canalized in deep snow to cleared roads, all active antiaircraft measures must be taken. Active defense may be limited necessarily to the extensive use of light automatic weapons. In snow covered areas, protection against observation is increased by use of a white covering for clothing and equipment and camouflaging supply dumps and other installations.

OFFENSIVE OPERATIONS

905. a. Offensive operations require special preparations and equipment in greater proportion to the strength of the command than for normal operations. These special requirements will vary with the climatic conditions. Signal communication, maintenance, supply, and evacuation become increasingly difficult as the attack progresses. The adverse effects of inadequate planning and lack

of forceful execution are proportionately far greater in deep snow and extreme cold than in temperate climates.

b. When formulating plans, the possibility of sudden weather changes must be considered and preparations made to meet the difficulties imposed by such changes. Additional heavy snow may fall during the operation, thus further restricting mobility. A sudden thaw may prevent cross-country movement, or isolate troops from adjacent friendly forces. Fogs may develop quickly and low clouds may obscure observation. Adequate arrangements must be made for the dissemination of frequent weather reports.

907. A surprise envelopment by a properly trained and equipped force offers many prospects of success. Deep snow will hinder the movement of hostile reserves to meet the envelopment.

908. a. Whenever possible, attacks should be made along ridge lines as they offer observation, ease of control, and normally are more free of snow. The enemy's fire is more limited against attack along ridge lines and his positions in the valleys become untenable upon seizeure of the high ground.

b. Attacks in the valleys along stream lines may encounter deep snow, down timber and brush resulting in difficulty of movement and affording the enemy maximum observed fire from adjacent heights.

909. The selection of objectives is in accordance with accepted doctrine with particular emphasis on installations or critical terrain features which domniate the routes of communication and supply in rear of the hostile position. Seizure of such features will prevent withdrawal or reinforcement. With effective friendly antiaircraft artillery or fighter aircraft operations, lack of resupply by air of trapped enemy units will result in eventual surrender or annihilation.

910. The critical importance of shelter will normally render destruction of enemy installations undesirable. The nondestructive effect of toxic chemical agents on installations will greatly increase the possibility of their use. Chemical agents which are liquid, or which vaporize at low temperatures, will be useful in operations of this character. Screening smokes are relatively unaffected by temperatures. Chemical agents disseminated by means of thermal generators are unaffected by temperature.

911. The interdiction of enemy supply routes and destruction of supply installations are important factors in the selection of com-

bat aviation targets. Targets will be more vulnerable because of concealment and low mobility. In the attack of hostile positions and bases during periods of extreme cold, destruction of the enemy's shelters has great tactical importance.

912. The use of armor in the attack is dependent upon favorable terrain, which must be free of heavy forests and deep snowdrifts. Frozen ground affords excellent trafficability for armored operations. When snow has drifted, hollows and depressions are avoided and the attack is pushed on those ridges which are relatively free from snow.

913. a. Because of slowness in movement, reserves are located initially close to the probable scene of future employment. When the ground is covered with deep snow, the reserve should be capable of oversnow movement. Reconnaissance of routes assumes greater importance due to varying surface conditions. Possible routes for movements of reserves must be reconnoitered.

b. Attacks in extreme weather may require greater depth in reserves, in order that assault troops upon capture of each limited objective can be relieved by fresh troops which are prepared to hold the objective or to continue the attack.

914. In a pursuit over snow, the encircling force should be composed of the most mobile troops. Maximum use is made of oversnow vehicles and troops trained in oversnow movement. Airborne troops may be landed near defiles with the mission of blocking the retreat of the enemy.

DEFENSE

915. a. Deep snow may favor the defense due to the difficulty of movement by the attacking forces. Excellent fields of fire are provided over frozen wide streams and lakes which afforded little or no cover to the attacker. Broken ice for a width of 20 to 30 feet forms a difficult obstacle.

b. Wooded areas, and rough terrain relatively free of snow, favor the attacker and are defended in strength and depth. Defense against tanks should be disposed in depth to cover those approaches which favor tank movement.

