CHAPTER 13

SPECIAL OPERATIONS

Section I. ATTACK OF A FORTIFIED LOCALITY

GENERAL

756. A fortified locality may comprise a single, strongly organized position. It will probably consist of a series of strongly organized positions disposed in great depth and breadth in such manner as to be mutually supporting. In either case the main position ordinarily will be composed of a series of mutually supporting major works, protected by minor gun emplacements, tank obstacles, troop emplacements, and wire entanglements disposed in front of and between them to cover dead spaces which automatic weapons cannot reach from the main fortifications.

The main battle position will be outposted by a system of concrete and steel artillery, automatic-weapon and troop emplacements, tank traps, and obstacles disposed in great depth to the front and flanks. The reduction of such a locality by direct attack may be costly in men, ammunition, and matériel. Such an attack offers little prospect of success unless the attacker has accomplished a high degree of technical training and has a great superiority, especially in tanks, engineers, infantry with special equipment, artillery, and combat aviation.

Whenever possible fortified localities are reduced by siege or by an attack from the rear, following an enveloping maneuver by ground or air-borne troops. When, because of secure flanks, isolation is impossible by an initial enveloping maneuver, and airborne

troops are not available, they must be reduced by direct attack to break-through at a weak point. The break-through is followed by envelopment of the created flanks to isolate the separate parts.

757. 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:

a. Reducing the hostile outpost system and gaining close contact with main position.

b. Breaking through the fortifications at the most favorable point.

c. Extending the gap by isolating and reducing hostile emplacements on its flanks.

d. 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.

Air bombardment and action of airborne troops may precede or be a part of any of the above phases. (See FM 31–50.)

758. The principal differences that distinguish a break-through of a fortified locality from the penetration (see pars. 450–454) of any other hostile position are the relatively greater special training and combat superiority required; the absolute secrecy and thoroughness of preparations; the types of special equipment and troops required; the frontage subjected to initial assault; and the action subsequent to the complete break-through and isolation of a fortified locality.

759. Air superiority is the first requirement for operations against a fortified locality.

760. Reconnaissance determines the extent of the

main position and its outpost system in depth and breadth; the location of dead angles and character of emplacements, artillery and antiaircraft artillery positions, tank traps and obstacles, and observation posts; those approaches which can be covered most effectively by the hostile defenses and those which afford the greatest advantage to the attacker; and those areas in rear of the locality which favor action from the rear after a break-through has been effected. Reconnaissance involves the employment of reconnaissance and combat aviation, highly mobile ground reconnaissance units containing engineers, sound and flash ranging, and signal intelligence units. Air photographs are taken of the entire locality at successive intervals to determine the initial hostile defenses and the progress of any changes being effected therein. Important localities are outlined heavily and indicated clearly on the photographs; copies are distributed to commanders 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.

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

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 facilitate the advance of adjacent units whose progress is not so rapid. Plans provide for the

utilization of every available agency of signal communication.

762. The attacking echelon is made up of specially selected troops and weapons. Normally, this attacking echelon will contain infantry, engineers, high muzzle-velocity, flat-trajectory guns, and chemical troops. The engineers equipped with demolition equipment will destroy obstacles and mine fields, and will assist the forward movement of the infantry and direct-fire cannon. Chemical troops will lay smoke screens, fire high explosives or gas, and open lanes through contaminated ground. Searchlights may be used for illumination during night operations.

763. Training of assault detachments is carried out by having them 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. 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.

764. Sufficient reserves are disposed in concealment behind 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 which can bring fire upon troops engaged in preliminary operations.

The use of combat aviation employing heavy bombs is important. Combat aviation is coordinated with the action of the attacking echelon. Hostile elements de-

fending the intervals between emplacements must be neutralized or destroyed.

765. Movement to attack positions is accomplished under cover of darkness, fog, or smoke.

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

767. 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.

768. Fire of heavy artillery is directed upon emplacements, massive obstacles, mine fields, and wire entanglements. The fire of lighter, flat-trajectory weapons and of flamethrowers is directed against loopholes in emplacements to neutralize the hostile weapons. Flat-trajectory artillery with high muzzle velocity, using direct laying, is employed to penetrate emplacements and armored turrets. Air bombardment may be arranged through coordination with the air commander and air attack employed against those positions of the fortified zone which offer profitable targets.

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 attack echelon. 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.

Engineers and other troops destroy remaining obstacles, mine fields, wire entanglements, tank traps and other obstacles which may impede the advance. They prepare crossings necessary for the supporting armored vehicles and weapons.

769. Some emplacements will remain intact following the employment of heavy artillery and combat aviation. Members of the assault team are assigned to destroy these emplacements by the placing of demolition charges. Under cover of supporting fires and smoke, the assault detachment advances close to the emplacements; final selection is made of the exact location and route thereto for each demolition to be placed; and the preparation of each demolition is completed. Nonpersistent chemicals, smoke, and incendiaries may also be thrown through the loopholes. Scaling ladders may be necessary in placing demolitions.

770. When all is in readiness for the assault, signal is given for supporting fires to lift. When supporting fires are lifted, troops detailed to place the demolitions rush forward immediately, cut or blow lanes through any remaining wire, and place and arm their demolitions under protection of smoke and direct fire on adjacent emplacements, then take cover. When the demolitions open the way into the emplacement, the assault troops rush the position and overpower hostile personnel remaining active. Hand grenades, thermite bombs, and light demolitions complete the destruction of bays not neutralized by the first demolitions.

771. Ordinarily, one assault detachment is formed for each emplacement to be attacked. After the capture of an emplacement, the next emplacement scheduled to be attacked is overcome in the same manner. When an assault results in prolonged hand-to-hand fighting, local supports are rushed forward to assist the

assault detachment. 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. Any halt is dangerous because of 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 passed over are reduced by special mopping-up detachments from general supports and reserves.

772. 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 prompt bombardment or fire to bear on any hostile mechanized and 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.

773. During the advance to the next emplacements, units are reorganized as completely as time and facilities will permit; any additional personnel, equipment, and material needed against the next emplacements are sent forward. Necessary adjustments in groupings, of plans of maneuver, and of plans of fire are affected.

774. The speed and regularity of the advance through the outpost system depends in a large measure on the degree of coordination maintained by the commander after the assault of the first emplacements.

Effective signal communication is vital. Liaison between tanks, artillery, the attacking troops, and aviation is maintained by all possible means of signal communication including radio telephone in the clear. Liaison officers, extensive wire nets, messengers, air-

planes, relay runner stations, visual signal stations, and advance message centers are employed in ample numbers to insure timely transmission of information and orders.

Once the operation is initiated, a failure of signal communication must not result in the halt of a tactical grouping whose advance is still possible. When a commander knows the plan of advance through the position and his unit is making progress, he halts in the absence of orders only when he *knows* that his continued progress will endanger unduly the plan of his superior commander.

THE BREAK-THROUGH

775. 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.

776. The main position will be composed ordinarily of a series of mutually supporting major works, protected by minor gun emplacements, tank obstacles, troop emplacements, and wire entanglements disposed in front of and between them to cover dead spaces which automatic weapons cannot reach from the main fortifications. The front of initial penetration of the position is carefully selected; it will be determined frequently by the existence of terrain and roads which favor the employment of armored forces in the breakthrough and exploitation. The dead angles within and between the main fortifications are sought out with particular attention to covered approaches thereto.

777. The width of the front of penetration is limited by the amount and types of artillery and aviation available, the capabilities for tank ar armored force employment, and the number of trained assault detachments available with proper equipment.

778. Airborne troops may be landed within and in rear of the larger fortifications on the front of the main attack, to block the movement of reserves and to assist the assault troops by attacking the fortifications from the rear. If they are used in the main fortified position, arrangements must be made to lift all artillery fire just prior to their arrival on the position.

779. The amount of ammunition, artillery, and bombardment 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. In any event, bombardment of the whole front by artillery and aviation continues from the opening of the preliminary operations. 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 loopholes in the fortifications. Smoke is used extensively to screen the front of attack.

780. Preparation fires on the front of penetration are lifted on a time schedule or on signal from the commander of the composite unit, 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 are maintained against fortifications not subjected to assault.

