

**AMPHIBIOUS OPERATIONS**  
**EMPLOYMENT OF HELICOPTERS**

(TENTATIVE)

(NAVMC-4540)

This document is IMPORTANT because it is the world's first printed textbook on the employment of helicopters in amphibious warfare. It formalized, in type, the original of the text which was prepared in early 1947, and used for instruction in the Marine Corps Schools that year.

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## PREFACE

The advent of the troop carrying helicopter and its establishment as standard equipment within the Marine Corps gives rise to a variety of questions related to the employment of such conveyances in the conduct of amphibious operations. It is the purpose of this pamphlet to explore the various aspects of helicopter employment, discerning the manner in which the characteristics of the vehicle can best be exploited to enhance the effectiveness of the amphibious attack, and providing thereby the basis for a body of doctrine governing helicopter landing operations.



\* [REDACTED]

# EMPLOYMENT OF HELICOPTERS

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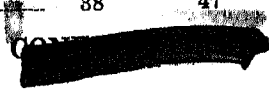
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## SECTION 1

### INTRODUCTION

1. **General.**—The helicopter, as a military conveyance, possesses certain distinctive characteristics which, if exploited, can enhance greatly the speed and flexibility of the amphibious assault, while at the same time permitting a desirable increase in the dispersion of the attacking naval forces. The ability of the helicopter to rise and descend vertically, to hover, and to move rapidly at varying altitudes all qualify it admirably as a supplement or substitute for the slower, more inflexible craft now employed in the ship-to-shore movement. Furthermore, its ability to circumvent powerful beach defenses, and to land assault forces accurately and in any desired altitude, on tactical localities farther inland endow helicopter operations with many of the desirable characteristics of the conventional airborne attack while avoiding the undesirable dispersal of forces which often accompanies such operations. The helicopter, furthermore, when transported to the scene of operations in aircraft carriers, makes operations possible at ranges which have not yet been achieved by the existing conventional troop carrier types.

The limitations on effective helicopter employment are of the same nature as those which have been encountered during the development of other conveyances employed in the amphibious attack, being mainly technical in nature. They are, at present, reflected in sharp limitations on load carrying ability, and on range, speed and mechanical reliability. It is accepted that such shortcomings will be overcome, as in the past, by a process of gradual development. However, the evolution of a set of principles governing helicopter employment cannot await the perfection of the craft itself, but must proceed concurrently with that development. Certain of these principles are now apparent, and a concept of employment based thereon is presented in the sections to follow.



## SECTION 2

### ORGANIZATION AND COMMAND

**2. Organization of the Landing Force.**—The basic tactical organization of landing forces involved in helicopter operations will vary from the basic organization of units involved in a conventional amphibious attack only in the degree rendered necessary by the technical limitations of the helicopter transport. These limitations, in turn, will vary progressively with the development of the helicopter itself. In its current state of development, the limitations thus imposed are sharply restrictive, reducing considerably the effectiveness of any landing force so transported in organic fire support and in transportation. An analysis of the capabilities of existing helicopter types is found in Section 9 of this pamphlet. While its limitations are, at the moment, of a stringent nature, they do not in any way alter the principles which govern the organization of the landing forces in the conventional amphibious attack. The necessity for special grouping of the landing forces for the tactical problems incident to landing, and for the administrative problems related to embarkation and overseas movement, remain present whether helicopters or landing craft are employed in the ship to shore movement.

As in the conventional amphibious operation, the battalion landing team will still be the basic task organization for landing while the embarkation group, built around a regimental combat team, remains the logical basic administrative organization for embarkation.

**3. Organization for Helicopter Units.**—**a. Administrative.**—It is contemplated that the transporting helicopter forces will be organized in the conventional aviation administrative formations extending from the helicopter squadron to the helicopter wing, and that the precise composition of these units will vary with the size and operating characteristics of the craft themselves.

**b. Tactical organization.**—As is the case in both airborne operations and conventional amphibious operations, the tactical formation of the transporting craft must be tailored to suit the tactical requirements of the transported assault forces. Thus, the administrative organization described in (a.) above will necessarily be modified in a limited degree by attachments and detachments to provide a balanced formation capable of transporting the various elements of the landing force for the particular operation involved. This tactical organization of the transporting aircraft will take the form of serials each of which will land a tactical element of the landing force at a single place in accordance with an announced sched-



ule. A further detailed discussion of the organization for the ship to shore movement will be presented in Section 5 of this pamphlet.

4. **Command Relationships.**—It is contemplated that the basic principles which govern command relationships in the conventional amphibious attack will be applicable to those operations which employ helicopters as transport for all or a part of the assault landing forces. Since the basic naval character of the operation is in no way modified or abridged it follows that the naval commander of the amphibious task force should be responsible for landing the helicopter landing forces and for supporting them in their subsequent operations ashore.

Such variations as will arise will be minor in nature, stemming from the fact that the helicopter formations will be landing force units. As such they will, in all probability, participate in the operation as an element of the expeditionary troops in a fashion quite similar to that now discharged by amphibian tractor units. Under such an arrangement, there would be direct command extending from the Expeditionary Troops Commander to the transporting helicopter units as well. The relationship between the transporting helicopter organizations and the troop units which they are to carry would follow closely the coordinate relationship currently employed in the conventional airborne attack. Likewise, the relationship between the transporting and transported forces during the ship-to-shore movement should follow the same principles as are enunciated for the seaborne ship-to-shore movement, wherein the transporting element is responsible for control of all craft involved and for delivery of the landing forces at the predetermined localities in accordance with a previously concluded schedule.

There will, however, exist a special relationship between individual helicopter units and the carrier-transport upon which they move to the theater of operations. This will be essentially the same relationship that normally exists between conventional squadrons and the carriers on which they are based. Carrier-transport will provide maintenance and repair facilities for the embarked squadrons, and the helicopter personnel will be temporarily integrated into the air department of the ship. It will be necessary for the Joint Expeditionary Force Commander to cover explicitly in his operation order the details of assignment and detachment of the helicopter units. Those instructions might logically prescribe that the relationship between all or a specified part of the helicopter units and carrier-transport would be terminated upon the discharge of all landing force personnel and equipment in each case, or at such other time as the Joint Expeditionary Force Commander might direct.



## SECTION 3

### TACTICAL CONSIDERATIONS

5. **General.**—The characteristics of the helicopter itself will affect sharply the tactical considerations which will govern helicopter landing operations. Particular influence will be evidenced in the selection of objectives, avenues of approach, schemes of maneuver, and landing plans, as well as on the date and hour of landing. The tactics involved in such operations will be further influenced by the varying situations which exist when helicopter transport is the sole means employed for conduct of the assault and when helicopter operations are conducted in conjunction with a conventional ship-to-shore movement involving assault seaplane transport.

6. **Selection of Objectives.**—a. The execution of an entire amphibious assault, including the logistical support involved and the conduct of all related operations, using air means alone, is not considered to be within the foreseeable future. On this premise, it must be concluded that objectives selected for helicopter-borne assault forces must be of a nature which will contribute significantly to the conduct of other seaborne amphibious operations, the sum of which will finally result in the capture of a beachhead. Objectives assigned helicopter landing forces may include;

(1) Terrain which dominates the selected landing beaches, and which, once in the possession of the attacker, will facilitate landing of reserves, supplies and equipment across those beaches.

(2) Localities which, in the possession of the attacker, will contribute significantly to the isolation of the beachhead area.

(3) Localities such as airfields which, in the possession of the attacker, will directly facilitate the conduct of other operations ashore.

(4) Localities, such as rocket launching areas, which must be brought into possession of the attacker in order to reduce a specific and serious hazard to the conventional ship-to-shore movement.

b. **Terrain Considerations.**—Considerations of terrain assume unusual significance when employing helicopters in amphibious operations. The conventional military evaluation of terrain features is altered and expanded with respect to selection of objectives. Objectives which are considered unattainable by normal ground action may be readily assaulted by helicopter-transported troops, provided landing areas reasonably free of heavy forest and enemy defenses are available.

[REDACTED]

Terrain features which, in normal ground operations, would be viewed as obstacles, should be examined in the light of their possible utilization as protective features during initial phases of the helicopter operation. For example, in volcanic areas such as are to be found in Iceland or in the fjord coastlines of Scandinavia and Alaska, key terrain may be readily seized by helicopter troops where normal amphibious assault and penetration would be slow and costly.

Certain additional factors which are of particular concern in the selection of objectives for the helicopter attack include:

(1) **Nature of the enemy defenses.**—Due to the vulnerability of the helicopter in landing, it will normally not be desirable to land directly on an objective which is defended in strength. However, should the tactical situation demand that helicopter-borne troops land on defended ground, the landing should only be undertaken in conjunction with intensive efforts to neutralize enemy fires and to mask enemy observation. In such a situation, the success of the operation will depend largely upon the effectiveness of the supporting fires which can be brought to bear on the enemy defenses. Depending upon the capabilities of helicopter units and the effectiveness of target location means, landing of helicopter-borne forces on defended ground may possibly be undertaken under cover of darkness or in periods of low visibility.

(2) **Selection of landing areas outside the range of damaging enemy fires.**—Because of the relative vulnerability of the helicopter in landing, landing space for helicopter-borne forces will usually be sought outside the range of damaging enemy fires, yet close enough to the objective so that the elements of surprise and mobility will not be entirely sacrificed.

(3) **Size of the landing area.**—The size of the landing areas available in the vicinity of the objective will determine the number of helicopters which can be landed simultaneously, and consequently the size of the individual serials. Where landing space is restricted, the time required for helicopters to discharge troops and retire may also determine the landing interval between successive serials.

(4) **The configuration of the landing area.**—The shape of the selected landing area (including the size and location of both interior and perimeter obstructions) will affect the dispositions and the amount of dispersion (in time and in distance) required between troop units landed from helicopters.

(5) **The distance of the landing area from the objective.**—Since surprise is an element to be particularly sought in helicopter operations, the landing area should be as close to

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the selected objective as possible, other things being equal. However, as has been noted, it should also be sufficiently distant to avoid serious damage to helicopters and troops during their disembarkation.

(6) **Ease of re-supply, reinforcements or evacuation.**—This factor as applied to the selected objective, will determine the degree of independence with which the helicopter effort may be undertaken, and the period over which it may be sustained without junction with other landing forces.

7. **Selection of Avenues of Approach.**—a. The characteristic flexibility of the airplane, which is inherent in the helicopter, permits it to approach the objective over routes which offer maximum opportunity to exploit both cover and concealment. The helicopter is capable of employing all of the desirable characteristics of the terrain in order to insure the safest possible approach. The shore line can be crossed in an area which is not well adapted to conventional amphibious operations and which accordingly, may be less strongly defended. The approach to the selected objective may be circuitous in nature, taking maximum advantage of reverse slopes and other irregularities in the terrain. It may likewise involve variations in altitude to make use of cloud conditions, and it may finally involve abrupt descents and changes in direction to deceive defensive observation. It is to be noted, however, that the foregoing considerations—all of which may enhance the security and effectiveness of the helicopter landing attack—may in part lose their usefulness should the maneuver become unduly complicated as to timing. From the point of view of precision in the timing of such operations, avenues of approach which permit more direct movement from ship-to-shore are desirable.

b. Other factors which will affect the selection of avenues of approach include:

(1) **Location of enemy installations.**—Avenues of approach should be so selected as to avoid known anti-aircraft positions or concentrations of troops which could deliver fires upon the helicopter formations.