916. a. Ordinary entrenching tools are often ineffective. The organization of the position requires special tools and explosives. The location of a defensive position on the military crest will

usually be effective, since both enemy personnel and tanks have difficulty in ascending steep snow covered slopes. When the ground cannot be excavated, snow trenches are used, at least 7-8 feet of solidly packed snow is needed for protection from small arms fire. When a prepared position is garrisoned, it will require heated shelters.

b. The defender utilizes every opportunity to improve routes of communications within the position. Paths are opened between elements occupying forward defense areas, between rear and forward defense areas, and in the most probable directions of employment of reserves. Care must be taken to provide maximum concealment of all paths, especially those to gun positions in forward areas. Automatic weapons of reserve units, when not otherwise required, are sited to prevent hostile penetration and use of these paths.

917. The most mobile troops of the defender are held in reserve. Reserves are held close to the probable scene of employment. In deep snow, the enemy may be unable to change his dispositions in sufficient time to meet a counterattack directed at his flank.

918. The bulk of the forces employed in delaying action are ski troops, and foot troops transported in vehicles which can operate on snow covered roads. Troops engaged in delaying action in snow are reinforced by artillery and infantry heavy weapons adapted for movement over snow. The selection of delaying positions and waging of effective delaying action is facilitated by deep snow which delays and canalizes enemy forces.

Section VIII. COMBAT AT DEFILES

919. A defile is a terrain feature which canalizes an advance. Defiles frequently occur in mountain passes, woods, towns, river crossings, lake regions, and swamp areas. A defile through which troops must pass is particularly susceptible to an attack. Ground defense is comparatively easy.

920. a. If the route of an advancing unit passes through a defile, a force may be sent forward to establish a defense in front of it to permit the main body to emerge from the defile unmolested and to secure sufficient space. Offensive action may be required to secure sufficient space. The defense may be conducted in a single position with flanks refused and protected by the obstacles creating the defile or the defender may adopt delaying action to

gain the necessary time and space for the main body to emerge and develop for any action required.

b. A similar defense outside a defile is often required of a rear guard to cover the retirement of the main body through a defile.

921. a. Defense may be conducted at the defile itself. In mountain passes or valleys, if the defender is more skillful in mountain movement than the attacker, he will have great advantage and will cause considerable delay. Conversely, if the attacker is more mobile, he will simply outflank the defender. The flanks of a position in a mountain pass cannot be considered secure against trained mountain troops.

b. A mountain defile is defended with the bulk of the forces on the high ground to the flanks which command the defile. For details see section VI.

c. Maximum use is made of demolitions, obstacles, and chemical agents within the defile to delay the hostile advance. Combat aviation is of maximum value due to the enemy's vulnerability to air attack while in the defile.

922. a. Defense in rear of a defile provides maneuver area to the defender while it closes the exit and restricts the movement of the attacker. The defensive position is concave towards the exit with flanks resting on obstacles. The distance of the position from the exit is such that converging fire of all arms can be brought upon the attacker before and during his debouchment. Reserves are held out to give flexibility to the defense and to counterattack promptly against enemy forces which succeed in emerging from the defile. The maximum delay and disorganization of the enemy is affected within, and in front of, the defile by the use of security forces; artillery concentrations; demolitions; obstructions; chemical agents; and air attack.

b. In the defense in rear of a mountain defile, care must be taken not to assume that the attacker will remain within the defile or that his main effort will be directed through it. If the attacking forces are mountain trained, they will seize the commanding terrain and outflank the defender.

923. The attack of a defile varies with the manner in which it is held and the accessibility of the flanks. When a defile is held at or within the entrance and the flanks are accessible, the main attack is made in a direction that insures the capture of localities which command the entrance. When the flanks are inaccessible,

the attack must be made by penetration. When the defile is held at the exit, the attack attempts to outflank the defense. By moving small forces through or around the obstacles creating the defile, the advance is made on a broad front to outflank defended areas. The attacker debouches from the defile on the widest possible front.