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

782. Because of the location of the flanking fortifications and troops within or nearby, the enemy is able to organize and launch a strong counterattack with great rapidity. Delay in attacking the flanking fortifications and reinforcing the advance of the composite unit may result in a serious reverse and the loss of the composite unit by hostile counterattack. Troops confronting the flanking works move to the support of the assault detachments as rapidly as fortifications are neutralized.

By breaking the continuity of the enemy front, the coordination of his mutually supporting fires is broken. His extensive signal communication system permits the enemy to reestablish rapidly the continuity and coordination of fires covering his front. Hence, once a breach has been effected its immediate exploitation is imperative.

783. The operations are continued until the entire front selected for a major break-through is reduced. As the attack progresses, the flanks of the penetration are defended against hostile counterattacks and the passage through the gap of troops assigned to exploitation and rear-attack missions is protected.

784. Only a commander who is actually present at a point of crisis can exercise a direct influence upon the attack echelon. A division or lower commander must be well forward from the time the attack is launched until a complete break-through is effected.

During the attack, much of the coordination originally ordered will fail because of the fluctuating fortunes on the front of attack. This condition will become more pronounced as the gap is widened and the penetration deepened. The initiative, vigor, and boldness of subordinates must be allowed full play. (See pars. 128 and 489.)

785. When the fortified locality has been breached throughout its depth, highly mobile units are immediately pushed through the gap under the protection of troops holding the shoulders of the penetration, of troops landed by air in rear of the fortifications, and of combat aviation. Mechanized forces lead the way. Once through the gap, mechanized forces spread out fanwise, moving rapidly on all roads leading toward the hostile rear and toward the rear of fortifications not reduced, to disrupt hostile lines of communication, destroy signal communication, to block the movement of reserves, and to complete the demoralization of the enemy. Closest cooperation by and coordination with aviation is demanded. The principal targets for bombardment aviation are hostile reserves, signal communication installations, and isolated resistances attempting to block the movement of the exploitation forces. Following the lead of the mechanized forces, the remaining troops of other arms in the exploiting force move rapidly to complete the isolation of the remaining fortifications and assist in the complete destruction of the hostile field forces. Since it must be expected that the enemy will attempt to close the gap, suitable forces must be assigned the mission of keeping it open.

Section II. OPERATIONS AT RIVER LINES

GENERAL

786. 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 and delaying action. They assist in screening against hostile ground reconnaissance and in providing security against hostile mechanized 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.

787. *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, the topography of the adjacent terrain, islands, and tributaries, the river bottom, the approaches to the river bank, the practicability of fords, and the danger to be expected from ice floes and freshets.

788. *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 can sometimes be greatly facilitated by use of airborne troops.

ATTACK TO FORCE CROSSINGS

789. The defenses 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.

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.

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

791. 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. This may be accomplished by a bold attack by troops transported by air and by mobile ground forces strong in armored vehicles, bridge equipage, storm boats, and amphibious vehicles. 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.

792. 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.

In establishing a bridgehead for a large force there are usually three successive objectives on the enemy side of the river: first, a position which will eliminate effective, direct, small-arms fire from the crossing front;

second, a position which will eliminate ground-observed artillery fire from the selected ponton bridge site(s) and which can be supported by light artillery on the attacker's side of the river; third, a position which will eliminate all artillery fire from the bridge site(s) and will provide the necessary maneuver space on the enemy side of the river for the command. Attainment of the first objective facilitates the crossing of succeeding troops by assault boats, foot bridges, and troop and vehicle ferries. Attainment of the second objective, coupled with air supremacy, normally will make possible the construction of ponton bridges to cross the bulk of 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 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 fully exploited.

793. *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.

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

794. In general the attacker should operate *on a wide front* with several determined attacks at separated localities. 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. (See par. 797.)

795. In the selection of crossing fronts and the crossing points, both tactical and technical requirements are considered.

Tactically, the attacker seeks concealment for his movement to the river, concealed final 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.

Technically, the attacker seeks a moderate current, a water area unobstructed by islands, bars, and reefs, suitable shores, good approaches on both banks, and easy connection to the existing road net. Old bridge sites frequently are advantageous.

796. Having selected the front or fronts on which the crossing is to be made the higher commander formulates his *plan of action* for the crossing.

797. 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 con-

structed. Other troops may also 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 the main crossing fronts. A portion of the command is held in reserve to exploit the most successful crossing.

798. *Engineer troops and matériel* must be made available early in the planning stage of the operation so that reconnaissances can be made and equipment prepared and properly disposed. Nondivisional engineer troops with the necessary ferrying matériel normally are attached to the leading combat teams making the crossing on each front. In addition, a reserve of engineer troops and matériel 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.

799. The *unit engineer* of the senior echelon is charged with all technical preparatory measures for the crossing and for the distribution of engineer troops and matériel, the construction and guarding of bridges, and the regulation of traffic thereon.

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 hostile airplanes and artillery and should be given antiaircraft defense.

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

800. As soon as 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, to locate routes of approach, final assembly areas, actual crossing points and routes thereto, and to prepare plans for schedule fires and other details of the crossing operation. In the execution of reconnaissance, restrictions imposed in the interest of secrecy must be observed.

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 radio communication is prohibited or reduced to the minimum in order to preserve secrecy. Once the crossing has been initiated, radio usually is relied upon for communicating with units across the river until telephones lines are established.

801. When the necessary preparations have been made, the superior commander gives the order for the execution of the crossing. (See FM 101–5.)

802. 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 and secrecy afforded by darkness.

803. Shortly preceding the crossing, the bulk of the troops to make the crossing is placed secretly in concealed bivouac out of hostile artillery range but 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 artillery 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.

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

Final assembly areas have the following characteristics: accessible for trucks which bring up engineer matériel, defilade, easy identification, concealment from air and ground observation, and several direct and concealed routes to the crossing points.

805. The first assault waves on each front, led by engineer guides, carry their boats from the final assembly areas 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.

Departures from the final assembly areas are timed to permit leading units to cross simultaneously on a broad front, but once these units leave the final assembly areas they do not halt and no attempt is made to maintain alinement between boats. Normally, there is no firing from the boats when the crossing is made under cover of darkness.

The movement from final assembly areas to the far shore is under control of the engineer troops.

806. The engineer crews return the assault boats to the near shore for the second wave, which has moved from its forward assembly area. 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.

807. *Footbridges* may be used for crossing first waves over narrow streams. Their construction is difficult under smallarms fire. Ordinarily they are used to cross succeeding waves of foot troops, particularly after the first objective has been attained.

808. *Ponton raft ferries* are provided 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. 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.

809. *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.

810. In addition to the fires of organic weapons, the crossing of tactical groupings is supported by artillery, combat aviation, smoke, and the fires of supporting weapons of the general reserve.

811. 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.

812. The *artillery* gives close and continuous support to the advance. As soon as the assault waves advance from their first objective, the artillery begins 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 ar-

tillery support. Artillery observers and liaison groups, with the necessary means of signal communication, accompany the assault units during the crossing and advance to the objectives.

813. *Antiaircraft defense,* both by ground units and aviation, is centered around the crossing fronts and particularly the ponton bridges. A portion of the automatic weapons of the antiaircraft defense is 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.

814. *Smoke* can conceal river crossing operations from ground observation but ordinarily not from air observation. It frequently is used during daylight hours in connection with feints or demonstrations in addition to concealing the actual crossing of the initial waves. The use of smoke places additional importance on the marking of embarkation points and bridge sites and the routes leading thereto.

815. The first objective having been taken and supporting infantry units having been brought up behind the initial wave, the attack is continued without delay on the second objective. Since this objective is selected in order to deprive the defender of his ground observation of the river, considerable resistance may be expected. Aggressively used, mechanized units may be effectively employed at this time.

816. The second objective having been taken, or the hostile light artillery neutralized, the superior commander normally directs the construction of the ponton bridge (or 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 equipment.

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 superior commander.

817. The bridge having been completed, the remainder of the artillery and other troops are crossed and a coordinated attack, if necessary, is made on the third objective. If construction of a bridge should prove impracticable, the passage of all troops and equipment is by ferry. When the third objective has been attained, subsequent operations may be of an offensive or defensive nature as the situation may demand.