(2) **Terrain.**—Land conformation such as coastal cliffs and ridge lines, as well as masking woods or construction, should be carefully studied, in order to gain full advantage of natural cover in the selection of routes of approach. A frontal approach from the sea into a defended zone should be avoided.

(3) **Supporting fires.**—The capabilities of supporting gunfire ships and covering aviation, insofar as relates to the probable effectiveness of preliminary bombardment and smoke operations, will directly influence the selection of helicopter avenues of approach.

[REDACTED]

(4) **Enemy radar coverage.**—The extent of enemy radar coverage will affect directly the selection of avenues of approach. This coverage should be carefully analyzed to determine the route and altitude which offer the best chance of avoiding detection.

8. **The Scheme of Maneuver.**—a. The scheme of maneuver for helicopter-borne forces will be governed by the tactical precepts of land warfare, influenced as noted previously, by the limited mobility, reduced fire power and restricted resources of the helicopter-landed force, once it is on the ground. The scheme of maneuver should be designed to take maximum advantage of the shock effect of the landing. To insure full advantage of initial surprise, proximity of the landing area to the objective is highly desirable.

b. Assault units should be assigned limited initial objectives covering the landing of subsequent waves and screening the landing area from direct fire. To minimize the overextending effect of all-around security requirements, aggressive penetration in the direction of the objective should be rapidly initiated and supported by the seizure of key terrain features, blocking avenues of approach, and incorporating the use of obstacles into the scheme of maneuver. Every consideration must be given to the provision of maximum assistance by close air support, naval gunfire, and friendly artillery when in range.

c. The scheme of maneuver may be characterized by great flexibility and speed by virtue of the helicopter's capability of simultaneous landing of entire units in desired tactical formations on the ground. The air delivery of logistical support directly to the helicopter force without regard to normally inaccessible terrain conditions will have a further significant effect on the selection of a scheme of maneuver.

9. **The Landing Plan.**—a. Terrain, particularly the size and character of possible landing areas, will directly influence the landing plan, affecting both the frontage and depth of the landing force and thereby influencing the pattern of the several serials involved as well as the echelonment of subordinate formations within serials. The characteristics of the helicopter itself, along with other aeronautical considerations, will also have a distinct influence on the landing plan. The ship-to-shore movement, for example, may be extended over great distances and without regard for beach terrain, and it may be launched from widely dispersed moving bases. Landings may be accomplished on almost any form of terrain—and over any coastline. Finally, by the use of simultaneous landing patterns, entire tactical units may be landed at one time with a minimum of initial disorganization.

[REDACTED]

b. Subject to the limiting conditions of suitable landing areas, the landing plan must provide for shock and power by initially placing a maximum of combat strength ashore at the predetermined time, and by providing for a rapid augmentation of the means assigned to the helicopter-borne forces. The landing plan must also provide operational depth and should insure flexibility in the echelonment of reserves and supporting arms.

(1) In applying the above basic factors, the landing plan as finally assembled should include provision for the following:

(a) Establishment of precise time and place of landing of all assault units down to and including rifle platoons, to insure proper tactical disposition on the ground.

(b) The landing of reserves and supporting arms and services at times and places to be designated by the landing force commander in conformity with the development of the situation ashore.

(c) Careful timing and coordination of the ship-to-shore movement to permit use of other arms to protect the movement.

(2) In evaluating the extent to which these principles can be applied, it will be necessary to ascertain the limitations imposed by the landing space available on the size serials which can be landed, as well as on the order of landing and on the time of landing successive serials. The number of helicopters which can be landed approximately simultaneously will be governed by the size of the helicopter, the landing and maneuver space required by the helicopter, the unobstructed area available for landing, and the selected avenues of approach to the landing area.

c. The minimum space required by helicopters for landing en masse is presently considered to be two (2) diameters between helicopters (measured in terms of the circle described by the tips of the rotor blades) regardless of the precise design involved, while the minimum space required by the helicopter in formation flight is about four (4) diameters between helicopters. Due to the helicopter's capability for steep approach and take-off, full and simultaneous utilization of the landing area available will not be seriously restricted by the height of perimeter obstructions, such as steep hills or trees. Such obstructions, along with wind considerations, will, however, affect the direction and altitude of the final approach. In this latter connection, the particular usefulness of low altitude approaches is to be noted. Such tactics can contribute to achievement of deception in landing, avoidance of observation and electronic detection during approach and landing, and reduction of vulnerability to enemy aircraft, anti-aircraft, and ground fires. Consideration should be given, however, to any

[REDACTED]

limitations imposed on the landing or retirement of serials occasioned by minimum altitude operations along restricted avenues of approach.

10. **Date and Hour of Landing.**—a. The factors governing the selection of the approximate date for landing are generally similar to those affecting to all amphibious operations (see USF-63). The influence of terrain is most pronounced when considered in conjunction with seasonal conditions in the area, such as weather, moon phase, and with the local enemy situation.

b. The characteristics of helicopters common to all aircraft are crucial factors in the selection of the date and hour of landing. Under the conditions imposed by basic operational requirements, and by requirements of time and space, local weather conditions are of paramount importance, as in the case of conventional airborne operations. Good aerological conditions must exist in order to speedily launch a helicopter force, control it during an extended ship-to-shore movement, and land it accurately in the prescribed order and pattern. Operation plans must therefore be flexible in order to allow for sudden changes in the date and hour of landing.

c. The comparative characteristics of day and night helicopter landings and the factors governing the decision to land under cover of darkness are strongly influenced by helicopter capabilities. The advantages accruing from the controlled spot landing feature, combined with the concealment afforded by darkness, and the resultant decreased effectiveness of enemy air and anti-aircraft defenses all strongly favor the execution of night landings. Such landings, however, will entail many technical problems which require study and development. The single matter of control will probably involve the extensive use of homing devices, radar, infra-red illumination, and pathfinder units. Night landings of helicopter forces, furthermore, will possess the usual liability of night operations after the troops are on the ground—decreased effectiveness of naval gunfire and air support and increased difficulty of tactical control.

d. In the final analysis, the decision as to whether the helicopter-borne force should be committed by night or day will depend on the estimated degree of air superiority which will be achieved, the need for security from enemy ground observation, the capability of obtaining such security in daylight, the advantages to be gained by surprise, and the actual experience and capabilities of the helicopter personnel. Daylight operations are comparatively simple of execution and should be favored when the situation will permit, although consideration should be given to various combinations involving any of the following:

[REDACTED]

[REDACTED]

(1) A night take-off followed by a daylight or dawn landing.

(2) A daylight take-off followed by dusk or night landing.

(3) A daylight landing in conjunction with the use of smoke when it will combine some of the advantages of both a day and night operation.

e. The enemy situation and our own situation will likewise exert great influence on the precise hour of landing. Helicopter troops must attempt to exploit the element of surprise. However, certain circumstances, which may endanger helicopter forces with destruction by the enemy before relief can be afforded from other friendly units, may prove the final factor in determination of H-hour. Such circumstances will exist when strong and mobile enemy reserves are so located that they may make contact with the lightly armed helicopter troops and overwhelm them without interference from other friendly troops or supporting fires. Thus it follows that helicopter troops should not be committed unless and until it can be reasonably concluded that such enemy reserves do not exist, or can be contained and immobilized, and that friendly forces, amphibious or land, can make contact with the helicopter troops in sufficient time to support them as required by the situation. On the other hand, a combined seaborne and helicopter operation may be designed to clear enemy defenses from a beach area and to assist in the deployment of an armored force. If such is the case, it might be best to establish H-hour for the helicopter attack after the seaborne landing, in order that the attacker's strength can be concentrated on areas which will assist most in launching and development of the armored attack.

**11. Problems of Coordination with Troops Landed by Other Means.**—Helicopter forces normally will be employed as part of a landing force and in conjunction with major amphibious landings or in extension of the ground action of the landing force. In most cases, long distances, with accompanying difficulty of direct control, will separate the helicopter troops from the landing force prior to establishment of ground contact. The problems of coordination with other troop elements will thus probably be acute. This obstacle can be in part reduced by a thorough consideration of the following factors during the planning phase:

a. Planning for helicopter operations should be coordinated at the highest level of tactical command involved (usually the Joint Expeditionary Force).

b. Parallel and concurrent planning is an essential, as is the timely dissemination of necessary information to all elements.



[REDACTED]

c. Ship-to-shore control agencies must be in communication with all elements of the task force over which or into whose area of operation the helicopter formations will pass.

d. S.O.P.'s for identification and for establishment of contact should be promulgated to all subordinate commands.

e. There must be effective signal communications between the helicopter-borne troops and other ground forces with which contact is expected.

f. There should be close liaison between helicopter units and troops landed by other means. Wherever possible, plans should include provision for exchange of fires between the helicopter-borne and other landing forces, and for the early reinforcement of the helicopter-borne troops with artillery and other heavy means as soon as ground contact is made.

g. Rehearsal under conditions closely simulating those of the actual operation is imperative to the full success of the plan.

**12. Planning Procedures.**—An operation involving the launching of helicopter transported troops from ships at sea retains all the characteristics of amphibious warfare with added flexibility and, therefore, added responsibilities for effective planning procedures. It appears that such procedures should conform in general to the principles prescribed by existing doctrine (see USF-63) as modified and extended in the several sections of this pamphlet. In planning the helicopter aspects of an amphibious operation, the principle problems will probably appear in coordination and liaison.

a. **Coordination.**—There must be extensive coordination between the transporting and transported units insofar as the tactical aspects of the landing are concerned. There will likewise be important coordination tasks which relate to the provision of fire support, the protection of the ship-to-shore movement and the integration of the helicopter-borne attack with other operations concurrently in progress. This latter coordinate function can only be discharged at the highest level—the Joint Expeditionary Force. The tactical plan desired by the Expeditionary Troops and helicopter landing force commanders will, in turn, result in a landing plan constituted best to support the selected scheme of maneuver. This landing plan, however, must have the approval of the Joint Expeditionary Force Commander since he is responsible for the control of the ship-to-shore movement. It will be necessary for him to obtain advise on the feasibility of the desired landing plan from the viewpoint of the CVE transport units, the fire support units and the air support organization, as well as from the viewpoint of the commander of such conventional landing forces as may be concerned. While the foregoing problems of coordination do not vary in principle from those encountered

[REDACTED]

in the conventional landing attack, they are, nevertheless, intensified by the employment of the air as a medium for movement of assault troops.

(1) As in the case of the seaborne amphibious attack, there are certain planning functions which are the sole responsibility of the individual commanders involved, while certain other planning functions are coordinate in nature. In this case, the helicopter-borne troop commander should alone be responsible for:

(a) Preparation of a scheme of maneuver for accomplishment of his mission ashore.

(b) Assignment of personnel and equipment to helicopters.

(c) Preparation of documents relating to embarkation of the landing force.

(d) Loading and unloading helicopters.

(2) In the same manner, the helicopter unit commander should be specifically responsible for:

(a) Assignment of helicopter units to transport the several troop formations in a fashion which will best support the scheme of maneuver ashore.

(b) Approval of loading of helicopters.

