FMFM 5-3

ASSAULT SUPPORT

U.S. MARINE CORPS

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DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
WASHINGTON, D.C. 20380

3 May 1979

FOREWORD

1. PURPOSE

This publication, FMFM 5-3, Assault Support, sets forth doctrine, tactics, and techniques to be employed in operations and training involving aviation assault support within the Fleet Marine Force.

2. SCOPE

This manual expands the doctrine, tactics, and techniques applicable to the employment of the assault transport function of Marine aviation contained in FMFM 5-1, Marine Aviation. Specific guidance is provided for vertical assault airlift requirements, fixed-wing assault airlift requirements, air delivery requirements, air evacuation requirements, and inflight refueling requirements of each element of a landing force. Specific guidance is placed on ship-to-shore movement, echelonment ashore, and integration of helicopterborne operations with all functions of Marine Corps operations.

3. CHANGES

Recommendations for improving this manual are invited. Comments and recommended changes should be forwarded to Commanding General, Marine Corps Development and Education Command (Code D 036), Quantico, Virginia 22134.

4. CERTIFICATION

Reviewed and approved this date.

BY COMMAND OF THE COMMANDANT OF THE MARINE CORPS

J. H. Miller
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Subj: FMFM 5-3, Assault Support; recommendation(s) concerning

1. In accordance with the Foreword to FMFM 5-3, which invites individuals to submit suggestions concerning this FMFM directly to the above addressee, the following unclassified recommendation(s) is(are) forwarded:

a. ITEM #1 (May be handwritten; if more space is required, use additional sheets and envelope.)

(1) Portion of Manual: (Cite by paragraph and/or page number.)

(2) Comment: (Explain in sufficient detail to identify the points of the suggestion.)

(3) Recommendation: (State the exact wording desired to be inserted into the manual.)

b. ITEM #2

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RECORD OF CHANGES

Change No.	Date of Change	Date of Entry	Organization	Signature

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ASSAULT SUPPORT

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CHAPTER 1

FUNDAMENTALS OF ASSAULT SUPPORT

Section I. INTRODUCTION

1101. GENERAL

a. The concept of extreme mobility through the extensive use of assault aircraft in tactical operations is an important part of Marine Corps doctrine. The battle area for both ground and aviation combat elements has been extended to cover large areas in offensive and defensive operations. Both the Marine Corps and potential enemy forces have the capacity to deploy and redeploy forces rapidly by air. Fire support means are also capable of swift positioning by air, which has the effect of extending their range. As logistic support can be provided by these same aviation assets, the combat and combat support forces are unencumbered and, thus, provided freedom of movement.

b. Aircraft speed and mobility provide the tactical commander an opportunity for quick maneuvers to fix the enemy, to amass sufficient combat power to destroy him at heretofore impossible distances, and to rapidly redeploy his forces if necessary. The tactics and techniques of offensive and defensive combat, expressed in the appropriate FMFM series, are applicable to airlifted forces. Flexibility and versatility provided by the use of aircraft permit the ground commander to reduce time and space limitations which would normally be encountered in the movement of assault forces. This versatility is not without penalty, however, for the combat commander must be prepared to defend against an enemy with potentially the same maneuver capability. His planning must be detailed and based upon sound intelligence analysis, for any attack by air lifted forces into the face of a viable enemy antiair threat is an invitation to disaster.

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c. This manual discusses the airlift of personnel, equipment, and supplies into, within, or from the battle area. This movement is accomplished by both fixed- and rotary-winged aircraft. Operations are discussed as part of the amphibious operation, with special attention being given to topographic and climatic considerations. The ground commander's scheme of maneuver is addressed only as it affects, or is affected by, assault support forces. Command relationships, planning considerations, and execution for assault support operations are included in the text.

1102. HISTORICAL EVOLUTION

a. The original conceptions of aviation and its uses were vague when the Marine Corps adopted the aircraft as a military vehicle. Only when a cargo carrying capacity was derived, did the assault support concept become foreseeable. The earliest use of aircraft for Marine logistic support is traceable to the "Banana Wars" of the 1920's. In 1928, Lieutenant Christian F. Schilt evacuated wounded Marines by air from Auilali, Nicaragua. His feat not only introduced medical evacuation, but also earned him the Medal of Honor. The movement of high priority cargo and personnel by air was established in the 1920's. By 1931, when the Division of Aviation was founded, the utilization of Marine aircraft for transport purposes was firmly established.

b. As operations expanded in the Pacific theater during World War II, the importance of rapid transport became evident. Intratheater movement of personnel, equipment, and cargo by air became common for Marines. The number of transport squadrons grew. During one critical phase in the air war on Guadalcanal, when aviation gasoline was in short supply, air operations were sustained for a period of several days by air supply alone. Eventually, Marine air transport grew to the extent that personnel and critical materials could be flown from the U.S. to Fleet Marine Force units anywhere in the Pacific Ocean. Marine air transport had been proven as a logistic support vehicle; however, its use as a tactical vehicle had not been developed.

c. Postwar design introduced aircraft capable of carrying large items of military equipment such as motor transport, artillery, and light tanks. These aircraft were termed assault transports. The year 1947, saw two significant events in the Marine assault support role. First, the National Security Act specified that aviation units were a component part of the Marine Corps. Second, the first Marine helicopter squadron (HMX-1) was formed. In Korea, when logistic support and medical evacuation by helicopter proved sound, the stage was set for vertical envelopment by helicopterborne forces.

d. In 1962, the newly arrived KC-130 was used to transpac an F-8 fighter squadron. Through the introduction of this inflight tanker, a new dimension had been added to Marine aviation. At Khe Sahn, the air-landed delivery by assault transport into a combat zone became a part of the Marine Corps heritage. Likewise, the battles in the Republic of South Vietnam affirmed the vertical assault, logistic support, and medical evacuation role of the helicopter. Thus the closest of ties have been formed between the Marine ground and air elements.

1103. FUNCTION OF ASSAULT SUPPORT

a. Assault support encompasses the use of aircraft to provide tactical mobility and logistic support for ground combat elements, the movement

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of high priority cargo and personnel within the immediate area of operations, inflight refueling for fixed-wing aircraft, and the evacuation of personnel and cargo. All operations are conducted with the ultimate goal being the attainment of the amphibious task force (ATF) objective. Assault support is evidenced during preassault operations as inflight refueling and permeates the remainder of the operation.

b. The use of helicopters as assault aircraft provides a means of rapidly deploying forces ashore, bypassing beach obstacles, and redeploying forces as necessary to meet the enemy threat. Tactical integrity must be maintained and deployment must be in sufficient strength to ensure that the deployed force is an effective fighting unit. The numbers of helicopters required, the time required to make the move, and follow-on support requirements must be decided. Tactically, the helicopterborne force is used in envelopment, double envelopment, encirclement, or turning movement. Helicopters may be used to affect a rapid force build up for the penetration and frontal attack, or to move a blocking force when terrain channels enemy retreat or reinforcement. These tactical forms of maneuver are discussed in detail in FMFM 6-series manuals.

c. The air delivery of high priority cargo and personnel by fixed-wing aircraft is the oldest form of assault support provided by Marine aviation units. These actions parallel those performed by the vertical assault aircraft. Rapid transit of essential items is provided from an airhead to tactical airfields in the area of operations. Other roles are the air drop or air delivery of supplies, personnel, and/or illumination. Illumination by fixed-wing assault aircraft provides the best long-term battlefield illumination available to the Marine Corps today. Night attacks and defenses can be illuminated as required by the ground commander. However, these operations may cause interference with delivery of fires from supporting arms. Fixed-wing assault aircraft are vulnerable to air defense weapons and tactical planning must consider this problem. Also, fixed-wing aircraft assets are normally limited, thus priority of utilization is required.

d. The role of inflight refueling is of such importance in modern day warfare that it warrants a squadron in each Marine aircraft wing (MAW) dedicated primarily to this task. Through the use of aerial tankers, the range and time on-station of reconnaissance, electronic warfare, offensive air support, and antiair warfare (AAW) aircraft can be extended. This manifests itself as a two-fold gain: first, the positioning and delivery of weapons systems as dictated by the needs of the tactical situation can be provided; and second, a reduction in the numbers of aircraft required to perform the assigned tasks, since their on-station time is extended.

e. Air evacuation completes the tasks inherent in assault support. This is normally envisioned as casualty and medical evacuation on the part of both helicopters and fixed-wing aircraft. However, it does encompass the rotation of personnel, the retrieval of repairable equipment, and the removal from the battle area of items no longer required in the accomplishment of the mission. The incorporation of air evacuation into the combat operation provides for effective utilization of aircraft assets and assists in reducing the security burden of combat commanders through removal of valuable but temporarily nonessential items of equipment such as fording kits for the tank elements. The use of aircraft in this role serves the interest of all elements of the Marine air-ground task force (MAGTF) and may be utilized by each effectively.

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1104. FUTURE CONSIDERATIONS

a. An amphibious doctrine in the Marine Corps evolves, it becomes necessary to project the tactics of the future. These tactics are inseparably tied to developments in hardware. The lift/range/speed capability of vertical envelopment vehicles will certainly be increased. As sophisticated weapons proliferate throughout the world, electronic defense measures will be emphasized in the vertical assault. The weapons capabilities of supporting arms must be increased to provide the range and accuracy needed to cover the movement of assault support aircraft. Navigational capabilities will be improved to allow greater accuracy in covering long distances from ship-to-shore during periods of darkness and inclement weather.

b. All future considerations will emphasize the rapid movement by sea and air of Marines and equipment in the proper mix to form the landing force. Thus, it is foreseeable that two, three, or more landing forces will be deployed at sea with feints conducted by one or two to hold the enemy, thereby preventing predeployment of his forces to the anticipated area of operations. As the landing force becomes established, assault transports will permit swift deployment of additional forces to rapidly expand the beachhead. Skillful use of this and other methods will be required to counter the effects of monitoring the amphibious forces by satellite and other sophisticated means. Such tactics anticipate the development of large assault transport aircraft with a rough terrain landing capability and increased numbers of high speed amphibious ships to land both troops and supplies on the beachhead.

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Section II. TERMINOLOGY

1201. GENERAL

This section provides an abbreviated list of terms often encountered in Marine aviation which are especially useful in understanding assault support. Familiarity with the terms and their meanings provide a key to any meaningful discussion of this subject.

1202. REFERENCES

Not all of the terms which one might encounter in assault support are contained in paragraph 1203, below. Only those of exceptional importance are included. For a comprehensive listing, the reader is referred to JCS Pub 1, Department of Defense Dictionary of Military and Associated Terms; NWIP 10-3(D), Naval Terminology; and LFM 01, Doctrine for Amphibious Operations. Within this text, those terms enclosed in "quotes" have been taken directly from JCS Pub 1.

1203. DEFINITIONS

a. Maximum Gross Weight.--The maximum weight (the aircraft plus all contents) at which the aircraft is designed to take off and accomplish its designed mission in given atmospheric conditions. It is the weight limit, either structural or aerodynamic, that is used for planning specific aircraft operations.

b. Operating Weight.--The basic weight of an aircraft plus crew, fuel, and any equipment required for the mission. In combat, this equipment may include tools, weapons, ammunition, and armor. (The operating weight can be reduced to increase payload for special missions by reducing the crew, fuel, or equipment.)

c. Payload Capability.--The weight of passengers and/or cargo an aircraft can carry. Payload is the difference between operating weight and maximum gross weight.

d. Standard Day.--A weather condition wherein the temperature is 15 degrees Centigrade (59 degrees Fahrenheit), the barometric pressure is 29.92 inches of mercury at sea level, and the specific humidity is zero. This standard provides a point of reference for any discussion of lift capability.

e. Ground Effect (Ground Cushion).--A condition created when a helicopter's rotor down-wash is altered in its flow by contact with the ground. This occurs while hovering or in very slow flight within one rotor diameter of the ground. The result of ground effect is that the helicopter requires less power to hover than when hovering out of ground effect.

f. Armed Reconnaissance/Escort.--A light strike reconnaissance aircraft of the OV-10 type which performs reconnaissance, helicopter escort, helicopter landing zone fire suppression, and other missions with the primary purpose of locating targets of opportunity.

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g. Armed Helicopter (Gunship).--A helicopter armed for suppressive fire, and flown in support of transport helicopters, utility helicopters, motorized or troop convoys, and other assigned missions.

h. Attack Escort.--Attack aircraft (VMA or VMFA), which are airborne on-station over assigned orbit points or along routes of movement that are immediately available for air strikes as assigned, directed and controlled by an airborne coordinator or forward air controller.

i. Tactical Air Coordinator (Airborne) (TAC(A)).--"An experienced naval aviator or naval flight officer who coordinates, from an aircraft, the action of combat aircraft engaged in close support of ground or sea forces." The TAC(A) acts as a coordinating controller when aircraft assigned separate missions are operating in proximity and a ground controller is not available.

j. Helicopter Coordinator (Airborne) (HC(A)).--An experienced naval aviator operating from a command-control aircraft, for the purpose of direct airborne coordination and control of helicopterborne assaults. He is responsible for the airborne control of all helicopters and assigned fixed-wing aircraft participating in and supporting a helicopterborne landing. If employed in conjunction with the TAC(A), the HC(A) is an agent of the TAC(A) and normally will be responsible for the airborne control of helicopters only. Fixed-wing aircraft conducting close air support on such occasions are controlled by forward air controllers with the ground forces or airborne.

k. Air Observer (AO).--"An individual whose primary mission is to observe or take photographs from an aircraft in order to adjust artillery fire or obtain military information."

l. Naval Aviation Observer (NAO).--An airborne observer/controller whose mission is to observe or take photographs, adjust and spot for artillery and naval gunfire, control close air support strikes, and to assist in the coordination of supporting fires.

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CHAPTER 2

ORGANIZATION AND MISSIONS

Section I. INTRODUCTION

2101. GENERAL

This section deals with the assault support means found in the Marine aircraft wing, Marine aircraft group (MAG) (helicopter), and in various Marine aviation squadrons. When discussing organizational entities, reference will be made to a nominal wing, group, or squadron as opposed to a specific organization. Specific mission and task listings are found in FMFM 5-1, Marine Aviation; the unit discussions will be directed to the role of the organization.

2102. MARINE AIRCRAFT WING

The elements within the Marine aircraft wing tasked with the assault support role are the Marine aerial refueler/transport (VMGR), Marine medium helicopter (HMM), Marine heavy helicopter (HMH), Marine light helicopter (HML), and Marine helicopter attack (HMA) squadrons. Other squadrons are capable of performing select tasks in the assault support role; however, with the exception of those found in the helicopter MAG, they will not be discussed as separate entities in this section. To provide insight into the capabilities of these other squadrons in this role, it must be pointed out that the fixed-wing squadrons can provide limited illumination support; the Marine observation squadron (VMO) has a paradrop capability for reconnaissance size units, and the headquarters and maintenance squadrons in the air groups and the support group have fixed-wing transport aircraft capable of providing illumination support for extended periods as well as limited air delivery and air evacuation capabilities. These resources augmenting the elements primarily tasked with providing assault support round out the assault support functional role of the Marine aircraft wing.

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2103. MARINE AIRCRAFT GROUP, HELICOPTER (MAG(VH))

The MAG is a task organized unit capable of extended independent operations. The helicopter MAG provides helicopter support, and such other air operations as may be directed, in support of the Fleet Marine Forces. The only elements organic to the MAG are the headquarters and maintenance squadron (H&MS) and the Marine air base squadron (MABS). As a task organized entity required to provide helicopter support and such other air operations as may be directed, the MAG is organized around squadrons required to satisfy the assigned tasks. Thus, a typical helicopter MAG is as depicted in figure 1. This is an example only and does not represent any specific helicopter group.

2104. MARINE AVIATION SQUADRONS

a. Types of Squadrons.--There are various types of squadrons associated with the assault support role. The individual squadron missions and tasks are delineated in FMFM 5-1, Marine Aviation. This paragraph deals with the H&MS and MABS of the helicopter MAG, each of the aircraft squadrons in the helicopter MAG, and the VMGR squadron. The aircraft squadrons have

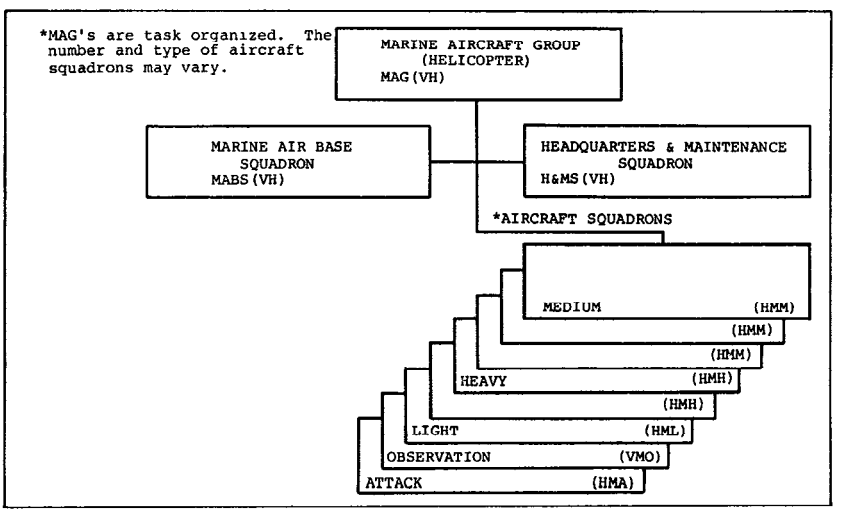

Figure 1.--Example of a Marine Aircraft Group, Helicopter (MAG(VH)).

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certain features in common such as performance of self-administration and organizational maintenance on assigned aircraft and support equipment. In general, squadrons are organized to function as an integral unit and detachments are not capable of self-support. The aircraft squadrons in the helicopter group are structured to operate as a subordinate unit of the MAG. When appropriately augmented, they are capable of functioning independently or as the air component of a task organized element.

b. Headquarters and Maintenance Squadron.--The headquarters and maintenance squadron in the helicopter group is a dual role organization: it attends to the personnel administration for the MAG headquarters as well as its own personnel, and it provides the supervisory personnel and equipment for intermediate level maintenance on aircraft and aircraft components for all squadrons in the MAG. Personnel, carried on the aircraft squadrons' table of organization (T/O) as intermediate maintenance activity (IMA) augmentees, are assigned to the H&MS to provide a work force within the aircraft maintenance department. Supply support for the aircraft squadrons and group headquarters is also performed by the H&MS.

(1) Mission.--The mission of the H&MS, MAG(VH) is to perform logistic and administrative support for units attached to the MAG.

(2) Tasks

(a) Provide intermediate aircraft maintenance for units assigned to the MAG.

(b) Perform intermediate and organizational aircraft maintenance and second echelon maintenance on assigned motor vehicles.

(c) Requisition, store, issue, and account for appropriate supplies and equipment of supported units.

(d) Provide administrative supply support for the headquarters of the MAG.

(e) Screen and repair aeronautical materials in need of rework, test, or check.

(f) Maintain the capability to deploy as an integral unit or by elements in support of separately employed units.

(g) Conduct individual and unit training as required to qualify organic personnel and supported squadrons for performance of assigned squadrons and personnel.

(h) Provide logistic, administrative, and training flight support for assigned squadrons.

(i) Provide postal and disbursing service for assigned squadrons and personnel.

(j) Provide intermediate armament maintenance for units assigned to the MAG. Provide munitions buildup, storage, and distribution of class V(A) munitions to supported units.

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c. Marine Air Base Squadron.--The Marine air base squadron in the helicopter group is the organization that is responsible for the establishment and maintenance of facilities. This includes, living, working, messing, laundry, and motor transport support. All airfield responsibilities such as fuel distribution, runway maintenance, crash crews, airfield lighting and meteorological reporting is covered by this squadron.

(1) Mission.--The mission of the MABS is to provide air base facilities and services (except airfield construction) for the Marine aircraft group or to supplement air base facilities and services provided by a station or facility when based thereon.

(2) Tasks

(a) Conduct airfield operations and air traffic control as required for supported units.

(b) Provide camp construction, utilities, and maintenance as required for supported units.

(c) Provide mess facilities as required for MAG organic units.

(d) Provide base storage and distribution of classes I, III, and III(A) supplies to supported units.

(e) Provide and operate the base air freight terminal.

(f) Maintain the capability to deploy as an integral unit and by elements in support of separately employed units.

(g) Conduct individual and unit training to qualify personnel of MABS and supported squadrons in the performance of required tasks and missions.

(h) Provide third echelon intermediate maintenance of communication-electronics material items organic to the group, less avionics and single sideband.

(i) Perform third echelon maintenance on motor vehicles and appropriate support equipment for supported units.

(j) Perform first - third echelon maintenance on organic motor transport equipment.

(k) Provide weather service support as required for supported units.

d. Marine Medium Helicopter Squadron.--The HMM is the primary troop transport organization. It is equipped with CH-46 Sea Knight helicopters. The squadron is organized to provide the primary vertical assault lift capability for personnel in the amphibious assault and is capable of moving approximately one reinforced infantry company in a single lift. In addition, the HMM may be used to deliver cargo or retrieve equipment.

(1) Mission.--The mission of an HMM is to provide helicopter transport of personnel, supplies, and equipment for the landing force during ship-to-shore movement and within an objective area.

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(2) Tasks

(a) Transport troops, supplies, and equipment. The primary task is transporting troops.

(b) Conduct evacuation operations.

(c) Augment local search and rescue facilities.

(d) Maintain the capability to operate from LPH's, LPD's, or other floating bases.

(e) Maintain the capability to operate under conditions of darkness and instrument flight conditions.

(f) Perform organizational maintenance on assigned aircraft.

e. Marine Heavy Helicopter Squadron.--The HMH is the logistic transport helicopter organization. It is equipped with CH-53 Sea Stallion helicopters. The squadron is organized to provide the primary vertical assault lift capability for supplies and equipment in the amphibious role. In addition, the HMH may be used to move personnel, airdrop supplies, and retrieve equipment.

(1) Mission.--The mission of an HMH is to provide helicopter transport of supplies, equipment, and personnel for the landing force during ship-to-shore movement and within an objective area.

(2) Tasks

(a) Transport troops, supplies, and equipment. The primary task is the transporting of supplies and equipment.

(b) Conduct evacuation operations.

(c) Augment local search and rescue (SAR) facilities.

(d) Maintain the capability to operate from LPH's, LPD's, or other floating bases.

(e) Maintain the capability to operate under conditions of darkness and instrument flight conditions.

(f) Perform organizational maintenance on assigned aircraft.

f. Marine Light Helicopter Squadron.--The HML is a utility helicopter support organization. It is equipped with UH-1N helicopters and is dedicated to utility support for the landing force. This includes command and control, medical evacuation, liaison, and courier service among others. The tasks are as varied as the term utility implies.

(1) Mission.--The mission of an HML is to provide utility combat helicopter support to the landing force in the ship-to-shore movement and in subsequent operations ashore.

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(2) Tasks

(a) Conduct emergency aerial supply and resupply.

(b) Conduct frontline casualty evacuation.

(c) Provide airborne control of tactical air support operations as required for command and control.

(d) Conduct liaison and courier service.

(e) Augment local search and rescue facilities within the capabilities of assigned aircraft.

(f) Conduct special operations as directed by higher authority.

(g) Perform organizational maintenance on assigned aircraft.

(h) Provide second echelon maintenance for organic motor transport equipment.

g. Marine Attack Helicopter Squadron.--The HMA is equipped with AH-1J or AH-1T helicopters dedicated to providing close-in fire support while escorting helicopters or surface motor marches. The ability to provide rapid response in proximity to friendly forces using visual target acquisition to assure accurate fire delivery and troop safety cannot be duplicated by any other means. The ability to integrate into helicopter flight traffic and rapidly react to enemy small caliber weapon threats are the keys to AH-1 utilization. Additional tasks might include air control and air spot assignments during the initial stages of the amphibious assault.

(1) Mission.--The mission of an HMA is to provide close-in fire support during aerial and ground escort operations during the ship-to-shore movement and within an objective area.

(2) Tasks

(a) Conduct armed escort flights in support of personnel and cargo-carrying helicopters.

(b) Provide landing zone suppression fire support.

(c) Conduct visual armed reconnaissance.

(d) Provide target marking and airborne direction for the attack of surface targets by high performance aircraft.

(e) Escort and provide suppressive fires for surface convoys and other ground unit operations.

(f) Maintain the capability to operate from aircraft carriers or other floating bases.

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(g) Maintain the capability to operate under conditions of darkness and reduced visibility.

(h) Perform organizational maintenance on assigned aircraft.

(i) Provide second echelon maintenance for organic motor transport equipment.

h. Composite Squadron.--Currently, there is but one permanently formed composite squadron in the Marine Corps. That organization, HMX-1, is not a fleet organization. It is included here to explain the nature of a composite squadron.

(1) A composite squadron has as its derivation a published table of organization. This table of organization is oriented toward the mission of the squadron and the aircraft assigned to or operated by that squadron. Always, the assigned aircraft are dissimilar in type and/or class.

(2) The mission and tasks of the example squadron, HMX-1, include providing helicopter transportation for the President of the United States, the Vice President of the United States, and other dignitaries, as well as providing support for the development of helicopter tactics, techniques and landing force equipment. This is the only helicopter unit in the Marine Corps specifically tasked on a permanent basis with planning, executing, and evaluating projects of a technical or tactical nature.

(3) The composite squadron found in the Marine aircraft wing is a task organized entity in appearance much like the composite squadron mentioned above. All attachments and detachments are temporary in nature and do not appear in the table of organization. Within the aviation community, the minus, reinforced concept may be applied only to squadron level units (aviation groups and wings are task organized). The HMM minus a portion of its CH-46's and crews reinforced with CH-53's, UH-1N's, AH-1J/T's, and their crews is a unique unit within the Fleet Marine Forces (FMF's). It is one of the composite squadrons as defined above.

i. Marine Observation Squadron.--The VMO is a fixed-wing aircraft squadron attached to the helicopter MAG. The visual observation mission performed by the squadron dictates a need for proximity to the ground force command post (CP), which facilitates an exchange of information. Thus, collocation with the helicopter organizations located nearest the ground combat element CP is ideal. Specific assault support missions that can be performed by the OV-10 Broncos found in the VMO include, airdrop, air delivery, illumination, and evacuation. However, assault support tasks are secondary to the air reconnaissance and observation roles of the VMO.

(1) Mission.--The mission of a VMO is to conduct aerial reconnaissance, observation, and forward air control operations to support the landing force in the ship-to-shore movement in subsequent operations ashore.

(2) Tasks

(a) Conduct air reconnaissance and observation in support of landing force units.

(b) Conduct forward air control and surface-to-surface gunfire spotting and observation missions.

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(c) Conduct emergency aerial supply and resupply within the capability of assigned aircraft.

(d) Augment local search and rescue facilities.

(e) Conduct frontline, low-level aerial photography.

(f) Conduct helicopter escort missions and close-in fire suppression.

(g) Conduct such other operations as may be required within capabilities of assigned aircraft.