818. Control during the crossing and advance to the first objective is mainly a responsibility of the leaders of small units. Capture of the first objective gives an opportunity for the next higher commanders to resume control and direct the attack on the second objective. Since the capture of the second objective usually is followed by the construction of ponton bridges and the crossing of artillery and the remainder of the troops, the superior commander may direct a coordinated attack on the third objective. The period of delay on each objective is as brief as possible. Every effort is made to conduct operations in such a way that the third objective will be seized and held in the minimum period of time. Signal communication is maintained initially by radio between forces on the opposite sides of the river. Later, wire lines may be laid across the river and wire communication established between the principal command posts.

819. Armored divisions, cavalry divisions, and other *mobile units* effect river crossings by advancing rapidly and bodly 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 de-

fended or undefended points on the river and then cross. If all crossings are destroyed, horse cavalry units may swim and armored or mechanized units may be ferried until bridges can be constructed.

DEFENSE AGAINST CROSSINGS

820. 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. 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.

Holding a river line in such force as to leave available insufficient reserves destroys the flexibility of the defense and exposes it to immediate defeat as soon as the river line has been pierced.

821. 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 crossings until the last possible moment, full authority to complete their destruction is delegated to any member of the bridge or ford guard. When it is apparent that the crossing cannot be kept from falling into enemy hands, *it must be destroyed.*

822. A river may be used as an obstacle directly in front of the battle position. In such a case (see sec. II, ch. 11) the river bank positions are held in strength; adequate reserves are provided to intervene at decisive areas. Such a defense is possible only when large

forces are available on the front to be held and the enemy is unable to turn or avoid the position. It subjects the troops in forward areas to the full force of the enemy artillery preparation.

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 lightly held but are capable of being covered by the concentrated fire of weapons.

The *artillery* is employed as in the defense of a position, except that a part may be placed well forward to cover the most likely crossing places, the enemy's probable assembly positions, and avenues of approach. The artillery must be prepared to concentrate its fire against the main crossing when it is discovered.

Tanks are held in reserve to be employed against those hostile elements which have gained a foothold on the friendly side of the river and constitute the greatest threat of the integrity of the position.

823. River lines may be defended by defensive-offensive action. (See sec. IV, ch. 10.) Unless the situation and the strength of the available forces indicate the advisability of holding the river line in strength, it is best usually to hold the mass of the forces 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 then is held by relatively weak detachments. Stronger detachments with local reserves are posted at the most probable points of crossing. The operations of the advanced detachments are organized in accordance with the doctrines governing outposts. It is their mission to force the enemy to disclose the full power of the supporting fires, to discover hostile crossings, and to prevent hostile troops from establishing themselves in bridgehead positions before the arrival and attack by the general reserves.

824. In defensive-offensive action, some artillery may be attached to the outpost detachments. The mass of the artillery is held in readiness prepared to support the attack. Then it is emplaced so that it can concentrate its fire in the critical area and support the attack in the decisive direction. Since the mass of the hostile artillery will still be on the far side of the river, much importance attaches to the neutralization of hostile air and ground observation regulating the enemy's artillery fire.

825. In defensive-offensive action, the attack of the general reserves 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, efficient signal communication must be assured and reserves must be prepared to move promptly and rapidly.

The mobility of the troops held in reserve is increased by the assignment of motor transportation.

Decisive results are promised by the prompt employment of mechanized units and combat aviation against hostile units which have already crossed the river and by air attack of bridges and of troops engaged in ferrying operations.

826. In any defense of a river line, covering forces remain on the enemy's side of the river 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. On wide rivers, after the cover-

ing force has withdrawn, contact with the enemy may be maintained by use of patrol boats.

827. 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.

828. *Combat aviation* can operate to prevent ferrying or bridging operations of the enemy by first achieving air superiority and then operating directly against ferrying and bridging equipment before it reaches the river, against ferrying and bridging operations and against troops assembled for crossing.

829. *Signal communication* is established so as to insure rapid communication with the outpost and covering forces and the quick transmission of orders to the reserve and the artillery. Multiple wire circuits are laid along alternate routes to increase the probability that some of them may escape damage from the heavy fire anticipated.

830. *Cavalry* units are employed initially on reconnaissance or security missions on the enemy's side of the river. Later they protect the flanks of units on the river or are held in mobile reserve.

The principal mission of the *antiaircraft artillery* is to protect the reserves and the artillery. Preparations are made to reinforce rapidly the antiaircraft defense in critical areas.

831. In a retrograde movement when the river line is to be held as a defensive or delaying position, the retiring columns cross at the available bridges which are not under hostile artillery fire. 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.

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 retirement across the river. Bridges and fords are destroyed to prevent them from being seized by the enemy and arrangements are made to ferry the last elements of the covering forces.

As soon as it has moved across the river, the artillery which crossed early is placed in position to protect the crossing places and cover the retirement 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.

832. The river may lie in rear of a defensive position. This is equivalent to defending a bridgehead and the position selected should eliminate all enemy artillery fire from the bridge sites and provide the necessary maneuver space. An even greater distance from the river may be desirable in order to find suitable terrain and to allow space for retrograde movements during the conduct of the defense. Plans must be made for withdrawal across the river.

Section III. NIGHT COMBAT

833. In spite of the inherent difficulties of the operation, night attack has assumed major importance as employed by troops especially trained to overcome the difficulties of the operation and exploit its advantages.

834. *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.

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.

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.

835. An unexpected collision of troops at night, or combat which extends into the night, usually develops into a standing 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.

836. In night combat, the influence of unit commanders on their troops is greatly diminished. Tactical operations and troop leading are surrounded with greater difficulties; the uncertainties of combat exercise a greater influence than in daylight operations.

837. 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 attacks in daylight over open terrain, or to attract hostile reserves.

838. Simplicity of plan, careful preparation, secrecy, surprise, and cohesion in execution are prerequisites to a successful night attack.

839. *Surprise* is the most essential feature of night attack. Preparations for night combat, whether made during daylight or darkness, must avoid betraying the locations or intentions of the troops. The attack itself may be made by stealth or by full use of all available fire power. Tracers tend to demoralize the defender.

840. The difficulties of night attacks increase with the size of the command. They therefore usually are undertaken only on a limited scale and with limited objectives.

841. Night attacks are made preferably by fresh troops or by reserves of troops in contact with the enemy. The best available troops should be used. When made by troops already in contact with the enemy, many details of execution are left to the commanders of front-line units.

Night attacks are often the manifestation of an aggressive leadership, which is determined to bring about a conclusion without delay. Morale of the troops and quality of the leadership, especially in the lower

grades, rather than numbers, are likely to measure the success attained.

When fresh troops are designated to make a night attack, their approach march is protected by troops already in contact with the enemy.

842. The hour at which a night attack is to be made depends upon the object sought. The exact hour of attack is kept secret as long as possible.

An attack launched during the first hours of darkness frequently strikes the enemy before he has had time to organize his position or his artillery support. It may also anticipate possible night operations on the part of the enemy. It may be delivered after victorious combat in order to frustrate the enemy's attempts to organize a withdrawal at nightfall or to consolidate a position for defense.

An attack during the last hours of darkness may be advantageous as a preliminary operation to a general attack at daybreak because it gives the defender no time to reorganize. The attack should usually be launched to give the attacker three hours of darkness on the objective in which to organize the position to resist counterattack. Antitank guns are brought up and emplaced. Tanks are moved forward and made immediately available to assist in repulsing the counterattack.

843. 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 and provision is made for guides.

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

marked, guides are provided, and compass directions are given.

845. Orders for night attacks are formulated with more than usual detail. Routes of approach, assembly 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, initial position and mission of the reserve; the course of action to be followed in case of success; the signal for withdrawal in case of failure, and a rallying point for each subordinate unit in case of withdrawal. Precise and detailed instructions for maintaining secrecy are issued; the use of lights is forbidden; bayonets are fixed; vehicles and animals are left at assembly positions and other measures to insure silence and secrecy are prescribed. The time of attack may be included in the order or may be announced later.

846. In the conduct of night attacks, only the simplest formations are employed. If the attack is 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. 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. The advance to the objective is so timed as to permit close support of the assaulting troops at daybreak. General

reserves are held generally well in rear and preferably on a flank, prepared to move promptly to the objective or to cover a withdrawal.

847. The particular circumstances attending each situation usually will indicate whether the assault should be prepared by artillery fire. Where artillery support is indicated, a short but violent preparation generally will suffice. This preparation is lifted 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.