(c) Preparing such plans as will result in delivery of troop units to the assigned landing areas in accordance with the landing plan.

(d) Execution of resupply and evacuation mission in accordance with instructions issued by higher authority.

(3) Joint responsibilities of helicopter and troop commanders will include:

(a) Preparation of a landing plan for submission to the Joint Expeditionary Force Commander for approval.

(b) Preparation of a rehearsal plan for submission to the Joint Expeditionary Force commander for approval.

(c) Preparation of signal operating instructions relating to the helicopter movements specifically for submission to the Joint Expeditionary Force Commander for approval.

(d) Selection of routes of approach, landing areas and supply landing points.

(e) Preparation of plans for resupply and evacuation to support the contemplated operations ashore. (These plans also must be approved by the Joint Expeditionary Force Commander).

- [REDACTED]
- (f) Plans for loading and unloading helicopters.
- (g) Plans for loading and discharge of troop units.

b. **Liaison.**—Close liaison, including exchange of liaison officers, must be maintained between helicopter commands, helicopter-borne troop units, and other troop units with whom ground contact is to be established, throughout the planning and execution phases.

13. **Training.**—The specific problems inherent in the employment of helicopters requires specialized training by all elements of the helicopter force. In addition to full scale rehearsal of each operation, the following supplementary training requirements will be characteristic of helicopter operations:

a. **Troops.**—In addition to normally prescribed basic and unit training for amphibious and land warfare, troop units which are to be employed with helicopters should receive training in such techniques as:

(1) Embarkation and debarkation procedures with helicopters.

(2) Loading and securing of cargo in helicopters, to include the formation of loading teams and the establishment of S.O.P.'s for combat loading.

(3) Qualification of helicopter and helicopter troop personnel to serve in a liaison capacity with the tactical and logistical control elements.

(4) Reorganization procedures upon landing (to include night landings).

(5) Familiarization with specialized signal equipment.

(6) The basic elements of helicopter operations.

b. **Helicopter squadrons.**—Helicopter squadrons should be specifically trained for employment as troop carriers in amphibious operations. Pilots and organizations should receive training in:

(1) Operations from carrier bases at sea.

(2) Formation flying in accordance with tactical requirements.

(3) Troop loading and unloading procedures.

(4) Technique of control during the ship-to-shore movement.

(5) Night operations.

(6) Basic infantry subjects.



## SECTION 4


### EMBARKATION

14. **General.**—The principles and procedures governing embarkation of landing force troops and helicopter units follow those for the conventional amphibious attack as prescribed by USF-6 and USF-63. Special applications to this type of operation are encompassed mainly in embarkation responsibilities, procedures for the embarkation of troops and their organic equipment, procedures for the embarkation of helicopters and their related equipment, and in the preparation of embarkation forms.

15. **Embarkation Responsibilities.**—Under the organizational scheme envisaged herein, embarkation of landing force ground troops and helicopter units is a coordinate responsibility of the appropriate landing force and naval commanders. It is to be noted, however, that the embarkation of landing force ground elements, and that of helicopter elements, are not interdependent, and it will usually be desirable to complete embarkation of ground elements and the majority of helicopter ground personnel prior to embarkation of helicopter flight elements.

16. **Embarkation Procedures.**—a. In order to insure effective resolution of the many coordinate embarkation problems involved it will be necessary to establish liaison between landing force, helicopter and naval commands at the earliest practicable date. During this period of planning, the tasks involved will include a determination of the precise size, location and capacity of troop and cargo spaces, and the cargo handling facilities available, both for embarkation and for transfer of cargo from cargo space to helicopter loading stations. Finally, it will be necessary to delineate in detail responsibilities for the embarkation of assault ground troops and helicopter personnel, and for the handling of supplies, including movement from below-deck stowage, spotting prior to loading and loading aboard helicopters.

b. The rigid weight and space limitations inherent in the helicopter itself render it essential that ground troop commanders maintain accurate personnel and tonnage data, to be based on the actual weight of each man, and actual weight and cube of each item of equipment. In this connection it will be necessary that all supplies to be embarked and later transported by helicopter should be assembled in small, light packages, marked clearly as to contents, weight and volume. Large items of equipment should be separated into their components insofar as the need for early use in the assault permits.



c. The ship platoon (see Section 7) should be the first element to embark. This platoon should discharge those conventional functions which are outlined in USF-63, and, in addition, should be charged with responsibility for all loading, ship board movement, and helicopter loading of supplies.

17. **Embarkation Forms.**—Study of the forms prescribed in Chapter 5, USF-63, indicates that all current loading forms will probably be required for embarkation of helicopter-assault troops, that these forms are suitable and that no additional forms will be required.



## SECTION 5

### THE SHIP-TO-SHORE MOVEMENT

18. **General.**—While great advantage will accrue to helicopter-borne landing in selection of objectives inland and defended landing beaches, the greatest single benefit from the helicopter technique will be in its application to movement from ship-to-shore. That movement, as is the case in the current standard techniques, is characterized by a degree of slowness and inflexibility which is not consistent with the requirements of the future. It is fortunate that the characteristics of the helicopter will make it possible to avoid the complexities and restrictions now found in the ship-to-shore problem.

19. **Factors Governing Conduct of the Movement.**—In exploring the details of the helicopter-borne ship-to-shore movement, it will be desirable to set forth those basic factors which it appears will govern the conduct of this movement. Those factors include:

a. The Joint Expeditionary Force Commander should be responsible for control of the ship-to-shore movement as in conventional amphibious landings.

b. The foregoing control by the Joint Expeditionary Force Commander should be exercised through his tactical commander.

c. Transporting carriers should approach the objective area in dispersed formations and should launch their helicopters immediately upon coming within range of the objective in order to emphasize speed and to preserve surprise.

d. Whenever practicable, landing areas should be usually located and identified by pathfinder personnel during D-Day operations and, where other considerations will be required, should be marked.

e. Under certain conditions, it may be possible to establish surface vessels or submarines between the helicopter transports and the beach to assist in guidance of the ship-to-shore movement. This technique should not be looked upon as invariable however since, in some cases, the time consumed in positioning the surface craft would reduce both the flexibility and rapidity of the movement.

f. Plans for the ship-to-shore movement must be completed in all detail by the several echelons of a naval amphibious force command in coordination, but must have the approval of the Joint Expeditionary Force Commander in order to insure the integration and coordination of the helicopter ship-to-shore movement with other operations, both land and air.

[REDACTED]

Based on the foregoing factors, a brief concept of the helicopter ship-to-shore movement is presented in the paragraphs to follow.

**20. Loading the Individual Helicopters.**—Prior to the arrival in the objective area the helicopters should be spotted for take-off and loaded. Helicopter teams should stow their equipment on board in accordance with previously prepared plans and under supervision of aircraft crews. At a specified time, and based on the calculations and figures expressed in the approach schedule, troops should be directed to embark in their respective helicopters. The helicopters will have been warmed up in sufficient time so that they can be wheeled into position and take-off made at proper time to insure scheduled arrival at the objective.

**21. Movement From The CVE Transport Area.**—a. The first helicopter to be launched from the CVE should carry the wave commander and should proceed slowly in the prescribed direction. The next craft off the ship should be flown at a rapid rate of speed until it closes up the interval between it and the wave commander. The remaining helicopters of the wave follow the same procedure, until the entire wave has left the ship. If the helicopters for one wave come from more than one ship, they must close at an orbit point, shoreward from the carrier-transports. The last helicopter of the wave to leave the ship should, upon closing with the preceding helicopter, inform the wave commander.

b. It is at this point, when the individual waves have formed and have joined to constitute a single serial, that the guidance by the control system must take effect. High performance aircraft and long endurance helicopters of the control system embarking control personnel and landing force personnel who have previously reconnoitered the specific landing area will, at this time, identify the serial for which they are responsible and assume the responsibility for its guidance to the designated landing area. These control aircraft and helicopters will be responsible not only for guidance of the serials to which assigned but for the maintenance of careful time check to insure that the landing schedule previously issued is, in fact, being carried out.

c. Upon approaching the designated landing area and at such time as the approach maneuver will permit, each helicopter serial should deploy into the formation prescribed in the landing plan. This deployment is necessary to insure that units land in the formations which will best support the prescribed scheme of maneuver. Helicopters should land at such distances and intervals as will permit effective deployment of the embarked troops. Immediately upon landing, troops disembark rapidly to move out of the landing area in the shortest possible time.

[REDACTED]

**22. Operations Subsequent to Landing of Assault Serials.—**

**a. The return of the helicopters to the CVE.**—As soon as the troops have disembarked from the helicopters, the craft should take off according to predetermined plans and return to the transport in the most expeditious manner. It may be necessary for the returning helicopters to fly at a different altitude or to follow a different route from that employed in the approach in order to avoid interference with the incoming loaded waves. They will be guided back to the CVE transport areas by elements of the control system or by means of individual homing equipment.

**b. Landing of the second and succeeding waves.**—In the landing of the second and succeeding waves of helicopters, sufficient time should be allowed to permit the preceding wave to take-off and clear the landing area. In order that a minimum number of helicopters will be on the ground in a restricted area at one time, such as would be the case when two landing areas were adjacent, the timing can be such that the wave landing in one area can arrive shortly after the landing of the wave in the adjacent area. The provision of air traffic control parties landed with pathfinder units or in the early waves will be of value in solving this problem.

Detailed and specific plans must be made for the landing of units and supplies after the first trip of the helicopters. If these units have been transported to the area in the CVE's which have carried the helicopters, the problem assumes no great difficulty. However, if they are loaded on APA's or other standard type of transport vessel, special landing platforms or similar services must have been prepared for the landing and loading of the helicopters. It is desirable, particularly in the case of assault units, that the elements which are to land in helicopters be loaded on the CVE's which carry the helicopters to the objective area. The planning for the landing of these units and supplies will be based on a priority system and should be formalized in a table similar to that used in normal amphibious operations.

**23. The Control System.**—**a.** It is conceived as was noted in paragraph 19, that the Joint Expeditionary Force Commander will discharge his responsibility for conduct and control of the ship-to-shore movement through his tactical air commander. The tactical air commander, in turn, would probably constitute a control group for the specific purpose of controlling the ship-to-shore movement.

In actual functioning, the system of control which he employs will have many of the aspects of tactical air direction as now practiced. There would, however, be a number of necessary innovations in specific duties and in equipment. This control organization must be assisted and advised by officers furnished by the corresponding echelons of troop and helicopter



commander. These liaison officers should embark with the appropriate echelon of the control organization.

Tasks of this organization are envisioned to embrace all aspects relating to control, coordination and guidance of the movement of helicopters between the carriers and the landing areas as well as keeping the Joint Expeditionary Force commander, and such other commanders as may be designated, advised of the progress of the movement from ship-to-shore and the landing of various helicopter serials. The precise composition of the control organization will vary with the size and requirements of the individual operation.

b. Certain personnel, not actually a part of the control organization, who will nevertheless have certain duties in the ship-to-shore movement are:

(1) **Helicopter group and squadron commanders.**—The helicopter group and squadron commanders' control duties consist primarily in acting as an advisor to the corresponding landing force commander. They are responsible for the performance of the helicopter units transporting the landing force element ashore.