(h) Maintain the capability to:

1 Operate from aircraft carriers and other floating and advanced bases within the capabilities of the aircraft.

2 Operate under conditions of reduced visibility and darkness.

3 Perform organization level maintenance on assigned aircraft and associated equipment.

j. Marine Aerial Refueler/Transport Squadron.--The Marine aerial refueler/transport squadron currently contains the KC-130 Hercules aircraft. The personnel assigned to the squadron possess the requisite skills in their military occupational specialties (MOS's) to permit direct operation of the aircraft when independently deployed in its functional role, and within the squadron, intermediate level maintenance on assigned aircraft. The primary value of the KC-130 lies in the inflight tanker role. The proper utilization of this aircraft permits extended operations by combat air patrol, close air support airborne alert, reconnaissance, and electronic warfare aircraft. It also reduces the logistic demands on the helicopter force. Since the ground cycle time for the aircraft concerned is often measured in hours, the capability of extending airborne time through the use of the inflight tanker provides a quantum step forward as the degree of air support provided can be extended without increasing the numbers of aircraft assigned to each role. Other tasks performed by the VMGR include air delivery of combat cargo, assault air transport between a logistic air head and small combat fields in the objective area, and casualty evacuation from small combat fields.

(1) Mission.--The mission of the VMGR squadron is to provide aerial refueling service in support of Fleet Marine Forces; provide assault air transport for personnel, equipment, and supplies; and to conduct such other air operations as may be directed.

(2) Tasks

(a) Provide aerial refueling service to Fleet Marine Force units.

(b) Provide assault air transport of air-landed troops and combat cargo between a logistic air head and small combat fields in the objective area or battle area.

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(c) Perform air delivery of combat cargo and emergency resupply, to include airdrop into the objective area during night and all-weather conditions, with or without the assistance of radar teams.

(d) Provide a capability of long-range direct delivery of high priority material and personnel to alleviate an emergency combat situation wherein other means of suitable air transport are not readily available.

(e) Provide casualty evacuation from fields within the objective area or battle area.

(f) Provide intermediate level maintenance of assigned aircraft and avionics equipment peculiar to those aircraft.

(g) Provide aircraft for airborne direct air support center (DASC)/command post functions when required for special operations.

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Section II. MARINE AIR COMMAND AND CONTROL SYSTEMS

2201. GENERAL

The control of aircraft extends with great detail over a much larger area than other types of military control. Time and space factors preclude a commander from subdividing an extensive area into small zones of action and exercising control of air operations through a number of subordinate commanders as in the case of ground operations. Because of these factors and because of the requirement for immediate in-flight response to directives and orders in air operations, it is necessary for the controlling commander to deal directly with individual aircraft flights through a centralized control system. For example, a situation may develop which would require that aircraft airborne on a prebriefed resupply mission be diverted to conduct a medical evacuation. Time would not permit the changes in orders to be transmitted through a group commander, even though the aircraft are organic to the group. It is in this sense that coordination and control of air operations over a relatively broad area by a single commander is emphasized. All aircraft operating in the objective area, however, are not controlled from a single location. The air control system does have sub-agencies, all of which exercise this detailed control of aircraft to assist them in accomplishing their missions.

2202. CONTROL OF ASSAULT SUPPORT AIRCRAFT

a. Control.--This aspect of Marine aviation is crucial, since it integrates all aircraft activity into a single, coordinated system. It provides for the exercise of authority over, and direction of, "air support" elements during the conduct of operations. Through the Marine air command and control system (MACCS), "control" is exercised to perform the following for all other aviation functions:

(1) Air space and air traffic control.

(2) Employment of aviation assets and weapons systems.

(3) Selection, coordination, and integration of the agencies of the MACCS for the execution of all Marine aviation functions.

b. Control of Assault Support.--FMFM 5-1, Marine Aviation, presents a thorough discussion of the meaning of control as it affects all operations; however, control of assault support is restated herein. As previously described, the major categories or divisions of assault support are vertical assault, air delivery, inflight refueling, and air evacuation. Rather than treat each division separately, functional "control" will be discussed according to the two major types of control which allow the easiest classification, air direction and air control.

(1) Air Direction.--Assault support air operations are characterized by low flight altitudes, extended movment within ground unit air space, and longer mission execution times. Therefore, positive radar control is not normally exercised. This is because either altitudes are too low, or areas are too close to long-range surveillance radars to allow discrimination among radar contacts. It also may be because control is more appropriate on-scene, or because positive control is unnecessary, given existing air

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defense conditions. Particularly with helicopter operations, the major agencies of the MACCS are more concerned with timely allocation of resources to existing mission requirements, than with the actual conduct of the mission. Terminal control agencies govern mission conduct. In vertical assault operations, the mission is normally prebriefed and/or controlled by on-scene terminal controller such as the helicopter coordinator (airborne), in direct contact with the supported unit. Major agencies such as the tactical air command center (TACC) and direct air support center focus attention on unforseen requirements to supply additional aircraft resources. Air direction may be accomplished simply through ensuring the timely launch of preplanned missions. In most instances, however, an intense effort is required to divert resources, make secondary mission assignments, and draw upon on-call resources to satisfy requirements which differ from the schedule. In these instances, air direction includes assessment of: the priority of other missions, aircraft configurations, en route flight clearances, and substitute action for requesters from whom support is being withdrawn. Thus, air direction is exercised in most vertical assault, air delivery, and air evacuation operations.

(2) Air Control.--The other aspect in the function of control of aircraft in assault support involves those operations wherein actual air control is exercised in the mission. These operations are characterized by conduct at sufficient altitude and distance from controlling agencies to allow radar acquisition and/or the use of terminal control agencies. This need not always entail surveillance radar control, but radar monitoring is preferred for fixed-wing assault support operations. Fixed-wing air delivery, inflight refueling, and air evacuation flights departing the objective area are examples of these types of operations in assault support. Air direction is exercised by a principal agency, while actual air control is exercised by MACCS radar facilities, or other en route, air traffic control agencies. Radar controlled airdrops or inflight refueling rendezvous are other examples of more precise air control in assault support. Terminal control is exercised in almost all instances of assault support.

2203. CONTROL AGENCIES

The following control agencies perform the described tasks for assault support.

a. Tactical Air Command Center.--The TACC is the senior MACCS agency. Within it, the supervision, coordination, and general control of all tactical air operations in the Marine air ground task force (MAGTF) area of responsibility are conducted. It also provides the Marine tactical air commander (TAC) the facilities and means to direct and coordinate organic aviation with that of other services. The TACC exercises its command and control of the entire MACCS through agencies, both organic and nonorganic to the Marine air control group (MACG). These agencies include the DASC and air support radar teams (ASRT's) of a Marine air support squadron (MASS), one or more tactical air operations centers (TAOC's) from the Marine air control squadrons (MACS's), and the tactical air control parties (TACP's) of the Marine Division. To effectively fulfill its responsibility for air direction and command of assault support operations, current intelligence information regarding pertinent aspects of the air and ground situation is collected by the TACC. General situation information is maintained by displays to enable the TAC or his designated representative to rapidly analyze and manage aviation assets. Control of assault support is exercised through the DASC, terminal controllers, and in some instances, the TAOC. The TACC retains scramble authority

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for the commitment of reserve aircraft to various air contingencies, whether direct or indirect air support. The TACC is equipped with the communication links necessary for rapid shifts of aviation assets as the air situation requires. This paragraph describes the role and tasks of the TACC in assault support, as well as its subordinate role when it is designated a tactical air direction center.

(1) Role.--The role of the TACC is to function as the senior MAGTF air command and control agency and to establish the operational command post of the MACCS from which the TAC can supervise and coordinate all MAGTF tactical air operations.

(2) TACC Tasks and Duties.--In the execution of responsibilities, the TACC performs certain assault support tasks and duties:

(a) Tasks.--In carrying out the assault support plans of the tactical air commander, the TACC is responsible for the following:

1 To maintain complete information on the air situation, including that ground combat information essential to the air effort.

2 To manage all aircraft in the objective area to ensure the most balanced and properly weighted utilization of assets for tactical air operations.

3 To oversee the operations of subordinate MACCS agencies to preserve economy and unity of effort in the execution of the TAC's air plans.

4 To prescribe emission control (EMCON) conditions in the objective area.

5 To prescribe succession of command and control responsibilities within the MACCS to compensate for any serious degradation within a component agency.

(b) Duties.--In performing the preceding assault support tasks, some of the duties of the TACC are as follows:

1 Coordinating the utilization of aircraft by the DASC.

2 Diverting aircraft from scheduled missions to meet other priorities.

3 Briefing pilots of diverted aircraft, as required.

4 Establishing alert conditions for ground alert aircraft.

5 Providing subordinate control agencies with appropriate flight schedules, identification signals, aircraft call signs, alert conditions, and aircraft availability.

6 Maintaining current status displays of all friendly air operations and detected threats.

7 Providing the focal point for the dissemination of tactical data information between air control agencies, both internal and external to the MACCS.

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b. Tactical Air Direction Center (TADC).--The TADC is an air operations facility subordinate to a TACC (USN/USAF/USMC). The TADC acts to coordinate and direct all air operations in a specified portion of the objective area. The TADC is normally identical in organization, facilities, and capabilities to a TACC. A TAOC can also function as a TADC for limited periods of time. The essential difference between the TACC and the TADC is the amount of air space for which each is responsible and the scope of their assigned tasks. When a MAGTF has overall responsibility for control of air in the objective area, the MAGTF commander establishes a TACC. If, however, overall responsibility rests external to the MAGTF, the commander establishes a TADC for his sector of responsibility. When it becomes necessary to organize an amphibious task force into subordinate task groups, each task group may employ a TADC (afloat) for control of air operations in its sector of responsibility. Overall control is retained by the commander amphibious task force (CATF) through the task force TACC. The MACCS TADC may be viewed as a similar "task group" agency ashore with responsibility for air operations in the landward sector. When the commander landing force (CLF) is capable of assuming control and, when approved by the CATF, all control of assault support operations (in the objective area) passes ashore. The primary control agency, previously designated a TADC, becomes the TACC. The CATF's TACC reverts to the status of a TADC (afloat).

c. Tactical Air Operations Center.--The TAOC is the subordinate operational element of the Marine air command and control system designed to control en route air traffic and air defense operations. The TAOC is placed under the control of a TACC/TADC ashore or afloat, depending upon the specific phase of a particular operation. Because of its surveillance radar capabilities, it is the primary source of radar control for all aircraft in its sector of responsibility. The TAOC detects, acquires, and tracks targets in its assigned area of responsibility and provides an up-to-date display of the air situation. Tactical data is exchanged by means of digital and/or voice communications with friendly aircraft, adjacent TAOC's, the TACC/TADC, and other agencies.

(1) Role.--The role of the TAOC in assault support operations is to provide navigational assistance to friendly aircraft in the accomplishment of support missions. Additionally, the TAOC functions as the alternate TACC/TADC, when directed.

(2) Tasks

(a) To recommend geographic sectors/subsectors of responsibility for itself and component elements.

(b) To detect, identify, and classify all aircraft within its sector of responsibility.

(c) To maintain a summary display of the air situation within its capabilities and to disseminate appropriate elements of this information to other designated agencies.

(d) To coordinate and execute emission control conditions set by higher headquarters.

(e) To operate as a TACC/TADC for limited periods.

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d. Direct Air Support Center.--The DASC is the principal air control agency responsible for the conduct of tactical operations directly supporting ground forces. It functions in a decentralized mode of operations, but is directly supervised by the TACC/TADC. It is normally the first major air control agency ashore and normally lands with the senior ground combat element fire coordination center (FSCC), e.g., scheduled or on-call waves. The DASC coordinates close air support strikes, assault support and certain air reconnaissance missions. It coordinates the timely distribution of air assets assigned by the TACC (afloat) and helicopter direction center (HDC) for allocation to appropriate terminal control agencies. These terminal control agencies include the airborne forward air controller (AFAC), the tactical air coordinator (airborne), the helicopter coordinator (airborne), and the air support radar teams. The DASC collocates with the senior ground combat element FSCC and works closely with this agency to ensure the coordination with other supporting arms. Because of the necessity for detailed and continuous communications and coordination between the DASC and the FSCC, both agencies, where possible, should be collocated in the same operating facility. When displacing either ashore or elsewhere, key DASC personnel should accompany personnel of the ground combat element to advise and assist in site selection. The DASC, equipped and operated by the MASS, may displace by echelon to preserve operational continuity. In addition to controlling and coordinating direct air support aircraft employment, the DASC received ground and air intelligence information and disseminates this information to the TACC/TADC, TAOC, and FSCC. The DASC also coordinates the movement and identification of friendly aircraft and responds to the TAOC's requirement for aircraft position information for aircraft under its control.

(1) Role.--The role of the DASC is to provide the means for processing direct air support requests, to coordinate aircraft employment with other supporting arms, and to control assigned aircraft with the procedures of area air space control. FMFM 5-1, Marine Aviation, contains a complete discussion of the DASC configuration and the circumstances appropriate for their employment.

(2) Tasks

(a) Receives fragmentary operation orders (frags) and coordinates scheduled preplanned assault support.

(b) Receives, processes, and coordinates ground force requests for immediate or on-call assault support.

(c) Adjusts preplanned schedules and diverts airborne assets in accordance with the priorities of the continuing ground combat situation and degree of decentralized authority assigned by the TACC/TADC.

(d) Coordinates the execution of assault support missions with the activity of other fire support means through the appropriate FSCC to ensure maximum aircraft safety and minimum mutual interference.

(e) Refers all conflicts in supporting arms activity to the appropriate FSCC for resolution consistent with the mission of supported units.

(f) Provides an operational point of contact for both user agencies and assault support aircraft for the resolution of conflicting priorities and the coordination of efforts.

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(g) Serves as the ground combat element's operational point of contact to ensure assault support air response to changing ground tactical situations and a possible reevaluation of priorities.

(h) Receives and disseminates to the ground element's air representative all pertinent tactical intelligence and information reported by aircraft performing assault support air missions.

(i) Assigns control of DASC aircraft to subordinate terminal control agencies such as TACP's, TAC(A)'s, FAC's, ASRT's, and landing zone control parties (LZCP).

(j) Provides requesting aircraft and other air control agencies with appropriate advisory information for the conduct of safe flight. Such information includes airstrikes (both visual and radar controlled), enemy antiaircraft activity, and airspace coordination areas (ACA's).

(k) Assigns general routes of aircraft approach and retirement.

(l) Records, monitors, and displays information on the planned and existing state of assault support missions and advises TACC, TADC, FSCC as required.

e. Air Support Radar Team.--The ASRT is the terminal air support control agency subordinate to the DASC which provides precision radar tracking and positioning of aircraft in all weather conditions. The ASRT employs a radar course directing central (RCDC), which consists of a precision radar and associated computer equipment designed to accurately position aircraft without visual reference to the earth's surface. Aircraft are guided to a point in space from which supplies or ordnance are released. This is accomplished by using radar derived positional information and manually inserted target position information, wind data, ballistics data based upon the type of delivery (free-fall or paradrop) being used, ejection velocity, speed, and altitude of the aircraft. In order to accurately compute this radar positional information, the RCDC must be established by an accurate land survey. There are three ASRT's organic to the MASS of the MACG. They are organized as highly mobile air control facilities and operate in support of the MAGTF.

(1) Role.--The role of the ASRT is to provide day/night all-weather precision control of aircraft operating in support of MAGTF operations.

(2) Tasks.--The principal task of the ASRT in assault support is to provide precision control of aircraft for medium and low altitude level air delivery in support of the MAGTF. The ASRT performs the following:

(a) Receives and computes target data for air delivery missions.

(b) Briefs aircrews on the mission requirements.

(c) Coordinates with the TAOC or other appropriate control agencies to receive radar handovers of mission aircraft.

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(d) Keeps the DASC fully advised as to ASRT operational status and conduct of operations.

(e) Notifies the DASC of the results of each mission.

(f) Positions aircraft at a geographic position which assists or permits the aircraft to accomplish a designated mission. Examples are:

1 Positioning aircraft for paradrops.

2 Positioning aircraft for flare drops.

3 Positioning helicopters over landing zones.

f. Tactical Air Control Party.--The TACP is "a subordinate operational component of a tactical air control system designed to provide air liaison to land forces and for the control of aircraft." TACP's establish and maintain facilities for liaison and communications between supported units and appropriate control agencies, inform and advise the ground unit commander on the employment of supporting aircraft, and request and control air support missions. There are two types of tactical air control parties. The first type is organic to the infantry battalion and the second type is organic to the infantry regiments and division. The principal difference between the two types of TACP's is that the battalion TACP has two forward air control parties (FAC parties), while the regimental and division TACP's have none.

(1) Tasks

(a) Provide liaison and communications between the commander of the ground unit to which assigned and the appropriate air control agency.

(b) Provide the commander of the ground unit current information on the employment and availability of assault support aircraft assigned to the support of his unit.

(c) Advise the ground unit commander and staff on matters concerning assault support.

(d) Prepare and forward requests for assault support in accordance with instructions received from the unit to which attached.

(e) Relay pertinent information to the tactical air control agency.

(f) Exercise control of aircraft during the terminal phase of assault support missions.

(2) Division TACP.--The division TACP consists of two air control officers and eleven enlisted communication personnel. The senior air control offficer normally performs the duties of the commander of the air and naval gunfire platoon, communication company, of the headquarters battalion. The air control officers assist the division air officer by monitoring all immediate air support requests from subordinate units, supervising the operation of aviation nets in the FSCC, and keeping the fire support coordinator (FSC) advised of the general air situation and specific requests of subordinate units.

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(3) Regimental TACP.--The regimental TACP is composed of one officer called the regimental air officer (AO), assigned to the regimental operations section, and four enlisted communication personnel from the communication platoon of headquarters company. The air officer acts in a dual capacity as a special staff officer to the regimental commander in regard to all aviation matters and as the officer-in-charge of the regimental TACP. In the latter capacity, he may act as an air controller actually controlling an assault support mission. He coordinates and consolidates all preplanned air support requests from subordinate units with the regimental FSC. He coordinates, as necessary, immediate assault support requests from subordinate TACP's.

(4) Battalion TACP.--The battalion TACP's are composed of three officers and twelve enlisted communication personnel. The senior naval aviator/naval flight officer functions as the battalion air officer and each of the other two officers is the leader of a FAC party.

(a) Air Officer.--The battalion air officer duties are similar to those of the regimental air officer. He normally remains with the battalion command group when deployed and functions as chief advisor to the battalion commander on all air operation matters. The battalion air officer supervises the training and operation of the two battalion FAC parties.

(b) Forward Air Control Party.--The two FAC parties generally accompany frontline companies of the battalion during all phases of the amphibious operation. The forward air controller may control aircraft executing assault support missions in support of the battalion. The FAC maintains positive ground-air radio communications with assigned support aircraft from a forward position which permits him to observe and direct each aircraft. The primary assault support duties of the FAC party are:

1 To operate well forward with the assault units of the battalion.

2 To advise the supported company commander on the proper employment of air.

3 To gather and report all information of an intelligence nature.

4 To stay abreast of the supported unit's plans, position, and needs.

5 To stay abreast of the enemy situation and location of friendly units.

(5) Division Air Section.--The division air section consists of four naval aviators/naval flight officers and is headed by a colonel. Although listed here, it is not a part of the division TACP. (Personnel from the division air section may augment the division TACP in the FSCC as necessary and the division air officer has staff cognizance over TACP operations.) The division air officer does, however, perform the following tasks normally performed by the TACP's:

(a) Provide the division commander current information on the employment and availability of aircraft assigned to the support of the division.

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(b) Advise the division commander, his staff, and commanders of those elements not having TACP's, on matters concerning air support.

(c) Prepare and forward requests for preplanned assault support in accordance with instructions received from the division commander.

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Section III. EQUIPMENT AND SYSTEMS

2301. GENERAL

In assault support, as in all other military elements during the amphibious assault, the capabilities and limitations of the equipment and systems influence the tactical decisions. This section describes aircraft, weapons, ground support equipment and systems, and automated data systems as they apply to assault support. Some of the equipments and systems will play a role in functional areas other than assault support. Such application will not be discussed in this text; therefore, reference to the appropriate FMFM 5- series manual is required for information regarding application to other functional areas.

2302. ASSAULT SUPPORT AIRCRAFT

Assault support aircraft are specifically designed to provide speed, mobility, and depth in the amphibious operation. These aircraft incorporate various combinations of troop and cargo capacity, hoist and external load capabilities, accompanied by other characteristics such as floating hulls and folding blades which make them particularly suited to the Marine Corps needs. Although recognized primarily as tactical vehicles, their logistic contribution is one that cannot be overlooked. When speed of movement is critical to those in need of resupply, the aircraft becomes the prime mover. This is true, not only when an item is critically in need, but also when geographic constraints slow surface traffic to an unacceptable level. This geographic constraint is most evident in the ship-to-shore movement. The commander must be prepared to move those critical items which determine the success or failure of his operation with his assault support aircraft. The enemy's capabilities to reinforce and resupply must not exceed those of the landing force.

a. CH-46.--The CH-46 (see fig. 2) is a twin-turbine powered, tandem rotor assault transport helicopter. It is compatible with all amphibious assault ships. For shipboard operations, the CH-46 incorporates an automatic blade-folding system which is operated from the cockpit. The lower portion of the fuselage is sealed to permit emergency water operations. Troops can board the aircraft through the main entrance doorway on the starboard side of the aircraft, or through the aft ramp and hatch area. Cargo can be loaded internally through the aft ramp and hatch area, or carried externally. The CH-46 has a maximum airspeed of 130 knots, cruises at 120 knots, and has a speed of 60-80 knots with an external load. Communications capabilities include two-way UHM, FM, and HF radio. The intercommunications system (ICS) has four internal stations and one external station located below the pilot's window on the starboard side. The CH-46 carries the XM-218 caliber .50 machinegun. Load characteristics for use in preliminary helicopterborne assault planning are found in appendix A.

b. CH-53.--The CH-53 (see fig. 3) is a twin-turbine powered, single main rotor assault cargo helicopter. It is capable of being operated from LPH's, LHA's, and LPD's. This capability is enhanced by the automatic blade and pylon-folding system. The CH-53 has a watertight hull and external sponsons which provide an emergency water landing capability. Troops can board the aircraft through the entrance door on the starboard side, or through the cargo ramp and door. Cargo can be loaded internally through the

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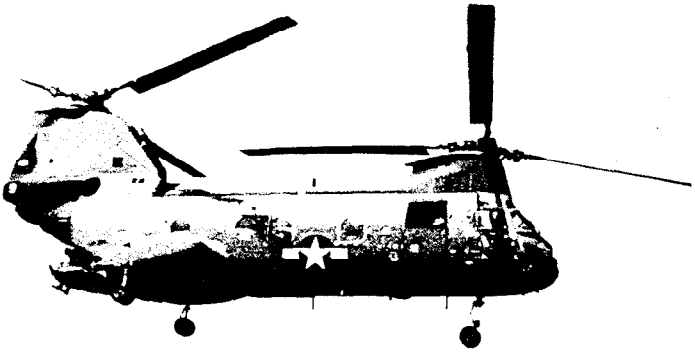

Figure 2.--CH-46.

Figure 3.--CH-53.

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aft ramp and hatch area, or carried externally. The CH-53 has a maximum airspeed of 150 knots, a cruise speed of 150 knots, and a speed of 100 knots with an external load. Communications include two-way UHF, FM, and HF radio. The ICS system has stations for all crew members and the heliteam leader in the cabin. It also has an external position for use by ground personnel below the pilot's window on the starboard side. The CH-53 carries the XM-218 caliber .50 machinegun. Load characteristics for use in preliminary helicopterborne assault planning are found in appendix A.

c. UH-1N.--The UH-1N (see fig. 4) is a twin-turbine powered, single main rotor utility helicopter. It is compatible with all amphibious assault ships. Skids provide landing mounts instead of wheels; however, ground handling wheels are provided for towing and shipboard handling. Personnel enter the aircraft through the hatch on either side of the aircraft. Cargo is loaded through the personnel hatches or carried externally. Maximum airspeed for the UH-1N is 130 knots with a normal cruising speed of 100 knots. Communications capabilities include two-way UHF, FM, and HF radio. In addition, a communications package, the command and control kit, can be installed for the use of the ground unit commander. The UH-1N may be flown with a single pilot and a qualified observer for certain specific missions. Because of its low silhouette and its ability to land in small, unprepared zones, the UH-1N is more suited for medical evacuation and emergency resupply in forward areas than are other types of helicopters. The UH-1N carries one GAU-2B/A 7.62mm machinegun and one M60D 7.62 mm machinegun. Load characteristics for use in preliminary helicopterborne assault planning are found in appendix A.

Figure 4.--UH-1N.

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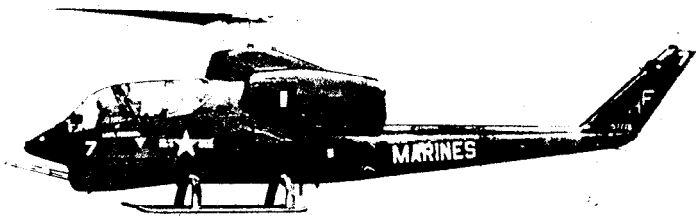

Figure 5.--AH-1J.

d. AH-1J.--The AH-1J (see fig. 5) is a light attack helicopter which was developed using the basic UH-1E airframe, rotor, and avionics system. The cruise speed for the AH-1J is 135-150 knots and the maximum speed is 190 knots in a dive. An older version is the AH-1G, a single engine aircraft with less firepower.

(1) The AH-1J chin turret mounts a three-barrel, 20mm cannon having a rate of fire of 750 rounds/minute and a carrying capacity of 750 rounds. It also has four external ordnance stations on the stub wings carrying a variety of machinegun and rocket pods weighing up to 2,200 pounds.