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

849. 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.

850. 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.

851. Obstacles and the fire of fixed weapons are the principal means used in breaking up the assault. Small-arms fire is opened as soon as the alarm is given and combat outposts have been withdrawn. Local

supports and reserves, using the bayonet only, counterattack, preferably the enemy's flanks.

852. 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.

853. As a rule, delaying action at night can be executed only by small units or detachments which operate and retire along well-defined routes. Rearward movements are regulated carefully to avoid losses by fire from friendly troops in rear. When the enemy possesses great superiority in combat aviation, daylight maneuver of large units may be impracticable. Disorganization and delay of advancing hostile ground columns may be accomplished by the night attack of small groups against marching columns, bivouacs, billets, or motor parks.

Section IV. COMBAT IN TOWNS

854. Towns offer concealment for troops and weapons and protection from fire of weapons and mechanized attack. 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.

855. 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. Fighting is at close range, and the outcome depends largely upon the initiative and aggressive leadership of subordinate commanders.

856. A town strongly held by the enemy may be taken by fixing the garrison through 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 concentrates on the capture of the near edge of the town by the methods applicable to the attack of any organized position and then reorganizes his effort to continue the advance through the town. The action within the town necessarily is decentralized to subordinate infantry leaders since lack of observation of the action precludes satisfactory centralized control. The attack is pushed rapidly through the town to capture quickly the exits on the far side. Assault units are freed from the responsibility of mopping up the town.

857. 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 reconnaissances determine the defensive organization of the area and the nature of defensive works and furnish pertinent data to all elements participating in the attack.

858. 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 and 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. 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 methods. However, opportunities will present themselves frequently where the support of tanks in such situations becomes desirable.

859. 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 conception of defense should be one of thorough all-around defensive preparation, with outlying buildings utilized for position organization 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.

860. Security detachments are posted at all important public service installations, such as water reservoirs, pumping stations, or electric power plants, in order to protect these installations from damage by small hostile groups or individuals who are able to penetrate the defense of the town.

861. 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.

862. 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 strong mechanized reserve is held outside the town in concealed positions, prepared to break up the enemy's outflanking maneuver.

863. Towns are favorable to *delaying action,* as they keep the attacker in ignorance of the strength of the forces confronting him and provide concealment and cover for screening the withdrawal. (See FM 31–50.)

Section V. COMBAT IN WOODS

864. In many respects, combat in woods is similar to that in towns (sec. IV). 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. Other woods, 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 woods are avoided as they are clearly marked and draw fire.

865. The *attack* usually seeks to avoid isolated wooded areas included in the enemy's defensive position by passing them on either 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 flank-

ing fire against the attack. During dry weather incendiary bombs are highly effective. Small wooded areas may be neutralized with chemicals.

866. 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 attack is directed first against the salients which are neutralized by the fire of the artillery and other supporting weapons. This supporting fire is maintained until the assault echelon is ready to rush the salients, when it is lifted to the reentrants of the woods, or to suitable targets within or on the far side of the woods.

The near edge of the woods is carried like any other position and then is used as a line of departure for the advance through the woods. The dispositions to be taken for this second phase of the attack depend largely upon the character 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.

867. 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 through 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 engaged where the greatest progress is being made.

868. Before debouching 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, and arrangements are made for support by the artillery and other supporting weapons. As the edge of the woods presents a well-marked target for hostile fire, the attacking forces make their egress rapidly to seize an immediate objective beyond the edge of the woods. Whenever possible, this objective should mask the edge of the woods from hostile ground observation and small-arms fire.

869. The movement of combat vehicles is regulated so as not to block the routes of advance through the woods. If the woods are not too extensive, vehicles are held on the near side until the attacking echelon has reached the far side.

870. 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 routes forward and to all positions in rear are reconnoitered and made known to all concerned.

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. Supports and local reserves are posted with a view to counterattack against the enemy's flanks. Full advantage is taken of the opportunities for ambush, surprise, and counterattack.

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.

871. When there is a possibility that the enemy may launch his attack on either side of a wooded area, preparations are made to repel the hostile groups with flanking fire from the flanks and salients. Combat groups are located in the area outside the woods to oppose the enemy's outflanking maneuver. Tanks held concealed in the woods, with routes reconnoitered and prepared, will add power to the counterattack of the defender.

872. When close contact is imminent, bayonets are fixed and preparations made to engage the enemy with rifle and machine-gun fire and to meet him in hand-to-hand combat with hand grenades and the bayonet.

Section VI. MOUNTAIN OPERATIONS

GENERAL

873. Mountainous terrain not classified as alpine offers no insuperable obstacles to the conduct of military operations, even in cold weather, if troops are properly equipped, clothed, supplied, and trained. In general, mobility is retarded, movement is restricted, firepower and fire effect are reduced, and signal communication and supply are more difficult.

874. Mountain warfare is characterized primarily by difficulties which terrain offers to movement. The inaccessibility of certain regions restricts areas in which troops are able to operate. The restricted nature of certain areas such as narrow valleys and defiles limits the strength of forces which can be maintained and

moved therein. The inadequate road net found in sparsely settled mountains enhances the military value of existing roads, adds importance to heights which dominate them, and slows down the operations.

Key terrain features consist of heights which dominate valleys and lines of communication with observation and fire; passes which permit movement through mountains; and roads and railroads which must be secured for supply purposes.

875. 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. They are favored by the concealment which is available for movement, by the diminished effect of firepower resulting from defilade, and by facilities for observation. 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 communication and of defending one's own routes. The actions of small semi-independent units in seizing or defending heights which dominate lines of communication or of fighting to seize or block passes and other defiles on routes of communication become of increased importance.

876. 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.

877. The theater in which the forces are to operate will necessitate special equipment and special training

to fit the climate, the character of the terrain, and the type of hostile forces to be encountered. They should ordinarily have a preponderance of high-angle, fire-supporting weapons; a high percentage of pack transportation; an adequate amount of radio and visual signal communication; and a high degree of logistical self-containment. Necessary specialized training includes ability to maneuver adequately on skis and snowshoes, visual signaling, use of both pack and motor transportation, mountain climbing, use of the gas mask in rarefied atmosphere and marksmanship. Physical hardening is a prime essential. Mountain operations call for the ability to carry heavy loads in long marches over rough trails.

878. Decentralization of operations is characteristic of mountain warfare. Tactical groups usually operate semi-independently in the capture of terrain objectives in order to carry out the plan for the force as a whole.

879. *Infantry* is called upon frequently to operate without close support of artillery. Specially trained and specially equipped infantry is best suited for combat role in mountainous terrain. Infantry units must be sufficient in fire power and capable of carrying on extensive operations without the aid of supporting arms and services. Since infantry operations in mountainous terrain are more fatiguing than in ordinary terrain, specially qualified and specially conditioned troops are necessary to carry out successfully the combat mission.

Machine-gun units seldom find fields of fire which permit them to utilize full grazing effect. The sharp relief offers opportunities to support advancing infantry with overhead fire. Mortars and grenades attain increased importance due to the increased amount of defilade.

880. *Cavalry* may include both mechanized reconnaissance and horse elements. The importance of horse elements increases in wooded, mountainous terrain, while the role of mechanized elements decreases. While mechanized units may be used on distant reconnaissance missions to the front and flanks or as flank protection, they are highly vulnerable to ambush. Horse elements are employed on similar less distant missions; some are attached to tactical groups for reconnaissance and security purposes.

881. 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 objectives defiladed by steep slopes. Horse-drawn and motorized artillery units are emplaced near the roads; pack artillery is capable of following foot and mounted elements and taking defiladed positions in the more difficult terrain overlooking the valleys. Control of artillery is decentralized.

Because of the difficulties in the conduct of artillery fire with air observation, greater dependence is placed on ground observation in mountainous terrain. Observation posts must be reconnoitered and established early and provision made for liaison observers with the forward echelons to assure close and timely support. Artillery liaison observers of the forward echelon must receive the same specialized training as mountain infantry.

The effectiveness of counterbattery 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.