(2) **Flight or formation commanders.**—flight or formation commanders are subordinate officers of the helicopter organization, each charged with the responsibility for leading the flight or formation to the landing area in accordance with the plan.

24. **Planning the Ship-to-Shore Movement.**—Sufficient helicopters should be made available to embark simultaneously all of the battalion landing teams to be so landed. The numbers thus required will, of course, vary with the characteristics of the helicopter but that variation will have no effect on the planning principles involved.

The formations, frontages and distance employed in landing assault units will be affected by the mission, the scheme of maneuver, the character of the anticipated opposition, terrain in the landing area, and the routes of approach. Plans should be so framed as to exploit the shock power derived from simultaneously patterned landing of assault elements or by closely spaced waves where the character of the landing area limits the number of helicopters that can land simultaneously.

a. **Planning forms.**—It is contemplated that the ship-to-shore movement in helicopters will require the following planning forms:

- (1) Landing schedule.
- (2) Landing of non-scheduled elements.
- (3) Helicopter availability table and employment plan.
- (4) Helicopter assignment table.
- (5) Landing Diagram (Landing Pattern).

(6) Debarkation diagrams.

(7) Approach schedule.

b. **Landing schedule.**—A landing schedule should be prepared for each operation and issued as an annex to pertinent operation orders showing the landing area, the troop unit to be landed, the CVE transport on which the unit is embarked, and the time of landing. The landing schedule is prepared by the landing force commander with the advice of the appropriate helicopter commander, and must be approved by the Joint Expeditionary Force Commander. With this schedule as a basis, division and regimental combat team commanders prepare landing schedules for their respective units.

The time of landing of units landed in the first trip of helicopters should be expressed in terms of H-Hour. When the helicopter landing is to take place over an extended area, it is normal to take as H-Hour the time of landing of the first wave of helicopters to land in any of the landing area.

ANNEX \_\_\_\_\_ to Opn O \_\_\_\_\_

### LANDING SCHEDULE

Landing Zone	Battalion Helicopter Group Designation	Troop Unit	From	Time of Landing
Red	MAG 15	BLT-1/9	CVE-16 CVE-17 CVE-18	H-Hour
Yellow	MAG 25	BLT-2/9	CVE-23 CVE-24 CVE-25	H-Hour
Yellow or Red	MAG 35	BLT-3/9	CVE-34 CVE-35 CVE-36	On Order
Orange	MAG 45	BLT-1/21	CVE-44 CVE-45 CVE-46	H-Hour
Brown	MAG 55	BLT-2/21	CVE-37 CVE-38 CVE-39	H-Hour
Orange or Brown	MAG 65	BLT-3/21	CVE-40 CVE-41 CVE-42	On Order

etc.

Figure 1.—Form for the Landing Schedule.

c. **Instructions for landing non-scheduled units and material.**—A further requirement will exist for a document which provides a simple method of transmitting requests for the landing of specific units or material. A form for such a document is shown in Figure 2. It will be noted that the table provides all of the information which the control system and commanders concerned require in accomplishing the ship-to-shore movement. It will probably be most appropriate for the document to be prepared by the highest troop echelon involved in the helicopter landing, upon recommendation of subordinates and with the advice of the helicopter unit commander concerned.

ANNEX \_\_\_\_\_ to Opn O \_\_\_\_\_  
**LANDING OF NON-SCHEDULED ELEMENTS**

Serial Number	Unit or Det.	Approx. Persons	Matériel & Equipment	Helicopters Required	Ship
911	Rear Ech BLT 1/9	25	_____	3	CVE 17
etc.					

Figure 2.—Form for Landing of Non-Scheduled Elements.

d. **Helicopter availability table and employment plan.**—(See figure 3). Such a document is necessary to provide the same basic information as is found in the similar documents relating to landing craft in the plans for a conventional ship-to-shore movement. It should present, in tabulated form, information concerning the number and type of helicopters which are available and the vessel on which they are carried, as well as the number and type of helicopters in each scheduled wave and serial.

It appears logical that the helicopter availability table and employment plan should be prepared by the helicopter landing force commander with the advice of the appropriate helicopter unit commander and that it should extend only to the first trip of the helicopters.

**HELICOPTER AVAILABILITY TABLE AND  
EMPLOYMENT PLAN  
AVAILABILITY TABLE**

Transporting Vessel	Number and Type Helicopters	Remarks
CVE 17	40	
	etc.	
Total	_____	

**EMPLOYMENT PLAN**

Wave/Serial	Number and Type Helicopters	Helicopter Carrier	Remarks
1/100	20	CVE-16 CVE 17	
	etc.		

Figure 3.—Form for Helicopter Availability Table and Employment Plan.

e. **Helicopter assignment table.**—(See Figure 4). There is an apparent need for a helicopter assignment table similar to the conventional boat assignment table, which organized landing force units into helicopter teams and assigns the teams to waves. The helicopter assignment table and the landing diagram contain the information necessary to implement the desired deployment of the landing force for the attack.

As in the case of the boat assignment table, the helicopter assignment table should be accomplished simultaneously with a landing diagram and is prepared primarily by battalion landing team commanders or the commanders of similar units.

ANNEX \_\_\_\_\_ to Opn O \_\_\_\_\_

**HELICOPTER ASSIGNMENT TABLE**

Helicopter No.	Personnel & Material	Weight	Cube	Formations
A1-1	CO Co A	240		
	2 runners	400		
	2 radio men with radios	500		
	5 NGF spotting teams	1000		
		2140		

etc.

Figure 4.—Helicopter Assignment Table.

f. **Landing diagram.**—The landing diagram is actually a graphic representation of the desired tactical deployment of the landing force as it lands on the ground. It illustrates the actual position of helicopter elements as they land. It should be prepared by the lower echelons of troop command—probably the battalion commander, but only with the advice and concurrence of the transporting helicopter units.

Certain important points which should be noted in the preparation of the landing diagram include:

(1) Waves are numbered from front to rear, and the number of scheduled waves involved will vary widely in different landings, depending on the degree of echelonment desired or required in each case.

ANNEX \_\_\_\_\_ to Opn O \_\_\_\_\_

**LANDING DIAGRAM**

H-HOUR 0800                      LANDING AREA RED

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Wave No 1 B1-11 B1-9 B1-7 B1-5 B1-3 B1-1\* A1-11 A1-9 A1-7 A1-5 A1-3 A1-1  
 H-Hour        X    X'   X    X    X    X    X    X    X    X    X    X

Wave No 2 B2-11 B2-9 B2-7 B2-5 B2-3 B2-1\* A2-11 A2-9 A2-7 A2-5 A2-3 A2-1  
 H + 3 min. X    X    X    X    X    X    X    X    X    X    X    X  
             B2-12' B2-10 B2-8 B2-6 B2-4 B2-2 A2-12' A2-10 A2-8 A2-6 A2-4 A2-2  
                  X    X    X    X    X    X    X    X    X    X    X

Wave No 3                      C3-11 C3-9 C3-7 C3-5 C3-3 C3-1\*  
 H + 6 min.                    X        X    X    X    X    X    X  
                                   C3-10 C3-8'        C3-4 C3-2  
                                   X        X        X    X  
                                   C4-11 C4-9 C4-7 C4-5 C4-3 C4-1\*  
                                   X        X    X    X    X    X  
                                   C4-12' C4-10 C4-8 C4-6 C4-4 C4-2  
                                   X        X    X    X    X    X

etc.

- 
- \* Wave Commander
  - ' Assistant Wave Commander

Note: The wave commander of Company A will command the 1st and 2d waves when formed at the primary control line.

Figure 5.—Form for Landing Diagram

[REDACTED]

(2) A wave may consist of one or more formations of helicopters, which are contemplated to land at about the same time. Size of the wave will be influenced by the number of helicopters in the flight and the configuration and extent of the landing area.

(3) Each helicopter team should have a number to indicate its position in the wave. For example, the helicopters embarking each company might be assigned a letter representing the company followed by two numbers separated by a hyphen, the first number to indicate the wave and the second to indicate the position in the wave.

g. **Landing Pattern.**—It is considered desirable to amplify the landing diagram with a photographic "landing pattern", (see figure 6) showing in actual vertical and oblique photographs, the attitude in which individual helicopters should be when on the ground. Such a picture would assist the wave commanders and the helicopter pilots in selecting the correct landing points.

The form should be prepared by the battalion landing team commander in close liaison with the corresponding helicopter commander and should be based upon the recommendations of subordinate company commanders. In its preparation, consideration should be given to the following:

(1) The terrain must be closely studied to determine the most desirable and feasible landing location for each helicopter.

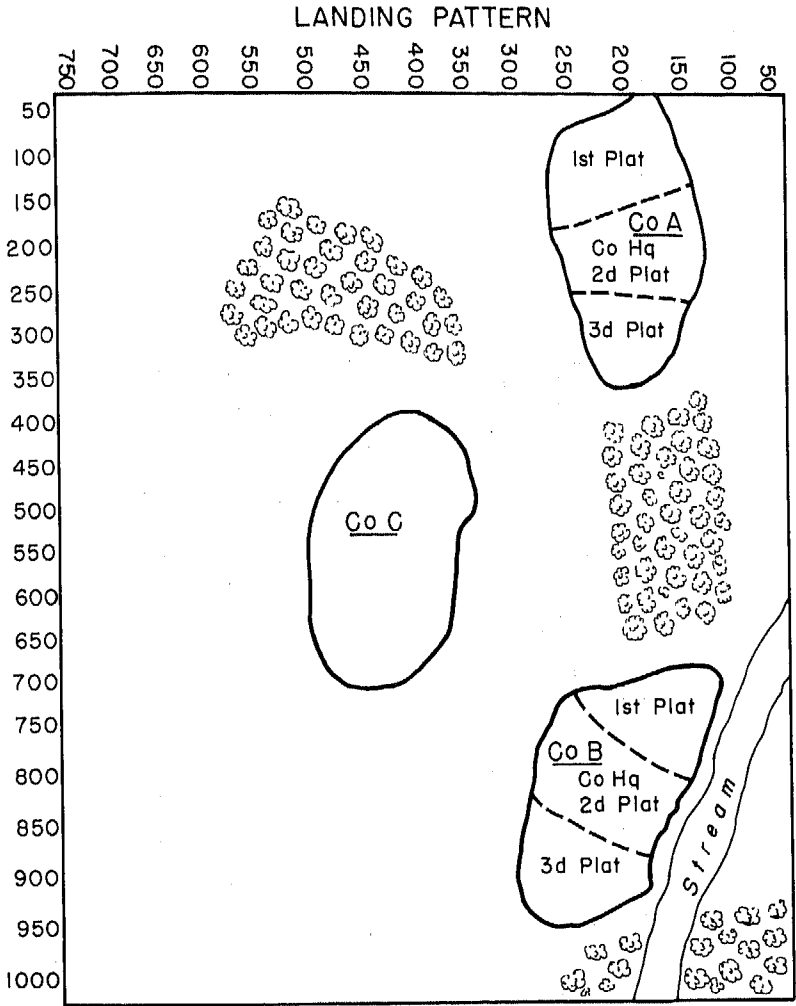
(2) It may be necessary or desirable for succeeding waves to overlap the landing area of the preceding wave. If this is the case, sufficient time must be allowed between waves to ensure that the preceding wave has cleared the area.