(2) The AH-1G, the earlier model of the AH-1J, has a chin turret which mounts a 7.62mm mini-gun and a 40mm grenade launcher. The capacity of the external ordnance stations is 1,640 pounds.

e. AH-1T.--The AH-1T is an improved helicopter derived by uprating the structures and drive train of the AH-1J helicopter and by incorporating provisions for employing the tube-launched, optically tracked, wire command link (TOW) guided missile system. The latter capability is in addition to the current weapons capability of the AH-1J which has been retained in the AH-1T.

f. OV-10A.--The OV-10A (see fig. 6) is a twin turboprop, multipurpose, fixed-wing, short takeoff and landing (STOL) aircraft. Two canted sponsons are mounted on the lower fuselage providing four external store stations housing four 7.62mm guns with integral ammunition supply and an additional store capacity of 600 pounds on each station. The OV-10A carries

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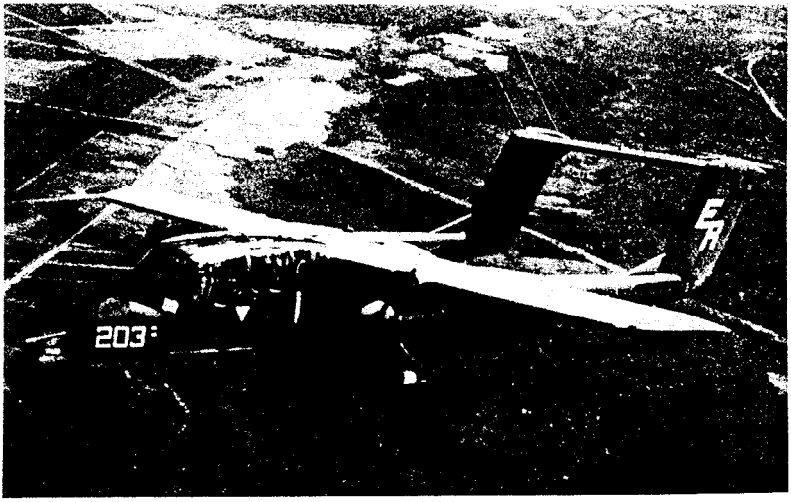

Figure 6.--OV-10A.

the GPU-2/A M197, three-barrel, 20mm machinegun. Additional weapons or a single external fuel tank may be installed on a centerline store station, 1,200 pounds maximum limit, under the fuselage. The maximum fuselage store loading, total all stations, is 2,400 pounds. With a proper mix of ordnance and external fuel, the OV-10A is able to perform armed reconnaissance or observation in support of the landing force. Other tasks include cargo transport, troop transport and control, and adjustment of artillery and naval gunfire. Time on-station can be computed for planning purposes as 120 minutes (190 minutes with 150 gallon external fuel tank) minus 33 minutes for each 50 nautical mile radius from the airfield to operating area.

f. KC-130.--The KC-130F/R (see fig. 7) is a five-member crew, four engine, turboprop, assault aerial refueler and transport aircraft with a cruising speed of 280-300 knots. Troops can be loaded through the entrance doorway on the port side of the fuselage, or through the aft ramp and hatch area. Cargo can be loaded through the aft ramp and hatch area. A passenger/parachutist door is located on each side of the fuselage near the aft end of the cargo compartment. It carries a maximum of 92 troops or 74 litters, plus two attendants. A portable winch is organic to the aircraft for loading and unloading assistance. Roller conveyors may be installed for aerial delivery or cargo handling assistance on the ground. For further information regarding load dimensions, weights, loading in pounds per square foot, and other specific information, reference should be made to FMFM 4-6, Movement of Units in Air Force Aircraft.

2303. WEAPONS

a. Automatic Weapons.--Automatic weapons employed by assault support aircraft are of two types: those designed for the self-protection of

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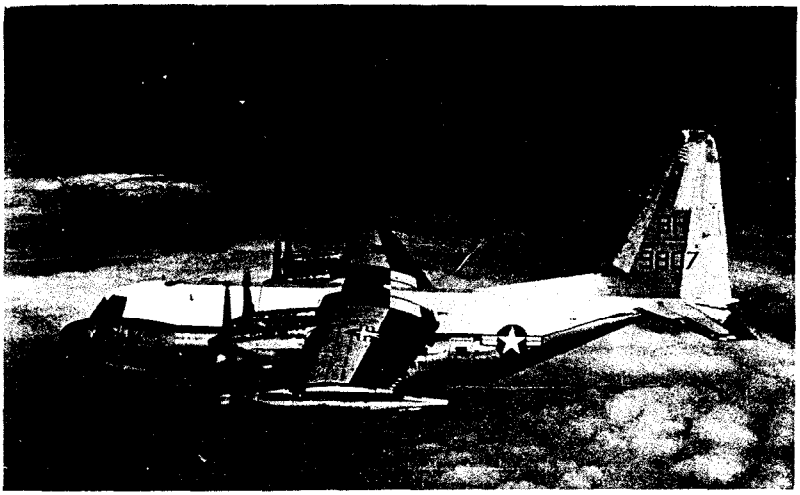

Figure 7.--KC-130.

transport helicopters and those intended for close-in, rapid response fire support by attack helicopters and lightly armed reconnaissance aircraft escorting the assault transport helicopters.

(1) The weapons used by the transport helicopters are the 7.62mm or .50 caliber machineguns commonly found in ground combat organizations. These are mounted in the helicopter cabin area and manned by crewmen.

(2) The AH-1G and OV-10 aircraft carry 7.62mm machineguns mounted in various turret, airframe, and/or pod combinations. These are forward firing weapons designed for rapid employment in a close-in support role.

(3) The AH-1G chin turret also mounts a 40mm grenade launcher with a 300 round/minute rate of fire.

(4) The AH-1J carries a three-barrel, 20mm turret mounted, forward firing weapons system for close-in fire support.

b. Rockets.--The OV-10, AH-1J/T, and AH-1G aircraft all have a rocket firing capability. These weapons normally will be limited to the 2.75-inch, 5-inch, and TOW rockets; although, as is pointed out below, not all of these aircraft are able to fire all of the foregoing weapons.

(1) The 2.75-inch rockets are mounted in 7-shot or 19-shot pods and may be fired in various combinations up to and including total pod firing. The optimum method of attack is total pod firing. For purposes of marking targets for attack, single smoke rounds are fired by the marking aircraft. Warhead types include fragmentation, shaped charge, and smoke.

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(2) The 5-inch rockets are mounted on the OV-10 and may be fired singularly or in combinations up to the pod capacity of four rockets. Warheads available are fragmentation, shaped charge, and smoke.

(3) The TOW missile is a tube-launched, optically tracked, wire guided missile capable of being employed from the AH-1J helicopter. Each aircraft is capable of carrying eight TOW weapons for antimechanized defense roles.

c. Flares.--Illumination support is an assault support task and can be performed by all types of aircraft using the MK-45 flare. The MK-24 can be carried both internally or externally. A single flare provides two million candlepower for a 3-minute duration. The number of flares capable of being employed by a single aircraft varies greatly with aircraft types and methods of carriage. For specific information concerning the flare-carrying capacities of individual aircraft, see the appropriate aircraft publications.

2304. GROUND SUPPORT

Ground support requirements for assault support aircraft are similar to those of other aircraft. The principle differences are reduced runways (landing areas) and no requirement for catapult launch or arrested landing capabilities. The requirements may be met through the use of expeditionary airfields or advanced sites.

a. Expeditionary Airfield (EAF) Concept.--The EAF concept (formerly short airfield for tactical support (SATS)) is a shore-based weapons support system which permits the employment of landing force aircraft within effective range of ground forces. It has the ability to launch and recover helicopters, V/STOL, and high performance tactical jet aircraft while supporting and maintaining up to one task--organized Marine VF/VA aircraft group, or a mixture of fixed and rotary wing aircraft under all-weather conditions. Currently under development is a vertical airfield for tactical support (VATS) for helicopter and vertical/short takeoff and landing (V/STOL) aircraft.

b. Advanced Site.--Helicopters can operate temporarily from advanced sites by using the following specialized equipment tailored to this specific environment:

(1) To reduce to probability of damage to personnel, helicopters, and equipment from flying debris, the advanced site should be surfaced. This can be accomplished readily and quickly by using a plastic matting called MOMAT. The 12 x 48 foot roles are helicopter transportable and air dropable. MOMAT will withstand heavy loads over uneven surfaces without damage to the material.

(2) Each engineer squadron is equipped with nine helicopter expedient refueling systems (HERS). Each system consists of a pump, two separators, and twelve fuel drums. These 500-gallon drums are shaped somewhat like a large rubber doughnut when fully fueled.

(3) A portable instrument landing system (ILS) is being developed to provide an all-weather capability at advanced sites. It will broadcast reliable precision glide slope so that aircraft can descend through an overcast into the site during minimal ceiling and visibility conditions which heretofore have restricted assault support.

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(4) Maintenance support equipment, such as test equipment, benches, hydraulic power units, and electrical power units must be moved ashore with assault support units to assure their continued support. This type of equipment is extensive, however, not on the scale and scope required for more sophisticated fixed-wing aircraft.

(5) Mobile maintenance facilities and collapsible shelters are provided for avionics maintenance. Vans are the standard 8x8x20-foot shelter, interconnected by cable and requiring external power.

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Section IV. ORGANIZATION FOR COMBAT

2401. *GENERAL*

The organization of units performing the primary assault support functions permits them to operate independently, or as a part of a larger task organized Marine aviation unit. The size and complexity of the operation alters very little the fundamental concepts of employment for assault support units. The principle variance is in the method that information is exchanged between the assault support unit and the supported unit. The method of exchange is prescribed by the controlling headquarters. These coordinating instructions are covered in Chapter 5 of this manual.

2402. *MARINE AMPHIBIOUS FORCE (MAF)*

a. The MAF, largest of the Marine air-ground task forces, is normally built around a division/wing team. However, it may range in size from less than a complete division/wing team up to several divisions and aircraft wings, together with an appropriate combat service support organization. The MAF is commanded by either a major general or a lieutenant general, depending on its size and mission. It is capable of conducting a wide range of amphibious assault operations and sustained operations ashore. It can be tailored for any intensity of combat and to any geographic environment.

b. The ground combat element of a MAF is usually a Marine division reinforced with appropriate force combat support units. However, the ground combat element can range in size from a division (-) to several reinforced divisions.

c. The aviation combat element of a MAF is usually a Marine aircraft wing task organized to conduct all types of tactical air operations; however, the aviation combat element can range in size from one to several aircraft wings. The aviation combat element is organized and equipped to facilitate its early establishment ashore in amphibious operations, and is designed for operations in an expeditionary environment. In a MAF which contains two or more aircraft wings, the senior wing commander is usually designated the tactical air commander of the MAF.

d. The combat service support (CSS) element of a MAF is a force service support group (FSSG) which provides maintenance, supply, engineer, motor transport, and medical support to the MAF. It is formed from the assets of one or more division support groups (DSG's), wing support groups (WSG's), and FSSG's depending on the size of the MAF. The components provide combat service support for a MAF through a central facility/location that supports all port, beach, and airfield operations. However, subordinate facilities may be established at separate locations.

e. A MAF may include an organic Marine amphibious brigade (MAG) or Marine amphibious unit (MAU) as a separate element in order to conduct air-ground operations separated sufficiently in space or time from other MAF elements or to temporarily utilize an in-being, cohesive MAB or MAU when the MAF is a follow-on force. Such operations involving a separate MAB or MAU would normally be of limited duration.

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2403. MARINE AMPHIBIOUS BRIGADE

a. The MAB is a task organization which is normally built around a regimental landing team (RLT) and a provisional Marine aircraft group. It is normally commanded by a brigadier general and is capable of conducting amphibious assault operations of limited scope. During potential crisis situations, a MAB may be forward deployed afloat for an extended period in order to provide immediate response and may serve as the precursor of a MAF. Under these conditions, MAB combat operations may be supported from the seabase, facilities ashore, or a combination of the two.

b. The ground combat element of a MAB is tailored to accomplish the mission assigned; however, the ground combat element of a MAB will normally equate to a regimental landing team.

c. The normal aviation combat element of a MAB is a provisional Mairne aircraft group including elements from the wing support group. This provisional Marine air group has substantially more varied aviation capabilities than those of the air element of a MAU. It contains those antiair warfare capabilities required by the situation. Unlike the MAU, the aviation combat element of a MAB is organized and equipped to be capable of early establishment ashore as existing airfields in the landing area become available. Should the landing area not contain suitable airfields, an expeditionary airfield will be developed using assets organic to the MAB.

d. The combat service support element of a MAB is a logistic support group (LSG) which includes significant resources from the DSG, WSG, and FSSG. Detachments from Navy combat service support resources are also included.

e. Each division/wing team, when reinforced by appropriate force troops units, has the capability to deploy two MAB's for separate missions should unusual circumstances require such flexibility. Deployment of a third MAB is precluded by lack of sufficient command and control and combat service support assets. Moreover, this same limitation would prevent the deployment of the division, wing, or MAF headquarters while two MAB's are operational. Accordingly, subsequent deployments from the division/wing team would have to be organized either for augmentation of one or both of the deployed MAB's or for amalgamation of all remaining division/wing assets with one or both of the MAB's to form a MAF.

2404. MARINE AMPHIBIOUS UNIT

a. The MAU is a task organization which is normally built around a battalion landing team (BLT) and a composite squadron. It is normally commanded by a colonel and employed to fulfill routine forward afloat deployment requirements. The MAU provides an immediate reaction capability to crisis situations and is capable of relatively limited combat operations. Although the MAU has the capability for conducting amphibious assaults, such operations are not routinely envisioned. When committed, the MAU is normally supported from its seabase. The MAU is considered to be the forward afloat deployed element of a larger landing force, such as the MAB, which would be constituted as required from CONUS and/or forward based combat ready Fleet Marine Forces.

b. The ground combat element of a MAU is normally a battalion landing team.

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c. The aviation combat element of a MAU is normally a composite squadron which may include two or more types of helicopters and elements from the wing support group. In some siturations, the composite squadron may also include V/STOL and fixed-wing observation aircraft. Depending on the nature of the operation, a DASC may be provided the MAU for control of aircraft ashore. Under such circumstances the DASC is normally collocated with the BLT FSCC.

d. The combat service support element of a MAU is a logistic support unit (LSU) and is formed from elements of the DSG, WSG, and FSSG. Detachments from Navy combat service support resources are also included.

e. The preplanned and coordinated employment of two MAU's simultaneously in a single combat mission is not contemplated. In situations where employment of readily available forces requires bringing together two MAU's originally formed for separate and independent operations, a MAB will be formed. In exceptional circumstances, a MAU may be a component of a larger MAGTF for a limited period.

2405. INDEPENDENT DEPLOYMENTS

Assault support tasks may be accomplished by units operating on independent deployments. Helicopter squadrons may engage in vertical assault airlift, air delivery, and air evacuation just as VMGR squadrons may be tasked to perform air delivery and air evacuation in support of friendly forces. Squadrons so deployed may or may not be augmented with supporting and/or security forces. Such deployments have occurred frequently in the past and must be considered when preparing for future operations.

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CHAPTER 3

AMPHIBIOUS OPERATION

Section I. INTRODUCTION

3101. GENERAL

The amphibious operation integrates ships, aircraft, weapons, and landing forces in a concerted military effort against a hostile shore. The amphibious assault builds up combat power ashore from an initial zero capability to a fully coordinated striking power. This is frequently accomplished in the face of high seas, rough surf, and adverse hydrographic features, in addition to the problems normally encountered in land warfare. The closest cooperation and detailed coordination among all participating forces in an amphibious operation are essential to success. There must be a clear understanding of the mutual responsibilities and of the special capabilities and problems of each component. Because the assault support elements are closely tied to the ground combat element, their logistic needs, the shipboard operations, and the air control system, a mutual exchange and understanding must exist. This chapter provides an insight into the capabilities and problems of the assault support forces in the amphibious operation.

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Section II. EMPLOYMENT OF ASSAULT SUPPORT MEANS

3201. GENERAL

Assault support, both rotary and fixed-wing, are employed primarily as movers of personnel, equipment, and supplies. The ranges involved, the purpose intended, the area and scope of operations, the base area, and the compatibility with other air traffic will all affect the use of assault support aircraft.

3202. PRINCIPAL CONSIDERATIONS

The principal considerations in the employment of assault support aircraft are:

a. Availability.--The numbers, models, and capabilities of aircraft assigned.

b. Helicopter Supportability.--Availability of assigned helicopters to support the concept of operations ashore regarding:

(1) Location, nature, and extent of landing zones, including ease of identification from the air.

(2) Enemy capabilities and dispositions, particularly the location, type, and density of enemy antiaircraft installations.

(3) Nature of the terrain over which the helicopterborne forces contemplate operations after landing.

(4) Requirements for logistic support, including aeromedical evacuation of casualties.

(5) Requirements for air, naval gunfire, and artillery fire support.

(6) Available helicopter lanes to and from the landing zone(s), and their restrictive effects on the employment of air, naval gunfire, and artillery fire support of other forces.

c. Limited Helicopter Supportability.--Inclusion of alternate plans for carrying out the landing when helicopter use is limited due to adverse weather or increased hazard:

(1) Revised landing plan substituting landing craft for helicopters.

(2) Revised dates or times for the landing to enable helicopter participation.

d. Fixed-Wing Assault Transport Supportability.--The factors affecting helicopter supportability listed in paragraphs 3202b(2) through (6) above, are applicable in regard to fixed-wing assault transport supportability. In addition, the nature, extent, and location of airfields, airfield sites, and air control and warning sites which determine the capability of shore-basing aviation assets are a consideration.

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the ground combat elements. It encompasses the movement from ship-to-shore for assault and reserve units, the relocation of reserve units, and the movement of forces from one shore location to another to enhance the assault in that sector. The vertical assault airlift is characterized by intense activity, the details of which will be explained throughout the text.

3205. FUNCTIONAL INTEGRATION

The functional integration of assault support means with aviation assets from other functional areas is an absolute necessity. Normally in the sequence of force application by air means, the assault support forces will be the last to be employed, excepting aerial refuelers. The requirements for integration commence in the fuel pits, extend down taxiways, cross flight decks, entail launch and recovery operations, and include coordination of the effort in the application of power ashore. The orchestration of reconnaissance, electronic warfare, combat air patrol, offensive air support, aerial refueling, and vertical assault aircraft efforts operating in support of and in proximity to the division front, which may extend to 30 miles, is a major task. Utilizing normal availability figures, the helicopter force alone averages up to three aircraft per mile along a division front.

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Section III. PREPARATION

3301. GENERAL

Preparation for the amphibious operation by assault support elements takes many forms. Training must be conducted to ensure personnel and organizational readiness level requirements are met. Rehearsals are required to test equipment, plans, timing, combat readiness, and communications. Finally, preparation must include measures for providing operational security.

3302. TRAINING

Training requirements vary with types of aircraft and the nature of the planned operation. The types of training covered here are not an all inclusive list. Much in the way of training will be in terms of training provided by the assault support means as opposed to training for the assault support means. Often in the area of assault support, initial training requirements will have to be deduced by the commanders and crews. Such decisions require a sound understanding of the mission and role of supported units. The following training tasks are typical of those that may have to be conducted in preparation for an amphibious assault:

a. Air Control.--Air controllers and aircrews must have the opportunity to work together to ensure control and navigational aid, provided by controllers, is precise; particularly, in the areas of airdrop and battlefield illumination operations.

b. Airdrop.--The delivery of cargo by airdrop requires integration between aircrews, fixed-wing and helicopter, and personnel from the air delivery platoon in the force service support group.

c. Battlefield Illumination.--Requiring training by aircrews and ordnance personnel, the area of battlefield illumination is one that must be carefully monitored as it is fraught with fire hazards.

d. Landing and Takeoff Techniques.--Any requirements for special landing and takeoff techniques must be accounted for and procedures established to compensate accordingly. Consideration must be given to obstacles, terrain, terrain elevation, temperature, soil texture, and size of landing areas.

e. Field Carrier Landing Practice (FCLP).--Individual crew members will have to be trained or provided refresher training in FCLP's in preparation for shipboard operations.

f. Landing Zone Marking and Direction.--The marking of the helicopter direction within landing zones by logistic support personnel is an area of training which will provide the commander with a smoother operation during the initial stages of logistic support area helicopter operations. See appendix B for information on landing zone operations.

g. Hoist and Rappel.--Hoisting and rappeling operations must be conducted to ensure proficiency on the part of all crewmembers.

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h. Wave Landings.--Wave landing techniques require close coordination on the part of a number of aircrews. In addition, the ground combat component personnel must be trained in proper procedures for personnel emplanement and deplanement during helicopter wave landing operations. This will ensure launches are conducted expeditiously and safely.

i. Casualty Evacuation.--Peacetime casualty evacuation is either simulated or, in actual cases, conducted without the imposing demands of true combat. Practice must be conducted by all concerned to ensure that casualties are expeditiously loaded and secured aboard the helicopter in such a manner as to avoid further harm.

j. Security.--Practice for security in operations is a necessity. In a sophisticated environment, secure voice operations are mandatory and the enemy capabilities might be so great as to require total radio silence throughout the conduct of a vertical assault airlift.

k. Navigation.--When the enemy forces are capable of retransmission of beacon and air direction signals that result in erroneous navigation inputs, the pilot must rely on dead reckoning navigation. Thus, aircrews must be trained to maintain and check positions by the use of time and distance methods. Also, terrain models should be built and provided for study by the aircrews.

3303. REHEARSAL

a. Rehearsal is the period during which the prospective operation is rehearsed for the purpose of:

(1) Testing adequacy of plans, timing of detailed operations, and combat readiness of participating forces.

(2) Ensuring that all echelons are familiar with plans.

(3) Testing communications.

b. The decision to conduct an integrated rehearsal involving the major elements of the amphibious task force rests with the commander amphibious task force. This decision is made early in the planning phase. In the event that integrated rehearsals with naval elements are not possible, the commander landing force usually requires a staff rehearsal as a minimum. This is done to check the communication system and staff functioning of all assault elements, combat support, and combat service support units. Integrated rehearsals involving all troops and support elements are desirable, though, in some cases, it may not be possible or expedient.

c. During rehearsals, conditions are made as realistic as practicable. However, flight distances may be reduced and other measures taken to minimize helicopter operating time in order to ensure maximum helicopter availability for the actual assault. Rehearsals of control agencies and coordination with supporting arms is of the utmost importance.

d. For a detailed discussion of rehearsals, see LFM 01, Doctrine for Amphibious Operations.

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3304. OPERATIONS SECURITY

Operations security encompasses "those actions that are necessary and appropriate to deny the enemy information concerning planned, ongoing, and completed operations." All personnel must be forewarned as to the threat aspects in various areas such as:

a. Electronic Surveillance.--The hostile capabilities in the areas of radar, IFF, and similar active emitters.

b. Signals Intelligence.--The hostile capabilities in the area of communications, electronics, and telemetry communications.

c. Human Intelligence.--The hostile capabilities and practices in the areas of espionage, subversion, exploitation of lost, captured, or misplaced documents, and prisoner interrogation.

d. Open Literature.--The hostile capability to exploit news media releases and technical publications divulging information relative to weapons, tactics, and operations and to exploit unclassified military communications, such as weather and flight plan traffic, by overt means.

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Section IV. EXECUTION

3401. GENERAL

a. Assault support, as is implicit in the discussions above, is diverse in its functions and requires careful planning to achieve the desired and optimum results. No manual can provide an adequate format for the employment of assault support, since each operation will present its own problems to the commander. Yet, some guidance is possible if one speaks to the issue in general terms. Such is the aim of the succeeding paragraphs under the headings of pre-D-day, D-day, and post-D-day. Again, it is cautioned that circumstances, not dogma, dictate the employment of assault support assets.

b. It must be emphasized that assault support operations are conducted solely for the purpose of providing assistance to other elements of the landing force. But, two precautions are in order:

(1) The availability of assets will most likely be less than enough to satisfy the requests of all the potential users. As a result, the requesting unit commander must ensure that the following steps are taken to get the maximum use of his assault support:

(a) All requests must be forwarded through the proper channels with the correct priority assigned to the request.

(b) Whenever possible, tasks must be consolidated to permit the accomplishment of multiple tasks or missions by a single flight of aircraft.

(2) Speed of execution and aggressiveness in the assault are of particular importance in the amphibious operations and are keys to the protection of the assault support force. Until such time as sophisticated countermeasures against heat seeking missiles and antiaircraft weapons are developed, surprise, to preclude massing of enemy defenses, will be assault support aircraft's best protective measure.

3402. PRE-D-DAY OPERATIONS

Following the deployment of aviation units into the amphibious objective area, operations are commenced in preparation for the assault. As the reconnaissance, antiair warfare, and offensive air support flights progress, assault support roles develop. The inflight refuelers will probably be needed by these aircraft which often operate at extended ranges to perform their missions. The air delivery of critical personnel and supplies, to ensure the continued operation of aircraft and support equipment, will begin. Search and rescue operations are commenced, reconnaissance teams are inserted and extracted as necessary, and agencies comprised of personnel from various organizations develop their internal working relationships. Pre-D-day evolutions may include antisubmarine operations, minesweeping operations, and such other efforts as the commander amphibious task force may direct. The scope of this manual requires that discussion of those evolutions be omitted. Diversion and deception are covered in LFM 01, Doctrine for Amphibious Operations. The antisubmarine warfare and minesweeping operations are primarily naval tasks and would limit assault lift

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capabilities if conducted by landing force aviation. These activities are discussed in the appropriate NWP and NWIP series of publications. The following tasks and/or task organized groups will be common to most amphibious assaults and are performed or formed to aid in accomplishment of the assault support role.

a. Inflight Refueling.--Inflight refuelers operate as necessary on either a fixed station or along a specified course. The specific rendezvous point, time, altitude, course, and speed are established for each flight to conduct refueling operations. Predetermined amounts of fuel are dispensed and receiver aircraft are disengaged to continue with their assigned mission. Details for the conduct of aerial refueling are contained in the Naval Air Training and Operating Procedures Standardization Program (NATOPS) Air Refueling Manual.

b. Search and Rescue.--SAR units maintain an alert status as prescribed. The search and rescue coordination center monitors the assigned frequencies and prepares to put specific recovery plans into effect as appropriate. Recognition and identification methods for use in the conduct of SAR missions are reevaluated and updated on a continual basis.

c. Initial Terminal Guidance Teams

(1) Initial terminal guidance teams of the force reconnaissance company or the reconnaissance battalion, Marine Division, have the inherent capability to provide terminal guidance for initial helicopter waves in the landing zones. The teams are composed of personnel who are inserted into the landing zone in advance of the landing zone control team (LZCT). They execute prelanding reconnaissance tasks and establish and operate signal devices for guiding the helicopter waves from the initial point to the landing zone. The initial terminal guidance teams may be the first elements to make contact with the enemy. It is of the utmost importance that they promptly report any enemy activity which may counter the landing. The use of initial terminal guidance teams may increase the difficulty or even prevent the use of landing zone preparation fires due to the presence of friendly troops in or around the landing zone. Duties of the team may include:

(a) Determining if there are obstructions in the landing zone, including radiological hazards.

(b) Giving advance notice of enemy position.

(c) Establishing homing and guidance devices.

(d) Recommending action to be taken by following waves.

(2) If landing zone preparation precludes use of initial terminal guidance teams, a homing device may be placed in the zone by an aerial drop immediately after the preparation is concluded.

d. Reconnaissance Party Insertion and Extraction.--A reconnaissance party insertion and extraction is the emplacement and withdrawal, respectively by helicopter, of patrol size teams into unsecured areas in order to extend the reconnaissance capability of friendly forces. The surreptitious introduction of the patrol will preclude enemy reaction.

(1) A flight briefing is conducted for the transport and armed escort pilots and the TAC(A). This is followed by a detailed reconnaissance

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briefing covering the latest intelligence, the mission, the objectives, the landing/drop zones, the frequencies, and the landing zone preparation to be conducted.