882. The importance of engineers increases with the difficulties of the terrain. Maintenance of existing roads and construction of new roads are of primary

importance. The existence of numerous sensitive points on the few highways facilitates demolition. The difficulties of access to certain positions frequently necessitate use of aerial tramways in a stabilized position. The rocky soil requires employment of explosives for constructing even the simplest of entrenchments. Light portable bridging equipment is necessary in mountain operations.

883. The hazards of flying in mountainous regions place a great restriction 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. Occasions may arise for employment of airborne troops. Such occasions include seizure of an important distant defile, and quick movement of a force to operate against the hostile flanks or rear.

884. Armored units suffer so many restrictions in mountainous terrain that their effective employment is generally very limited.

885. *Antitank* units are especially effective in the mountains as their weapons are easily placed and hidden.

886. 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 relaying messages. Additional radios are desirable. Great reliance is placed on visual signaling and messengers. Messenger dogs may be used to supplement foot messengers.

The command post of a small unit usually is located near the observation-post of the unit. Command posts of regiments and larger units should be near road centers and, if practicable, near a landing field.

RECONNAISSANCE

887. *Reconnaissance* in mountain warfare is facilitated by the restriction of enemy movements to the available road net and by numerous defiles, but it is made difficult by changing weather conditions, rugged terrain, and the concealment and cover available for hostile troops. The apparent impassability of certain areas must not lead to the conclusion that they are inaccessible to hostile troops.

Maps of mountainous regions seldom are accurate. A correct knowledge of the terrain can be gained only by a study of the ground itself, supplemented by a study of air photographs. The employment of reliable local guides may be advantageous.

Mechanized reconnaissance vehicles are pushed out for distant reconnaissance; however, absence of alternate routes and suitable turn-arounds offers them little opportunity for escape when surprised and ambushed. Horse cavalry patrols can utilize trails for reconnaissance purposes.

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. Observation posts are echeloned in altitude as well as in width and depth.

Offensive reconnaissance executed by specially trained detachments, operating in difficult areas which often are weakly guarded, will produce excellent results. The capabilities for reconnaissance and counter-reconnaissance by small elements operating with boldness should not be overlooked.

Close reconnaissance is conducted by dismounted patrols equipped with radio and visual means of signal communication. It is initiated early and pushed well to the front. It is tedious and fatiguing, but may be facilitated considerably by use of local guides. Aviation will be the principal means of obtaining information of hostile dispositions, installations, and troop movements in rear areas.

MARCHES

888. 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.

889. The rate of march in mountains is influenced by the elevation above sea level, steepness of slopes, and other factors. The rate of marching 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; greater increases in altitude cause sharp reductions in marching and climbing rates. In elevations above 5,000 feet conservation of energy becomes of prime importance. Pace must be slower; short rest periods are important during the first hour of marching.

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.

When frequent steep slopes are encountered greater distances between foot or animal elements are required. Rests depend upon the mission, the length and difficulty of the march, and the condition of the troops. On long marches, frequent short rests may be taken in addition to the customary regular halts. At a distance from the enemy, effort is made to utilize

favorable routes in valleys in order to reduce fatigue of troops. Motors and air transport sometimes may be used for rapid displacement of reserves.

In *winter,* travel may be possible only for specially equipped and specially trained foot troops, as support artillery and pack trains may be completely immobilized. In such cases combat aviation may be an effective substitute for artillery, and transport aviation or man pack may be the only means of supplying marching columns.

890. *Security on the march* calls for special measures due to 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. 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.

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 or egress from 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.

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 lateral or branch valleys. Consideration must be given to the fact that such detachments should start one to two hours ahead of the main body and ordinarily are unable to rejoin their units until after the completion of the march.

891. 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 combat, advance guards will act independently for longer periods of time than is the case on more normal terrain.

892. 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 well out to occupy dominant observation posts and defiles in order to discover the advance of the enemy from afar and thus gain information of the enemy's strength in time for it to be of use. The mountainous terrain enables these detachments to effect greater delay than in normal terrain.

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 and succeed in making deep incursions into a bivouac area.

OFFENSIVE COMBAT

893. In *attack,* action of the force as a whole usually will be along an axis of advance. Tactical groups fight under the almost complete discretion of their respective commanders. Their operations are aimed at key terrain features in their zones of advance which either are objectives in themselves or which must be passed in reaching assigned objectives. (For attack of defiles, see sec. VIII.)

In difficult mountain terrain, the reinforced battalion is ordinarily the largest unit which can be employed as a unit in the attack

894. Because of the importance of lines of communication, objectives are usually terrain features such as passes or heights which control hostile lines of communication or from which the enemy can dominate friendly lines of communication by observation and fire.

895. The commander influences the action by deciding at the outset where he intends making the main attack. Usually it will be the terrain feature which offers the best opportunities for flanking action by small units, effective supporting fires, and the most advantageous approach to a decisive objective. Adjacent tactical groups make secondary attacks. The commander disposes his reserves primarily to favor reinforcement of the main attack. When the terrain permits, reserves are so located as to be able to exploit the success of secondary attacks.

896. 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.

897. *Boundaries* between tactical units usually are not designated. Instead, subordinate units are given axes of advance to their objectives, particularly when they operate at extended distances from each other.

898. Each tactical group makes its main effort along the crests and slopes or by a combined advance along heights and valleys. It is particularly important that early possession of the heights on each side of the

defile assure protection to troops operating within the defile.

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. Artillery with each tactical group furnishes close support.

Combat aviation may be employed against hostile artillery reserves and supply installations.

899. The flanks of tactical groups are protected by terrain obstacles supplemented by the action of detachments acting either as flank guards or as liaison detachments with adjacent combat teams.

900. 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 ground that is slow and difficult for the advance with insufficient supporting fires and carried out under observed fires of the defense. The sharpness of relief lines facilitates maintenance of direction in the night attack. (See sec. III.)

901. The success of each tactical group is exploited to the utmost by *pursuit*. When the location of the reserves and the terrain permit, each tactical group is reinforced. It pushes rapidly and deeply in the designated direction and initiates lateral movement against hostile forces which are holding up adjacent tactical groups whenever conformation of the terrain permits. It is this lateral action against the lines of communication of the enemy which will cause 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.

In addition to direct pressure exerted on the with-

drawing enemy, every effort is made to delay 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 maneuvers may be difficult to organize because of lack of mobility. However, small detachments of foot troops relieved of all excess equipment may be used; airborne troops may be used; and at times small detachments of cavalry may be able to effect the encircling maneuver. In deep snow, ski troops may be employed effectively. Key terrain features on the enemy's route of withdrawal may be suitable objectives for airborne troops.

DEFENSIVE OPERATIONS

902. 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 seeks to retain heights which dominate, by observation and fire, hostile routes of communication and approach. It also seeks to deny the enemy access to passes or other defiles which, if lost, will render defended heights untenable.

903. *Defensive positions* usually comprise a combination of heights and defiles. In defending heights, positions forward of crests are difficult to screen from hostile observation. Steepness of the slopes and the defilade caused by sharp relief may make the establishment of bands of fire with flat-trajectory weapons impossible. On the other hand, positions on forward slopes lend themselves to long-range barrage and interdiction fires by flat-trajectory weapons and for a long-range observation system. Reverse slopes may afford a good field of fire for automatic weapons against personnel clearing the crest. It often is possible to combine the advantages of forward slopes,

crests, and reverse slopes. If the forward slope is too steep, the depth of the position may be increased by utilizing spurs extending toward the front to establish advanced elements of the position which are capable of flanking fires. At times two successive crests can be included in the position.

In defending passes or defiles, the defense attempts to support its flanks on impassable obstacles on adjacent heights. It takes full advantage of observation from the slopes of these heights, and pushes the flanks of the position forward on them in order to gain reciprocal flanking fires in front of the position. For other methods applicable to the defense of defiles, see section VIII of this chapter.

904. *Demolitions and chemical agents* assume increased importance to the defense. In favorable terrain such as passes and other defiles, contaminated demolitions are capable of blocking the advance of all arms except infantry detachments without vehicles. Their effect may endure for long periods of time.

905. The *outpost* of a defensive position usually has good routes of withdrawal which unmask fires 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.

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.