(3) The landing pattern will be dependent directly upon the number of waves, the extent and configuration of the landing area, and the scheme of maneuver after landing. It is entirely possible that one wave might land with the long axis of its formation at right angles to that of a preceding wave.

(4) The landing pattern will be the projection of the landing diagram on to the ground.

h. **Debarkation Diagram.**—(1) The Debarkation Diagram will present a schematic diagram of the flight deck of the CVE and the location of each specific helicopter by number on the flight deck. (See figure 7).

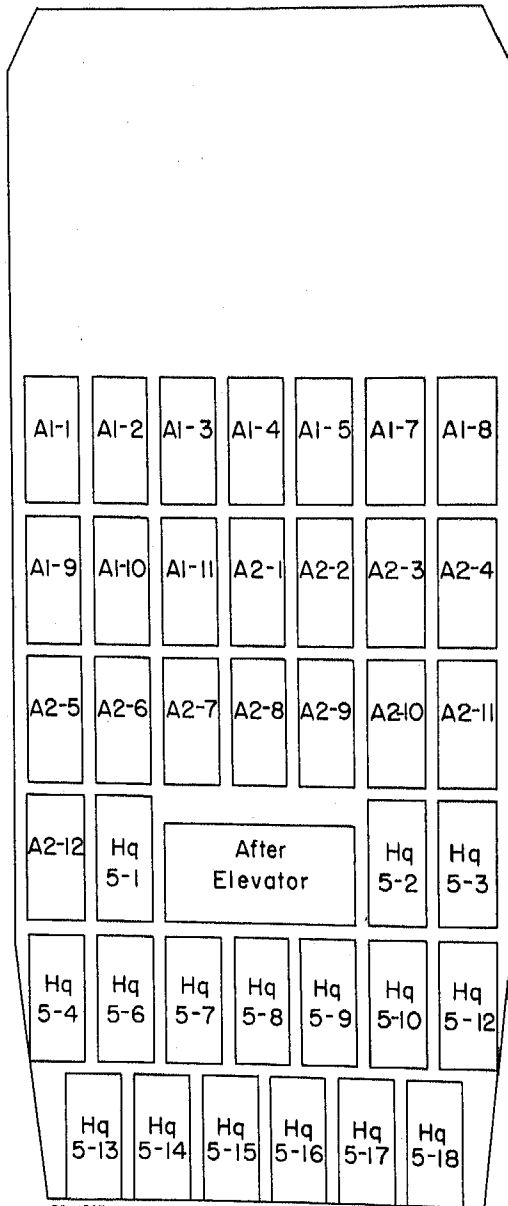
(2) The form should be prepared by the battalion landing team commanders or similar unit commanders in conjunction with CVE and helicopter commanders.



RD 6587

Figure 6.—Landing Pattern.

DEBARKATION DIAGRAM



RD 6587

Figure 7.—Debarkation Diagram.



i. **Approach Schedule.**—An approach schedule (figure 8) is necessary to provide that information required by the control system in accomplishing the ship-to-shore movement in accordance with the time requirements of the landing force. It should be prepared by subordinate landing force and helicopter commanders in coordination.

ANNEX \_\_\_\_\_ to Opn O \_\_\_\_\_

**APPROACH SCHEDULE**

Wave	Leave the Ship	Leave IP	Land
1	H-81	H-21	H
2	H-78	H-18	H+3
3	H-75	H-15	H+6
4	H-73	H-13	H+8
5	H-70	H-10	H+11
6	H-68	H-8	H+13

Figure 8.—Approach Schedule.

## SECTION 6

### FIRE SUPPORT

25. **General.—a. Prelanding Operations.**—In many cases the objectives assigned helicopter-landed forces will be outside the effective supporting range of naval gunfire, thus leaving the burden of early fire support entirely on support aircraft. In addition, the hazard involved in operating helicopters in and around naval gunfire trajectories emphasizes further the usefulness of aviation as a supporting means. Finally, there will be cases where the importance of tactical surprise as to the time and place of landing may either prevent pre-D-Day supporting operations or it may limit the length of pre-H-Hour fires. In such a case the decision of the Joint Expeditionary Force Commander relative to the employment of air and naval gunfire prior to the landing of a helicopter force will depend on the relative merits of tactical surprise and upon the success of preliminary neutralization and destruction of targets ashore. Among the several factors which might influence this decision, the following are paramount:

(1) **Flexibility of the helicopter force.**—From the point of view of the hostile defender, the helicopter force possesses extreme flexibility in the matter of time and place of the landing. The speed with which the landing can be consummated further enhances that flexibility. As a result, the decision concerning the preparation must be based on a consideration of whether it will reduce the inherent advantage of such flexibility by indicating where or when the attack is to be made.

(2) **Defensive forces and/or installations within the selected landing area.**—Relative freedom from defending forces and defensive installations constitutes an obvious requisite for a helicopter landing area. As the strength of defense increases within the selected landing zone the need for adequate preparation increases proportionally. Naturally, however, a point is reached with respect to density of defense where an area becomes impracticable for use as a helicopter landing zone.

(3) **Deception.**—Due to the flexibility of the helicopter-borne force, suitable prelanding targets for air or naval gunfire may be designated in an area, or areas, at some distance from the selected landing zone, in the interest of deceiving the enemy. Such demonstration fires should, when possible, aid the subsequent plan of attack and be directed against definitely known targets.

b. **Final Preparation of the Landing Area Prior to Arrival of the Helicopter Force.**—Attention must be given to the neutralization of hostile forces within the landing zone, as well as to the destruction of hostile defensive installations

[REDACTED]

therein prior to the arrival of the helicopter force. Such activities may have been initiated during a prelanding bombardment, if so ordered by the Joint Expeditionary Force Commander. In the absence of prior bombardment, however, adequate coverage must be given to such targets during execution of the ship-to-shore movement, and should be continued as long as possible consistent with considerations for the safety of the helicopters.

c. **Isolation of the Landing Area.**—Until the final stages of the approach of leading helicopter elements, the enemy will be uncertain as to the exact location of the selected landing area. His defense can be expected to remain immobile until such time as he does ascertain the site of the landing. Therefore, the tempo of this phase of fire support during the ship-to-shore movement, that of isolation of the exact area selected for landing, will increase as initial helicopter elements approach the area, finally assuming first priority over other targets connected with the helicopter landing. The contribution of supporting fires to this isolation effort will include interdiction of movement of hostile troop units toward the landing area, neutralization of hostile weapons able to bear on the landing area or friendly forces in early deployment, and maximum screening of hostile observation commanding the landing area.

26. **Close Air Support.**—The principles governing the conduct of close air support in the normal amphibious attack appear entirely valid insofar as the helicopter operation is concerned. There will, however, be a few variations in the details of application. Most important among these is the character of the scheduled pre-H-hour attacks. In the conventional amphibious operation these attacks are so delivered as to result in neutralization of the immediate beach area and those defensive installations which can exert a direct influence on the beach line battle. In the helicopter-borne attack, however, it will be necessary for the close air support components to achieve neutralization not only of the selected landing area, but of the corridor through which the helicopter serials will pass as well. This additional demand is a direct outgrowth of the fact that the helicopter flight formations, must be afforded positive protection from the time they leave the transport carriers until they return from delivering their assault loads.

Orbit points for "on-station" close support aircraft should be established as near the helicopter landing areas as conditions permit in order to reduce the time required to obtain close support. Consideration should be given to preparing a plan which requires "on-station" support aircraft to report

[REDACTED]

directly to the tactical air control agency of the senior ground unit landing by helicopter to facilitate the delivery of close air support.

**27. Naval Gunfire.—a. Targets Appropriate to Prelanding Naval Gunfire Preparation.**—In the event a prelanding naval gunfire bombardment is to be employed in support of a helicopter-borne operation particular attention should be given to the neutralization and destruction of hostile forces and installations within the landing zone, to isolation of the landing zone, as well as to neutralization and destruction of anti-aircraft weapons able to bear on the approaching force. Care must be exercised in naval gunfire planning to give the enemy no clue as to the location of the selected landing area. The preponderant volume of fire should not be placed on hostile forces within the landing area. The bulk of available fires, placed outside the landing area, should be for the purpose of preventing the movement of hostile reinforcements into the area, eliminating all located enemy anti-aircraft weapons (especially those within range of selected routes of helicopter approach and withdrawal), and early softening up of the key objectives within the general beachhead area. The efforts of naval gunfire should be directed as well toward the interdiction of hostile movement of all types of anti-aircraft weapons to positions within range of helicopter routes. Hostile AA weapons, regardless of location, should be treated as high priority targets of opportunity. The maximum destruction of anti-aircraft artillery is advantageous since any such weapon must be considered potentially able to be moved within range of proposed helicopter dispositions during periods of poor visibility when observation might be denied to friendly interdicting arms.

**b. Naval Gunfire Support of the Ship-to-Shore Movement.**—Careful coordination of effort must be achieved between naval gunfire and supporting aviation in the elimination of such hostile threats to helicopters as fighter aviation and anti-aircraft weapons. Since the CVE transport area will be located a considerable distance offshore, certain fire support ships may move into the intervening sea area along the route to be followed by the helicopters in order to provide additional anti-aircraft protection for helicopter formations. With respect to areas ashore, high priority must be given to the neutralization of weapons able to bear on the helicopter route, especially in the absence of prelanding fires by naval gunfire. Plans should include positive neutralization of all located hostile artillery, anti-aircraft artillery, and troop concentrations together with provision for means of immediate engagement of defenses previously undiscovered. It may be desirable for naval gunfire air spotters to accompany each major component of the helicopter force, both during approach to and

[REDACTED]

withdrawal from the landing zone, in order to accomplish rapid neutralization of hostile weapons upon discovery. Additional naval gunfire air spotters should be charged with responsibility for destruction of such weapons in a systematic manner after discovery.

**c. Coordination of Naval Gunfire with Helicopter Operations.**—An important consideration in planning will be the safety of the helicopters from friendly naval gunfire in their movements to and from the landing zones. As has been noted before, three dimensional lanes must be established for helicopter operations. Naval gunfire trajectories must be kept out of these lanes at all times except for possible prearranged fires. Consideration should be given to the ability of naval gunfire to furnish the maximum support in the selection of locations for these lanes. A single, straight line, absolutely defined in lateral boundaries, minimum and maximum altitudes, is desirable from the point of view of optimum support by naval gunfire. Use of such a lane would necessitate return of helicopters over the same ground at a different, prescribed altitude, tending to simplify the problem of isolation of the route as well as the neutralization and destruction of hostile weapons within range thereof. However, as has been noted before, the selection of avenues of approach must consider all aspects of terrain, enemy defenses, observation and the distances involved. Having once determined upon the most suitable routes of approach, careful planning will be required to select the best fire support areas. Areas chosen must permit the maximum distribution of fires to accomplish the above purposes during the ship-to-shore movement. Only scheduled fires should be permitted to enter or cross helicopter lanes. For maximum simplicity in coordination, rigid prohibition must be enforced against the firing of other than scheduled missions across any designated route of helicopter traffic.