(2) The reconnaissance patrol is then inserted by airdrop, helicopter landing, or rappeling into the desired zone. Retraction zones and methods must be designated for the removal of reconnaissance parties. Briefings for flight crews are the same for extractions as insertions.

e. Tactical-Logistical (TACLOG) Groups.--TACLOG groups are the principal advisors to the naval control organization during the ship-to-shore movement. They receive and process requests from helicopterborne units. The helicopterborne unit will form a TACLOG group aboard the flagship of the helicopter transport group/unit. TACLOG concurrently advises the HDC and helicopter logistics support center (HLSC) of requests initiated by the preparation of troops, supplies, and equipment for movement from various ships. For a detailed discussion of the TACLOG group, see FMFM 4-1, Logistics and Personnel Support.

f. Helicopter Logistics Support Center.--The HLSC is formed by the helicopter transport group/unit commander and is located in proximity to the HDC and TACLOG. The officer in charge is the helicopter logistics coordinator.

(1) The mission of the HLSC is to coordinate the debarkation in accordance with the landing plan. Deviations from the landing plan, including the debarkation of on-call and nonscheduled serials, are coordinated by the HLSC in accordance with the priorities expressed by the helicopterborne unit.

(2) The HLSC is concerned with the coordination of debarkation from individual ships of the helicopter transport group/unit. After receipt of a request, TACLOG concurrently advises both the HDC and HLSC in order for the HDC to allocate helicopters and HLSC to initiate notification of the specific ship of the impending requirement. After allocation of helicopters has been confirmed by the HDC, the HLSC provides the details to the ship concerned.

3403. D-DAY OPERATIONS

D-day operations center around the actual assault. Normally, amphibious assaults are two-pronged, being both surface and helicopter landed. LFM 01, Doctrine for Amphibious Operations, and NWP 22-3(C), Ship-to-Shore Movement, are primary source documents for information on the conduct of both waterborne and helicopterborne movement. The discussion of D-day operations in this paragraph are oriented to the helicopterborne movement of the assault and support forces.

a. Air Operations.--Air operations will include intensified air defense measures, air attacks in the vicinity of landing zones and helicopter approach and retirement lanes, air escort measures to neutralize or destroy enemy antiaircraft and other helicopters and fixed-wing transports, and such other miscellaneous operations as may be necessary to support the assault.

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b. Prelanded Reconnaissance.--Obstacles to helicopter landings may be emplaced by the enemy very quickly, and local weather conditions may not be as forecast. Therefore, it is essential that last minute confirmation of reports on landing zones and approach lanes be obtained. This may be accomplished by aerial or ground reconnaissance activities or initial terminal guidance teams. Care must be taken, however, not to divulge landing zones and approach lanes to the enemy.

c. Helicopter Coordinator (Airborne)

(1) An HC(A) will be assigned for the initial assault and will be airborne over the objective area in a command and control (C&C) helicopter. The HC(A) will be an experienced naval aviator knowledgeable in all aspects of helicopter operations. The transport helicopter flight leader will act as HC(A) when an HC(A) has not been assigned.

(2) It is imperative that the HC(A) be a participant in the planning phase and be thoroughly knowledgeable in every facet of the operation.

(3) During the preparation phase, the HC(A) requests the assistance of assigned observation and tactical support aircraft through the DASC and appropriate TAC(A)'s.

(4) During the execution phase, the HC(A) and the helicopter-borne unit commander will be airborne in the same (C&C) helicopter for the purpose of arriving at timely and coordinated decisions such as:

(a) Final selection of landing zones.

(b) Selection of landing zones for succeeding waves, if required.

(5) The HC(A) is responsible for execution of the following functions under cognizance of the TACC and HDC:

(a) Airborne coordination and control of helicopters while en route and within the objective area.

(b) Coordinating activities of assigned airborne forward air controllers and/or naval air observers (NAO's). The HC(A) will ensure that fixed-wing preparation strikes, controlled by the AFAC's/NAO's, are being accurately conducted and are timely and sufficient.

(c) Advising the TACC and HDC on the status of the landing to include any change made in accordance with subparagraphs (4)(a) and (4)(b), above.

(6) The HC(A) will provide information concerning:

(a) Weather along the approach and retirement routes and in the landing zones.

(b) Enemy operations observed along the approach and retirement routes.

(c) Alternations to the helicopter routes.

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(d) Employment of supporting arms, including NAO activities.

d. Naval Aviation Observer

(1) During an amphibious helicopterborne assault, the NAO controls close air support strikes in the vicinity of the landing zones and assists the HC(A) in airborne coordination and control of helicopters. He is a qualified air observer who is familiar with all types of aircraft that he will be controlling and weaponry that is available. An NAO may be designated for each landing zone. The NAO utilizes fixed- or rotary-wing assets in performing his mission. Tasks that may be assigned are:

(a) Control landing zone preparation.

(b) Detection and timely engagement of targets so as to neutralize or destroy them.

(c) Control close air support missions.

(d) Control armed helicopter fire suppression missions.

(e) Control artillery and naval gunfire missions when required.

(f) Report intelligence information.

(g) Mark landing zones and control approach, landing, and departure of the transport helicopters.

(h) Other tasks as directed by the controlling HC(A).

(2) If armed escort is provided for the transport helicopters while traversing the approach and retirement lanes, an additional AFAC should be assigned with the task of detection and timely engagement of enemy targets so as to neutralize or destroy them.

e. Command and Control Helicopter

(1) The helicopterborne unit commander and the HC(A) may be airborne in a command and control helicopter. This will allow the helicopterborne unit commander to communicate with his subordinate unit commanders and permit him to arrive at timely decisions in coordination with the HC(A).

(2) The command and control helicopter will provide the helicopterborne unit commander and the HC(A) with the means to accomplish the following:

(a) Observe the landing zones and change them, if so authorized, or recommend changes to higher echelons.

(b) Observe initial helicopter waves landing.

(c) Coordinate and influence the attack of subordinate units in the landing zone.

(3) In an operation with multiple landing zones, subordinate commanders may require command and control helicopters to control and coordinate their maneuver elements.

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f. Preparation for the Assault

(1) Detailed procedures for enplanement of personnel and the stowage and handling of aircraft vary according to the characteristics of each ship and the procedures established aboard that ship. There will be a variety of deck and troop space configurations even among ships of the same class. For this reason, no ship's characteristics are presented in this discussion, which is designed to provide a general understanding of the factors involved in preparation for the assault.

(2) Helicopters receive last minute maintenance and preflight checks to ensure readiness for the coming missions. Radios are checked and adjusted, fuel tanks are filled to proper levels, and initial wave aircraft are spotted on the flight deck for launching. Prior to the assault, ammunition, vehicles, fuel pods, and other cargo must be palletized, spotted, and fitted with slings, as necessary. Forklifts must be serviced and trained operators standing by to use them.

(3) Enplanement of the helicopterborne unit is under the overall control of the ship's combat cargo officers, assisted by the troop unit, and the ship's company personnel.

(a) The primary flight control (PriFly) is the control center of the ship during flight operations. It is staffed by the ship's air officer. All flight operations incident to launching and recovering helicopters are controlled from primary flight control.

(b) The flight deck and hangar deck officers are in charge of operations on their respective decks, assist the air officer in the control of helicopter launch and recovery operations on the flight deck, support operations on the hangar deck, and control the operation of the elevators.

(c) The troop debarkation officer is a troop unit officer whose mission is to control and expedite heliteams from the time they are assembled until they report to the control point for enplanement. He must also monitor progress of the troop lift and make progress reports to higher authority. He will require assistance on the hangar deck and flight deck to ensure an orderly flow of troops from assembly area to aircraft.

(d) The combat cargo loading officer is a ship's officer who controls movement of personnel and cargo to the flight deck for helicopter lift. His duties require close coordination with the troop debarkation officer, the flight deck officer, and the hangar deck officer. He maintains a record of all troops and cargo lifted by helicopter and advises appropriate ship's officers on the status of the lift.

(e) The flight deck guides are ship's company personnel responsible for safely leading heliteams from control point to loading point.

(4) Enplanement procedures:

(a) Troops are initially alerted in an assembly area located on the hangar deck. Heliteams are assembled, passenger manifests prepared, life preservers buckled on, and all personnel readied for the enplanement.

(b) From the assembly area, heliteams move to a control point, normally adjacent to the flight deck. It should be large enough to

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accomodate sufficient personnel for one complete deck launch. Coordination of troop movements from the assembly area to a control point is an important function of the troop debarkation officer and the combat cargo loading officer.

(c) From the control points, troops are led by flight deck guides to their respective helicopter loading points where they enplane under the supervision of the helicopter loading supervisor. The guides will pick up passenger manifests from the heliteam commander at the control point.

(d) During enplaning, consideration must be given to the safety of personnel and helicopters. Radio antennas, which could become entangled in rotors, must be dismantled or extreme caution used. Troop equipment attached to packs may damage the aircraft during the loading, en route, and unloading phases.

g. Conduct of the Landing

(1) General.--The helicopterborne landing is conducted by executing the plans prepared jointly by the helicopterborne unit, the helicopter unit, and the other responsible units discussed herein.

(2) Ship-to-Shore Sequence

(a) When directed, helicopters comprising the first assault waves are readied and spotted on the flight decks of the assault ships. On signal, troops enplane, and the helicopters are launched.

(b) Flights of helicopters rendezvous about their parent ship and proceed as waves to the landing zone, or to a previously designated wave rendezvous point where flights from several ships rendezvous to form a single wave.

(c) At the designated control points, the helicopter wave leader reports his wave to the appropriate air control agency. The wave proceeds via the designated approach route to the landing zone. En route attack and/or helicopter gunship aircraft cover the helicopter waves and provide protection from enemy ground fire. An HC(A) or TAC(A) may assist in guiding and controlling the wave to its destination.

(d) When helicopters report to HC(A) for control, they should be briefed on any changes to the prebriefed landing zone situation, to include the following:

1 Wind direction and velocity.

2 Physical obstructions in the landing zone.

3 Friendly and enemy positions.

4 Methods by which the landing zone will be marked.

5 Other matters of special interest.

(e) During the initial phase of a landing, before the landing zone control party is established in the landing zone, and in the absence of initial terminal guidance teams, the HC(A) will control helicopters

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from the initial point (IP) to the landing zone on the helicopter control (HC) net. Upon establishing the LZCP in the landing zone, the landing zone control officer will control helicopters from the IP to the landing zone.

(f) On approach to the landing zone and immediately prior to the landing, the pilot shall inform the heliteam leader of the direction in which the helicopter will be headed when landed.

(g) Upon reaching the landing zone, troops deplane and helicopter waves return to the ships to refuel and enplane subsequent troop serials. Subsequent waves follow the same general procedure.

h. Assault.--The action of the helicopterborne troops ashore is usually executed in two phases: the initial assault and the exploitation. The initial assault involves seizing and establishing landing zones which may be used as a base of operations ashore. The second task involves an aggressive exploitation of the initial advantage attained by conducting further ground or helicopterborne operations ashore. These two tasks are not separate and distinct, for the success of the initial assault is vital to accomplishing subsequent tasks of the unit. When the situation permits, and it is apparent that the initial assault will be successful, exploitation should begin immediately. Such exploitation may be the execution of preplanned deeper landings and may involve redirecting elements scheduled to land after the initial assault waves.

(1) Securing the Landing Zone.--The first and most vital task of the helicopterborne unit is seizing the landing zone and destroying the enemy therein. Ground action is initiated immediately after landing of the first wave and is continued until the landing zone is secure. Plans for initial action to secure the landing zone must be prearranged in detail and each unit commander must thoroughly understand his mission and how the tasks of his unit fit into the overall plan. All leaders must continuously evaluate the situation from the beginning of the operation until the assigned mission is accomplished.

(2) Technique of Assault.--The technique of assault employed by the helicopterborne unit is a tactical decision for the helicopterborne unit commander. The composition of waves, assignment of responsibility, establishment of control, and initiation of the attack to seize objectives are infantry element responsibilities. These tactics and techniques are not within the purview of this publication and may be found in FMFM 3-3, Helicopterborne Operations.

i. Landing Categories.--The helicopterborne ship-to-shore movement normally continues throughout general unloading. Once the helicopterborne assault is completed, the helicopters are employed to support landing force tactical and logistic requirements ashore and to support general unloading of assault shipping. Landing categories in the helicopterborne ship-to-shore movement include:

(1) Scheduled waves consisting of those assault elements of the landing force, together with their initial combat supplies, to be landed by helicopter for which time, place, and formation for landing have been determined. Landing of this category proceeds in accordance with the helicopter employment and assault landing table without change, except in emergency. The landing of scheduled waves usually begins at H-hour or other

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specified time and continues until all elements in this category are landed.

(2) On-call waves consisting of those helicopterborne units with their initial combat supplies or emergency supplies which may suddenly be needed ashore. The time or place of employment cannot be predicted. These units, with their equipment or specially selected supplies, may be requested for possible augmentation, replacement, or exploitation as the situation ashore requires. Because of the urgency that may be attendant upon landing, elements or items in other landing categories may be interrupted to permit on-call landing. The number of oncall units or items must be preserved. On-call elements to be landed by helicopter are held in readiness aboard ship. These elements are listed in the helicopter employment and assault landing table following the scheduled waves. They are landed at the request of the appropriate troop unit commander.

(3) Nonscheduled helicopter movements consist of any remaining units of the landing force and their initial combat supplies, and any replenishment equipment or supplies which are to be helicopter lifted and which are not included in either the scheduled or oncall categories. The landing of this category commences upon completion of scheduled landings. Once started, it may be interrupted to permit oncall landings or landings of other selected units or supplies, or may be temporarily suspended because of unforeseen conditions. Modifications should be kept to a minimum since alterations will complicate the helicopter ship-to-shore movements.

j. Medical Evacuation (MEDEVAC) Procedures.--The use of helicopters for medical evacuation has greatly increased the casualties' chances of survival. The timely treatment of wounds has resulted in a much lower death rate from wounds than previously occurred. Though the means of evacuation are rapid and efficient, there are certain inherent hazards involved in the conduct of such missions, even though the missions are carefully planned and professionally executed. The considerations for ground and air elements involved in evacuating casualties by helicopter pertain to both helicopterborne amphibous assaults and subsequent helicopterborne movements ashore.

(1) In the early stages of vertical envelopment/helicopterborne assault operations, evacuees may be removed from the battlefield in two ways: by transport helicopter returning to designated amphibious ships with helicopter platforms or to a pickup zone ashore, or by a preplanned medical evacuation helicopter accompanying the assault formation. There are a number of advantages as well as disadvantages in the use of either of these methods.

(a) The most rapid response is achieved by using a returning transport helicopter when the landing is conducted from amphibious ships with helicopter platforms, since they are the pickup points for additional assault waves and maintain a medical facility aboard.

(b) Medical assistance is not available on board the returning transport helicopter. Moreover, in a helicopter movement ashore, the transport will be required to return to a medical facility which may not be in the proximity of the pickup zone. In this case, the ground element will lose the assault lift capability of that transport for the time required to complete the evacuation.

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(c) A helicopter attached to the assault formation, and assigned the specific task of medical evacuation during the initial assault landing, provides the best medical assistance. It will have the necessary medical personnel and equipment on board to ensure a high probability of evacuation success.

(d) When a helicopter is assigned to the single task of medical evacuation during the initial stages of an assault, its lift potential is not available to assist ground unit maneuver.

(2) The choice of either method in handling initial evacuation needs is a planning decision to be made by the helicopterborne commander. The method selected is contingent upon the expected initial enemy contact in the landing zone and the desired employment of helicopter assets for the specific helicopterborne assault to be conducted.

(3) After the initial helicopterborne assault, continuous helicopter medical evacuation is provided by deck or strip alert MEDEVAC crews available to all combat units on call. Effective use of these alert helicopters is dependent upon landing zone organization and evacuation classification.

(a) The organization of evacuees in the pickup zone by ground element medical personnel will result in the most critical casualties being evacuated first and the less seriously wounded and killed in action's (KIA's) being evacuated at a later time or in a second helicopter. Casualty placement in the pickup zone should be as close as possible to the desired point of pickup consistent with personnel safety.

(b) The helicopter should be directed to the pickup point by voice communications, hand signals, colored smoke, and/or colored panels during daylight missions, and by voice communications and landing zone identification lighting and illumination during night missions. Landing zone illumination is best provided by the helicopter landing light system or parachute type flares. Ground source illumination identifies a zone adequately, but tends to blind the pilot. The enemy proximity may mitigate against the MEDEVAC helicopter utilizing its landing light, in which case, the ground commander must have means available to define the landing zone.

(c) MEDEVAC pickup zones cannot always be selected in favorable terrain, but mission success is largely dependent upon a pickup site that will accommodate the size of the helicopter employed. The site should not contain high obstacles or debris which will be blown by rotor wash, and should offer some measure of protection for the vulnerable helicopter from enemy direct fire weapons. This protection can be provided by terrain cover, plus an effective base of suppressive fire during the critical landing, loading, and departure phases of an evacuation conducted in forward battle areas. It may be more expeditious to move the MEDEVAC to a landing zone large enough to accommodate a helicopter than to attempt the MEDEVAC via hoist from a confined or densely vegetated area.

(d) A specific situation briefing is necessary for successful execution of evacuation missions. This information is relayed to the MEDEVAC pilot by means of radio communications from the ground element and contains the following:

1 Location of the pickup zone.

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2 Approximate size of the pickup zone (in established units of measurement; i.e., feet, meters, etc.).

3 Ground obstacles in the zone.

4 Wind direction across the zone (example, from the north).

5 Means to be used for zone marking.

6 Friendly positions in terms of direction and distance from the zone.

7 Enemy positions, if known.

8 Direction from which the helicopter may draw fire and type weapons, if known.

9 If the helicopter crew will be cleared to return enemy fire.

10 Number and precedence (routine, priority, urgent) of casualties in the zone. Type of wound (head, stomach, leg, etc.).

(4) The precedence (routine, priority, urgent, or mandatory as defined in paragraph 4803) assigned to battlefield casualties determines their sequence of evacuation. Casualties must be properly classified to ensure that the most seriously wounded are evacuated first. A casualty classified emergency will be evacuated before one classified priority, even though the emergency mission may have been received later than the priority mission. Equally important to mission success is the proper classification of all casualties in order that true emergencies be lifted first, without regard to which ground unit has casualties to be moved.

3404. POST-D-DAY OPERATIONS

Post-D-day operations will be comprised primarily of logistics operations. The tactical movement of units will be accomplished to counter the enemy threat or to exploit a breakthrough. In the face of the mobile and well armed enemy as envisioned in modern day conflict, the mobility of the assault forces utilizing aircraft for maneuver is a potential weakness. Through the use of mechanized forces and his own helicopter forces, the enemy may employ rapidly his air defense weapons. Thus, efforts to utilize the assault support assets of the landing forces by assault troops or their supporting arms may be met with overwhelming resistance. Speed of response must be assumed to be a viable enemy capability. The friendly forces are prepared to conduct three types of activities: downed helicopter recovery, night operations, and logistic support.

a. Downed Helicopter Recovery Operations.--Successful helicopter recovery operations, in event an aircraft is forced down due to the mechanical failure or enemy fire, are primarily dependent upon the expeditious and coordinated actions of the maintenance recovery team, the security element, and the recovery vehicle. Established for the recovery of helicopters employed are the following:

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(1) Organization by job assignment of type aircraft maintenance teams.

(2) Designated security elements that will be immediately available for employment.

(3) Equipment requirements by type aircraft.

(4) Designated recovery vehicles, call signs, and frequencies.

(5) Depending upon the location of the downed helicopter and the enemy situation, an AFAC and standby aircraft if desired.

b. Night Helicopter Operations.--It will often be advantageous to conduct certain helicopterborne operations during periods of darkness because of the surprise and concealment which results. However, the necessity for positive control, visual identification, and requisite caution on the part of both pilots and troops complicates such operations.

(1) Of primary concern during the employment of helicopters at night in the amphibious assault are the lack of prominent landmarks visible during periods of darkness and lack of pilot familiarity with the area. Therefore, electronic or visual aids to navigation and landing will normally be required, except in the rare cases where good visibility and easily recognizable terrain features exist.

(2) A slower rate of activity must be accepted in night operations. Fewer helicopter landing points may be used, loading and unloading times are increased, smaller helicopter waves must be used, and the time interval between waves is extended. Flight delays are encountered in rendezvous, approaches, and landings.

c. Night Illumination Support.--Night illumination support can be provided for periods as brief as minutes to as long as 8 or more hours by a single aircraft. The longer periods are provided by the fixed-wing transport aircraft and helicopters which have a greater flare carrying capacity than attack aircraft. In the amphibious assault, the principle use of flares envisioned is to illuminate the battle area for defensive operations. Prescribed loads are maintained in an on-call basis. Electronic countermeasure aircraft are maintained in an alert status or airborne to support the aircraft conducting illumination operations.

d. Sequence of Logistic Operations.--Logistic support for helicopterborne operations normally follows this sequence:

(1) The advance party of the helicopter support team (HST) lands in the designated landing zones with assault troops in early scheduled waves. These advance party personnel improve landing zones and select helicopter support team installation locations.

(2) The remainder of the HST lands in succeeding waves; establishes and marks dump sites, supply landing points, and casualty evacuation stations; and prepares to receive and distribute supplies. In addition to supply, some of the principal logistic support functions such as maintenance, medical service, evacuation, and salvage may be performed by the HST. These functions will eventually be consolidated ashore under designated combat service support agencies of the landing force.

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(3) Supplies and equipment are landed in a predetermined sequence, except as modified by troop unit requirements ashore.

(a) Initial combat supplies and equipment are landed with assault troops.

(b) Emergency supply requests are filled from stocks of critical supply items (ammunition/rations/water) prepositioned aboard ships. HST's are advised when emergency supplies are en route and prepare to expedite delivery to the requesting units.

(c) Landing force supplies, consisting of those supplies remaining in assault shipping after initial combat supplies and emergency supplies have been unloaded, are landed selectively in accordance with the requirements of the helicopterborne unit until the situation ashore permits inception of general unloading.

(4) When linkup with surface landed forces is planned, resupply of helicopterborne units may be effected overland by surface means. The resupply of isolated units and delivery of emergency resupplies, however, may continue to be effected by helicopter.

(5) When linkup with surface landed forces is not contemplated, plans will provide for increased supply levels in selected landing zone(s).

e. Helicopter Support Team.--The HST is a task organization which is formed and equipped for employment in a landing zone to facilitate landing and movement of helicopterborne troops, equipment, and supplies, and to evacuate selected casualties and prisoners of war. An HST is normally attached to the helicopterborne unit. Its composition, organization, and equipment will be governed by the scope of the contemplated operation. It usually consists of a headquarters section, control elements, and a landing zone platoon. For additional information, see FMFM 4-3, Shore Party and Helicopter Support Team Operations.

(1) Composition of the HST.--The nucleus of an HST is provided by the division support group when an extensive logistic support buildup is required.

(2) Tasks Performed by the HST

(a) Tactical.--The HST must establish, operate, and maintain electronic and visual navigation aids to guide aircraft, communications to direct and control helicopter operations in the vicinity of the landing zone, and participate in local security, as required.

(b) Logistic.--The HST develops the landing zone for logistic support of helicopterborne units. HST tasks include selected casualty and prisoner of war evacuation; unloading and loading helicopters; operation of material-handling equipment; maintenance of records of supplies received, issued, and on hand; and preparation of supplies, equipment, and personnel for helicopter movements.

(c) Additional Tasks.--In addition, the HST keeps the TACLOG and the helicopterborne unit informed of the status of landing waves and serials.

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(3) Helicopter Control Elements of the Helicopter Support Team

(a) The helicopter control elements of the HST's are called the landing zone control teams.

(b) LZCT's are normally landed early in the assault to provide for the control and direction of helicopters in the vicinity of each landing zone. The helicopter unit can provide communication personnel to form the nuclei of four LZCT's. These teams can be subdivided to provide landing site controllers as required.

(c) Communications are obviously necessary for the control of helicopters by LZCT's, among all landing sites, and between the landing zone controller and the HST commander. The landing zone control officer will have the capability to enter the UHF and HF helicopter direction nets to monitor the progress of helicopters en route. Upon arrival at the IP, the helicopters will be controlled by the landing zone control officer on the landing zone control net (UHF or VHF). The landing zone control officer will control and coordinate each landing site controller on the landing zone control party net (VHF). He will also use the landing zone control net (VHF) to coordinate logistic support lifts, both inbound and outbound. If the landing zone is to be used for an extended period of time, wire is installed linking each landing site and the landing zone control officer to the HST commander.

(4) Communication Support of the HST.--Elements from the division support group, including communication equipment, are normally provided to form the nucleus of the HST. This allows the HST commander to communicate with supply dumps, LZCT's, and TACLOG. Whenever there is no logistics buildup in the landing zone, the service platoon of the helicopterborne infantry battalion may assume the communication support augmented by the LZCT of the helicopter unit. In any event, a communication team is normally included in the HST.

(a) During the ship-to-shore movement, the HST commander enters the tactical net of the supported unit. This net allows the battalion to make logistic support requests directly to the HST. If the requested support is not available locally, the HST commander can make his request to the proper source of supply over the HST logistics net. This net connects the HST commanders with the helicopterborne TACLOG, landing force TACLOG, and landing force shore party. When the regimental landing team command post is established, requests for logistics support are passed over the regimental command net for consolidation and coordination prior to submitting requests to TACLOG or landing force shore party on the HST logistics net.

(b) Communications between the HST commander and subordinate elements are established on the landing zone local. This is a VHF voice net and will be guarded by the HST commander, landing zone control officer, and all supply dumps within the landing zone.

(c) As soon as possible, wire lines should be installed from the HST commander to supply dumps in the landing zone, the supported unit commander, and all landing sites. Wire connections are of particular importance if operations are expected to continue over an extended period. Once wire is operational, radio is placed on a standby status.

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(d) See figure 8 for a sample diagram of HST communications. Care must be taken when laying wire in or near landing zones due to the hazards it creates for helicopters. Wires must be on or near the ground and should be secured.

f. Delivery Techniques.--Delivery techniques are: air landed, freedrop, parachute, and helicopter hoist delivery.

(1) Helicopters generally land if carrying internal loads. External loads provide flexibility in the handling of bulk cargo and reduce the time required for loading and unloading, although inflight airspeed and maneuvering, especially during takeoff and landing, are reduced. The reduced time and exposure to enemy fire in the landing zone may more than offset this disadvantage, however.

(2) Packaging requirements for freedrop from helicopters are less stringent than for freedrop from fixed-wing aircraft. In many instances, standard containers, reinforced with steel strapping, will withstand the shock of low altitude helicopter drops.

(3) Aerial delivery by parachute can be conducted by both helicopters and fixed-wing aircraft. This method of delivery is desirable when enemy action or the nature of the terrain precludes the landing of helicopters, or when the delicacy of the item prohibits the use of freedrop. This not only provides a resupply capability during darkness or inclement weather, but will reduce exposure to enemy fire. It should be noted, however, that parachute delivery is the least accurate of the four delivery techniques.