906. The main battle position will include defensive areas which may be considered as almost impregnable, due to difficulties of approach combined with a con-

tinuous system of fires, and areas which are more vulnerable to attack due to the difficulty of covering them with a continuous system of fires. Extreme care must be exercised in concluding that certain terrain is impassible for the attacker since areas that actually are impassible for specialized detachments are rare. The dispositions should achieve continuity of fires throughout those areas which permit, and at least continuous surveillance over those sectors in which dead spaces render a continuous system of fire impracticable. Organization in depth is designed to prevent any deep penetration of the more vulnerable sectors.

The limited road net imposes rigidity on defensive dispositions. Once made, they are difficult to change and their proper determination constitutes one of the basic decisions of the commander.

Ambushes and a complete system of protected road blocks should form an integral part of the defense.

Reserves are held close to main routes of lateral and axial communication.

907. The battle position consists of defense areas organized for all-around defense and occupying important terrain features. Gaps between adjacent defense areas are closed by connecting groups strong in automatic weapons and are covered by other defense areas on dominating terrain in rear.

908. 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.

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.

Combat aviation is particularly effective in prevent-

ing or delaying the maneuver of hostile reserves, particularly in their passage of defiles.

909. 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 fire so that they can be launched on short notice when the enemy is exhausted and spent in his attack. Because of the local nature of combat, a general counterattack is seldom possible. The reserves will ordinarily be held well forward.

910. The rear areas of a defensive position may be subjected to harassing attacks by specialized enemy detachments able to traverse terrain which is impracticable for larger forces, or by airborne troops. Protection from such attacks is afforded by placing security elements in positions which command areas in which hostile approach is at all probable. The security elements charged with this duty should consist of light detachments able not only to drive off the hostile forces but to pursue them and cut off their retreat.

911. In *delaying action,* the usual operation is to slow down the enemy by maintaining on high ground elements which threaten by fire any hostile movement along the valleys. This is combined with a series of resistances in defiles with special emphasis on blocking passes between valleys.

912. The commander prescribes axes of withdrawal for tactical groups and successive positions which they are to reach as well as times of arrival on each.

The breaking off of combat by small units is facilitated by sharp relief which affords them dead space from hostile fire.

Engineer and chemical units are utilized to effect de-

lay by demolitions and by chemicals in areas which have been coordinated with interdiction fires of artillery.

Section VII. COMBAT IN SNOW AND EXTREME COLD

GENERAL

913. Military operations conducted under conditions of extreme cold and deep snow demand special equipment, and, preferably, special organization and training for troops designated for such operations. Severe weather conditions handicap movement and require special tactical and logistical measures for successful operation.

914. The role of *infantry* remains unchanged. Movement in deep snow is difficult and slow unless special equipment has been provided and units have been trained thoroughly in its use.

Foot troops trained in the use of skis, snowshoes, and other special equipment can operate under conditions which immobilize other troops. In deep snow, the movement of mounted and motorized units is very difficult. For operations to be conducted during extreme winter weather, the infantry component of the force should be large.

The infantry units are organized into light self-sustained combat teams from which all weapons and equipment, unsuited to the operation, have been removed.

915. *Ski troops* are especially equipped and trained for operations on skis in deep snow. Ski troops are especially well suited for use as patrols or as raiding parties against the hostile flanks, rear, and lines of communication. In extensive winter operations, large

bodies of ski troops may operate as a major force. Armament is adapted to the operations to be undertaken. In general, armament includes rifles, bayonets, a large proportion of light automatic weapons, pistols, hand grenades, and material for destroying trains and mechanized vehicles. Heavy weapons transported on sleds may be included, but when high mobility is essential these weapons usually are undesirable.

916. *Horse cavalry* can be effectively employed in cold climates with little snow. Deep snow will impair its mobility.

917. *Armored units* move across country with facility when the ground is thoroughly frozen and there is little snow. Streams and other bodies of water present no barrier when frozen to a sufficient thickness to carry the weight of vehicles. Vehicles of the track-laying type can operate in snow which is packed sufficiently to provide traction. For the successful operation of motor-powered vehicles in extreme cold special equipment for starting and operating engines must be provided.

918. Extreme cold affects both ballistics and matériel of *field artillery*. Snow affects mobility. It may be necessary to replace trucks by tractors, and to place matériel on runners. Horse-drawn and pack artillery are suitable in cold climates with little snow.

919. While the missions of the air forces remain unchanged under conditions of extreme cold and deep snow, these conditions reduce the capacity of all air units to participate in air operations.

In many situations, detached forces can be established or reinforced by airborne troops, and essential supplies, such as food, ammunition, and gasoline, can be delivered to ground troops by air transport.

920. The principal mission of *engineers* is the maintenance of open lines of communication. Engineers may be augmented by additional enlisted men or by civilian labor, and by special snow removing equipment. Organization for this task approximates that of any well-organized highway department. Engineers may be called upon to assist in the construction of trenches in frozen ground where the use of explosives is required.

921. Full use is made of existing commercial signal installations. Radio is extremely important and the number of sets is increased. Shelter for operators and equipment is essential. In deep snow, messenger service is by ski messenger or by sled.

922. *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 temperature. Agents disseminated by means of thermal generators are unaffected by temperature.

923. When planning tactical operations for execution during rigorous winter weather, careful consideration must be given to the probable effects of weather upon operations, health of troops, supply, evacuation, and maintenance of signal communication. Ice, deep snow, and extreme cold modify the normal utilization of terrain features, and present unusual problems which must be solved to insure success without unnecessary casualties. Provision must be made, in particular, for the supply of warm clothing and bedding of special types suitable to the requirements imposed by the climate. Provision must be made for hot meals and for an adequate supply of water.

924. In deep snow and extreme cold distant reconnaissance is performed by air units and is subject to the conditions imposed by bad weather and short periods of daylight. In deep snow, close reconnaissance is best performed by ski patrols. When the terrain is favorable, this reconnaissance can be deepened by the use of motorized sleds which are employed either independently of or in conjunction with ski patrols. Mechanized and motorized units and horse cavalry are effective when the ground is frozen and there is little snow.

925. Marches in snow and extreme cold are executed on foot, mounted on horses, on skis, on snowshoes, by motor transport, or by a combination of these methods. With the exception of ski troops, the distance covered ordinarily will be less than that expected under more favorable climatic conditions.

926. The principal problem for foot or mounted troops in snow is that of breaking the trail. Troops marching in front are relieved frequently. The trail may be broken by men on skis, by horse-drawn sleds, by tractors, by tanks, by snow plows, or by horse cavalry.

927. If 1 foot, or more, of suitable snow is present, trained skiers, in open terrain, are the most mobile troops. The rate depending on the slope of the ground, varies from about 1½ to 3½ miles an hour. For short distances with trained men it will reach 6 miles an hour. Under unfavorable conditions, skiing is very exhausting and the usual system of halts will not apply. The number and length of halts must be determined by the conditions encountered.

928. The rate of movement on snowshoes varies from

1½ miles to 2½ miles per hour. Marches over considerable distances can be performed only by men trained and accustomed to the use of snowshoes.

929. The possibility of movement by motor transport is dependent on the depth of snow. In 3 inches or less, motor transport without special equipment can move at reduced speeds. In snow up to 18 inches deep, motor transport can move if equipped with chains, and leading trucks equipped with lugs. In snow over 18 inches deep, a snow plow is necessary. When shuttling is contemplated, adequate provision is made for cleared turn-arounds. Tractors and half-track vehicles will experience little difficulty in any snow that is sufficiently packed to give traction. Motorcycles are of little value in any snow.

930. *Security* is facilitated by the limitations which snow and ice impose upon the movement of large enemy forces. Unfavorable weather may limit air and ground observation of the enemy, but requires special security measures against raids by ski troops.

931. Where snow impedes movement, security forces of troops on the march ordinarily consist of ski detachments, operating as patrols.

932. Security at a halt is affected by the fact that enemy movements in heavy snow, except for units on skis, are limited to roads. This indicates the need for strong detachments posted on roads, with the areas between them covered by dismounted or ski patrols. The tour of duty of sentinels, under severe conditions, may be for periods as short as 20 minutes.

933. Dense forests provide an effective screen against hostile air observation for elements not utilizing roads or beaten trails. In open snow-covered areas, protection against observation is increased by use of a white

covering for clothing and equipment. Since the operations of ground troops, not specially equipped, are restricted in heavy snow to cleared roads, targets for attack by enemy aircraft are often presented. Therefore, the employment of all effective antiaircraft measures is necessary. Because the movement of large-caliber guns is often difficult, active defense may be limited necessarily to the extensive use of light automatic weapons.