**d. Naval Gunfire Support of the Helicopter Force after Landing.**—After landing of the helicopter force conditions approximate those of a normal amphibious operation, subject to coordination with further helicopter movements. During the early stages, the force will be predominately dependent on air or on air and naval gunfire for fire support. To this end, spotter teams from shore fire control parties should land with the earliest echelons of helicopter forces which are assigned the mission of seizing the extremities of the selected landing area. This procedure will facilitate early location of naval gunfire spotters in advantageous positions to observe on the perimeter of the landing area. One air spotter should be assigned to work with each spotter team. Isolation of the landing area becomes most important during this exploitation by the helicopter force. The defending enemy is theoretically capable of counterattack from any direction over the ground

[REDACTED]

with which he is thoroughly familiar. In order to accomplish effective isolation of the area and initial deployment of the helicopter force, air spotters should be maintained on station both day and night.

e. **Peculiar Circumstances Affecting Naval Gunfire Techniques.**—As the inshore distance of the landing zone increases, the more radical becomes the departure from normal naval gunfire procedures as encountered in the usual form of amphibious operation. If the landing zone is sufficiently far inland to be beyond the range of 5"/38 guns, close support must be provided by the main batteries of heavy ships. The use of such support vessels as the LSM(R) will generally be limited to helicopter attacks against small islands or to the support of landings close to the shore. It is reasonable then, to conclude that reliance will be placed on indirect fires except in the most unusual circumstances. Furthermore, as the distance between spotters and firing ships increases, it may be necessary to introduce radio relay, and there may appear a need for specially equipped helicopters or conventional aircraft capable of acting as radio relay stations.

28. **Fire Support Coordination.**—a. **General.**—Certain factors distinguish the helicopter attack from a normal seaborne attack from the point of view of fire support coordination. The helicopter attack under foreseeable materiel restrictions will be executed by a lower echelon of command than will the conventional seaborne attack. The seaborne landing force will invariably include artillery, thus necessitating the presence of a landing force artillery officer who will act as coordinator of supporting arms. The helicopter attack, on the other hand, may be executed without organic artillery, thus necessitating assumption of the coordinator's duties by other than the artillery commander. Utmost coordination will be required between pre-H-Hour air and naval gunfire support and the approaching helicopter serials to prevent endangering friendly forces.

b. **Organization for Fire Support Coordination.**—Due to inherent limitation of the size of the force which can be transported by helicopters, that force will normally be one without an organic fire support coordination center. The requirement for a coordinating agency may be met by detaching a team from a parent division or corps FSCC and assigning it for the duration of the helicopter operation to the headquarters of that force. Otherwise liaison officers representing each of the supporting arms would of necessity coordinate fire support among themselves. If artillery accompanied the helicopter force, or actively supported the force from positions outside the landing zone, the artillery commander, or his representative, would act as coordinator of fire support in accordance with doctrine contained in USF-63. In absence of artillery the naval gunfire liaison officer with the senior echelon

[REDACTED]

participating in the helicopter attack should coordinate fire support by air and naval gunfire, in accordance with directives of the force commander. In the event an FSCC team is detached from a parent echelon, it should include a Target Information Section. In the absence of an organized FSCC team, however, target information requirements would have to be furnished by the S-2 of supporting artillery, or by the S-2 of the senior echelon participating in the helicopter operation.

c. **Factors in Initial Coordination During Ship-to-Shore Movement.**—In keeping with the mandate that only scheduled fires of naval gunfire vessels or field artillery should be allowed to cross designated helicopter lanes, detailed pre-arrangement by the highest echelon of command is required in order to minimize coordination efforts during critical periods and to facilitate fires against targets of opportunity. Zones of responsibility should be assigned to definite fire support areas with a view toward obviating mutual interference between helicopter lanes and supporting fires. In addition, those zones in which naval gunfire would probably most endanger helicopters should be assigned as an initial responsibility to supporting aviation.

d. **H-Hour Coordination Activities.**—One important phase of fire support coordination will include careful integration of pre-H-Hour naval gunfire, artillery and air attacks with the approach of initial serials of helicopters. The speed of the helicopters and difficulties of obtaining continuous, direct observation by supporting arms will render such integration more difficult than in a seaborne assault. Provision should be made to station the coordinator of fire support, or his representative, in a helicopter or conventional aircraft of the control organization. The coordinator should order the lifting of all supporting fires at the most propitious time with relation to the movement of initial serials of helicopters.

e. **Safety Requirements After Landing.**—The fluid nature of initial combat ashore will necessitate extreme care in execution of target of opportunity fires by all supporting arms to avoid endangering friendly troops. Direct support artillery and close support aviation procedures already provide for continuous monitoring and checking for safety of all missions requested by subordinate elements. In the helicopter operation, a similar system of safety checks should be instituted in the naval gunfire organization.

## SECTION 7

### LOGISTICS

29. **Capabilities and Limitations of the Helicopter as a Supply Vehicle.**—The capabilities and limitations of the helicopter as a method of transport for equipment and supplies are functions of the cargo characteristics of the available helicopters. At the present time these characteristics are sharply restrictive, greatly limiting the effectiveness of the vehicle. The largest load of which the present helicopter is capable of transporting is only 800 pounds and measures 194 cubic feet. Other limitations are presently imposed by size of cargo doors and cargo compartment. (See Section 9 for details). Those characteristics, of course, will vary as technical advances in helicopter design are realized and many of the existing restrictions will disappear. Nevertheless the principles which govern logistic operations related to a helicopter assault will remain unchanged and this discussion will confine itself mainly to an exploration of those principles.

30. **Procedures for Supply of a Helicopter-borne Landing.**—

a. Individual helicopter-borne combat troops should carry as much as practicable, of the individual equipment and supplies required to initiate action. Following the landing, early resupply may be effected by using helicopters to carry supplies from helicopter transports or other vessels, by air drop from land-based or carrier-based planes, or by use of landing craft when seizure of a beach is effected. Initially, evacuation of casualties will probably have to be made by helicopter.

b. **Provision of Supplies.**—The most critical items of supply for a helicopter landing will be ammunition, water, rations and medical supplies. Regardless of plans for early resupply of helicopter-landed troops by other means, sufficient supplies to sustain the needs of helicopter-landed troops until their contact with ground troops should be embarked in helicopter-transport. Generous safety allowances should be made, since the quantity of supplies will in any case be relatively small and should present no stowage problem. The supplies should be distributed, in each class, equally among the helicopter transport. This combat loading of helicopter transport is required for two reasons:

(1) To minimize the effect of loss of one or more helicopter transport.

(2) To ensure ready availability of any required item of supply. Regardless of the type of ship employed for helicopter transport, such ships will be limited in the number of helicopters which can be handled during any given period. Furthermore, helicopters returning from shore can not "lie



off" their transport as can landing craft. Therefore, the ready availability of supplies will be dictated by the availability of helicopters and their presence aboard a transport or ability to land on a transport.

c. **Packaging of Supplies.**—Supplies should be packed in sturdy, light containers. Emphasis must be placed on limiting the weight of the packing in order to insure maximum utilization of the available payload of the helicopter. Original containers will probably be adequate for rations and most types of ammunition. Whenever possible, individual boxes or containers should weigh less than 50 pounds since all will be handled by hand. Water should be carried in 5 gallon expeditionary cans. It is probable that the standard air delivery containers such as the A-6 and A-4 will be useful for small items such as medical supplies or spare parts. When free drop from low altitude (see following paragraph) is employed, rigid or reinforced containers will probably be required. For ration and ammunition boxes, sufficient reinforcement can probably be attained by steel strapping with standard packing equipment.

d. **Methods of Delivery.**—There appear to be three feasible methods of delivering supplies by helicopter—air landing, free drop, and parachute. Of these, the first two give by far the greatest promise of practical usefulness.

(1) **Air Landing.**—The most practicable means of delivering supplies by helicopter is by air-landing, in which the helicopter actually lands at the desired unloading point. This method is efficient in that no special packing of supplies or equipment is required. This results not only in a saving of time, but also means that only a very small portion of the payload is dead weight in the form of special containers. Assuming that the helicopter can land at any desired point, use of this air landing method will ensure efficient distribution. Furthermore, under this scheme no cargo handling personnel are required in the helicopter. It would appear then that whenever possible, resupply plans should envisage actual landing of the helicopter for discharging supplies.

(2) **Free-Drop.**—It is practicable to utilize the helicopter's capability for hovering to "free-drop" supplies from low altitudes—perhaps 20-50 feet. Packing supplies for this type of drop would be far less difficult than packing for a free drop from conventional aircraft in flight, since the drop can be accomplished at low altitude and the helicopter will impart little if any forward momentum to the package. It is probable that standard containers reinforced with steel strapping will withstand satisfactorily the shock of such a drop. The use of some such technique is indicated when conditions make it impracticable or the helicopter to land or when it is necessary to discharge the helicopter and get it out of the area in

[REDACTED]

the shortest possible time. The pilot alone will not be able to jettison the packages in the cargo compartment and a fraction of the payload would thus have to be sacrificed for at least one individual to accomplish this task. It is to be noted, however, that the pilot could jettison exterior or underslung loads if they were properly rigged. In addition to free drop from a hovering position, it is also possible to lower cargo by means of the power hoist with which the helicopter is equipped. This might be useful for bulky or fragile loads. It is a slow process, however, and cannot be used where speed is a dominant factor.

(3) **Parachute-Drop.**—It is possible to employ the helicopter for air drop of supplies using standard air delivery containers and cargo parachutes. Little use of this method is anticipated since it seems much less efficient than free drop from a low, hovering position. In order to allow the parachute sufficient time to open, minimum dropping altitude will be 200 feet. The supplies will have to be carefully packed in standard air delivery containers. Payload will be sacrificed in the amount of the weight of containers and the parachutes. It is visualized that any circumstances in which parachute drop is possible would also permit free drop from low altitude and that the latter method would be preferable.

e. **Personnel for handling supplies aboard transport vessels.**—Landing force personnel are required aboard the helicopter transport to receive and stow landing force supplies which are loaded aboard for eventual air delivery by helicopter, for sorting these supplies and spotting them for loading into the helicopter, and for actually loading the supplies into the helicopters when resupply missions are flown. The number of such personnel required is a function of the number of helicopters which can be simultaneously loaded on the flight deck for air delivery missions, and the labor required to move the supplies from below-decks stowage and to arrange them for loading. These factors will vary with the individual transport and with the type of helicopter used. Personnel so employed should be thoroughly trained in procedures for handling supplies and for loading them into helicopters. When the bulk of supplies have been sent ashore, the personnel of the Ship's Platoon can be ferried ashore by helicopter in small increments to join the supply element of the helicopter landing force. The Ship's Platoon will normally be a part of the helicopter landing force.

f. **Personnel for handling supplies in the landing area.**

(1) In the area where supplies are unloaded or dropped from helicopters, landing force personnel will be required to unload the helicopters, assemble and sort the supplies, and place them in dumps. These personnel will perform

[REDACTED]

the same functions for a helicopter landing as the Shore Party performs in the conventional amphibious operation. In order to economize on personnel and to make the maximum use of the available payload, it is visualized that the personnel performing the logistical functions outlined above should also be prepared to function as a supply activity for making the supplies delivered by helicopter available to the combat troops.