(4) Helicopters equipped with power hoists may be used for fragile loads; however, hoisting of loads is slow and subject to weight limitations. Also, it is especially hazardous to the aircraft and its crew when subjected to hostile fire or loss of power.

g. Early Phasing Ashore

(1) Helicopter units are displaced ashore at a time calculated to cause minimum interference with other landing operations and yet, be compatible with the landing force requirements. The establishment of helicopter operating bases ashore and severing of dependence upon shipborne bases is a progressive process. Initially, flights of helicopters may operate from roughly prepared sites, receiving limited logistic support ashore. Aircraft maintenance during this period is accomplished aboard ship or at other developed bases in the area. The personnel and equipment necessary to service and perform maintenance for helicopters are transported ashore early. This may be accomplished by the organic aircraft of the helicopter unit or by landing craft.

(2) Helicopter units which operate ashore for extended periods require establishment of maintenance and supply facilities ashore. During the interim period, flight elements of the helicopter unit generally operate from locations ashore for limited periods, returning to ships for maintenance with a gradual lessening of dependence on their shipborne bases, until maintenance facilities are operating ashore.

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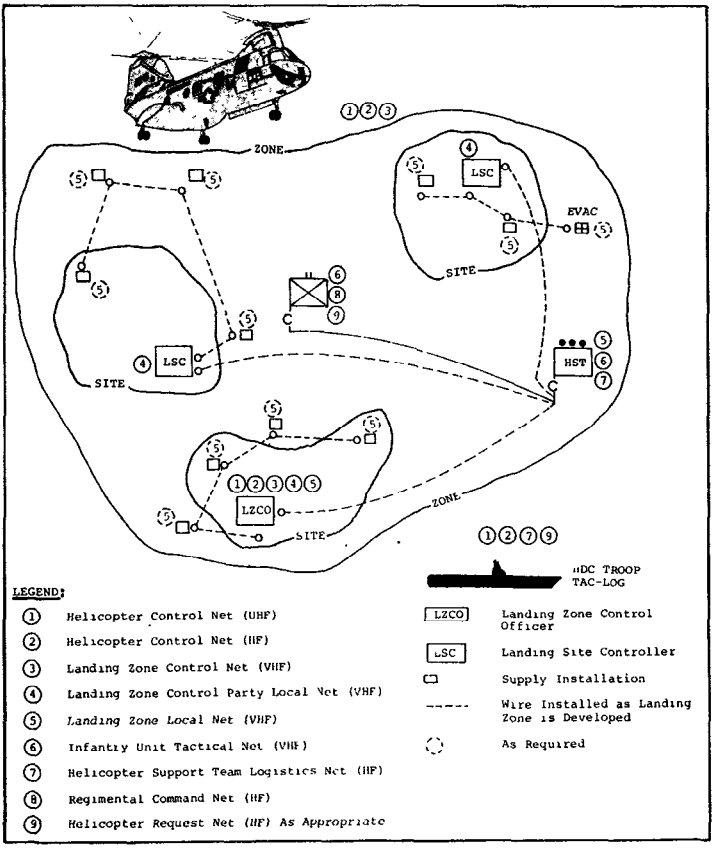

Figure 8.--Helicopter Support Team Landing Zone Communication.

3405. POSTASSAULT PHASE OPERATIONS

Upon termination of an amphibious operation, the landing force must be prepared to conduct subsequent operations. The specific termination of the assault phase is prescribed in LFM 01, Doctrine for Amphibious Operations. One of the determinates is the accomplishment of the amphibious task force mission. The postassault phase reflects the shore basing of assault support aircraft, retention of rigid rules for the selection of approach and retirement lanes to counter antiaircraft (AA) threats,and operations without the elaborate documentation of the ship-to-shore movement. Logistic support

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facilities are established ashore to accomodate the needs of the landing force. The amphibious task force, when dissolved, leaves a landing force that now must operate in accordance with the tenets of land warfare. The following paragraphs discuss the methods of accomodation which permit the Marine Corps amphibious structure to mold assault support forces to land warfare operations.

a. Initiation of Helicopterborne Operation.--Helicopterborne operations may be initiated in two ways:

(1) The command echelon, having control of both helicopter and ground combat elements, may assign a mission to a subordinate ground combat element commander which requires helicopters, or the executing ground commander may determine that an assigned mission can best be accomplished by employing helicopters and request such support. In these instances, it is this mutual commander who provides the necessary helicopter assets and defines command relationships for the accomplishment of the mission assigned. It is incumbent upon the subordinate ground combat element commander to determine (in conjunction with the helicopter unit commander) if sufficient assets are allocated to accomplish their mission.

(2) A subordinate ground combat element commander, who does not have control of helicopter assets, may determine that a requirement exists for him to conduct a helicopterborne operation. Through the operational chain of command, he then initiates a request to conduct the operation which should contain the type, scope, and anticipated duration of the operation and an estimation of helicopter assets required. Once the landing force/MAGTF commander approves the operation, he will assign the ground combat and helicopter elements and establish appropriate command relationships for the accomplishment of the mission. The commanders designated to conduct the operation will review the initial determination of air assets required and submit revisions, if necessary, to the landing force/MAGTF commander. It is incumbent upon the landing force/MAGTF commander to make an immediate evaluation and advise the commanders involved of the approval or disapproval of such revisions.

b. Selection of Helicopter Landing Zones

(1) In vertical envelopment/helicopterborne assault operations, the final selection of landing zones must be made by the commander of the task organized force based upon the recommendations of the helicopter and helicopterborne element commanders. In all other helicopterborne operations, the ground combat element commander will select the landing zones based upon the advise and recommendation of the supporting helicopter unit commander. This is normally decided by staff coordination and the information is transmitted through briefings. Landing zone criteria such as size, slope, and trafficability requirements are found in appendix C.

(2) Prior to a helicopterborne operation, it may be highly beneficial if a common aerial reconnaissance is made of the landing zones by the task force commander, if designated, the HC(A), the helicopterborne unit commander, and the transport helicopter flight leader. This would help ensure a common understanding of the area and its problems as well as the responsibilities of each commander involved.

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c. Changing of Landing Zones and Aborting the Mission

(1) In vertical envelopment/helicopterborne assault operations, the designated task force commander is responsible for all decisions, including diversion from primary to alternate landing zones and aborting the mission. The authority to abort a mission will not be delegated. The landing force/MAGTF commander may delegate the authority for diversion from primary to designated alternate landing zones to the HC(A) in those cases where the helicopterborne unit commander and the HC(A) are in agreement. He will not, however, delegate authority to divert to designated alternate landing zones in cases where such agreement has not been reached. In these cases, the recommendations of both the HC(A) and the helicopterborne unit commander are relayed to the designated task force commander, who makes the final decision. Should they be unable to communicate with the designated task force commander, the decision rests with the ground unit commander.

(2) For all other operations in which helicopter support is provided (e.g., logistic support, liaison, and patrol insertion), the HC(A), or the helicopter flight leader when designated, will render onsite decisions regarding abort or diversion from the primary landing zone after consultation with the ground unit commander present. As is indicated above, in such cases where there is not agreement between the ground unit commander and the HC(A), the matter will be referred to the MAGTF commander or his designated representative for resolution.

d. Selection of Approach and Retirement Lanes

(1) The control and coordination of the helicopter movement through approach and retirement lanes must be as formalized during subsequent phases of operations ashore as during the amphibious assault. This means that selection of helicopter lanes is equally as important here as in the amphibious assault. In some instances, it may be practical to designate specific lanes with the fire support restrictions imposed on tactical ground units which are being overflown. In other instances, this may be impractical. This is especially true where several ground units in separate operations are involved, each being supported by artillery.

(2) Because of possible restrictions to ground elements, decentralized control and coordination may be required. This is done by passing control to the HC(A) airborne, in the area, who assists the DASC. The HC(A) must remain in contact with DASC while he provides en route movement control. The DASC, after coordinating with the FSCC, provides continuous information allowing the safe passage of helicopters through an area. Subordinate FSCC's can provide the same information to the HC(A), or transport commander when the coordination at the DASC/FSCC level cannot adequately provide the needed control. If possible, the helicopters are maneuvered around areas that require fire support coordination.

(3) Airspace coordination area is a block of airspace in the target area in which friendly aircraft are reasonably safe from friendly surface fires. It may occasionally be a formal measure (a three-dimensional box in the sky). Information included in dissemination, if a formal measure, will provide minimum-maximum altitude, length (two coordinates), width, and effective date/time group (DTG).

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e. Landing Plan

(1) The landing plan documents associated with the amphibious assault are not usually required since planning time available is limited, and because the helicopter availability, employment and assault landing, and heliteam wave and serial assignment tables are not necessary. Other availability reporting and passenger manifesting methods are used. The same information as would ordinarily be required in a landing plan must be made known through staff briefings, liaison, and standing operating procedures (SOP's). Through these methods, the helicopterborne unit can program the utilization of the assigned helicopters. A payload can be developed with a sequence of landing. In short, the control and coordination of the needed helicopter movement can be accomplished.

(2) Under normal circumstances, passenger manifests are mandatory in order to keep track of personnel for both administrative and operational reasons. One system of manifesting is accomplished through the use of passenger tags (see fig. 9). Tags are issued and prepared in the assembly area by the individual members of a heliteam and given by the heliteam commander to the troop loading assistant prior to or during loading, usually at the "ready circle." In certain operations, such as extractions under fire this process is impossible and, should an aircraft be lost, unit commanders must discover who was on board by comparing unit rosters with lists of personnel accounted for in other ways.

f. Logistic Support Area (LSA).--During extended land operations or during helicopterborne operations where deployed infantry and artillery units down to company/battery level must be logistically supported by helicopter, development of supporting combat bases or logistic support areas is necessary. The basic function of an LSA is similar to that of amphibious ships logistically supporting an amphibious operation. The LSA provides a source of support in one or more of the four logistic functional areas (supply, medical, transportation, and service). LSA's are established as follows:

(1) Whenever possible, units will be supported from an LSA established and operated by the force service support group. In the event the helicopter support operations are widespread or at an uneconomical distance from the FSSG, additional LSA's may be established nearer the operating units. The remaining discussion will be concerned with LSA's established to support specific combat operations rather than central LSA's operated by the FSSG.

NAME
RANK SER. NO. ORG. AIRCRAFT NO.

Figure 9.--Passenger Tag.

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(2) The LSA will be established initially by elements of the shore party battalion, augmented as required by personnel and equipment from the FSSG, medical battalion, etc., to provide the logistic support desired for the operation. The size of the LSA, shore party, FSSG support, medical support elements, etc., will be determined by the scope, duration, and mission of the supported forces. In small operations of limited duration, the supported unit may establish and man the LSA with organic forces.

(3) In major operations where all combat service support functions are to be performed by the LSA, where the duration of the support from an LSA is to be lengthy, or where the magnitude of supplies and services at the LSA is large, the FSSG may assume responsibility for operation of the LSA. The shore party detachment then operates the landing zone within the LSA for the FSSG.

(4) Experience has shown that establishment of a logistic control agency similar to the TACLOG in amphibious operations may prove beneficial during larger operations. When more than one unit of battalion size is being logistically supported by helicopters, a logistic operations center, composed of a logistics representative from each deployed battalion and from the senior headquarters, is established. The unit representatives receive and relay logistic support requirements from their units. The senior command's logistic representative coordinates the efforts of the unit representatives, establishes and consolidates delivery priorities, determines logistic helicopter requirements, and coordinates their employment. Where multiple LSA's are supporting a single operation, the logistic operations center may also coordinate helicopter support from the various LSA's.

g. Helicopter Support Group

(1) A shore party helicopter support element of appropriate size is responsible for the actual landing zone operation. This includes material handling support, proper rigging and hookup of loads, and control of aircraft operating in the landing zone. A shore party helicopter support element is task organized, and is capable of operating one LSA landing zone in support of a reinforced infantry regiment with supporting artillery.

(2) The helicopter support element is responsible for the following:

(a) Preparation, maintenance, and marking of the LSA, and the assignment of sectors of the landing zone to each supported unit for staging of its supplies and equipment prior to helilift.

(b) Material handling and coordination of the actual staging of cargo, supplies, and equipment. Rough terrain forklifts, as required, will be assigned by the shore party battalion to each LSA landing zone.

(c) The rigging and hookup of external helicopter loads. The helicopter support elements provide the requisite nets, slings, cables, and other lifting devices to support the tactical and logistical operations.

(d) Providing landing zone communication personnel and equipment for local control and briefing of helicopters conducting lifts to and from the landing zone.

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(e) Management of passenger control facilities for administrative troop lifts.

(f) Providing helicopter support elements to company and battery levels when required.

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Section V. LOGISTIC SUPPORT CONSIDERATIONS

3501. GENERAL

a. The aviation logistic system must be capable of incremental introduction of supply and support into the objective area at a rate consistent with the tactical situation and the shore facilities available. A typical phasing shore will progress from austere control, operations, and logistic requirements to full group/wing sustained operations and the necessary support associated.

b. The establishment of a Marine aviation element of any size ashore is a major logistic problem involving:

(1) The movement of heavy and complex equipment and combat aircraft by surface and air.

(2) The installation of dispersed facilities, often in relatively underdeveloped areas, which requires extensive engineer effort.

(3) The provisions of great quantities of supplies, principally fuel, spare parts, and aircraft munitions.

c. When established ashore, elements of the Marine aviation element are often dispersed over a wide area, perhaps as much as several hundred square miles. Included in this area of operation are a complex of airfields, helicopter operating sites, radio and radar installations, antiaircraft missile battalions, command and control agencies, and maintenance and supply facilities. The construction of airfields and the installation of supporting activities will require engineer support which cannot be provided by units organic to Marine aviation.

3502. SUPPLY AND MAINTENANCE

Assuming that the decision has been made to operate aircraft from bases ashore, within or near the objective area, aircraft can begin arriving almost as soon as a usable airfield has been seized and secured or one constructed. Like all elements of the assault force, however, they cannot operate successfully unless they are properly supported by the supply chain.

a. Supply.--In terms of the incremental phasing of supplies ashore, the support essential for aviation units is somewhat the reverse in its sequence of demands when compared with that of ground units. Whereas ground units start at a relatively low level of need and build to a more substantial demand as the operation expands, aviation units require a sizeable infusion of logistic support from the outset.

(1) Refueling facilities are essential and will normally require either the manning of emplaced systems or the establishing of tactical airfield fuel dispensing system (TAFDS) units as well as the transfer of fuels ashore from tankers.

(2) Ordnance will need to be stockpiled and the associated storage areas will likely need to be constructed for operational use.

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(3) The avenues of supply must be kept open and operating and all levels of maintenance need full logistic support to ensure the maximum availability of aircraft for employment in direct air support or assault support roles. For specific information concerning maintenance levels and logistic requirements, see FMFM 4-1, Logistics and Personnel Support.

3503. ENGINEERING REQUIREMENTS

a. The Marine wing support group provides engineer services (construction, facilities, maintenance, utilities, and TAFDS) support to the Marine aircraft wing and assigned units. Additional engineer support may be provided by a task organized engineer group when formed or the engineer support battalion and Navy mobile construction battalion.

(1) Helicopter Operating Sites

(a) Displacement.--Displacement of helicopter units from an amphibious assault ship for operations ashore requires the preparation of suitable helicopter operating sites.

(b) Loading Surfaces.--Transport helicopters require a firm surface or pad to accommodate the landing wheels. Concrete pads with embedded tiedown stakes and rings offer the most desirable helicopter landing surface. However, such facilities are not often available, in which case MOMAT or other suitable and imported surface materials must be applied.

(c) Rotor Clearance.--In addition to the construction of a suitable pad, consideration must be given to the requirements for safe rotor clearance between helicopters for taxiing, parking, and during rotor engagements required for blade tracking and other maintenance procedures.

(d) Revetments.--If the helicopter pad is to be within range of hostile fires, it is advisable to install revetments in order to reduce the possibility of damage to more than one helicopter from any single incoming round, should an attack occur.

(2) Operating Strip for Observation Aircraft.--Initially, the area requirement is any cleared level ground, in excess of 1,000 feet by 50 feet and free of major obstacles on the approach or takeoff suffices for observation squadron (VMO) operations. A highly satisfactory surface is provided by aluminum matting. The OV-10 has a marginal capability on dirt surface. The relatively small effort required to clear a dirt strip is within the capability of most engineer units.

(3) Airfields for Fixed-Wing Transport Aircraft.--In order to establish and rapidly develop air bases for fixed-wing transport aircraft, a systematic plan for occupation, installation, and development of aviation facilities ashore is necessary. Therefore, planning is once again the key to expediency.

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Section VI. SPECIAL OPERATIONS

3601. GENERAL

Assault support aircraft frequently are involved in special operations and operate under conditions requiring special considerations. These are addressed here to assist in visualizing these operations and the variables introduced by the special considerations.

3602. OTHER AMPHIBIOUS OPERATIONS

The other amphibious operations to be addressed are withdrawals, demonstrations, and raids. They are discussed in LFM 01, Doctrine for Amphibious Operations.

a. Amphibious Withdrawals.--An amphibious withdrawal is characterized by a progressive reduction in the size and firepower of the friendly force. The loss of firepower from retrograded artillery and tanks must be offset by a corresponding increase in protective fires by air and naval gunfire. Rapid removal of covering forces can be provided by helicopters which reduces the exposure time of a relatively small force to enemy action.

b. Amphibious Demonstrations.--The amphibious demonstration is an attempt to delude the enemy and force him into a course of action which is unfavorable to him. Helicopter waves may approach landing zones, an airborne DASC may be utilized for communications deception, mock paradrops may be employed, and inflight refueling support may be needed for the aircraft engaged in the bombardment associated with such demonstrations.

c. Amphibious Raids.--Amphibious raids are swift incursions into enemy territory. Operation security is stressed to ensure surprise, and the use of helicopters to introduce and withdraw the raid force is probable since they provide speed and mobility so useful in these situations. Aerial refueling is a likely need, as supporting arms coverage will predominantly be that provided by air. In addition, an antiair warfare covering force may require aerial refueling.

3603. ENVIRONMENTAL FACTORS

The environment plays a major role in assault support aircraft operations. Both the aircraft and support personnel suffer from restrictions imposed and hazards created by the environment. These factors are discussed below with information concerning their effects upon assault support operations.

a. Cold Weather Operations

(1) Cold weather operations present some unusual problems for assault support aircraft. The very nature of their use calls for operations from temporary forward area facilities. Increased material failures and increased maintenance requirements can be expected. These include cracked tires and seals, frozen oil and fuel lines, moisture in electronic components, and ruptured oil, fuel, and hydraulic tanks.

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(2) Mission response time will increase. Bulky clothes, cold temperatures, wind, ice, snow, sleet, and freezing rain will all slow down the tempo of operations. Maintenance efforts should be sheltered from the effects of the weather or even slower response time and lower aircraft availability will result.

(3) Blowing snow, both from wind and/or rotor wash may be a real restriction on the time or place of helicopterborne landings and air delivery. Ice fog can turn a clear area into a hazardous situation in minutes and can last for hours.

(4) A light snowfall or a low overcast coupled with total snow coverage on the ground can easily induce vertigo. Therefore, preparations must be made for the conduct of all flights under instrument flight conditions. This requires that landing zone control measures be emphasized.

(5) Care must be taken to ensure the surface stability of landing zones. Areas covered by snow may be either thin ice or frozen crust covering water or deep mud which will inhibit or preclude landing or subsequent movement.

b. Desert Operations.--As defined in this manual, a desert is a dry, barren region, largely treeless and sandy. The topography may vary from flat terrain to irregular mountain heights. Meteorological conditions include drastic changes in temperature and wind velocity. Commanders must include considerations for:

(1) Employment

(a) Loading zones must be located well to the rear when conducting large troop movements to preclude detection by visual or electronic devices. Loading may be accomplished at several departure areas with flights assembled in the air following loading.

(b) Landing sites normally are plentiful in desert areas, but may often require preparation with low flash point fuel or fuel combined with oil to stabilize blowing sand and dust.

(c) Navigation is made difficult by the lack of reference points. Aircrews may be required to carry both tactical map and aeronautical charts. Dead reckoning and electronic aids must be used to supplement the maps, charts, and photographs used to accomplish visual navigation.

(d) Vulnerability of aircraft in flight is increased as lack of terrain features permit long-range observation and detection. Care must be taken in the selection of flight routes and maximum use must be made of night operations and screening smoke. An increase in the number of escort aircraft will be required to ensure adequate suppressive fires under these conditions of increased vulnerability. This escort group must include an electronic warfare (EW) capability during both day and night operations.

(e) Antimechanized defense for helicopterborne forces will be difficult. The limited ground mobility and firepower of these forces require compensation. Additional light antitank weapons will be carried by the helicopterborne force. Therefore, additional lifts will be required to accomodate the increase in weapons. Also, aviation units will be called upon to attack enemy armor. This may include illumination support and TOW

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missile fires provided by assault support aircraft. Ultimately, there must be a linkup with other ground forces to effect an adequate armor defense.

(2) Personnel

(a) Daily water consumption will vary from 12 to 24 quarts a day per individual. Aircrews must have access to water during flight operations.

(b) Due to the nature of amphibious operations, personnel may not have sufficient time to acclimate to desert conditions. Should this be the case, additional aircrews and support personnel will be required to maintain the high tempo of operations characteristic of the amphibious landing.

(c) Blowing sand and dust common to desert areas will result in irritation and partial loss of visual abilities if preventive measures are not taken.

(d) Maintenance personnel must use gloves to protect their hands from burns when working on aircraft and support equipment due to heat absorption by metal objects.

(3) Weather

(a) Although daytime temperatures may be high, low temperatures may be encountered at night. These periods of lowered temperatures, which increase the lift capability of aircraft, will vary from desert to desert. In some areas, significantly lower temperatures will not be reached until the early morning hours. In other areas, lowering temperatures will immediately follow the sunset.

(b) Windstorms often arise suddenly, accompanied by blowing sand. These sand storms are frequently so severe that they totally obscure vision and prohibit safe landing even when using mechanical aids.

(c) Rainfall, although rare, is characterized by torrential thunderstorms. Base areas must be located to preclude damage from the resulting flash floods.

(4) Support

(a) Maintenance efforts will be increased due to the erosive effects of sand on engines, rotor blades, propellers, and other mechanical parts. Windows pitted by sand may so restrict visibility that replacement will be required. Fuel and lubricants may become contaminated by sand, necessitating additional effort to purge the contaminated system.

(b) Security requirements are increased due to scant vegetaion and lack of terrain features increasing the problem of concealment. Dispersion of units increases their vulnerability to mechanized raiding parties. Aircraft themselves can be effectively dispersed and camouflaged. Petroleum and ordnance storage areas must be relatively secure and well defended against both air and ground attack.

c. Jungle Operations.--For the purposes of this manual, jungle is defined as an area located in the humid tropics wherein the land is covered

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with such dense growth of trees and other types of associated vegetation that it impedes military operations. In jungle operations, commanders must include considerations for:

(1) Employment

(a) Loading/landing zones are limited, both as to size and number. They are characterized by high vegetation barriers requiring vertical climbs and descents with resultant decreased payloads. Also, the limited size of the landing zones require considerations for an aircraft being down in the zone, thus precluding its utilization by other aircraft.

(b) Vulnerability during transit to and from landing zones varies considerably. Tall trees and overhead canopies restrict target acquisition and fields of fire for the enemy. However, when conditions do permit the utilization of antiaircraft weapons, they are extremely difficult to locate and counter.

(c) Tasks performed by assault support units that will enhance the operation include visual reconnaissance, command and control communications, aerial resupply, and casualty evacuation. The latter two means of support take on increased emphasis due to the difficulties encountered in surface movement by motor transport units.

(2) Preventive Medicine Program.--Personnel in jungle environs are susceptible to fungus type infections and often exposed to malaria. Aviation units engaged in jungle operations must pursue a strong preventive medicine program. Innoculations and plentiful laundry and bathing facilities are mandatory. Due to the fixed nature of aviation facilities, an active insect control program may be pursued to reduce the threat of disease spread by such pests.

(3) Weather

(a) High temperature and humidity combinations result in reduced lift capabilities. Aviation and ground units must work in close concert with one another during the load planning process to ensure adequate lift capability is provided.

(b) Periods of extended and/or heavy rainfall are common in tropical areas. This, in turn, will result in restricted flight operations due to the resultant reduced visibility.

(4) Support

(a) Maintenance efforts in jungle operations must emphasize preventive maintenance. Corrosion, particularly in electrical components, will develop rapidly on both aircraft and resupply stocks.

(b) Security against air attack is enhanced through the use of dispersion and camouflage. The most difficult security problems will be associated with ground attacks due to the difficulty in detecting infiltrating saboteurs who take advantage of the cover provided by lush vegetation.

3604. COUNTERINSURGENCY

Counterinsurgency is discussed in detail in FMFM 8-2, Counterinsurgency Operations. The assault support role in the counterinsurgency effort

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is of critical importance. Extensive use of illumination, helicopter inserted reconnaissance patrols, helicopters to move cordoning forces, and air delivery of supplies is common to counterinsurgency operations. The most common problems for the employment of assault support aircraft by the commander in countering insurgency is the lack of landing zones and poor trafficability in the areas of operations. This hinders effective utilization of the mobility provided by assault support aircraft.

3605. NONCOMBATANT EVACUATIONS

a. The evacuation of noncombatants from foreign soil is an ever-present possibility for Marine forces. This effort is conducted, conceptually, as a no-risk operation, i.e., no offensive effort is made and no hostile action is contemplated against the indigenous population. The primary concern is the safe removal of U.S. nationals.

b. By its nature, this type of operation is normally conducted within a city or its built-up environs. Assault support aircraft, particularly helicopters, are envisioned for use as they provide for minimum exposure of the evacuees and the evacuation force. Flights in support of these operations may encounter obstructions such as towers and antennas with accompanying guy wires, small landing zones, and other hazardous and demanding flight conditions. Special care must be given to the problems of control, landing zone identification, and flight scheduling or sequencing in these instances.

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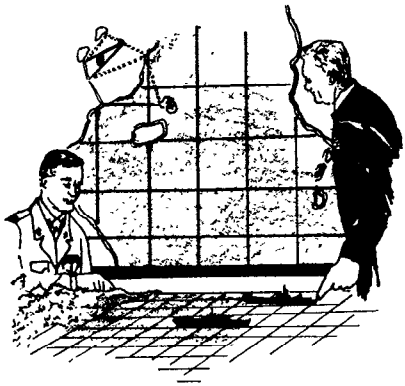

CHAPTER 4

AIR SUPPORT PLANNING

Section I. INTRODUCTION

4101. GENERAL

The Marine air-ground task force is designed to operate as the landing force or as a component of a larger landing force. As we have seen, organic assault support forces within the task force contribute to the execution of the operation as elements of landing force aviation. Specific considerations apply to this aviation element in the planning sequence, which are the subject of this chapter.