934. Two important factors affect measures for antimechanized security. First, extreme cold decreases the importance of water obstacles; however, concentrated artillery fire, air bombing, or deliberately placed demolition charges may make them either an obstacle or a trap or both. Second, snow over 18 inches deep will limit or completely stop the use of wheeled combat vehicles, except on cleared roads, and will hamper the operation of track vehicles. In snow, antitank guns should preferably be mounted on runners and drawn by light tractors. Snow trenches, revetted on the near side, are effective obstacles when frozen. On roads in hilly country, heavy boulders are effective.

Antitank mines, unless properly placed, are relatively ineffective as the tank will press them deeper into the snow without exploding them. They should be placed on a hard surface if satisfactory results are to be expected. The low volatility of gasoline at low temperatures reduces the effectiveness of the gasoline grenade against tanks. If used, they should be thrown at both the top and bottom of the tank.

Snow increases the opportunities for employing antipersonnel mines and booby traps, especially along trails.

935. Many chemical agents which are effective at normal temperatures are not effective in extreme cold. This is particularly true of persistent agents. However, protective measures must not be neglected.

936. *Offensive operations* require special preparations, proportionate to the strength of the command and the climatic conditions. Signal communications, supply, and evacuations become increasingly difficult as the attack progresses. Careful planning and detailed preparations are essential in order to insure that the attack does not fail through lack of adequate command and administrative arrangements.

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 movement and mobility. A sudden thaw may prevent cross country movement or cause troops to become cut off from adjacent friendly forces. Fogs may develop quickly, and low clouds may obscure observation. Special arrangements are made for the compilation of frequent weather reports. The plan of operations having been decided upon, it is executed promptly, being adapted to changes in weather as they occur.

937. An *envelopment* by a properly equipped force offers many prospects of success. Deep snow will hinder the movement of hostile reserves, other than ski troops, to meet the envelopment.

938. If practicable, the main attack is made over ground free of heavy forests and snow drifts. Wooded terrain areas are preferable to stream valleys which ordinarily contain deep drifts. However, it is expected that ridge lines may frequently offer better avenues of approach than corridors because the wind often sweeps the crest clear and allows more rapid movement.

939. The objectives of the attack are the critical terrain features which dominate the roads leading from the hostile position. Seizure of such features will prevent withdrawal, reinforcement, or resupply, and will

result in the eventual surrender or annihilation of the enemy.

940. *Combat aviation* targets remain unchanged under conditions of extreme cold or deep snow.

941. The use of *armored forces* in the attack is dependent upon favorable terrain, which must be free of heavy forests and deep snowdrifts. When snow has drifted, hollows and depressions are avoided and the attack pushed on those ridges which are relatively free from snow.

942. Because of slowness of movement, reserves are located initially close to the probable scene of future employment. When the ground is covered by snow, the reserve should contain a large proportion of ski troops, infantry-supporting weapons on sleds, and full-track or half-track type motor transport.

943. In a *pursuit* in snow, ski troops, infantry transported in track-laying type vehicles, and artillery equipped with full-track or half-track type prime movers, if available, are assigned to the encircling force. Airborne troops are landed near defiles with the mission of blocking the retreat of the enemy by demolitions and other obstacles.

944. In a *defensive* conducted in snow, every effort is made to delay the progress of hostile preparations and dispositions. By this means the defender endeavors to gain such time as is required under the conditions of terrain, snow, and weather, to readjust his dispositions for meeting the attack.

Combat aviation and the fire of long-range artillery, are employed against hostile columns and transport, and troops in assembly positions. The most mobile troops and weapons are used to delay the hostile advance and development, remaining on this duty until

forced to retire within the position. Ski troops are well suited for this purpose. They are equipped with a large proportion of automatic weapons, and are supported by infantry heavy weapons and pack artillery transported on sleds or special vehicles.

945. Deep snow may favor the defense due to the difficulty of movement by the attacking forces and the fact that an immobile force in deep snow can be hidden. Excellent fields of fire are provided over frozen wide streams and lakes which afford little or no cover to the attacker. Keeping the ice broken up for a distance of 20 to 30 feet from the shore will form a difficult obstacle.

946. Open areas which are relatively free of snow, and heavy wooded areas favor the attacker, and are defended in strength and depth. Troops are more lightly disposed when an area has a foreground covered by deep snowdrifts. Antitank weapons are disposed in depth to cover those approaches which have the least snow.

947. Ordinary entrenching tools are ineffective and the organization of a position requires special tools and explosives. The location of a defensive position on the military crest will usually be effective, as both enemy personnel and tanks have difficulty in ascending a steep slope covered with snow. When the ground cannot be excavated, or when necessary to obtain sufficient command for firing, snow trenches are used. At least 5 feet of solidly packed snow is needed for protection from small-arms fire. When a prepared position is garrisoned, it will require heated shelters.

948. The most mobile troops of the defender are held in *reserve*. Because of difficulties of movement, reserves are held close to the probable scene of employment. As in any defense, the integrity of the posi-

tion is maintained by counterattacks launched against the flank of any force which has succeeded in gaining a foothold within the position. In deep snow, the enemy may be unable to change his dispositions in sufficient time to meet a counterattack directed at his flank, especially when ski troops or troops equipped with snowshoes are employed in the counterattack.

949. The defender utilizes every opportunity to improve routes of communication within the position. Paths are opened in snow between elements occupying forward defense areas, between rear and forward defense areas, and in the most probable directions of employment of reserves. Automatic weapons of reserve units, when not otherwise required, are sited to cover these thoroughfares in order to prevent unexpected use by the enemy.

950. 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. Engineers are employed effectively in creating demolitions and other obstacles to the enemy's advance. When the depth of snow is not excessive, every effort is made to impede the movement of hostile mechanized and motorized units which will endeavor to strike at the flanks and in rear of the delaying force.

Section VIII. COMBAT AT DEFILES

951. Any terrain feature which restricts the front of advance of a force is a defile for that force. Mountain passes are a common form of defile. Defiles frequently occur in woods, towns, river crossings, lake regions, and swampy areas. Because of their nature, defiles are comparatively easy to defend and difficult to attack.

952. A defense in front of a defile is employed by advance forces to permit the main body to debouch from the defile unmolested and to secure sufficient space for its deployment. Offensive action may be required to secure sufficient space. The minimum distance from the exit at which the defense is conducted depends on the range of the hostile artillery and the size of the main body. 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 debouchment of the main body. Delaying action is particularly effective when opposed by an enemy of lesser mobility.

A defense in front of a defile is often required of a rear guard to cover the retirement of the main body through a defile.

953. A defile may be defended sometimes at points within. The terrain within the defile restricts the front and the maneuver of both defender and attacker. Such a defense can be employed advantageously by small forces only when the flanks are secure, or when the defender's mission is solely one of obtaining limited delay.

Maximum use is made of demolitions, obstacles, and chemicals within the defile to delay the hostile advance. Maximum use is made of available combat aviation due to the enemy's vulnerability to air attack while in the defile.

A position is occupied across the valley with flanks resting on the high ground. Reserves are held close to the position. Counterattacks are launched from the high ground against the attacker's flanks and rear. A defense within the defile is often used in conjunction with a defense in rear of the defile to give depth to a determined defense.

954. 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 effected within the defile by the use of covering forces, artillery concentrations, demolitions, obstructions, chemicals, and air attack.

955. The manner of forcing a defile depends largely upon 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 is made by penetration. When the defile is held at the exit, the attacker 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

956. Basic principles of combat are applicable in jungle fighting but difficulties of terrain, visibility, and climate so complicate command, supply, and maneuver as to require variations in technique and application of equipment. However, resourceful leadership, proper training, and suitable equipment will convert natural difficulties into relative advantages.

Control and maneuver over jungle terrain are extremely difficult. Few roads or trails are available;

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Control and maneuver over jungle terrain are extremely difficult. Few roads or trails are available;

they often must be slashed as movement progresses. Observation is limited to short distances, sometimes to only a few feet. All these difficulties increase in proportion to the size of the force involved.