Section IX. JUNGLE OPERATIONS

924. a. Basic principles of combat are applicable in jungle fighting but difficulties of terrain, visibility, and climate so complicate command, maneuver, supporting fires, supply, and evacuation that the application of these principles must be adapted as required by the limitations imposed. Resourceful leadership, proper training, and suitable equipment will convert natural difficulties into relative advantages.

b. Control and maneuver in jungle terrain are extremely difficult. Few roads or trails are available; they often must be constructed as movement progresses. Observation is limited to short distances, sometimes to only a few feet. Artillery survey is particularly difficult. All these difficulties increase in proportion to the size of the force involved.

925. a. Jungle tactics must be based on sound fundamentals. Control should be facilitated, yet formations must be sufficiently flexible under conditions of limited visibility and vulnerability to fire to permit rapid deployment. In general, units will move in column of files, adequately secured and alert for last-minute deployment into line. Intervals between men may extend to the limit of visibility between them.

b. Maneuver in the jungle consists of outflanking resistance, using rearward units which break out of the main column to turn the enemy position. Such tactics require basic training to produce resourceful individuals who consider the jungle an ally. Movement through the wilderness must be routine, not an exceptional emergency. Troops which cannot leave the trail are a liability in the jungle.

926. a. Jungle areas favor surprise and ambush by small forces. On the march, ambush is a constant threat. However, the very factors which facilitate ambush localize the surprise obtained. Security may be obtained by use of flank and rear guards which take position at key points such as stream crossings and high ground. Prearranged and rehearsed plans to meet surprise attacks rapidly likewise insure protection. In jungle movements,

distances between elements of a force should be much less than in open country, special measures being taken to maintain contact.

b. Bivouac areas must be prepared for perimeter defense, with suitable fields of fire. Security elements are posted to cover avenues of approach which threaten the bivouac area. Frequently the length of the column will dictate bivouac along the trail in depth. In such instances security may be decentralized to the smaller units.

927. The ability to maneuver off trails requires hardened troops, thoroughly acclimated and equipped for close fighting. Their training must enable them to move cross country, at least for tactical movements, and give them confidence in their jungle technique. Arms and equipment must be designed for maximum mobility through tangled wilderness under oppressive climatic conditions.

928. a. Defense in a jungle meeting engagement is difficult. It consists basically in blocking the routes of approach to the attacker's objective. Since these routes are almost always defiles, trails, streams, and ridge lines; strong blocking positions should be established where the attacker's maneuvering power is limited. These positions must be protected against an offensive turning movement, which means that the usual lack of visibility handicaps the defense if the attacker acts aggressively.

b. Where infiltration past the blocking position must be controlled, use is made of a series of strong support positions organized along a rearward line such as a ridge or river line. Reserves must act aggressively and have equal mobility with the attacker. In general, mobility must be used to strike the enveloping force when it is at the greatest disadvantage.

c. If no objective other than the route itself is threatened, defense can be organized in depth along the route, since the attacker must eventually return to it. Such defense should constitute a succession of self-contained strong points, organized for all-around defense, with prepared plans for counterattacks at points where the attacker is at maximum disadvantage.

d. In terrain where flanks can be anchored to obstacles and there is time to lay out and construct entrenchments and gun positions, the characteristics of jungle country give the defense great advantages. Such a position can only be overcome slowly and at great cost to the attacker. If backed by strong, mobile reserves, and secure supply lines; such a position, held with determination, can stop superior forces for a considerable time.

929. As in the defense, the principles of offensive action are unchanged in the jungle, although the methods of their application differ in some respects. Because of the cover and concealment afforded troop movements, it is to be expected there will be some meeting engagements with little or no advance warning. This requires commanders to estimate the situation rapidly, arrive at a decision, issue the necessary orders, and execute the plan of action. Rapidity of action will gain surprise which is always a contributing factor to success.

930. In the penetration of an enemy position the advantage lies with the attacking force in the early stages of the action, since the cover afforded his attacking echelon will enable him to approach close to the enemy position without being detected. However, at the same time, his approach may be canalized by a scarcity of trails, by dense vegetation through which passage must be cut, and by swamps or lagoons. During the actual attack of the organized position, the advantages accrue to the defender. Natural camouflage and concealment of front-line defensive weapons and positions frequently defy attempts to locate them. This makes the assault extremely costly to the attacker. If terrain permits, there is an excellent opportunity to use the infantry-tank team to demolish fortifications and overrun the position. The flame thrower mounted on the tank may be very successful when used in this manner.