4102. PLANNING GUIDANCE

As soon as practicable after the receipt of the initiating directive, the CATF issues a planning directive to ensure that interdependent plans are coordinated and completed according to the time limitations, and are comprehensive in their scope. This directive specifies the principal plans to be prepared and the time allotted for preparation. Then each successive commander; i.e., landing force, ground, and aviation, prepares a planning program containing his force planning schedule. This planning guidance, at any level, may be either oral or written and is prepared for and given to subordinate commanders and staffs. It also provides the needed information for concurrent, parallel, and detailed planning for the subordinate unit commanders involved, as well as a framework for the necessary studies and estimates. It serves, for instance, as a guide for the preparation of aviation staff estimates. As soon as the CLF provides his initial planning guidance, the MAGTF aviation commander will issue his guidance to aviation subordinates. Such guidance is updated throughout the planning phase by directives, memorandums, outlines, plans, staff conferences, and informal briefings.

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4103. PRELIMINARY PLANNING DIRECTIVES

Preliminary planning directives augment the CATF planning guidance and may, in fact, precede the initiating directive. They are based upon alerting notices received by commanders providing forces for the amphibious task force. Although the format of such alerting notices are too varied to be defined, they will be definitive enough to permit an analysis of the area of operations and an assessment of additional intelligence requirements. Study of beaches, ports, communication networks, existing air facilities, and terrain provides an initial basis for determining the number and types of landing force air elements that can be accommodated and supported within possible landing areas.

4104. SEQUENCE OF AIR STAFF PLANNING

The sequence of planning air support, as it affects the landing force, includes the following steps:

a. Receipt of Initiating Directive.--The initiating directive is an order to the CATF, with copies to the landing force and major component commanders, to conduct an amphibious operation. The initiating directive provides for the establishment of an ATF, the assignment of a mission, and the necessary forces to accomplish the mission.

b. Initial Estimate of Landing Force Air Support Requirements.--Aviation planning commences with the preparation of initial estimates of landing force air support requirements, including offensive air operations, antiair warfare operations, assault support operations, air reconnaissance operations, and electronic warfare. These estimates are prepared as soon as initial information of an operation is received by the CLF. At this time, only the broadest estimates can be made. These initial estimates are usually limited to those which tentatively determine the number and types of participating units, the control agencies necessary, and the logistic support necessary.

c. Initial Planning Conference.--Subsequent to the receipt of the initiating directive, the CATF conducts an initial planning conference. At this stage, the CATF and the CLF jointly render decisions on issues which concern all of the elements of the amphibious task force, both landing force and naval. The initial estimate of landing force air support requirements assists the CLF in reaching the basic decisions at the initial planning conference. Included in the basic decisions are the selection of landing force objectives, development of the landing force concept of operations ashore, selection of helicopter landing zones, selection of fixed-wing aircraft landing fields, and drop zones.

d. Commander Landing Force's Planning Guidance.--Planning guidance is derived from a consideration of the information contained in the initiating directive, the initial planning conference, and other instructions that may be received. This guidance is the commander's input to his staff and subordinate commanders for preparation or revision of their estimates. The commander's guidance may take a wide variety of forms and information, but will normally outline a general course of action which the commander particularly desires to be initiated. Subsequent planning guidance will be provided to all levels throughout the planning process.

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e. Aviation Estimate of Supportability.--The aviation estimate of supportability summarizes significant aspects of the situation as they influence any proposed course of action, analyzes the impact of aviation factors upon the particular situations, and then evaluates and determines how aviation units can best be employed in support of each contemplated landing force course of action. The aviation estimate is presented verbally or in writing to the CLF by the landing force aviation element commander. This estimate is discussed in detail in section V.

f. Commander Landing Force's Estimate.--The CLF selects the most favorable course of action in his estimation and announces it as his decision. The commander's decision provides a firm basis for subsequent development of the operation plan, and appropriately amplified, it becomes the commander's concept of operations ashore.

g. Detailed Estimate of Air Support Requirements.--Detailed planning of landing force air support requirements commences after the CLF issues his concept of operations. The detailed estimate of air support requirements establishes the number and type of aircraft, in terms of squadrons, that will be needed to support the operation. It also provides information concerning the use of nuclear weapons, enemy targets in the beachhead area, enemy targets remote from the beachhead which may affect the force, air reconnaissance necessary to support the operation, assault support operations in and about the landing area, and the control facilities necessary to support the commander's concept of the operation. Attention is given to the time required to locate and prepare facilities and/or sites which will assist the aviation component in the early establishment of aviation units ashore. Special consideration is given to the aviation requirement to conduct AAW operations. A further discussion of this estimate is contained in section VI.

h. Aviation Concept.--The final step in the aviation staff planning sequence is the preparation of the concept of operations, and completion of the aviation element task organization which includes all aviation support units needed for the tactical units specified in the detailed estimate of air support requirements. Air operation plans and orders may now be prepared.

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Section II. BASIC ELEMENTS OF ASSAULT SUPPORT PLANNING

4201. GENERAL

Upon receipt of the amphibious task force and landing force initial planning directives, preliminary air support planning is commenced. The following paragraphs cover the principal considerations involved in assault support planning.

4202. CENTRALIZED CONTROL

a. In an amphibious operation, a single integrated air control system is developed that is capable of controlling and coordinating all air operations within an assigned area of responsibility. Control of air operations is exercised by various commands as the operation progresses. Plans must be made to provide each of these controlling commanders with the proper facilities for the requisite centralized control.

b. As soon as conditions permit, air control facilities are established ashore that parallel the naval control agencies afloat. The control facilities ashore are initially held in a standby status, monitoring all air control circuits. Upon recommendation of the CLF (or appropriate agencies ashore), however, the CATF may pass control of air operations to CLF or the joint task force commander concerned. The passage of control may be incremental. After passage of any or all control functions ashore, the Navy control centers afloat continue to monitor appropriate circuits, ready to resume active control in the event this becomes necessary.

4203. ACHIEVEMENT OF LOCAL AIR SUPERIORITY

Success in an amphibious operation requires a distinct margin of air superiority in the area of its operations. Because complete destruction of enemy air strength is rarely attained, all elements of the ATF must be provided with continuing air defense operations that exploit the capabilities of all participating forces. Both types of operations are essential; neither alone can provide the degree of air superiority needed for the decisive joint application of military power. Planning and executing of this effort must be closely coordinated with all other operations in the objective area to ensure friendly aircraft have freedom of action and, conversely, that is denied to the enemy.

4204. ACCESS TO CONTROL AGENCIES

Plans must ensure that all landing force command levels are provided direct access to the agency exercising control of aircraft allocated to direct air support. Intermediate ground command levels may countermand or modify requests of subordinates for direct air support at the time the requests are made to the air support control agency.

4205. DEPLOYMENT OF AIR UNITS

a. Landing Area.--Plans should provide for early seizure of sites for operating aircraft and air control facilities in order to:

(1) Provide for the early deployment within the objective area of air units designated for continuing support of the landing force.

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(2) Extend the radius of warning and control and therefore improve the task force air defense capabilities.

b. Adjacent Areas.--Plans providing for deployment of aircraft to airfields in friendly territory adjacent to the amphibious operation area must:

(1) Facilitate rapid deployment to airfields within the objective area.

(2) Provide for the support which may only be acquired through the use of aerial tankers to extend the range of supporting aircraft.

4206. AIRCRAFT AVAILABILITIES

Initially, assault support which is preplanned in detail must be provided by aircraft operating amphibious shipping or bases within effective range of the objective area. As the facilities for operating land-based aircraft are secured within the objective area, aircraft operating from such facilities are employed through the tactical air control system (TACS) to fulfill an increasing amount of the total air support requirements. Plans must assure that the transition into the objective area can be made without interrupting the effectiveness of the assault support. Aircraft are phased into the land-based facilities to shorten response time and, therefore, to improve assault support effectiveness.

4207. TRANSFER OF AIRSPACE CONTROL

Plans must provide for the orderly transfer of airspace control throughout the amphibious operation. More detailed guidance may be found in AFM 1-3/FM 100-28/NWP 17/LFM 04, Doctrine and Procedures for Airspace Control in the Combat Zone. The following subparagraphs outline the transfer sequence which, if employed, must be the subject of detailed planning:

a. Airspace Control Authority.--The area airspace control authority of the joint force commander exercising control over the combat zone in which the amphibious objective area (AOA) is located transfers control to the advance force commander of the amphibious task force.

b. Advance Force Commander.--The advance force commander transfers airspace control to the commander amphibious task force.

c. Commander Amphibious Task Force.--The CATF passes control to the CLF or other commander ashore.

d. Commander Landing Task Force.--Upon the termination of the amphibious operation, the commander landing task force transfers control back to the area airspace control authority of the appropriate joint force commander.

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Section III. PLANNING RESPONSIBILITIES

4301. GENERAL

Planning in detail ensures the maximum support from the available aircraft, while avoiding unnecessary degradation of the air support capability. Planning, however, is a coordinate responsibility of all concerned. Although specifically defined herein as the responsibility of one command or commander, the parallel and concurrent characteristics of planning common to all amphibious operations are also applicable to that needed for assault support.

4302. AMPHIBIOUS TASK FORCE

The CATF has the following responsibilities:

a. Determination of Overall Requirements of the Amphibious Task Force.--Naval requirements remain generally constant throughout the operation. Air superiority must be attained and maintained in the objective area, and the movement of enemy forces into and within the objective area must be curtailed or halted. A continuing requirement exists for air defense against enemy air, surface, and subsurface attack.

b. Determination of Air Support Capabilities.--The CATF determines the air support capabilities of the entire task force in terms of sorties, endurance on station, ordnance loads, and payloads.

c. Coordination of All Air Support Tasks.--The CATF coordinates all requests for air support originating within the task force and allocates aircraft in accordance with ATF assets and capabilities. When the need arises, he makes requests for additional support to higher authority.

d. Preparation of an Air Plan.--The CATF prepares an air plan to govern the employment of aviation throughout the operation. The air plans of subordinate commanders of the amphibious task force must conform to the amphibious task force plan.

4303. LANDING FORCE

The CLF has the following responsibilities:

a. Determination of Landing Force Air Support Requirements.--The CLF coordinates all requests for air support originating within the landing force and submits the consolidated requirements to the CATF.

b. Determination of Landing Force Air Support Capabilities.--The CLF determines the air support capabilities of the landing force aviation units and submits this information to the CATF.

c. Submission of Plans for Deployment of Aviation Elements Ashore.--The CLF submits recommendations to the CATF for the deployment ashore of landing force and other aviation units.

d. Preparation of an Air Plan.--The CLF prepares an air plan in coordination with the amphibious task force air plan.

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4304. LANDING FORCE AVIATION

Landing force aviation planning responsibilities are:

a. Determination of Landing Force Aviation Air Support Requirements. --The landing force aviation commander submits requests for air support to the CLF. These requests are consolidated with those from other landing force elements.

b. Determination of Landing Force Air Support Capabilities.--The landing force aviation commander submits the air support capabilities of landing force aviation units to the CLF.

c. Submission of Plans for Deployment of Aviation Elements Ashore.--The landing force aviation commander submits recommendations to the CLF for the deployment ashore of landing force aviation units.

d. Preparation of Operation Plan.--The landing force aviation commander prepares an operation plan in coordination with the amphibious task force and landing force air plans.

4305. AVIATION UNITS

Aviation units are responsible for providing input as required by the landing force aviation commander regarding their needs and capabilities. Normally, the planning directive published by the landing force aviation commander will contain the necessary guidance as to the type and timeliness of information required.

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Section IV. INITIAL ESTIMATE OF LANDING FORCE AIR SUPPORT REQUIREMENTS

4401. GENERAL

The initial estimates of landing force air support requirements is prepared as soon as preliminary information of an operation is received. At this time, only the broadest estimate can be made. This initial estimate is usually limited to the number and type of units to participate, the control agencies necessary, and the logistic support needed. Some assault support allocations can be deduced from predictions of the aviation capabilities of the force involved, estimations of the enemy air which might be encountered, and the general mission of the landing force.

4402. LANDING FORCE AVIATION TASKS

The landing force aviation commander is tasked with evaluating and submitting an initial estimate of landing force air support requirements. After his evaluation, he will prepare his initial estimate of the numbers and types of units to be employed. He will consider the following factors in the preparation of his estimate:

a. Characteristics of the Area of Operations.--This includes all characteristics which will have an influence on possible courses of action. The factors are divided into two principal classes:

(1) General Factors.--A broad field which includes the influence of political, economic, and psychological conditions upon the conduct of operation.

(2) Fixed Factors.--Stable characteristics in the area of operations. It is necessary to determine what limitations they impose or what advantages they may offer to the commander's force or those of the enemy. These characteristics include hydrography, terrain and topography, climate and weather, daylight and dark periods, locations and distances, lines of transportation and supply, health and sanitation conditions, usable facilities and fixed defenses, area communications facilities, and missile sites. Pertinent conclusions should be drawn in each case.

b. Relative Combat Power.--This includes an examination and comparison of opposing forces which involves an assessment of communication and electronics capabilities, logistic support, and time and distance factors.

c. Assess Factors of Environment and Relative Combat Power.--Having surveyed the environment, comparative resources, and his own and the enemy's capabilities, the commander will find it useful to review the conclusions reached thus far. He must assess their possible impact by identifying deficiencies in information and sensitive areas of security, tabulating strength and weakness factors, and finally, making the initial determination of the adequacy of his own force.

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Section V. AVIATION ESTIMATE OF SUPPORTABILITY

4501. GENERAL

Preparation of an aviation estimate of supportability is step number two of the air support planning sequence. It is a special staff estimate prepared by or under the cognizance of the landing force tactical air commander. There is no set format for this estimate, and it may be presented verbally or in writing. Its purpose is to summarize significant aviation aspects of the situation as they might influence any course of action proposed, and to evaluate and determine how aviation units can best be employed. The criteria for preparing and presenting the aviation estimate of supportability is found in FMFM 5-1, Marine Aviation.

4502. AVIATION STAFF ESTIMATES

a. The aviation estimate of supportability is often assumed to be the air commander's operations estimate, or the assumption is made that every aviation staff officer and subordinate unit makes an aviation estimate of supportability for an amphibious operation. This, in fact, is not true. The tactical air commander will require his staff and subordinate unit commanders to prepare staff estimates to assist him in reaching his decision and preparing his aviation estimate of supportability. These staff estimates are prepared for the TAC and used as data for his paragraph 3, ANALYSIS, which:

(1) Provides a discussion of proposed courses of action from the aviation viewpoint.

(2) Is concerned with the factors affecting the employment of air support with the landing force.

(3) Analyzes the impact of all factors upon specific potential situations.

b. Air component staff officers and subordinate unit commanders preparing assault support estimates will concentrate on these influencing factors.

(1) Enemy Situation and Capabilities

(a) Intelligence planning commences with the receipt of planning memorandums from higher headquarters and continues throughout the operation. A preliminary intelligence estimate is prepared to furnish the commander with sufficient intelligence to formulate basic decisions and to assist him in issuing planning guidance. The principal intelligence collecting agencies available in an amphibious operation are unified in specified command intelligence centers and facilities. The intelligence sections and centers of Army, Navy, and Air Force component commanders; the fleet intelligence centers; and the intelligence sections of the commander amphibious task force and other operating forces are all combined and directed in their efforts. Within the framework of these collection agencies are communication and electronic reconnaissance elements, special intelligence units, and aerial, submarine, surface, and ground elements. Some information is by its very nature of importance to both the helicopter unit commander

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and the helicopterborne unit commander. In planning for a helicopterborne operation, sufficient intelligence must be collected to meet all operational and logistic planning requirements of the helicopter and helicopterborne units.

(b) The data required by the helicopter unit will include, but not necessarily be limited to, such information as enemy detection and tracking capabilities; the type and location of his antiaircraft weaponry; his force concentrations; his jamming, MIJI (meaconing, interference, jamming, intrusion), and other electronic warfare capabilities; weather conditions likely to be encountered; terrain and landing zone conditions; and safe areas, if any.

(c) When planning helicopterborne operations, special emphasis must be placed on enemy capabilities which present a hazard to the aircraft. These threats are treated individually in the following subparagraphs. Of particular concern in each case is information as to the existence, extent, and location of the threat, for this information is vital to the selection of landing zone, approach and retirement lanes, and the employment of countermeasures to the enemy threat.

1 Ground Threat.--Ground threats can be any one of a variety of means. Generally, they can be considered to be those means which are brought to bear against helicopters, and helicopterborne forces, in the landing zone. This includes mines in the landing zone, a highly mobile force such as armor, and especially artillery, mortar and heavy automatic fire. Other methods of preventing or hindering landings are the installation of stakes, wires, and artificial obstructions in general. In areas where limited landing zones are available, extensive utilization of obstructions may be encountered.

2 Surface-to-Air Threat.--The helicopter is vulnerable to surface-to-air weapons of both the antiaircraft and surface-to-air missile (SAM) variety. The relatively low speed and limited ability to perform evasive maneuvers result in restricted survivability in the face of a heavy surface-to-air threat. When visual acquisition is required by enemy gunners, operations may be conducted by transiting threat areas using darkness, clouds, and terrain flying techniques to mask movement of friendly helicopters. If faced with a sophisticated radar acquisition and firing system, the helicopter must resort to the use of terrain flying techniques and/or cover by the jamming or destruction of enemy radar. A particular problem, when faced with the present highly mobile surface-to-air weapons, is that once a helicopterborne force has been inserted, the general resupply and medical evacuation routes of helicopters and their destination are known. These aircraft then become extremely vulnerable to the mobile weapons system.

3 Air-to-Air Threat.--The enemy air-to-air threat must be measured, and if it poses viable threats, it must be countered with an escort or protective fan consisting of early warning systems and friendly antiair means commensurate with the threat. However, an extensive air-to-air threat implies an extensive air-to-ground threat, and it becomes a concern beyond the scope of this publication and is more appropriately addressed in FMFM 5-5, Antiair Warfare.

4 Threat Location.--A careful intelligence analysis of the enemy's antihelicopterborne threat should provide information regarding the disposition of enemy weapons and troops. The weapons comprising a threat

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to helicopters are the same weapons that are utilized to defend against friendly offensive air assets. The weapon characteristics, coupled with the key installations and terrain features which the enemy must defend, will provide a starting point for determining enemy threat locations. The determination of threat location is vital to the selection of landing zones, approach and retirement lanes, and supporting arms provided to cover the helicopterborne forces.

(d) The enemy's electronic warfare capabilities are also important in planning helicopter operations. Three factors become evident in this regard: the enemy's ability to determine the intent of friendly forces by passive mode operation, the enemy's ability to jam circuits, and his capacity to interfere with effective control efforts. Well planned, well briefed operations can be conducted in near or total radio silence, thus countering the enemy electronic warfare efforts. Also, covered radio circuits can be used for those transmissions that are considered essential. Countermeasures may also be employed to offset the enemy's electronic warfare ability. The discussion of countermeasures against enemy electronic warfare can be found in FMFM 2-3, Signal Intelligence/Electronic Warfare Operations (U).

(e) The noncombatants in the area of operations can pose a serious threat to helicopterborne operations. A helicopterborne force normally is not equipped or manned to handle large numbers of noncombatants. As a result, it may become necessary to evacuate noncombatants, or to lift personnel and supplies to control and care for them. In either case, a drain on helicopter assets may result. With foresight in planning, this burden will be minimized, though the problem may still be substantial.

(2) Requirements for Aviation Support.--This is an estimate of the assault support assets needed to perform the mission.

(3) Topography.--Terrain in the objective area influences the selection and number of suitable landing zones. Adequate terrain intelligence is a must to permit the selection of the best landing and assembly areas, as well as the routes to and from these sites, which are likely to be in proximity to the objective. The nature and extent of obstacles to both enemy and friendly movement, particularly armor, must be evaluated before a barrier plan can be formulated. Additionally, the effects of terrain on the employment of nuclear weapons by either side must be analyzed.

(a) Profiles.--Terrain profiles are extremely important should weather or enemy activity necessitate nap-of-the-earth flight. A definitive study of the terrain profile will reveal minimum safe altitudes in the amphibious objective area (AOA), or in specific sectors of the AOA, which might be used during periods of darkness or in marginal weather conditions. A three-dimensional mockup providing a profile for study by pilots during planning and briefing will reduce visual navigation problems that are often encountered when operating in unfamiliar areas. Also, the selection of routes will be facilitated by such displays.

(b) Aerial Photography.--Aerial photography is vital to terrain studies. Cartographic changes are profound and frequent in many areas of the world. Rivers change course, woods arise or are cleared, cities develop, roads are built, powerlines appear, and other such existing and reinforcing changes alter the appearance of the terrain; thus, maps must

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be updated with current photographs to assist in accurate navigation and optimum landing zone selection.

(4) Weather.--Early in planning, a study must be made of the weather conditions likely to prevail during the proposed operation. Data are obtained by analysis of climatological studies, long- and short-range forecasts, and weather reconnaissance. The study includes an analysis of the possible contemplated operation and will indicate the overall feasibility of the operation from the weather viewpoint. The helicopter unit commander will consider normal temperatures, prevailing winds, precipitation, cloud cover, and ceilings that may be encountered in planning for the operation. Weather conditions can severely curtail or even halt air operations. Extensive cloud cover coupled with low ceilings will practically rule out assault lifts as large flights of helicopters cannot be assembled and flown safely under these conditions. In any case, the use of helicopters places increased emphasis on the requirement for accurate and detailed weather predictions.

(a) Minimums.--Helicopters are capable of operating visually under substantially lower ceilings and less visibility than fixed-wing aircraft. However, the helicopter becomes increasingly vulnerable to ground fire, since it is forced to fly lower and slower as weather conditions deteriorate. When weather conditions preclude the use of fixed-wing escorts, the employment of helicopters must be weighted against the increased risk. If the urgency of the mission requires the insertion, transport helicopters may be directed to proceed with only helicopter gunship escort. The planning for a low altitude, low visibility flight must be done carefully. The lane selected must provide the best terrain aids to navigation even if the overall distance is greater. Although helicopters are capable of single plane flight under instrument conditions, they must be able to descend to the landing zone either through visual flight conditions or by utilizing electronic terminal guidance.

(b) Reconnaissance.--In the event that adverse weather conditions may arise, a preplanned weather reconnaissance should be flown in sufficient time so that actual weather information can be made available to the helicopter unit, helicopterborne unit, and the controlling agency. If weather precludes fixed-wing support, a decision must be made concerning what course of action to pursue: to commence the helicopterborne assault supported by only helicopter gunships, to accept the risk of slower manpower buildup in the zone, or to delay or cancel the operation. Should cancellation be deemed necessary, it is best to make and promulgate that decision as soon as possible.

(c) Command Decisions.--During the planning and execution phases, adverse weather may cause delays or modification of flight altitudes and formations, approach and retirement lanes, escort plans, landing zones, and fire support plans. Weather minimums must be established early in the planning phase to prescribe the conditions that the commander landing force will accept to mount the operation. Because of the variety of helicopter support provided during combat conditions, it is not feasible to establish specific weather minimums for all situations. Factors such as type of support, mission precedence, number and type of helicopters and fixed-wing aircraft employed, aircraft capabilities, pilot experience, ordnance available, nature of the weather, and enemy situation all combine to dictate the minimum acceptable weather conditions for the launching of the mission. Although one or two helicopters might be able to accomplish

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an emergency MEDEVAC or resupply mission under extremely adverse weather conditions, larger scale operations normally would require significantly better weather in order to afford sufficient airspace for the maneuver of a large number of aircraft.

(5) Observation and Surveillance.--The observation and surveillance effort must be adequate to provide ample warning in the event of an attempt by the enemy to fortify his antiair defenses. This need will vary with the tactical situation, but inadequate intelligence of this nature could cause a great hazard to the operation.

(6) Communications.--Requirements for communication support must be defined. This will include scrambler capabilities for air-to-air and air-to-ground communications, command circuits between the landing force aviation commander and the commander of assault units. The latter may be by land or via a wireless system. The number of circuits required must be determined well in advance to ensure adequate frequency allocation. In short, a well thought-out communication plan will be a necessity for the smooth functioning of any operation.

(7) Logistics.--The logistic support requirements of assault support forces are extensive. The logistic considerations are discussed in the staff estimate as an influencing factor. These considerations are covered in detail in paragraph 4504.

(8) Hydrographic Conditions.--The air transportability of assault support forces, their supporting establishment, and air control agencies are often a cause for aviation staff members overlooking the beach, surf, and port facilities. However, the bulk of the aviation logistic support must be surface landed. For instance, the amount of aviation fuel required makes any other form of movement prohibitive, except for short periods. In addition, expeditionary field facilites require not only surface landing, but they also place a large demand on shipping spaces. Thus, water approaches to the land must be the concern of commanders even though a helicopterborne assault is anticipated.

(9) Specific Commitments.--Each contemplated course of action must be reviewed to identify the specific commitments for the helicopter and fixed-wing transport forces assigned. A careful analysis of the CATF concept must be included to ensure that pre-D-day operations are not overlooked. Extensive refueling and transport operations prior to the assault may reduce the fixed-wing transport availability to the extent that air delivery operations will be curtailed during and after the assault. Likewise, a demand for helicopters to conduct pre-D-day antisubmarine warfare operations might interfere with the helicopterborne ship-to-shore movement; therefore, this analysis must cover the effects of long term and surge efforts on availability of aircraft and on crew efficiency.

4503. INFLUENCING FACTORS

In arriving at the detailed estimate of air requirements, the landing force aviation commander analyzes each of the factors listed below in terms of the five requirements listed in paragraph 4501b(2)(c): mission, situation, analysis, evaluation, and conclusions:

a. Mission of the landing force.

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b. Scheme of maneuver.

c. Enemy situation.

d. Estimated duration of the operation.

e. Employment of other fire support means.

f. Employment of nuclear weapons.

4504. LOGISTIC SUPPORT CONSIDERATIONS

The ability to transport rapidly the items needed by the user and to make deliveries to areas inaccessible by surface transport have aided the logistician as well as the tactical commander. As modern day military technology developed, the supply support for that technological equipment and the personnel maintaining the equipment have placed a heavy burden on the supply system. As an example, the total fuel requirements for a CH-46 squadron may exceed 18,000 gallons a day. This factor is pointed out to emphasize the added burden imposed on the supply system and the need for detailed planning and precise execution to minimize the effects of that burden when utilizing aircraft in all roles. The principles involved are the same as logisitic principles have always been. The impetus, planning, and coordination have not been compromised by the introduction of increased aircraft use into operations. On the contrary, though the principles of supply are the same, the transport methods are improved when using the aircraft as a resupply vehicle.

a. Operational Requirements.--The basic principles, techniques, and procedures applicable to logistic planning for support of helicopterborne operations are the same as for other amphibious operations. This section considers only those logistic aspects which are peculiar to helicopterborne operations.

(1) The level of supplies carried must not impair mobility. That is, too much stockpiling can encumber a force that needs to redeploy or withdraw. Also, helicopters and other transport aircraft must not be inadvisably tied up when the movement of troops may be required within the AOA.

(2) Tactical and logistic plans must be closely and continually coordinated to ensure availability of helicopters for logistic support.

(3) Plans for logistic support must be coordinated and integrated with plans for the overall logistic support system. Plans must provide for shifting supply sources from amphibious shipping to shore-based installations. Such plans require that surface landed supplies be prepared in advance for helicopter delivery and that designated supply installations establish helicopter loading sites. Plans must include allocation of helicopters to provide initial and continuing logistic support of the helicopterborne unit. All available helicopters may be employed initially for the landing of combat troops and their equipment. However, provisions must be made to ensure the early landing of supplies and to build up and maintain desired supply levels ashore.