957. Supply problems frequently control the entire plan of operation. Lines of communication are tenuous, difficult to maintain, and always vulnerable to attack. In particularly difficult country all material must be moved by hand. Weight-saving expedients are imperative, as are specially trained and equipped medical, engineer, and service troops.

The maintenance and protection of supply routes are major considerations. When available, water routes will be found best, although air transport may also 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.

958. 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 should extend to the limit of visibility between them.

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. Trail-bound troops are a liability in the jungle, not an asset.

959. Jungle areas favor surprise and ambush by small forces. On the march, ambush is a constant threat.

Fortunately, however, the very factors which facilitate trapping a column localize the surprise obtained. Security may be obtained by the use of advance detachments 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. Flanks are protected by detachments.

Bivouac areas must be prepared for all-around defense, with suitable fields of fire. Outpost elements are stationed on all roads, trails, and stream beds leading to or near the bivouac area. Frequently the length of the column will dictate bivouac along the trail in depth. In such instances security must be decentralized to the smaller units.

960. 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.

Where infiltration past the blocking position must be controlled, use is made of a series of strong support positions organized along a rearward line (ridge line, 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.

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 defenses 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 a maximum disadvantage.

In terrain where flanks can be anchored to serious obstacles and there is time to lay out and construct intrenchments 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 long time.

961. The ability to maneuver off trails requires hardened troops, thoroughly acclimated and equipped for close fighting. Their training must enable them to move across 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.

962. The rifle and bayonet, automatic rifle, grenade, submachine gun, carbine, machete, and mortars are weapons 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 their employment. Against well-constructed defensive positions flame throwers are extremely valuable. All infantry heavy weapons must be transported by pack, small cart, or on the backs of men. Tanks may be used in close support of infantry.

953. 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 necessitates rapid preparation of adequate trails and supply lines.

964. 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 the troops, supplies and equipment by air. In jungle warfare the seizure, construction and protection of the necessary airdromes is often made the intial objective of all forces involved.

965. Signal communication is extremely difficult. Visual signalling is often impossible, the use of runners slow and frequently hazardous, the range of radio may be reduced greatly, and wire circuits 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 are valuable for important messages. In actual combat, wire communication within battalions or similar units is vital.

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

967. 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, if exploited by proper discipline, training, and hardening to jungle conditions. The force which is able to move freely off the trails and to maintain itself under extremely arduous conditions will enjoy great advantages.

Section X. DESERT OPERATIONS

968. The character of deserts varies greatly. The surface may consist of loose sand and sand dunes, over which the marching of men and animals is difficult and the movement of motor vehicles is greatly impeded, or may have a hard surface which permits the movement of mechanical transport.

There are seldom any well-defined roads but trails generally exist between water sources. Hard desert is often passable anywhere by motor transport at considerable speed. Half-track vehicles are especially efficient. 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.

There are few landmarks and maintenance of direction is often difficult. Mirage is a constant source of error. Distances are deceptive and usually are greatly underestimated.

969. 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.

970. The general doctrines governing offensive and defensive operations apply in desert operations. The troops employed must be 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 mechanized forces make them especially useful. The number of animals in the force is held to the minimum, because of the large amount of water they require. Motorized units, mechanized units, or troops transported by air are employed to hold points of tactical importance such as water sources.

971. Air operations are very effective in desert operations since concealment from air observation is difficult. Air transport is especially useful for the supply of isolated detachments.

972. Desert terrain is often very advantageous for a wide encircling or turning movement by highly mobile mechanized forces, in cooperation with combat aviation. Such action may prove decisive.

Section XI. PARTISAN WARFARE

GENERAL

973. *Partisan warfare* is carried on by small independent or semi-independent forces, operating against a greatly superior enemy. The partisan operations are conducted for the purpose of harassing or delaying larger forces, causing losses through attrition, destroying signal communication, or making incursions on the enemy's lines of communication and supply.

Partisan operations may result as an aftermath of the defeat of the main forces of modern armed opponents. They may result from the intention to occupy territory or quell rebellions of semicivilized peoples. 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.

974. 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. Raiding parties operating against the enemy's rear carry supplies and equipment essential for as much as several weeks.

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.

975. 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 employment 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 reconnaissance patrols in contact with the enemy.

Use is made of obstacles to delay the enemy in front while attacking him in flank and rear. 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 mechanized operations.

976. 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 enemy to a decisive engagement.

977. When the objective of the operations is the destruction of partisan forces or the quelling of tribal uprisings, vigorous and bold action by mobile forces is ordinarily the quickest 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 are then organized as defensive areas from which highly mobile columns conduct operations against any organized resistance located. Since the attacker is usually greatly superior in strength and means of combat, encirclement by double envelopment should be attempted in order to bring about a decisive result.

978. 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 communication, and main sources of supply is the quickest method of bringing about decisive battles and overthrowing the enemy.

Undue dispersion of force by using numerous minor detached forces may lead to defeat in detail.

Vigorous air attacks conducted in front and on the flanks of operations directed toward vital objectives prevent hostile concentrations that would slow up or divert the main forces. In addition to their material effects, air attacks weaken morale and the will to resist of both the armed forces and the civilian population.

Section XII. AMPHIBIOUS OPERATIONS

979. *Amphibious operations* involve joint land, naval, and air action for the landing of sufficient troops on a hostile shore to establish a beachhead on which to land the necessary force to carry on the normal type of war. Such operations present many technical and tactical problems requiring special organization and equipment and landing craft of proper types.

980. Prior to operational planning it is essential to make long-range meteorological forecasts and detailed studies of the enemy defense system and of beach and hydrographic conditions in the area selected for the landing.

Planning is centralized and is based on the tactical scheme of maneuver of the landing forces. Due to the need for secrecy, detailed plans, except essential elements, are withheld from lower echelons until just prior to the operation.

981. The highly complex nature of amphibious operations makes centralized control impractical during the initial stages of a landing and requires a great degree of cooperation between the participating services. This makes intensive training mandatory. Subordinate units must be trained to operate independently until the next higher echelon arrives on shore and assumes control. On completion of initial training, joint full-scale rehearsals of the contemplated operation are conducted.

982. The most critical period of the landing is during the approach to the beach, as hostile small arms and artillery fire break up boat formations and causes numerous casualties. During the landing phase it is essential that provisions be made for naval gunfire and air support to dominate effectively the fire from beach defenses and insure the safe landing of the force.

Smoke, effectively employed, decreases the percentage of casualties. Landing beaches constitute a serious bottleneck and it is necessary to provide for the rapid and orderly movement of troops and supplies inland through the critical beach area.

983. Sufficient air strength must be available to insure air superiority within the area of amphibious operation and to provide the necessary air support. Preliminary bombing of the land communications serving the area of landing operations may be required.

It is desirable that airborne troops and transport aircraft be available on a scale sufficient to undertake a major role in the neutralization of enemy coast defenses in the landing area, capture airfields, and delay the movement of enemy reinforcements to the landing area. Naval forces are necessary to provide protection for the amphibious expedition. Effective antiaircraft support during the landing and subsequent beach organization will be needed in order to reduce the effectiveness of hostile air activity in that critical area. Tanks are valuable in clearing beach defenses and breaking up the movement of hostile local reserves.

984. Efficient communication is of great importance if necessary control of ships, landing craft, aircraft, and troops in this complicated operation is to be achieved. Consequently signal communication agencies must be carefully organized and equipped and given a very high degree of combined training.

Engineers normally are employed to reduce obstacles to the landing, organize the beaches and form a mobile beach reserve.

Evacuation in the initial stages is performed by empty landing craft returning for more supplies. Battalion and regimental aid stations, collecting stations, and clearing stations are set up as soon as the situation permits.

985. In amphibious operations, supply difficulties are increased greatly as the maximum cargo carrying capacity of ships usually is sacrificed to permit tactical loading. While troops must land properly equipped and ready to fight, all equipment must be kept to the minimum and non-essential items omitted. Provision must be made for sufficient initial supply to safeguard against possible delay in resupply. Levels to be maintained are prescribed by higher headquarters.

986. The success of continued tactical operations ashore depends on the ability of supply agencies to furnish all classes of supply to combat units. In order to do this, it is necessary at an early stage of the operations to capture a port that can be opened quickly and put in working order. This must be followed by capture of additional ports as soon as possible. However, plans must be made for maintenance over beaches for a long period.