931. a. The envelopment frequently will be used to gain decisive results. Such envelopments may be by land, or water, or airborne. The limitations on the use of land envelopments are imposed by lack of available routes for use by the enveloping force, and also by the excessive time required for the action due to normally slow progress in jungle terrain. Because the terrain and jungle growth will not permit such movement the use of the tank battalion in mass is seldom possible. Under such conditions, it may be found advisable to attach elements of the tank battalion to subordinate units in order that tanks may be used in small groups in conjunction with the infantry attack.

b. Water-borne envelopment frequently will offer possibility of striking the rear or flank of a defensive position without a time-consuming jungle march. Against an aggressive enemy care must be exercised to avoid a defeat in detail. Strong support of the water-borne force is essential, particularly during the landing phase of the operation.

c. The advantages and weaknesses of a water-borne envelopment

are, in general, common to an envelopment by airborne forces. Jungle terrain may limit the number of suitable airheads. As a result surprise may be difficult to achieve. When conditions permit, the entire operation may be airborne or a combination of any of the three methods of envelopment may be employed.

932. The rifle and bayonet, automatic rifle, grenade, machine gun, submachine gun, carbine, machete, and the mortar are weapons well suited for jungle fighting. Heavy mortars and rockets may replace artillery in the jungle, when lack of observation and the weight of field pieces limit the employment of artillery. Against well-constructed defensive positions, flame throwers are extremely valuable. Infantry heavy weapons often are transported by pack, small cart, or on the backs of men.

933. While light mobile forces are an essential in jungle warfare, such troops are too lightly armed to attack strongly organized positions. Part of the force, normally armed, must be moved up rapidly to relieve the advanced troops once such a position is uncovered. This makes imperative the rapid preparation of adequate trails and supply lines.

934. Conditions encountered in jungle warfare impede the progress of land forces and greatly restrict the movement of artillery and heavy equipment. Under these conditions it is desirable to use a greater proportion of aviation which has relative freedom of movement over the jungle. Jungle conditions may require the movement of the bulk of troops, supplies, and equipment by air. In jungle warfare the seizure, construction, and protection of the necessary airfields is often made the initial objective of all forces involved.

935. a. Supply problems frequently control the entire plan of operation. Lines of communications are tenuous, difficult to maintain, and always vulnerable to attack. In particularly difficult country, all material must be moved by hand. Native carriers are of great value in work of this type since they are acclimated and accustomed to existence on minimum subsistence. They should be organized into units of a semi-military character, stiffened by officers and noncommssioned officers in whom they have confidence. Native carrier organizations which are to work in forward areas exposed to fire should be especially selected and trained for the purpose. Weight-saving expedients are imperative as are specially trained and equipped medical, engineer, and service troops.

b. The maintenance and protection of supply routes are major considerations. When available, water routes will be found best.

although air transport also may be utilized to relieve troops of the necessity of guarding long and exposed lines. Self-containment of supply, in keeping with the proposed operation, is the ideal.

936. Signal communication often is difficult. Visual signaling usually is impossible; the use of runners is slow and frequently hazardous; the range of radio may be reduced greatly; and wire circuits are hard to install and maintain. When clearings are available, drop and pick-up messages are highly satisfactory, provided the liaison type of plane is used. Pigeons may be used for important messages. In actual combat, wire communication within battalions or similar units is vital.

937. Ground reconnaissance is conducted habitually by small parties. Distances at which security and reconnaissance detachments operate are decreased in proportion to the thickness of the jungle.

938. In general, jungle fighting is conducted at extremely close quarters by relatively small bodies of troops. Initiative by individuals and small unit leaders is the key to success, reinforced by proper discipline, training, and hardening to jungle conditions. The force which is able to move off the trails and to maintain itself under extremely arduous conditions possesses a great advantage.