(2) The number of personnel required for the functions outlined above will vary with the size of the combat unit being supplied, the quantity of supplies being delivered, and the area over which the activity is carried on (number of unloading points, etc.). It is estimated that 35 to 50 men should be able to carry out these functions for an infantry battalion. The initial group landed can be progressively augmented by personnel from the Ship's Platoons, as the need for their functions aboard the helicopter carriers decreases. The Shore Platoon should be attached to the helicopter landing force prior to embarkation. Personnel of both the Ship's Platoon and the Shore Platoon should be provided by the Shore Party Regiment of the Marine Division.

(3) Such transportation as can be moved by helicopter should be landed at the earliest practicable time in order to increase the flexibility of the landing force. Under present material conditions the only means of transport of supplies within the airhead will be by hand cart. Each cart can be loaded with about 200 pounds of supplies, and provision should be made for the early landing of these carts (a minimum of 10 for a battalion) prior to delivery of the bulk of the supplies.

(4) The shore platoon of the helicopter landing force will normally establish dumps for Class I and V and possibly a miscellaneous dump for other classes. Supplies unloaded or dropped from helicopters will be moved to dumps and from the dumps to the troops by hand cart.

g. **Marking of supply landing points.**—Initially supplies landed by helicopters will be landed in the landing area without regard for type of supplies. The forward echelon of the Shore Platoon should land with or preceding the first increment of supplies, and should make a rapid reconnaissance of the area, selecting the most desirable dump sites with adjacent landing points for each class of supply which will be landed. The location may be tentatively selected in advance by map reconnaissance but should be confirmed. They must be approved by the commander of helicopter landing force and must be consistent with the tactical situation existing after landing and with the technical capabilities of the helicopter. The forward echelon of the Shore Platoon should be equipped with panels or other suitable devices to clearly and distinctively mark each supply landing point. Markings should specify the type of supplies, ammunition, rations, etc., to be landed at each point.

**h. Resupply missions.**—Plans should be made for the delivery of supplies to the helicopter landing force in the sequence for which their need is anticipated. It must be recognized, however, that emergencies will arise which require modification to such a schedule. Accordingly, provision must be made including communication facilities for requests from helicopter-transported units for specific supplies not available in the dumps. In addition to the amount and type of supplies required, the desired landing point should be specified in the request.

**i. Sequence of Resupply Mission.**—It is contemplated that the movement of supplies ashore in a helicopter landing will follow, in a general manner, the sequence outlined below:

(1) Helicopters returning from the landing of assault troops will land on the carrier and be refueled, if necessary, in preparation for the resupply missions.

(2) Some of the helicopters will load the forward element of the Shore Platoon and their equipment. Others will load high priority cargo and transportation in accordance with the supply plan.

(3) Helicopters will proceed to the landing area as soon as loaded without waiting for groups to form. (The participation of the Tactical Air Commander in such movement is discussed in Section 5).

(4) Upon landing the helicopters will unload as rapidly as possible and return to the carriers.

(5) Upon landing, the forward element of the Shore Platoon will immediately reconnoiter previously selected dump sites. Contact with troop commander will be established and his concurrence on dump sites will be obtained. The dump sites will then be clearly marked indicating the type of supply to be landed at each dump.

(6) The forward element of the Shore Platoon will then collect the supplies which have been unloaded from the helicopters, sort them and place them in dumps.

(7) Succeeding helicopters will bring in both supplies and additional personnel of the Shore Platoon. These personnel will unload the resupply helicopters as soon as they land in order to expedite the return of the helicopters to their carriers.

(8) A liaison officer from the Shore Platoon should be with the troop commander at all times following the landing and should keep him informed of supplies available in the dumps within the landing area. This liaison officer in turn, should have communication (radio, wire or runner) with the Shore Platoon Commander in order to keep him informed of the troop units requirements for supplies.

[REDACTED]

(9) The Shore Platoon Commander should now have sufficient personnel to permit the rapid unloading of resupply helicopters and to permit needed supplies to be delivered to assault units as required.

(10) Supplies and equipment will be landed according to a pre-determined schedule except in such circumstances where such a schedule does not meet the needs of the landing force. When advised of a requirement which cannot be filled from the stocks in the dumps, the Shore Platoon Commander should advise the appropriate logistical control agency of the requirement and of the supply landing point where the desired supplies are to be landed.

(11) The control agency will request one or more transports to load the required supplies in the next available helicopter for delivery to the desired point.

(12) The Shore Platoon Commander, when advised that the required supplies are enroute, should provide for their expeditious unloading and delivery to the assault troops.

(13) When the majority of the supplies aboard any one carrier have been delivered ashore, the ship's platoon of that carrier should be progressively reduced. The members of the Platoon should be ferried ashore where, upon arrival, they should report to the Shore Platoon Commander for employment in that unit.

(14) Casualties in the helicopter landing forces will be evacuated to designated casualty collection points within the landing area where they will be loaded into resupply helicopters for further evacuation to designated vessels of the Attack Force or Joint Expeditionary Force. (See paragraph 31.)

(15) Since combat units landed by helicopters will usually be expected only to seize a single locality prior to contact with other forces there will normally be no need to move the principal logistical installations. However, changes in the tactical situation may endanger the supplies in the dumps and eventually require the movement of these installations to avoid capture by the enemy. A decision for such a move will be made by the troop commander based on the developments of the tactical situation. The logistical control agency afloat must be advised in advance of any change in the supply area.

(16) When ground contact has been made, resupply procedures for the troop units will follow those normal to land warfare. Thereafter, the helicopters will be used for the resupply of isolated units or in other cases for where normal ground resupply methods are impracticable.

**31. Evacuation by Helicopter.**—The helicopter offers great opportunity for accelerating the evacuation of casualties from the zone of immediate contact. When unloaded, resupply helicopters can be used to evacuate personnel casualties either to carrier transports or perhaps direct to hospital ships. The

[REDACTED]

medical sections of assault troop units normally will be landed in the airhead with initial reserves. The aid stations of such troop units should be in the vicinity of the selected supply area, and as soon as resupply helicopters are unloaded, casualties will be embarked for evacuation. As the aid stations move away from the supply dump area in order to maintain contact with assault forces, personnel to man an evacuation station (similar to Shore Evacuation Station of the Shore Party) must remain to receive casualties from the aid stations and prepare these casualties for air evacuation.

Personnel of the Shore Platoon can accomplish the landing of the casualties aboard the helicopters under the direction of evacuation station medical personnel. To a limited extent, Shore Platoon personnel, after delivering supplies to the combat units, can be utilized to bring casualties from the aid stations to the evacuation station at the air planning area. (The estimate of 50 personnel for the Shore Platoon does not include an allowance for litter bearers, however, and this function must not be allowed to interfere with their primary supply mission). The organic medical sections should be augmented with litter bearers if heavy casualties are anticipated.

Helicopters transporting casualties should inform their transport or designated hospital ship by radio immediately upon take-off from the landing area in order to ensure priority in landing.

## SECTION 8

**32. Signal Communication Planning.**—Proper communication planning for a helicopter landing operation demands the same careful considerations as for any amphibious landing to ensure the formulation of a well coordinated and flexible signal plan capable of providing efficient communications for every foreseeable contingency. As in the case of the conventional amphibious attack the helicopter landing force must possess in addition to command communications, necessary channels of communication to maintain close coordination with supporting aviation, naval gunfire and adjacent ground units which may be involved in the operation. Sufficient planning time must be available not only for adequate development of the communication plan but to permit effective dissemination of the plan as well. Signal plans must include provision for liaison and communication between the helicopter-borne landing forces and those air and naval units which are to furnish fire support for the helicopter landing operation. Signal plans must also include provisions for the establishment of liaison and communication with adjacent ground units or with landing force units which are conducting a seaborne ship-to-shore movement in conjunction with the helicopter landing. Finally signal plans must provide the communications required to enable the helicopter landing force commander to exercise effective control of his assault units, maintain contact with higher headquarters and to maintain such communications with the carrier bases as may be required to ensure orderly and efficient logistical support.

**33. Communications During the Overseas Movement.**—Communication during the overseas movement is maintained through the communication facilities normally employed by naval forces and should be furnished by the transporting carriers. These facilities are confined to radio and visual means, as security restrictions may permit. In general, the facilities available to the helicopter landing force commander during this period are the same as those provided the amphibious landing force unit commander embarked upon a troop transport.

**34. Communications During the Ship-to-Shore Movement.**—

a. **Helicopter Control.**—During this phase the troops of the helicopter landing force are passengers. Control of the helicopter flight, will be effected by the controlling agency established for the movement (see Section 5) employing communication procedures similar to those required in tactical air control. All helicopters, as soon as they leave the carrier deck, will switch their radios to the pre-set frequency assigned.

[REDACTED]

The primary purpose of this net is to ensure orderly landing of helicopter waves at the designated landing areas on schedule, and with a minimum of confusion and congestion. All tactical messages pertaining to the helicopter landing operation should be transmitted over this circuit. Each helicopter in flight should also guard a pre-set emergency channel prescribed for all aircraft engaged in the operation. Such a channel will provide a positive means of imparting emergency or distress communications to the helicopters while en route to the landing area.

b. **Helicopter Landing Force Control.**—Certain helicopters must be provided with additional radio equipment to that normally provided each helicopter for normal flight operations, to permit the helicopter landing force commander to transmit last minute tactical information to his subordinates and also to permit the receipt of final instructions from echelons of the Control Group. Minimum radio requirements in the helicopter for this purpose would appear to be:

(1) For the helicopter landing force commander:

(a) One MHF-AM radio transmitter and receiver for communication with higher headquarters.

(b) One VHF-FM radio set embodying two (2) receivers to permit monitoring of the tactical VHF channel of higher headquarters as well as the Helicopter Landing Force Tactical Net.

(2) For subordinate commanders in the helicopter-borne force (to include BLT commanders):

(a) One VHF-FM radio set to permit guard on the Helicopter Landing Force Tactical Net.

(b) One VHF-FM radio set to permit communication with the assault company commanders of the helicopter landing force.

(3) For the assault company commander and company executive officer.

(a) One VHF-FM or equivalent, to permit communication with the BLT Commander.

35. **Communications During Assembly and Organization on the Ground.**—During this period, it is essential that the signal communications normally required for ground combat be established promptly, along with those which are peculiar to helicopter operations. The communications requirements at this time are extensive, and include:

a. (1) Pathfinder communications.

(2) Communications for assembly of the landing force.

(3) Command channels within the helicopter landing force concerned with the introduction of additional forces, air resupply and air evacuation.

[REDACTED]



[REDACTED]

(4) Communication with supporting naval and air forces.