(4) It is not only essential that the logistic system supporting helicopterborne units be responsive and flexible, as is detailed in

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subparagraphs (5) and (6) below, but it must also be economical. That is, wasted effort, such as occurs in the supplying of unneeded articles or the loading of helicopters to one-third of their capacities, is the sort of inefficiency that can hinder an operation. Resources must be wisely used and not uselessly squandered.

(5) Responsiveness is a key word in logistic support. Mobility is increased by limiting prescribed loads to those supplies and equipment that can be carried by individuals and/or transportation means organic to those units. The four essentials of a responsive logistic support system are:

(a) Rapid, reliable, and direct communciations between support and supported units.

(b) Efficient packaging, material handling techniques, and equipment to ensure rapid assembly of needed supply.

(c) Efficient and economical utilization of transportation means to ensure availability where and when support is required.

(d) Automatic flow from the supply source to the user of items which have uniform consumption rates.

(6) Flexibility in the logistic support system may be achieved by utilizing fixed-wing aircraft to provide an alternate means to resupply units. The use of fixed-wing aircraft for aerial delivery of supplies requires advance planning to ensure the proper packaging, palletizing, and rigging of supplies and equipment. To compensate for possible shipping losses or destruction of supply installations ashore, logistic support plans must provide for multiple supply sources. Amphibious ships equipped with helicopter platforms may be designated the primary supply source for a specified helicopterborne unit. Similarly, supply installations established ashore by surface landed units should be located adjacent to terrain suitable for use as a helicopter supply loading zone.

b. Extended Support.--Due to the important role of logistics in air support, a major factor for consideration in an estimate of supportability is easy access to port facilities and the time required to prepare existing facilities/sites/supply/storage/maintenance repair areas and to resupply routes.

c. Decisions.--In view of the above, most TAC's will prefer a course of action that provides for the early seizure and securing of the terrain encompassing existing airfield, port, and resupply facilities. Whenever duration of the operation is such that logistic support facilities and operating sites can be established ashore, the demands imposed upon the assault support aircraft are lessened. Response time is shortened and maintenance space is normally improved. Also, much of the transport burden is shifted to the less costly surface means. This frees the helicopter force to perform tasks of a higher priority for the landing force as a whole, and it provides a more reliable supply capability in the event of inclement weather which might reduce or preclude efforts via aircraft.

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Section VI. DETERMINING DETAILED ASSAULT SUPPORT REQUIREMENTS

4601. GENERAL

A detailed estimate of assault support requirements is made by the landing force aviation commander after the CLF has issued his concept of operations. It is made to assure that adequate resources are available for the operation. The CATF may require that landing force aviation participate in some or all of the amphibious task force air support effort. Therefore, the landing force aviation commander may also participate in the determination of the estimate of air support requirements for the ATF. At this point in the planning sequence, the adequacy of assault support means is measured to determine if sufficient assets have been assigned to support all requirements.

4602. GROUND COMBAT ELEMENT ASSAULT SUPPORT REQUESTS

Upon receipt of the CLF concept of operations, the ground combat element commander formalizes his assault support requests. The number of tactical troop lifts is calculated, close air support target lists are made, and additional support requirements are evaluated and submitted to the CLF. The ground combat element commander will predict, as nearly as possible, his observation, air spot, illumination, medical evacuation, command and control, and logistic support needs. These estimates, combined with the definitive requirements of the troop lift, constitute the ground combat element assault support portion of the air support request.

4603. DETERMINATION OF REQUIREMENTS

The detailed estimate of assault requirements is a document of considerable value for the continuous planning of the amphibious operation. It includes the following:

a. Number of aircraft required by type.

b. Amount of bulk fuel necessary to support the operation.

c. Amount of ordnance required by type.

d. Amount of shipping and number of landing craft and amphibious vehicles required by type.

e. Amount of special equipment required by type, organic and otherwise.

4604. ADDITIONAL AIR SUPPORT MEANS

When the detailed estimate of assault requirements indicates that adequate aviation resources are available for support of the landing force, appropriate requests for additional aviation means are submitted by the CLF to the CATF. Should the amphibious task force aviation resources be inadequate for such supplementation, the CATF will consolidate and forward the list of shortages to the superior providing the initiating directive for the needed resources. When additional assault support means are not available, adjustment of plans is made by the CATF in concert with the CLF (and Air Force component commander, if assigned).

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Section VII. FORMULATION OF AIR PLANS

4701. GENERAL

Air operations reflect the nature of air plans and centralized control dominates the planning phase. Basic uniformity of practice that can promote effectiveness in the conduct of operations is valuable, but it is not intended to restrict initiative or flexibility that may be necessary to meet the demands of each situation.

4702. AMPHIBIOUS TASK FORCE OPERATION PLAN

a. Development.--The chief distinction between various concepts developed in the estimate of the situation and the development of the operation plan is that of precision. What is to be done, by whom, and when is set forth in the amphibious task force plan. This plan should be clear, concise, complete, and authoritative in nature. It must convey positively the CATF's determination and intentions.

b. Format.--The format for the amphibious task force operation plan is found in NWP 22-1, The Amphibious Task Force Plan. Of particular importance in the preparation of subordinate aviation unit plans are the air operations, antiair warfare, and amphibious operations (for ship-to-shore movement) annexes.

c. Responsibilities.--The CATF will identify the tasks to be performed by landing force aviation in order to:

(1) Attain and maintain air superiority in the objective area.

(2) Curtail or halt the movement of enemy forces into, and within, the objective area.

(3) Provide air control within the objective area.

(4) Conduct the helicopterborne ship-to-shore movement.

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Section VIII. AVIATION COMBAT DOCUMENTS

4801. GENERAL

a. The operations of aviation elements in combat are governed principally by three types of documents: operation plans/orders, fragmentary orders, and standing operating procedures.

b. The decentralized control in ground combat operations permits the division commander to issue an operation plan or order directed toward overall objectives. The detailed orders necessary to achieve those objectives will be issued by subordinate commanders. By contrast, the wing in combat does not move or displace toward an objective; rather, it is moved ashore into more or less fixed physical locations. The combat tasks are performed by the aircraft which cover relatively large geographical distances in the performance of these tasks and, upon completion, return to these established installations. Air operations are planned and controlled centrally at the wing level and are affected by changing tactical situations and the daily requirements of supported ground forces.

c. As a result of these differing situations and methods of control, aviation command is exercised through the operation plan, fragmentary orders, and standing operating procedures as shown in the following paragraphs.

4802. AVIATION UNIT OPERATION PLAN

a. The aviation unit operation plan (OPLAN) is a formal document. The five-paragraph format is typical. However, attachments may appear as overlays, tables, and computer printouts, or in other formats which promote ease of understanding, but the sophistication will vary with the time allowed for the preparation. When the commander issues an order to execute, the operation plan normally is redesignated an operation order retaining its numerical identity.

b. The operation plan normally states the aviation mission in broad, general terms such as "provide landward extension of the amphibious task force air defense system" or, "be prepared to assume control of air operations in the objective area." The wing operation plan also states the mission of its subordinate elements in similar general terms, providing broad guidance to groups and squadrons for relatively long periods of time. Detailed orders for the conduct of specific tasks are issued separately on a day-by-day basis during an operation.

c. Development of the concept of operations precedes detailed planning of the helicopterborne assault. The concept, although general in nature during preliminary planning, is continually refined as detailed planning progresses and, eventually, becomes part of theo operation plan. The concept of operations is the principle medium for coordination with other component commanders to ensure supportability. For this reason, the information contained in the preceding paragraphs is of vital concern to both the helicopter unit and helicopterborne unit commander. Initial losses in early stages of the assault must be accurately evaluated. Continuing support in terms of combat strength buildup may be severly hampered by a highly mobile enemy air defense system. The helicopterborne unit commander may have consolidated his ground position, but may find that his logistic

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support is severely restricted as enemy air defenses between his position and the helicopter/logistics support areas have been built up to the point of shutting off helicopter traffic to the landing zone. For this reason, objectives assigned to helicopterborne forces must be carefully selected.

(1) Objective.--Objective selection and the scheme of maneuver for helicopterborne operations must adhere to the principles of ground combat with variation as necessitated by the amphibious characteristics involved. In the face of a viable enemy antiair threat, the scheme of maneuver and objective selection for helicopterborne forces should be such that helicopter approach and retirement lanes can be covered by artillery and/or naval gunfire.

(2) Subsequent Operations.--As operations develop ashore, the support role assigned to naval gunfire is limited to the flanks of the landing force by range capabilities and the support emphasis swings toward artillery. At the same time, the frontal area to be covered by these supporting arms is constantly increasing. The massing of fires to cover approach and retirement lanes will, therefore, become more difficult. Thus, the selection of subsequent objectives ashore must weigh these factors versus the enemy antiair weapons attrition and his resupply/reinforcing capability in planning subsequent helicopterborne operations. For this and other reasons, a constant flow of intelligence information must exist within both aviation and ground commands during subsequent operations ashore.

d. The attachments to the OPLAN amplify, as is necessary, the basic plan. Appendix D provides an example of a basic OPLAN and selected annexes. Some of the annexes referred to below, or elsewhere in this publication, have universal applicability throughout the Marine Corps and, for that reason, are not shown in appendix D, but may be found in the appropriate FMFM. Highlights of an aviation unit operation plan are found in the following annexes:

(1) Intelligence.--This annex includes the essential elements of information, target list, weather and terrain studies, landing zone studies, and the enemy order of battle.

(2) Operations.--This annex includes chemical, biological, and radiological (CBR) defense; search and rescue; operations overlays; employment of friendly forces; fire support; and escape and evasion.

(3) Logistics.--This annex covers petroleum supplies, medical services, airfield characteristics, base development plans, and ammunition supplies.

(4) Communications-Electronics.--This annex covers circuit requirements, radio plans, frequency allocations, communications security, call signs, and visual signals.

(5) Movement.--This annex includes procedures for air movement of Fleet Marine Force units.

(6) Air Operations.--This annex covers aircraft schedules, armament, helicopter operations, employment of land-based air units, frag orders, air communications, and air control procedures.

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(7) Amphibious Operations.--This annex provides information on the ship-to-shore movement. Included is the landing force landing plan, wing landing plan, vertical assault plan, helicopter availability table, helicopter landing diagram, helicopter control instructions, helicopter employment and assault landing table, heliteam wave and serial assignment table, and the helicopter landing zone summary.

4803. HELICOPTER MISSIONS

a. Preplanned Missions

(1) In order to effectively employ the helicopter assets on a day-to-day basis, the landing force/MAGTF commander must establish priorities and study the needs throughout the landing force/MAGTF. Preplanned missions provide, by far, the most efficient and economical use of helicopters. Preplanned missions may include helicopterborne assaults, programmed resupply, air reconnaissance, air observer spotting, reconnaissance team insertion and extraction, liaison, or courier flights. Preplanned missions are requested well enough in advance to allow detailed and coordinated planning among the requester, the helicopter unit, and fire support and air control agencies. These missions may be requested hours or even days ahead and allow planning to be accomplished down to the individual pilots. Requests for helicopter support for a helicopterborne assault should be submitted immediately up the operational chain of command. As soon as possible, assets should be allocated so that the planned mission can be launched.

(2) All units submit requests for preplanned helicopter support through their operational chain of command to the commander of the landing force/MAGTF. As requests proceed up the operation chain of command, each intervening commander should determine the feasibility of the requests, consolidate the requests, if possible, establish a priority, and forward them. When these requests reach the landing force level, they are then matched against the assets that are available. When the requests do not exceed the number and type of helicopters available, the requests are approved and submitted to the helicopter unit for execution. If the requests exceed the assets, then the landing force/MAGTF commander must determine which requests will be cancelled, consolidated, or modified. The modified requests are then submitted to the helicopter unit for execution. When the disposition of the requests has been made, the requester must be notified through his chain of command. During an amphibious operation, these missions are then scheduled in the landing plan.

b. Immediate Missions

(1) Immediate missions are those which arise suddenly and which, by their nature, cannot be planned in advance. This could include such support as MEDEVAC, emergency resupply, or reaction force. These missions are launched in support of any requesting unit within the landing force/MAGTF. The landing force/MAGTF commander will allocate some of his helicopter assets to provide immediate response for support or, through the DASC, will divert airborne helicopters from missions of lower priorities. These helicopter assets are assigned to the air control agency to provide more rapid response for the requester. Normally, very little detailed planning can be accomplished in advance of these missions. Therefore, the request received by the air control agency must include the crucial information provided in a preplanned request.

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(2) The nature of immediate helicopter support missions requires that they be transmitted by the most rapid and effective means of communication available. Requests for immediate missions during the amphibious operation are submitted by the helicopterborne unit directly to the helicopter direction center, on the helicopter request (HR) net, or by the helicopter support team to the TACLOG, who then gives the request to HDC. Surface landed units submit requests on the tactical air request (TAR) net, which are then forwarded by the TACC to HDC via Navy nets. The HDC supplies helicopters dependent on the tactical situation and the availability of helicopters. During subsequent operations ashore, the requests are submitted to the DASC on the TAR or HR net(s) as appropriate. Requests via these nets are monitored by senior commands whose silence means that they approve the request.

c. Mission Precedence.--A mission precedence of routine, priority, urgent, or emergency is assigned by the unit commander requesting the mission. Although the mission precedence of mandatory can be assigned, it can only be specified by the landing force/MAGTF commander or his designated representative.

(1) Routine

(a) Administrative or tactical transport of personnel, material, or equipment where time is not a critical factor and delay would not endanger lives or loss of material.

(b) Helicopter evacuation of a deceased person, a patient with a minor illness, or a patient requiring routine transfer from one medical facility to another for further treatment.

(2) Priority

(a) Tactical movement of personnel, material, or equipment where excessive delay would jeopardize the success of the mission. This includes logistic operations where delays would result in excessive material loss. This would occur, for example, in instances where spoilage or seizure by the enemy is feared.

(b) Helicopter evacuation of seriously wounded, injured, or ill personnel who require early hospitalization, but whose immediate evacuation is not a matter of life or death.

(3) Urgent.--Evacuation of critically wounded, injured, or ill personnel whose immediate evacuation is a matter of life or death.

(4) Emergency.--Missions involving safety of U.S. or other friendly lives, or missions requiring immediate transport of vital supplies or equipment.

(5) Mandatory.--Missions involving possible loss of human life or national prestige to the extent that risk which would normally be unacceptable are taken. Mandatory missions require the approval of a flag officer.

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CHAPTER 5

COMMAND, COORDINATION, AND COMMUNICATIONS

Section I. INTRODUCTION

5101. GENERAL

The coordination of Marine aviation assault support forces is of considerable scope and at times complex. Participation in joint operations, the range and capabilities of high performance aircraft, the communications necessary to control widely dispersed aircraft and aviation units, and the integration with artillery and naval gunfire units all require extensive planning and precise execution for effective command and control.

5102. COMMAND AND STAFF RELATIONSHIPS

Command and staff relationships are discussed in detail in FMFM 3-1, Command and Staff Action. The areas unique to aviation commands are further discussed in FMFM 5-1, Marine Aviation. Amplification here is directed toward commands subordinate to the wing, such as the landing force aviation commander.

a. Command.--It is essential that all subordinate commanders have access to the landing force aviation commander. Units either land-based or embarked upon amphibious shipping must rely on either radio communications or messenger service to provide this access when the landing force aviation commander is afloat. Ashore, the units may augment the above methods with landlines.

b. Staff.--The organization of the squadron and group staff is explained in FMFM 5-1. Although aviation command staff members are not integral elements in the chain of command, they will often play a more active role in the decision-making processes than their counterparts at the

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Operational control of the MAW passed to the Air Force component commander is not desirable and should be avoided if at all possible.

b. Command Relationships

(1) Two basic principles governing command relationships are set forth in JCS Pub 2, Unified Action Armed Forces (UNAAF).

(a) The joint force commander exercises operational command of assigned forces through his Service component commanders or uni-Service force commanders.

(b) The joint force commander maintains organizational intregrity of his Service components insofar as practicable in order to exploit fully the inherent overall combat effectiveness of the component.

(2) The Marine air-ground task forces assigned to a joint force will operate under a naval component commander or as a uni-Service force. If the naval component consists predominantly of Marine Corps forces, the commander of the MAGTF will be designated naval component commander.

(3) Operational command of an MAGTF assigned to a joint force will be exercised by the joint force commander through the naval component commander.

(4) The relationship that exists between an MAGTF and other Service components of a joint force is one of coordination and mutual support.

5203. NAVAL COMMAND

As discussed in paragraph 5104, the mission of the Marine Corps places the landing force within the naval operational chain of command. Operational control of landing force aviation is exercised through the commander of the landing force. Aviation supply support will be provided by the amphibious task force during the period that the helicopter units are embarked.

5204. LANDING FORCE

Where preponderance of tactical aviation comes from the Navy or Marine Corps, the overall air effort in the objective area will be directed by a naval aviator under the CATF until control is passed ashore. The officer so designated will be responsible for the preparation of the amphibious task force air plan. In execution of the plan, he will use the control agency designated by the joint amphibious task force commander. Landing force aviation will be organized as a subordinate task organization of the landing force. (See fig. 10.)

a. Landing force aviation is represented by the commander landing force during all phases of the operation, even when the control of all air is vested in the CATF. Since immediate responsibility for the conduct of landing force operations ashore is vested in the commander landing force, the planning and execution of the landing and assault are primarily his concern. The speed and mobility of aircraft and the requirement to be responsive to the cognizant commander make it essential that control of air be exercised by that commander.

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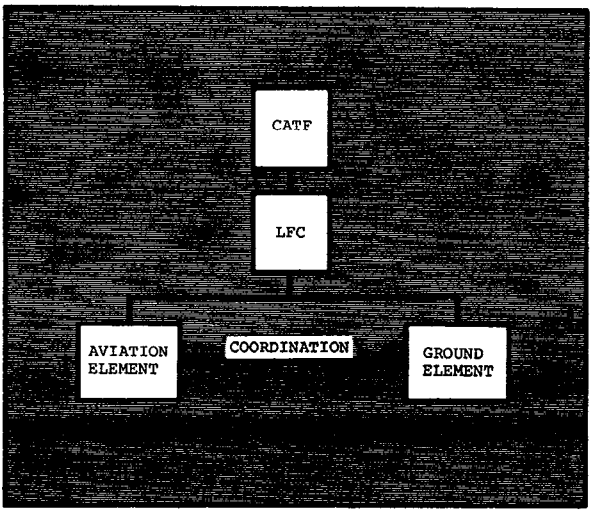

Figure 10.--Command Relationships Within the MAGTF (Operational Phase).

b. As early as possible, the commander landing force establishes air control facilities ashore that parallel those of the CATF. Upon the recommendation of the commander landing force, the CATF may pass responsibility for control of air operations to the commander landing force. The passage of control may be in stages; i.e., control of close air support may be passed ashore prior to control of other air operations. After passage of any or all control functions ashore, the Navy control centers afloat continue to monitor appropriate circuits, ready to assume active control in the event that it becomes necessary.

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Section III. FUNCTIONAL COORDINATION

5301. GENERAL

Functional coordination is a major requirement of Marine aviation. In this sense, it refers to the simultaneous coordination of all Marine aviation functions. It is apparent that aviation activities can conflict with each other in the same or adjacent airspace. Airspace control is designed to minimize this potential conflict and to regulate activity when a conflict arises. Control is obtained according to a set of preestablished priorities established by the MAGTF commander through his TAC. Functional coordination has four aspects in its application, all of which interact:

a. Intratheater Coordination.--This is the coordination required to govern the use of airspace on a scale much larger than that which affects a sector. Aircraft will routinely transit a sector or enter from an adjacent sector. This interaction requires a centralized authority for coordination.

b. Intrasector Coordination.--An additional need exists to coordinate multiple aircraft activity within a sector. This requirement generates the unique characteristics of the particular air command and control system. The approach followed by the MACCS for assault support operations will be discussed in subsequent paragraphs.

c. Coordination of Air Operations With Ground Operations.--To regulate air activity within one sector is not sufficient. Aircraft operate in a sector to support a ground commander; therefore, a requirement exists to coordinate air activities with those ground activities which are dependent upon use of airspace, artillery as an example. In this instance, there is a requirement which generates unique characteristics of the particular air command system: how it integrates with other supporting arms and the ground commanders' activities.

d. Technical Coordination.--Technology has advanced in some areas of air activity faster than in others. Needs have become more demanding, creating a situation wherein control of some aviation functions is heavily dependent upon technology. This dependence establishes a requirement for both manual and semiautomatic systems coordination which is in a continuous process of development within the Marine Corps as new items of equipment are introduced.

5302. INTRATHEATER COORDINATION

In view of the organization of the United States Armed Forces throughout the world today, the MAGTF will frequently be required to participate in combat action as a component of a joint force. It is, therefore, necessary to examine and standardize some applications of the Marine aviation for its role in such operations. See LFM 04/NWP 17, Doctrine and Procedures for Airspace Control in the Combat Zone; JCS Pub 2, Unified Action Armed Forces (UNAAF); JCS Pub 8, Doctrine for Air Defense From Overseas Land Areas; and JCS Pub 10, Tactical Command and Control and Communications Systems Standards (U), for a more detailed discussion of MAGTF participation in joint operations.

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a. Sector Assignment.--Plans for joint operations involving a MAGTF should provide, as is pointed out in JCS Pub 8, Doctrine for Air Defense From Overseas Land Areas, that a specific sector or area of responsibility be given to the MAGTF. The boundaries of this sector should be predicated upon the air defense and airspace control capability of the MAGTF, and will normally include the zone of action and objectives assigned.

b. Control and Coordination

(1) The joint force commander is responsible for providing overall guidance for the effective use of tactical air resources, including the general priorities and restraints to be applied, with due regard for the needs of subordinate commands and the maintenance of organizational integrity. He also establishes procedures to coordinate the employment of air resources with those agencies which require its support, and the control of airspace, as well as the reallocation of tactical air resources when it becomes necessary to meet emergencies.

(2) The joint force commander should coordinate air operations and airspace control through a coordinating authority for air (CAA), designated by the joint force commander.

(a) The CAA should normally be a member of the joint staff, operating from the joint combat operations center (COC). The coordination of tactical air operations and control of airspace are functions so vital to the overall success of the mission that they must be exercised by the joint force commander through a joint agency. In exceptional situations, it may become expedient for a component or supporting commander to be designated as the CAA. Such might be the case when that commander is providing the preponderance of tactical air assets and possesses the requisite capabilities to exercise the authority.

(b) The joint CAA, under the direction of the joint force commander, shall establish guidelines and procedures and supervise the coordination of tactical air operations through the compatible and mutually supporting tactical air control systems of the components.

(c) Centralized direction by the CAA does not imply assumption by the CAA of operational control over any air assets. The CAA has the authority to require consultation between the agencies involved, but does not have the authority to compel agreement. Matters on which the CAA is unable to obtain essential agreement shall be referred to the joint force commander for resolution.

(3) The MAGTF commander, through his tactical air commander and the agencies of the Marine air command control system, commands, controls, and coordinates Marine tactical air operations. The MACCS, while primarily responsive to the MAGTF commander, must also be compatible with and supportive of other like systems within the joint force. The TACC/TADC is the primary point of contact for operational aviation coordination with the CAA and forces external to the MAGTF, although subordinate agencies may interface directly to exchange information. When engaged in joint operations, aircraft of more than one service may be required to traverse and/or conduct operations in portions of the same airspace, thereby necessitating procedures to minimize mutual interference and to maximize operational effectiveness and safety. Under such conditions, it is essential that all aircraft operate under an integrated airspace control system. Any airspace control system

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however, be responsive to the ground commander's need for artillery and/or naval gunfire support, as well as providing for air defense and ensuring flight safety. The joint force commander establishes general airspace control procedures and responsibilities to achieve the maximum safety and operational effectiveness. The joint coordinating authority for air is additionally responsible for the coordination of airspace control. The purpose of any coordination must be to maximize effectiveness and efficiency. In this case, however, the effectiveness of the coordinated ground, surface, and air effort is the prime consideration, not merely to increase efficiency. Within the MAGTF sector of responsibility, the TAOC is the major en route air traffic control facility, and the Marine air traffic control squadron (MATCS) provides terminal air traffic control.

c. United States Air Force Tactical Air Control System.--The necessity to operate aircraft of more than one Service within the same airspace and coordinate supporting ground fires requires familiarity with the functions of appropriate air control agencies of the other Services. During land combat operations, the Marine Corps air control effort will interface with the Air Force tactical air control system. The Air Force component commander (AFCC) uses the TACS to exercise centralized control over his forces, to monitor the air-ground situation, and when designated as the airspace control authority, to coordinate, integrate, and administer the airspace over the combat zone. TACS provides the AFCC with the organization and equipment necessary to plan, direct, and control Air Force tactical air operations and coordinate joint air operations with components of the other Services. Within the TACS are found the appropriate agencies required for general direction, procedural guidance, and coordination of friendly air activity. For a description of the Air Force tactical air control system, see FMFM 5-1, Marine Aviation.

5303. INTRASECTOR COORDINATION

Intrasector coordination involves two activities: direct air support operations which include assault support and antiair warfare. This publication will discuss only the former, since antiair warfare is a vast subject and is covered in FMFM 5-5, Antiair Warfare.

a. Direct Air Support.--The following is a summary of participation from a coordinating agency point of view:

(1) TACC/TADC.--As the supervisory authority for the MACCS, the TACC/TADC constantly requires current information concerning air operation. This will be provided by receiving inputs from the DASC and TAOC regarding the specific functional activity for which they are responsible. The TACC/TADC consolidates this information and employs it in making decisions of a supervisory nature. The TACC/TADC normally controls ground alert assault support aircraft and has the authority to divert aircraft from preplanned missions should the need arise. Both of these functions may be delegated to the DASC if the situation allows or dictates and if priorities are clearly defined. The DASC and/or TAOC receive the final mission assessment for the missions conducted and forwards this information to appropriate agencies as designated by the tactical air commander.

(2) TAOC.--The TAOC participates in the conduct of assault support primarily by providing aircraft movement control. For aircraft flying longer distances in the objective area, the TAOC provides flight separation data to ensure flight safety. The TAOC coordinates with the DASC's on

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aircraft identification and radar handovers for ASRT's that control airdrops and provide other terminal control services. It controls aircraft initially entering the sector to participate in direct air support missions. Finally, the TAOC controls the conduct of air refueling operations assigned in support of other missions. Early warning and control (EW&C) sites function in a manner similar to that of the TAOC, but are more limited.

(3) MATCS.--Within the MACCS, expeditionary terminal control facilities are required and the MATCS, MAG is an operational facility designed to handle that requirement. The mission of the MATCS is to direct and control air traffic, including lands and takeoffs, within a designated air traffic control area under all weather conditions.