939. a. Night operations under jungle condition are practicable for small forces of specially trained personnel. In general the normal difficulties of movement and control are so complicated by darkness that large night offensive operations are inadvisable.

b. Defensive measures against surprise night attacks are essential. Such measures should include adequate security advance plans which include, the designation of rallying points; local protection of bivouacs by passive measures which give warning of close approach; and fire plans which cover all approaches.

940. a. Unfavorable health conditions must receive the attention of all commanders. The necessary innoculations and a period of gradual acclimation are basic requirements.

b. Sanitation and health measures must be fully implemented, otherwise the strength of a command may be serious reduced by medical evacuations. In malarial countries, unless the tactical situation requires, marches should not begin until sufficiently after daylight to permit the preparation of breakfast and the breaking of camp to be completed after daylight. Similarly camp should

be made sufficiently before dusk to facilitate individual protection against insects during the dangerous dusk period.

c. Consideration should be given to the problem of medical evacuation. Light aviation is frequently the most suitable means. In view of the difficulties of collection and evacuation, casualties may have to remain with organizations for considerable periods of time. As a result unit medical personnel should be selected carefully to insure their ability to handle such cases.

d. As in arctic operations, preselection of personnel should be considered as a means of reducing nonbattle casualties.

941. a. Jungle warfare of the type described should be limited to the initial seizure of tropical areas. All combat methods should be designed to exploit the capabilities of the user. An industrial nation should therefore capitalize on its mechanical developments to permit the earliest possible use of heavy weapons and normal combat methods. Full use of aviation, water transport, engineers, and airborne troops place a more lightly equipped defender at maximum disadvantage. Native labor is of value particularly in the early stages of such an operation before power tools are available.

b. Engineer units are of great importance in the process of opening-up jungle country, particularly units equipped and trained for rapid construction of roads and airfields under the conditions encountered.

Section X. DESERT OPERATIONS

942. a. The characteristics of desert areas vary greatly. The surface may include areas of loose sand and sand dunes, boulder-strewn areas, mountain areas, areas of extremely rugged terrain, or flat hard-surfaced areas. In areas of loose sand, foot movement and the movement of ground transports may be greatly impeded.

b. There are seldom any well-defined roads, but trails generally exist between water sources. In flat hard-surfaced areas, roads and trails are not vitally essential to the movement of ground transport. Desert areas are also characterized by limited vegetation and relatively few obstacles to movement. Limited vegetation results in an increased importance being placed on the technique of artificial camouflage. In certain desert areas the lack of obstacles makes possible a greater freedom of movement than usually found in normal terrain.

c. There are few landmarks and maintenance of direction often is difficult. Mirage is a constant source of error. Distances are

deceptive and usually are greatly underestimated. The effect of weather upon operations must be considered. Seasonal rains may make cross-country movement difficult or impossible; dust and sand storms may reduce visibility, facilitating surprise movement of forces, but greatly increasing maintenance problems. Extreme variations in temperature within a 24-hour period may be expected.

943. Desert warfare is characterized by the dependence of movement and operations on supply; particularly supply of water. Lack of roads, difficulties of maintaining direction, the danger of sand storms, and the vulnerability of supply columns to air and ground attack impose serious obstacles to the problem of supply. When local water supplies are inadequate, water must be brought from the rear by tank truck, rail, or pipe line. Successful operations are dependent upon—cross-country mobility; adequate maintenance, supply, and reinforcement of rapidly moving forces; dependable communications; and the coordinated action of air and ground forces. Mobile ground units or units transported by air assume increased importance.

944. a. The general doctrines governing offensive and defensive operations apply in desert operations. The troops employed must be trained and acclimated thoroughly before engaging in desert operations. A high degree of mobility is desirable in the forces employed. When the character of the desert permits, the speed, fire power, and comparative independence of water supply of motorized and armored forces make them especially useful.

b. The necessity for an effective organization for maintenance, recovery, and evacuation of weapons and transport is emphasized. Allowance must be made for an appreciably greater than normal consumption of fuel and lubricants when units are moving cross country. Stretches of loose or heavy sand may be made passable by the use of wire netting, canvas strips, or similar means. Low pressure, smooth tread tires assist wheeled vehicles in crossing areas of loose or heavy sand. Motorized units, armored units, or troops transported by air are employed to hold points of tactical importance, such as water sources.