(5) Communication with higher headquarters and other landing forces with a common or coordinate mission.

b. Pathfinder units may or may not be required for helicopter landing operations. These units might precede the main helicopter landing force to designate the helicopter landing areas by means of special electronic devices or visual aids by which following helicopter waves may then be guided. Special units of this nature will be essential if operations are to be conducted at night or under conditions of poor visibility. Special assembly units equipped with portable homing beacons or direction finding equipment, sonic, super-sonic, subsonic devices as well as various visual signalling aids such as infra-red beacons may also be required to assist in the assembly of the helicopter landing units within the landing zone under conditions of poor visibility.

c. The immediate establishment of normal channels of communication to support the subsequent combat is essential to the helicopter landing force commander. In view of the stringent weight limitations prescribed by an operation of this nature, the landing force commanders must rely upon radio as his primary means of communication. Radio nets which would be established at this time include:

- (1) Command nets.
- (2) Air-ground communications with the helicopter forces.
- (3) Air support net.
- (4) Reconnaissance net.
- (5) Naval gunfire support net.
- (6) Logistical and Evacuation net.
- (7) Radio channels to higher headquarters and adjacent ground elements.

d. It should be noted at this time that the process of communication transition from the initial landing to the actual inception of the assault is continuous. The communications initially established are essentially the same as those which are employed primarily for the purpose of conducting the assault. In essence, this transition closely resembles the period in any amphibious landing when troops leave the assault boats and proceed inland from the beach. As each headquarters comes ashore it immediately establishes communication with its subordinate units to obtain effective tactical control of this operation. In similar fashion, the commanders of the various echelons of the helicopter landing force must also immediately establish such communication as will be necessary to ensure efficient conduct of offensive operations.

**36. Communications During the Ground Assault.**—Because of the highly mobile nature of the helicopter operation, radio

is the primary means of communication for this force. The radio nets employed for offensive operations are the same as those indicated in the preceding paragraph. The purpose of each net and minimum equipment requirements are discussed below.

a. **Command Nets.**—The helicopter landing force commander should establish a tactical command (VHF-FM voice) net which includes all of his subordinate units. In addition, it is essential that the helicopter landing force commander be provided with sufficient high-powered radio sets as early as practicable to ensure positive communication with the expeditionary troop commander, the helicopter attack force commander and the logistical control agency. The operating distances of 75 to 100 miles which will probably be encountered in an operation of this nature indicate that relatively heavy radio equipment will be required to provide this communication. Means for landing heavy equipment and power supply for this purpose must be devised.

b. **Communications with the Helicopter Force.**—The helicopter landing force commander can use portable VHF equipment for communication with helicopters in flight. It may be necessary to maintain one helicopter on station to act as a relay station for passing traffic to and from the helicopter attack force commander aboard ship. If high-powered radio equipment is provided, the helicopter landing force commander may establish direct communication with the helicopter attack force commander.

c. **Air Support Net.**—Air support for the helicopter landing force may be handled in the same manner as that for the amphibious landing force. Direct radio communication may also be accomplished with aircraft providing direct support in the landing area by means of contact made with the tactical air commander by means of portable equipment.

d. **Naval Gunfire Support Net.**—If the landing area is sufficiently close to permit effective naval gunfire support, the helicopter landing force commander should be provided with sufficient naval gunfire liaison parties and communication equipment to effectively control such fire. The effective range of normal naval gunfire will place support vessels within the range of light radio equipment.

e. **Logistical and Evacuation Net.**—This net is to be employed for the coordination of airborne resupply and control of air evacuation operations. Because of the considerable operating range for communication from the landing area to the helicopter landing force logistical control agency aboard ship, it will probably be necessary to establish initially a radio relay agency in the form of a helicopter on station to relay logistical requests from the landing area to the carriers.

[REDACTED]

f. **Radio Channels to Higher Headquarters and adjacent units.**—The command channels of both higher headquarters and adjacent ground units with which the helicopter landing force commander must coordinate his efforts should be guarded insofar as the capabilities of radio equipment available for air lift will permit.

g. **Messenger Communications.**—Messenger communication within the helicopter landing force will be generally the same as for any other ground unit. The employment of helicopter messenger service to higher headquarters and adjacent ground units appears almost mandatory if distances permit. The helicopter is very well adapted for carrying messengers and also for use in message pick up and drop.

h. **Wire Communications.**—Because of bulk and excessive weight, initial wire installations will be at a minimum, involving almost exclusive use of light combat wire, telephones and, at most, emergency-type switchboards. If logistical resupply permit and other tactical considerations so dictate, limited field telephone installations may be made during the later stages of the offensive.

i. **Visual and Sound.**—Perhaps one of the most important means of communication for the helicopter landing force will be that of visual and sound signalling. Signals of this nature are neither heavy nor do they occupy much space. Their employment is relatively simple and are ideal for transmission of prearranged messages to aircraft. Fluorescent panels are particularly suitable for prearranged code messages, marking of front lines and landing areas. Colored smoke is also available for this purpose. At night infra-red signal lights are ideal for marking landing areas. Sound signals employed within the helicopter landing force may be similar to the same emergency sound signals as are employed within all ground units.

j. **Signal Supply and Repair.**—Helicopter landing operations will impose a tremendous drain on batteries and radio equipment. Initial logistical planning must therefore provide for adequate early resupply of batteries and spare radio equipment. It will probably be more feasible to replace inoperative radio equipment than to attempt repairing it in the field under the conditions in which the helicopter forces must operate. Replacement by spares should not only encompass portable radio equipment but also the heavier, higher-powered sets.

## SECTION 9

### CHARACTERISTICS OF HRP-1 AND HO3S-1 HELICOPTERS

#### 37. Piasecki Helicopter.

**Designation:** HRP-1.  
**Description:** Single engine, twin-rotor (fore and aft), tricycle landing gear, transport helicopter.  
**Manufacturer:** Piasecki Helicopter Corporation.  
**Crew:** 2.  
**Passengers:** 4 equipped Marines (Not to exceed 900 pounds, with helicopter loaded to full fuel capacity of 100 gallons. 4 casualties on litters.  
**Gross Weight:** 6,900 pounds.  
**Empty Weight:** 5,007 pounds.  
**Useful Load:** 1,893 pounds.  
**Pay Load:** 900 pounds.  
**Maximum Speed**  
    **at Sea Level:** 100 MPH.  
**Cruising Speed:** 75 MPH.  
**Probable endurance**  
    **at Cruising Speed:** 3 hours at 75 MPH.  
**Operating Radius:** 60 miles.  
**Cargo Space:** Length, 13 feet 9 inches.  
    Width, 5 feet, maximum  
    Height, 5 feet 4 inches, average.  
    Total, 36 square feet.  
    194 cubic feet.  
    Maximum load concentration in cargo space is 11 pounds per square inch.  
    Center of gravity travel: 19 inches.  
**Cargo Door:** Height, 5 feet.  
    Width at bottom, 4 feet 6 inches.  
    Width at center, 4 feet.  
    Width at top, 2 feet.  
**Fixtures for under-slinging cargo:** None. Can be attached by using units.  
**Weight of under-slung cargo:** 900 pounds.  
**Size of underslung cargo:** Should be kept as small as possible.  
**Hoist for cargo:** Inside cargo space; swings out cargo door, 400 pounds capacity; cable length, 100 feet.

Space under helicopter without raising wheels above ground:

Radio:  
Notes:

Approximately 12 inches.

Yes, VHF.

Helicopter capabilities are based on full load of gas and oil. Operating radius includes safety factors.

### 38. Sikorsky Helicopter.

Designation:  
Description:

HOSS-1.

Single engine, single main rotor, with anti-torque rotor, tricycle landing gear, helicopter.

Manufacturer:

Sikorsky Division, United Aircraft Corporation.

Crew:

1.

Passengers:

2 equipped Marines (not to exceed 400 pounds),  
2 casualties on litters (external).

Maximum weight:

4,985 pounds.

Empty weight:

3,805 pounds (with oil in engine).

Maximum Load:

1,180 pounds (includes gas, crew, and passengers or cargo).

Operating radius:

80 miles.

Pay load:

400 pounds.

Endurance:

4 hours at 60 MPH.

Maximum Speed at  
Sea Level:

103 MPH.

Cargo Space:

With seat for Passengers removed:

Width, 56 inches.

Length, 35½ inches.

Height, 46 inches.

Total, 53 cubic feet.

Luggage Compartment:

Width (average), 23 inches.

Length, 36 inches.

Height, 28 inches.

Maximum weight of Luggage: 145 pounds.

Luggage or cargo can not be removed in flight.

Center of Gravity:

400 pounds of cargo may be loaded in cargo space with none in luggage compartment. Cargo must be kept within the area designated as cargo space; if small in bulk, cargo should be placed in approximate center of such space. Center of gravity limits will not be ex-



ceeded if 145 pounds is placed in luggage compartment and 255 pounds in the cargo space.

Doors:

On each side of the cargo space. Opening with door removed is 26 inches wide and 41 inches high.

Underslung cargo:

Not practical with present design and size.

Hoist:

Operated by pilot, 250 pounds capacity.

Radio:

Yes, VHF.

Notes:

Helicopter capabilities are based on full Load of gas and oil. Operating radius includes safety factors.



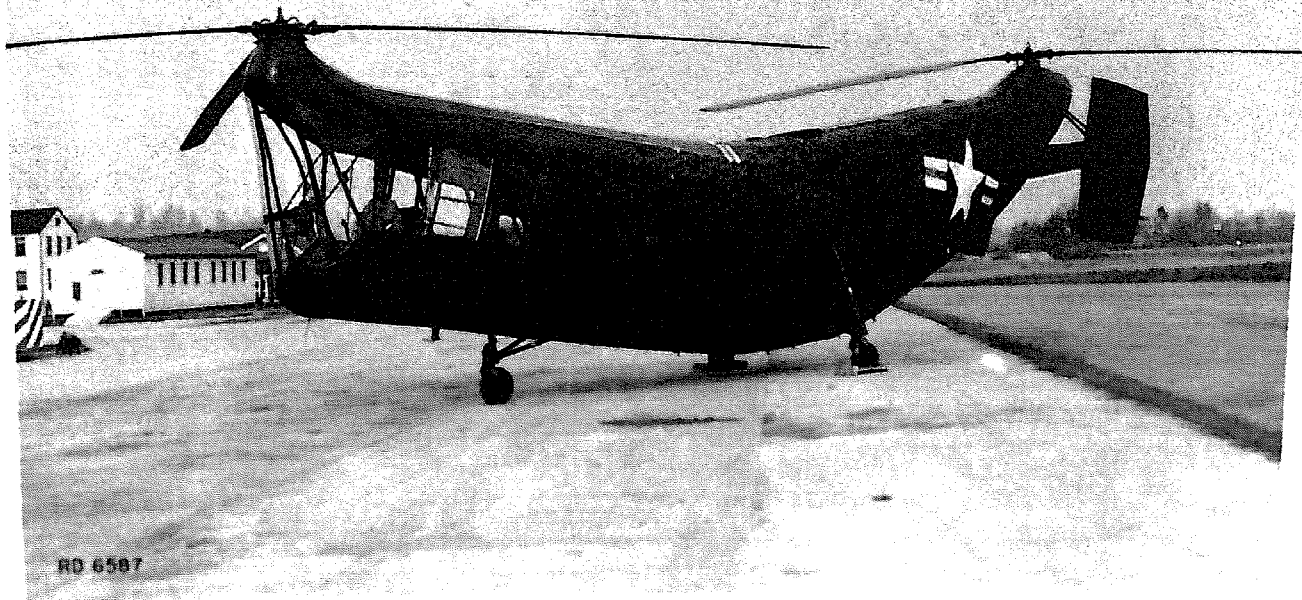


Figure 9.—Piasecki Helicopter (HRP-1).



Figure 10.—HRP-1 helicopters return to CVE for succeeding wave of troops





NO 6587

Figure 11 — Sikorsky Helicopter (HO4S-1).



Figure 12.—HO3S-1 helicopters during operations in the field.