945. Air superiority is extremely important, not only to destroy or neutralize hostile forces and installations but to protect our own forces from hostile air observation and attack. Air transport is especially useful for the supply of isolated detachments.

946. Desert terrain is often very advantageous for a wide encircling or turning movement by highly mobile armored or motor-

ized forces, in cooperation with combat aviation. Such action may prove decisive.

Section XI. PARTISAN WARFARE

GENERAL

947. **a.** Partisan warfare is carried on by small independent or semi-independent forces, operating against a greatly superior enemy. Partisan operations are conducted for the purpose of harassing or delaying larger forces and causing losses through attrition. They are also valuable in destroying signal communication, gaining military information, assisting regular forces to reconquer the country, or making incursions on the enemy's lines of communications and supply.

b. Partisan operations may result as an aftermath of the defeat of the main forces of modern armed opponents. They may arise from the intention to occupy territory or quell rebellions. They may be employed in friendly but enemy controlled areas.

948. The military geography of the area may require operations in mountains, deserts, jungles, or undeveloped terrain. Special arms, equipment, and methods of operations may be necessary. The situation in each instance must be studied critically to determine the appropriate preparations and methods necessary for the conduct of successful operations.

949. Every effort should be made to supply organized partisan groups with small portable radios and secure codes. If regular forces can maintain communication with partisan groups, they can be controlled and their operations coordinated with those of the regular troops. Supply and resupply of partisan forces will consist largely of air drops. Adequate and dependable signal communication is essential to carry out supply operations by air. If radio communication is good, air support can be given partisan operations by combat aviation.

950. **a.** In planning partisan operations against a superior force, good information of the enemy's dispositions and movements and a thorough knowledge of the terrain and road net are needed. Large-scale operations are avoided. Tactics are based on a small force striking a quick blow with surprise against isolated detachments and unprotected columns or convoys.

b. The plan of the commander provides for assembling the bulk of the command after each enterprise to prevent its dispersion and

to insure proper direction in the conduct of subsequent operations. Partisan groups should at all times have a rendezvous so that in case of dispersal by a surprise attack each individual can find the assembly point.

951. a. In the conduct of partisan warfare the mobility, enterprise, and reliability of the troops employed are more important than their numerical strength. In general, the best results are obtained by the use of numerous small detachments under capable and versatile subordinate leaders, all operating under the direction of an experienced superior commander. The enemy's main body is harassed and held in suspense by repeated threats and raids. Whenever practicable, movements and attacks are made at night. During daylight hours, the main forces remain concealed, leaving only reconaissance patrols in contact with the enemy.

b. Partisan raiding parties operating in the enemy's rear may seriously interrupt the enemy's system of supply by destroying bridges and attacking supply trains. Every effort is made to keep in communication with these raiding parties so that their subsequent activities may be properly directed. Passive measures, operations at night, and dispersion counteract hostile air and armored operations.

952. Larger forces engaged in the suppression of partisan warfare have superior organization, armament, and equipment but may be handicapped by lack of reliable information, by dependence on an organized system of supply, and by difficulty in bringing the partisans to a decisive engagement.

953. When the objective of the operations is the destruction of partisan forces or the quelling of tribal uprisings, every effort should be made to enlist the support of native elements to form small mobile constabulary-type units. Such units are familiar with the area and with the partisan opponents. Vigorous and bold action by mobile forces is ordinarily the quicket and surest way of defeating the enemy bands. Usually, this can be accomplished best by an advance on a broad front along all available routes within the affected area against the enemy's principal villages and strongholds. These then are organized as defensive areas, from which highly mobile columns conduct operations against any organized resistance located. Since the attacker usually is greatly superior in strength and means of combat, encirclement by double envelopment should be attempted in order to bring about a decisive result.

954. a. When the objective of the operations is the occupation of the hostile territory, concerted action directed against the capital, the government, the main lines of communications, and main sources of supply is the quickest method of bringing about decisive battles and overthrowing the enemy.

b. Undue dispersion of force by using numerous minor detached forces to combat similar small partisan forces may lead to defeat in detail.

c. Vigorous air attacks conducted in front and on the flanks of operations directed toward vital objectives prevent hostile partisan concentrations that would slow up or divert the main forces.

Section XII. JOINT AMPHIBIOUS OPERATIONS

955. Joint amphibious operations are over water operations, conducted by Army, Navy, and Air Force jointly, for the purpose of effecting a successful landing on a hostile shore. Amphibious operations present many technical and tactical problems which require special organization and equipment.

956. An amphibious operation may be carried out for any or all of the following purposes:

a. To seize and secure a beachhead from which to initiate major land operations.

b. To seize and secure an area for use as a naval or air base.

c. To seize and secure an area to deny its use to the enemy.

d. To destroy enemy facilities, installations, and forces in a particular area.

e. To effect deception or gain information of the enemy.

957. Types of amphibious operations are determined by the types of vessels employed; namely, those which can place personnel, vehicles, and supplies directly on the beach, and those which require the transshipment of troops, vehicles, and supplies to smaller landing craft for movement to the beach. Amphibious operations may be classified as ship-to-shore operations and shore-to-shore operations. A ship-to-shore operation is a transshipment of troops, equipment, and supplies from seagoing vessels to smaller landing craft and the subsequent movement to the landing beach. A shore-to-shore operation is an amphibious operation in which the *bulk* of the landing force with certain supplies and equipment is transported in landing ships, craft, and/or vehicles from a shore base directly to a landing beach without transshipment.

958. a. In an amphibious operation the initiative and the capability of effecting surprise lie with the offensive forces. The enemy must spread his forces to defend his whole coastline, not knowing where or when the attack will come. The attacker can select the landing areas and can use his floating reserve to exploit any weakness in the enemy's defense.

b. Numbers and types of ships and craft are usually limited and the composition of the landing force with its equipment must conform to the capacity of the available vessels. More time is required to attack from sea than from land and the assault troops are particularly vulnerable to attack from enemy air, sea, and land weapons. The assault troops cannot take an effective part in the combat until landed on the shore. Suitable landing beaches for large forces may be limited and may be denied by unfavorable sea conditions and strong defenses. Because of the distance of the landing areas from the air bases, land based air support may be limited. When this condition exists air support must be partly, if not wholly, supplied by carrier based aircraft. Unfavorable weather and surf conditions may arise at the time of the landing. After the troops are ashore, they must be supplied over the beaches until ports and/or airfields can be obtained or developed.

959. a. Army units must be specially grouped to facilitate the landing of combat units intact. Each combat unit must be so organized that it will be self-sufficient in fire power until the supporting weapons are landed. Similarly, a special naval organization is required to embark, convoy, and land Army forces and to provide naval gunfire support at least until artillery units are established ashore. Air units must be employed so as to insure adequate air defense during the voyage, the landing, and the beach operation, as well as adequate offensive action prior to, during, and after the landing.

b. Special equipment must be used to breach underwater obstacles and beach defenses. Special ships, craft, and amphibious vehicles are required to land the personnel, supplies, and equipment. The geographical features of the landing area will determine the type and quantity of the special amphibious equipment needed in a partcular operation.

GENERAL PHASES OF AN AMPHIBIOUS OPERATION

960. a. The planning phase covers the preparation of plans and the coordination between Army, Navy, and Air components of

the details for the operation. Logistic and operational planning must be concurrent and closely coordinated.

b. During the concentration and specialized training periods, forces participating in the operation must be assembled, organized into a task force, and trained jointly, utilizing improvised sand tables or terrain models. The training should include instruction in the execution of specific orders over a representation of the actual terrain. This can be accomplished without sacrificing secrecy, if appropriate precautions are taken by the staffs in the preparation of sketches and other training aids of the landing areas.

c. The equipment, supplies, and vessels for the assault troops are assembled and combat loaded. The joint force embarks and rehearses the planned operation as realistically as time and availability of resources will permit. Rehearsals should be completed sufficiently in advance of the sailing date to permit any last minute changes that might be indicated.

d. Movement to the objective area includes the movement of the task force from the point of embarkation to the landing area.

e. Prelanding operations consist of reconnaissance, mine sweeping, naval and air bombardment, under water demolitions, destruction of beach obstacles and other operations designed to facilitate the assault landing.

f. The assault phase is the actual assault landing on the hostile shore.

g. Reserve troops and supplies to support the operations are brought in and established ashore.

h. Adequate beachheads are gained, consolidated, and organized, and logistical installations are developed.

GENERAL DOCTRINES

961. General doctrines which are particularly applicable to amphibious operations as a whole are—

a. There must be unified command throughout every phase of the operation.

b. It is the responsibility of the joint commander to coordinate the operations of the Army, Navy, and Air Force in order to assure the teamwork essential to the success of the operation.

c. Each joint force must be organized, equipped, trained, and rehearsed specifically for the task it is to perform.

d. Organization and operation of initial shore logistic functions require specially trained and equipped personnel.

SHORE PARTY

962. a. Once ashore and off the beach, the task of the combat unit is the same as combat under any other circumstances. However, special attention must be given to establish the logistic services to support the operation. This is the mission of the shore party.

b. Engineer special brigades or similar organizations are trained and equipped to give combat organizations the initial logistic support required for amphibious operations. The shore party is represented by the engineer special brigade, plus supporting service units. Thrusting from the rear forward, the services build a logistic chain. The most advanced link in the chain begins behind the combat troops. It must be commenced on D-day by an organization specially trained to forge it under conditions of heavy combat. This organization carries on its duties until the fixed logistic service organization constructs and organizes the more permanent installations upon which rapid and large expansion of the logistic chain can be founded. The engineer special brigade, with advanced elements of the permanent logistic agency attached, lands with the assault elements on D-day.

c. The primary tasks of the shore party upon arrival on the hostile shore include—

(1) Facilitation of the movement across the beach of combat troops with their equipment.

(2) Unloading the cargo from ships and lighters as soon as the tactical situation permits and as rapidly as the cargo can be delivered to the shore.

(3) Rapid dispersion, inventory, and storage of supplies to minimize losses from enemy action and other causes.

d. The first task is accomplished progressively as elements of the shore party arrive, clear the beach of mines and obstructions, construct necessary exit roads, and complete the tasks of removing or repairing stalled vehicles and other mobile equipment.

e. The second and third tasks require adequate provision of vehicles, labor personnel, and equipment for handling materials and other supplies. It is imperative that movement of the supplies from the beach be expedited. The beach must not become an overloaded dumping ground. The engineer special brigade organically possesses the means for planning, controlling, and furnishing specialists for shore party operations.

963. During the initial stages of an amphibious assault and until the artillery can be established ashore, assault troops must be supported by Naval gunfire and air bombardment. Sufficient naval forces and air forces must be supplied to accomplish this mission and in addition to provide protection for the entire force. Once the artillery is established ashore, naval gunfire and tactical air, reinforced, if necessary, by strategic air forces are used to reinforce the fire of the artillery.

964. Due to the great concentration of fires of the various arms and services, centralized control of all fires is essential. To accomplish this, a fire support coordination center (FSCC) or its equivalent is set up in each echelon of command from the battalion to the army. The FSCC consists of artillery, naval, and air force officers and is organized and directed by the artillery commander.

965. Efficient signal communication is essential for control of ships, craft, aircraft, and troops. Signal communication units must be given joint training prior to any amphibious operation.

966. The Joint Force Commander is responsible for the adequacy of the logistics plan. The logistics plan must be able to support the tactical plan and, likewise, the tactical plan must fall within the capabilities of the logistics plan to support it. Provision must be made for sufficient initial supply to safeguard against possible delay in resupply. Levels of supply to be maintained are prescribed by higher headquarters.

967. a. For additional details see FM 31–5 and amphibious manuals in the 60 series.

b. For detailed information relative to signal communication, see appropriate classified joint texts.