(4) DASC.--The DASC is the central coordination agency for direct air support and as such performs a number of functions. The DASC receives immediate requests from ground units directly and, if necessary, through the FSCC; it receives aircraft by category from the TACC/TADC for commitment to ground unit support; it coordinates with the TAOC for some en route aircraft; aircraft under its control are handed over to terminal control agencies for actual mission execution; it integrates direct air support activity with the senior FSCC and provides designated MAGTF agencies with information on fire support coordination measures, restrictions, and controls; it directs and coordinates the employment of subordinate ASRT's; and finally, the DASC determines routes of approach and retirement for aircraft under its control.

(5) TACP.--The TACP is the agency representing ground elements in the direct air support sequence of events. It forwards requests for air and controls aviation assets assigned to missions. It advises the ground element on the use, availability, and techniques/requirements to make the most economical use of direct air support missions. It provides the aviation representation at various levels of FSCC's for coordination.

(6) TAC(A).--The TAC(A) may request and receive aircraft from the DASC for control as instructed by supported ground units or as prompted by the mission to which he is assigned. Further, the TAC(A), in conjunction with the HC(A), will act as a coordinating controller when fixed-wing and helicopter aircraft are operating in proximity and a ground controller is not available.

(7) HC(A).--The HC(A) assists the DASC or HDC in the coordination and control of helicopters. An HC(A) normally is utilized only for the initial assault and works closely with the TAC(A) to endure coordination of helicopter movement with fixed-wing aircraft employment during combined fixed-wing and helicopter operations.

b. Antiair Warfare.--This topic, which is the second activity in intrasector coordination, is discussed in detail in FMFM 5-5, Antiair Warfare.

5304. AIRSPACE UTILIZATION

Airspace utilization is the degree of access to a block of airspace required to support a tactical mission. It is conditioned by the desired level of aircraft activity, the presence and capabilities of surface-based fire support means, airspace control requirements, and the assignment priorities. Consequently, when airspace utilization is being planned, all significant uses of airspace over the combat area must be considered. For

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the amphibious assault operation, the joint force commander who orders the operation will assign, to the CATF, an airspace of defined proportions which will include the amphibious objective area. All operations in the AOA will be under the control of the CATF until the amphibious operation is terminated. To ensure unity of effort in overall air operations, the CATF will coordinate air operations within the defined airspace as necessary with the commander responsible for airspace control in the surrounding area.

a. Utilization Priorities.--The speed, range, and maneuverability of aircraft require centralization of control throughout the AOA. Yet, the ground commander's requirement for responsive fire support, specifically artillery and naval gunfire, necessitates the use of airspace that may conflict with aircraft operations. The CATF, in conjunction with the commander landing force, establishes force level priorities and general airspace control procedures. Subject to these procedures, MAGTF ground commanders are responsible for assigning immediate airspace utilization priorities within their area of responsibility. Airspace utilization requirements are coordinated with those of adjacent and high echelons.

b. Reassignment of Control.--At the termination of the amphibious assault operation, the amphibious task force will be dissolved, the assigned airspace will be disestablished, and the airspace control will normally revert to the airspace control authority designated for that area.

5305. AIR-GROUND COORDINATION

Fire support coordination is the planning and executing of fire so that targets are adequately covered by a suitable weapon or group of weapons. Its objectives are to assure that the most effective fire support is provided to all components participating in an operation, that adequate provisions for troop safety are made, that efforts are not duplicated, and that coordination with adjacent and higher units prevents mutual interference. Early in the planning stages of an operation, representatives of the various fire support means (artillery, naval gunfire, and air) begin examining known and anticipated targets. Their purpose is to determine the most economical yet efficient means to achieve the desired effect on each target. They attempt to distribute fire support to all participating ground combat elements according to predetermined priorities, yet maintain enough flexibility to meet the demands of developments. Pre-D-day and pre-H-hour naval bombardment, airstrikes, and beach strafes are planned to offset the vulnerabilities of assault elements prior to artillery coming ashore. Once ashore, as the landing force pushes inland to the limits of naval gunfire ranges, artillery support receives heavier emphasis. Another complex task exists for fire support coordination planners and that is to ensure the delivery of fire support without endangering friendly forces. This necessitates provisions for avenues of movement for the assault support aircraft throughout the operation. This is a particularly difficult task when aircraft are widely scattered in the performance of logistic support tasks.

a. Coordination of Air Support With Other Fire Support Means.--The characteristics of aircraft, particularly their mobility, require that specific attention be given to their integration with other fire support means. The activity of these aircraft must be coordinated with other air activity to meet force priorities and safety requirements. The problems created by aircraft speed and movement necessitates control being centralized at the highest level of the MAGTF. This centralization is required to ensure economical use of resources and to provide flexible response for the

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entire MAGTF ground combat element. Centralization of control dictates a process wherein air support is requested from a central, functional, control agency. Immediate and on-call requests to the DASC are screened by intermediate ground command echelons for approval. The significance of this requesting procedure is that each intermediate echelon must examine the location and status of any artillery or naval gunfire missions in progress and look carefully for any other threat to aviation within their area of responsibility. The process of approval allows higher echelons the opportunity to disapprove when more pressing requirements for assault support exist elsewhere or when higher priority fire missions would have to be either checked or terminated in order to accomplish the requested air mission. Provisions are established within each MAGTF to ensure flexibility and rapid integration of air with other supporting arms. In order to accommodate this function, a specific agency has been established within the MAGTF structure where all supporting arms activity is centrally reviewed, approved, coordinated, and displayed. Furthermore, general control measures are employed which allow rapid and effective coordination when necessary.

(1) Fire Support Coordination Center.--The various FSCC's are the commander's agencies tasked to stay abreast of the supporting arms effort and to perform the necessary coordination. They are the only agencies which combine the communications and personnel needed to plan, receive, process, implement, and forward information concerning artillery, air, and naval gunfire activity. The FSCC is a staff agency at each level of infantry command from the battalion through the command element of the largest MAGTF, the Marine amphibious force. Staffed by representatives of each of the supporting arms, FSCC personnel are closely attuned to the intentions of the commander and represent his interests in fire coordination matters. For decisions beyond their assigned responsibility, they establish immediate contact with the commander. They consolidate the summary information on supporting arms activity and assign the necessary control measures for continuous fire support.

(2) Coordination and Control.--Coordination and control measures set forth responsibility, restrict and control fires, and complement the effort of higher and adjacent units. Aircraft are subject to limitations in the execution of their missions in much the same manner as ground units. In the case of assault support operations, the fire support coordination line (FSCL) and suppression of enemy air defenses (SEAD) requirements are of the greatest concern and importance. These measures ensure that the ground commander maintains airspace utilization approval authority over his immediate airspace and that safety requirements for both aircraft and ground forces are met.

(a) Fire Support Coordination Line.--The FSCL is a line beyond which all targets may be attacked by any weapon system (including aircraft and special weapons) without endangering troops or requiring additional coordination with the estbalishing headquarters. The effects of any weapon system may not fall short of this line. The FSCL is ideally located at the extreme ranges of artillery and naval gunfire. Inside the FSCL, coordination with other supporting arms is obviously necessary, and attack of targets must be coordinated with the appropriate ground commander. As a fire coordination control means, it serves the following two purposes:

1 Provides ground commanders with sufficient control of aircraft to assure troop safety, aircraft safety, and coordination of airstrikes with ground maneuver. It additionally precludes the unnecessary duplication of supporting fires.

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2 Provides aviation commander, air control agencies, and pilots of aircraft with sufficient information to clearly delineate the degree of control or coordination required for aircraft to attack ground targets or conduct flight operations in the area.

(b) Airspace Coordination Area.--The ACA is a block of airspace in the target area in which friendly aircraft are reasonably safe from friendly surface fires. It may occasionally be a formal measure (a three-dimensional box in the sky); more frequently, it will be informal (e.g., "keep the field artillery and naval gunfire north of GREEN River, close air support to the south"). (See fig. 11.)

(c) Suppression of Enemy Air Defenses Techniques.--SEAD techniques are closely related to counterbattery fires and are employed in support of hostile antiaircraft weapons that can fire on assault support aircraft during the execution of their missions. SEAD fires are primarily delivered by artillery units; however, naval gunfire and support aircraft may be employed in this effort. Because of the detailed and close coordination required, SEAD fires are planned, coordinated, and controlled by the

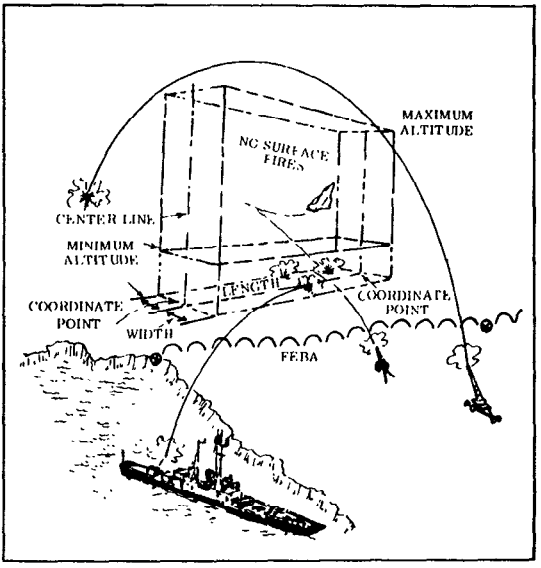

Figure 11.--View of Typical Airspace Coordination Area in Effect.

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appropriate FSCC. The aviation representative in the FSCC plays a most important part in the planning of these missions. He is responsible for the preparation and use of SEAD templates that represent the area and time each type of aircraft will be vulnerable to antiaircraft fires during certain types of missions. The key to a successful mission lies in thorough planning and positive control of its execution. The mission is controlled directly by the forward air controller, forward observer (FO), and/or when naval gunfire is utilized, by the shore fire control party (SFCP). These controlling agencies can be located side by side in an observation post or tied together with "hot lines" to ensure instant reaction. When aircraft are used in SEAD roles, control is provided by a tactical air coordinator (airborne) or a forward air controller.

5306. FIRE MISSION CONTROL AGENCY COORDINATION

Due to the flexibility and capabilities of MACCS agencies, strict adherence to fixed areas of responsibility is not always applicable. As noted, these agencies perform cross-functional services and are assigned missions according to their abilities. Another major employment consideration is that required coordination must not be omitted by procedural oversight or variance from common practice. Such oversight has been experienced and is identified herein. There are missions in all of the aviation functions which could be directed outside, but in relative proximity to a ground commander's airspace boundaries. These missions would be directed by the MAGTF commander in support of the total landing force and fire support coordination measures and have not been previously addressed.

b. Fire Coordination Beyond the FSCL.--Past definitions of the FSCL have placed no restriction on, or requirement for coordination of, any surface fires impacting beyond the FSCL. By previous definition, surface fires could be traversing or initiating in a ground commander's airspace (as defined by the FSCL) without a formalized requirement for coordination, if impact was beyond the FSCL. The potential hazard that this presents to aircraft operations inside that airspace is apparent. There is an equal hazard, perhaps greater, to aircraft operating in proximity to the FSCL, but not inside it. It has been stated that the FSCL will "ideally" be at the limit of friendly surface fire capability, but in fluid combat situations, particularly amphibious operations, this may be an unrealistic expectation. Similarly, there may be other surface fire or friendly aircraft activity which does not employ the ground commander's airspace, but which does use airspace adjacent to the FSCL. This activity presents potential hazards to MAGTF air support operations. Joint task force (JTF), amphibious task force, or the MAGTF itself may all have targets designated in these areas. Air and ground reconnaissance, indigenous friendly force activity, interdiction, or offensive AAW operations are examples of such missions which could be reasonably anticipated. Previous FSCL definitions have not provided for the safety of aircraft employed in proximity to these activities. The requirement exists to ensure coordination regardless of the source of the activity or location of the target, if hazards to aircraft operations are involved. During those phases of the amphibious operation when control remains afloat, this coordination is provided by the tactical air control center/supporting arms coordination center (TACC/SACC) afloat. As control phases ashore, coordination inside the FSCL becomes the responsibility of the DASC and the senior ground combat element FSCC. Coordination beyond the FSCL is retained afloat. FSCL's, however, are normally not established by the MAGTF, rather they are designated by the ground combat element.

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Additionally, for larger size MAGTF's, there is often no fire support coordination agency at the force level. As a result, once full control is passed ashore, the coordination capability previously provided by the TACC/SACC afloat may be overlooked and lost. To overcome this loss, the ground combat element FSCC may be tasked to coordinate all surface fires which use any airspace in the MAGTF area of responsibility, regardless of its relationship to the FSCL. This solution is reasonable only if responsibility is assigned to that FSCC to coordinate all surface fires within assigned airspace and within surface fire unit maximum range and ordinate capabilities. In this instance, the DASC may be assigned the aircraft hazard advisory/coordination task. Regardless of the methods employed, aviation commanders must ensure that air and ground fires beyond the FSCL are coordinated in such a manner that provides for the safety of their aircrews and aircraft.

c. Control Agency Capabilities.--Another factor which influences the use of air control agencies is their ability to function in that capacity. As in the preceding discussion, the situation may arise wherein any agency directly supporting ground units may be employed in support of the entire MAGTF. For example, the ASRT offers the capability for all-weather, radar controlled bombing. It is routinely assigned to the DASC for direction and operates primarily in support of the ground combat element. Yet, its basic radar capability and the range at which it can operate makes it valuable as a means to support the entire MAGTF, regardless of its capabilities relative to an FSCL. It can be tasked to periodically control missions in direct support of the MAGTF according to appropriate priorities. If inside the FSCL, the DASC will provide the necessary supporting arms coordination. If not, and depending upon the responsibilities of the senior FSCC, either the TADC/TACC or the DASC may perform this coordination. The two significant factors are that the air coordination beyond the FSCL is the responsibility primarily of the TACC and that the basic capabilities of the air control agency, not the formal organizational structure, dictates the employment method for that agency.

5307. AUTOMATED AND MANUAL SYSTEM COORDINATION

The Marine air command and control system is in the evolutionary process of changing from manual to automated systems. Since the change is not fully effected as yet, a requirement exists for coordination measures to interface the manual and automated processes. Additionally, plans must incorporate manual procedures to be employed, should automated systems failure occur. Specific methods are not addressed in this manual, rather they must be developed to reflect the personnel and equipment employed at each force level.

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Section IV. COMMUNICATIONS-ELECTRONICS

5401. GENERAL

The assault support function requires a variety of air operations in support of the landing force. These operations require a reliable and responsive communication network. The principle means of tying the complex of users and providers assault support together is via electronic systems. The flexibility of the command in its prosecution of the campaign is directly related to effectiveness of the communication systems. This is readily apparent in assault support operations.

5402. REQUIREMENTS

The communication and electronic requirements as addressed herein are of three types. Upon occasion, the distinctions may not be as simple as the divisions presented. However, an understanding of the following should identify a solution for all foreseeable communications requirements:

a. Operational Nets.--This group of nets provide the means for controlling aircraft and missiles, for immediate air requests, and for the conduct of other operational communications. This, in general, is characterized by the Marine air command and control system which is addressed in previous chapters. For a brief net description, see FMFM 5-1, Marine Aviation; for a detailed net description, see FMFM 10-1, Communications.

b. Command, Administrative, and Logistic Nets.--These nets provide a means for the aviation commander to exercise command and control of subordinate units. Administrative and logistic matters of such a priority as to warrant a rapid exchange of information are passed via this means. Whereas the operational nets tend to be aircraft and missile oriented, the command, administrative, and logistic nets are oriented to the units, people, and supplies. This group of nets is viewed as the supporting structure for the operational nets.

c. External Systems.--The landing force aviation commander must have a tie between his communication systems and external systems. This is true for both the operational and the support systems and is in response to two principle causes:

(1) Air traffic to and from sectors not under the control of the tactical air commander must be coordinated.

(2) Support and supported elements of the landing force must have a means of transmitting their air requests to the tactical air commander. The tactical air request net satisfies this requirement for the immediate needs of the ground combat element. However, a means must be provided for passing the immediate requests of units not on the tactical air request net and for passing the routine air request for all elements of the landing force.

5403. EQUIPMENT

Tables of equipment for the various aviation units include adequate equipment for the establishment of normal communications. Command

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communications for independent deployments may require augmentation from the force communication battalion to satisfy long haul or unusually heavy communication demands.

a. For communication purposes, the Marine Corps has three types of equipment:

(1) Voice.--Voice communications are established within the system as required for a particular mission. Initially, these requirements will be in direct proportion to the phased establishment and activation of MACCS agencies ashore. Complete voice communication capability is required as the entire MACCS is expanded ashore. Voice communication requirements can be met with wire, radio, or any combination thereof. It is important to keep in mind that a requirement to communicate does not necessarily generate a requirement for a radio net, except for communications with aircraft.

(2) Teletypewriter.--Teletypewriter communications are established between elements of the system for general operational and administrative traffic. In some instances, teletypewriters may be used to transmit and receive tactical traffic requiring real time or near real time response.

(3) Data.--Data links are established between elements of the system to exchange digital data. These links, with their associated terminal equipments, allow the exchange of information between automated elements of the system. The requirements for data communications will vary depending upon the degree to which a task oriented system is automated. As an example, a single TAOC and DASC operating in the MAB will have fewer requirements for data communications than two TAOC's, a TACC, and a DASC operating in the MAF. Requirements for these links will be identified on the basis of needs of the mission.

b. For detection and control, the Marine Corps has radars ranging from lightweight trailer mounted Hawk radars to the large less mobile three-dimensional radars of the TAOC. Many factors affect the operational capabilities of radars. The ranges of radars can be severely reduced by weather conditions, improper emplacement, and their operating efficiency. Rain and snow, for instance, will reduce radar range, and a radar place on poor terrain surrounded by low hills will have its low altitude capability severely reduced. A radar not operating at its peak or designed efficiency, either due to equipment failure or improper maintenance, adversely affects the unit as well. Since these factors cannot be forecast, planning is based upon design criteria; yet, as we have seen, the actual operational ability is a produce to several variables.

5404. COMMUNICATION NEED-LINES

Requirements to communicate within the system are expressed as need-lines. These need-lines may be satisfied by any communication means available, including those external to the system. For example, circuits established by the Defense Communication System (DCS) may be allocated for the coordination of the control system for tactical air. Need-lines may represent radio or wire used in conjunction with voice, data, or teletypewriter communications, or any combination thereof. The need-lines, as is mentioned above, are simply an expression of the requirement to communicate. The type and number of channels associated with each need-line, as well as the means of satisfying a specific form of terminal service, are based upon the

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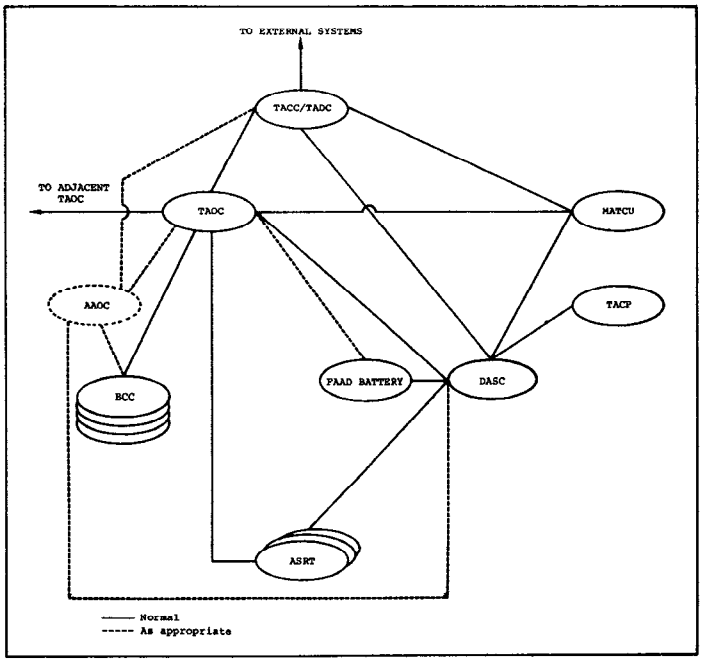

Figure 12.--Communication Need-Lines, Typical Marine Air Command and Control System Development.

particular mission and situation. Figure 12 represents need-lines in a typical situation in which less than the entire assets of the MACCS are employed. It is possible that the totality of requirements expressed in figure 12 could be met with wire and wire-multichannel radio (excluding ground-to-air). On the other hand, radio nets could be extensively employed. The mission and tactical situation will determine the need-lines. Equipment availability and geography will determine how the need-lines are satisfied.

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APPENDIX A

PLANNING DATA FOR ASSAULT SUPPORT HELICOPTERS

1. GENERAL

Planning data for assault support helicopters is provided in this manual for the purposes of ground training only. It is not intended that actual lift calculations will be made using this data. This information is provided as instructional material to be used in command post exercises and academic situations where the units conducting the training do not have access to current aircraft publications. In all actual helicopterborne operations, planners must use data provided by the helicopter unit.

2. PAYLOAD ANALYSIS

Payload is variable depending on the configuration of the aircraft and atmospheric conditions. For standardization, the operating weights shown in figures 13 to 18 are used for the combat configurations. The maximum gross weight tables were prepared by using the performance data charts in the appropriate NATOPS flight manuals. To compute payload, find the elevation of the landing zone or pickup zone, whichever is higher, and enter the table at that elevation or the next highest elevation shown (do not interpolate). Move across the table to the column under the temperature forecast for the selected elevation at the time of the operation. That block will show the maximum gross weight payload in pounds of cargo and the number of combat troops that can be lifted with that payload.

3. HELICOPTER FUEL/SPEED/RANGE DATA

Fuel consumption for a helicopter varies greatly with the tasks it performs. For example, the helicopter may have to wait in a pickup zone for several minutes burning fuel at a rate of 200 pounds per hour, or it may pick up and land many external cargo loads with several minutes of hovering at high power settings, burning fuel at a rate of 300 pounds per hour. The figures shown in figure 19 are average figures for a "typical" mission.

4. TIME FACTORS

a. In planning the time required for a helicopter lift, all increments of time required to perform specific actions must be included. The table shown in figure 20 lists the average time required to perform these movements and should be used for planning. The times are expressed in minutes. This table can be used for both shipboard and land-based operations.

b. To ensure that each increment of time is accounted for, a flight profile may be used. A sample flight profile is depicted in figure 21.

c. LHA/LPH/LPD launch intervals between waves are 10 minutes for flight deck packed helicopters and 16 minutes for helicopters lifted from the hangar deck.

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ELEVATION	Temp °F/°C	41/5	50/10	59/15	67/20	76/25	86/30	95/35	104/40	113/45
	Sea Level									
	1000									
	2000									
	3000									
	4000									
	5000									
	6000									
	7000									
	8000									

KEY

Gross Wt Payload/Troops

Aircraft Basic Weight .....

Crew ( ) and Equipment .....

Fuel .....

OPERATING WEIGHT .....

NOTES:

1. Table figures based on hover out of ground effect, no wind, with full fuel load.
2. Payload may be increased by reducing the operating weight.

Maximum Gross Weight .....

Operating Weight .....

PAYLOAD .....

Figure 13.--Maximum Gross Weight Table.

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ELEVATION	Temp °F/°C	41/5	50/10	59/15	67/20	76/25	86/30	95/35	104/40	113/45
	Sea Level	23,000 4280/17	23,000 4280/17	23,000 4280/17	23,000 4280/17	22,570 3850/16	21,500 2780/11	20,500 1780/7	19,500 780/3	18,720 0/0
	1000	23,000 4280/17	23,000 4280/17	23,000 4280/17	22,500 3780/15	21,500 2780/11	20,500 1780/7	19,650 930/3	18,720 0/0	17,900 0/0
	2000	23,000 4280/17	23,000 4280/17	22,500 3780/15	21,500 2780/11	20,500 1780/7	19,700 980/4	18,800 80/0	18,000 0/0	17,150 0/0
	3000	23,000 4280/17	22,375 3655/15	21,550 2730/11	20,675 1955/8	19,700 980/4	18,900 180/9	18,100 0/0	17,225 0/0	
	4000	22,000 3280/13	21,500 2780/11	20,750 2030/8	19,850 1130/4	19,000 280/1	18,150 0/0			
	5000	21,250 2530/10	20,750 2030/8	19,900 1180/4	19,100 380/1	18,275 0/0				
	6000	20,500 1780/7	19,900 1180/4	19,150 430/1	18,300 0/0					
	7000	19,700 980/4	19,150 430/1	18,300 0/0						
	8000	19,000 280/1	18,300 0/0							

KEY

Gross Wt
Payload/Troops

Aircraft Basic Weight 13,470

Armor 1,400

Guns & Ammunition (Two Caliber .50 Machineguns and Ammo) 380

Crew (4) and Equipment 1,000

Fuel 2,470

OPERATING WEIGHT 18,720

NOTES:

1. Table figures based on hover out of ground effect, no wind, with full fuel load.

2. Payload may be increased by reducing the operating weight (reduce fuel).

Maximum Gross Weight 23,000

Operating Weight 18,720

PAYLOAD 4,280

Figure 14.--Maximum Gross Weight Table (CH-46).

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ELEVATION	Temp °F/°C	41/5	50/10	59/15	67/20	76/25	86/30	95/35	104/40	113/45
	Sea Level	9,050 1156/5	8,900 1006/4	8,800 906/4	8,500 606/2	8,250 356/1	7,950 56/0			
	1000	8,950 1056/4	8,700 806/3	8,500 606/2	8,250 356/1	8,000 106/0				
	2000	8,700 806/3	8,400 506/2	8,200 306/1	8,000 106/0					
	3000	8,450 556/2	8,150 256/1							
	4000	8,150 256/1								
	5000									
	6000									
	7000									
	8000									

KEY

Gross Wt
Payload/Troops

Aircraft Basic Weight .....
Crew ( ) and Equipment ..... } 6,248

Fuel 1,646

OPERATING WEIGHT 7,894

NOTES:

1. Table figures based on hover out of ground effect, no wind, with full fuel load.

2. Payload may be increased by reducing the operating weight.

Maximum Gross Weight 9,500

Operating Weight 7,894

PAYLOAD 1,606

Figure 15.--Maximum Gross Weight Table (UH-1E).

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ELEVATION	Temp °F/°C	41/5	50/10	59/15	67/20	76/25	86/30	95/35	104/40	113/45
	Sea Level	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,350 1874/6
	1000	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,400 1924/6	9,950 1474/6
	2000	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,400 1924/6	10,000 1524/6	9,550 1074/4
	3000	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,500 2024/6	10,450 1974/6	10,050 1574/6	9,700 1224/5	
	4000	10,500 2024/6	10,500 2024/6	10,400 1924/6	10,350 1874/6	10,250 1774/6	10,000 1524/6			
	5000	10,350 1874/6	10,300 1824/6	10,250 1774/6	10,200 1724/6	9,950 1474/6				
	6000	10,150 1674/6	10,150 1674/6	10,050 1574/6	9,900 1424/5					
	7000	10,000 1524/6	9,950 1474/6	9,750 1274/5						
	8000	9,800 1324/5	9,600 1124/4							

KEY

Gross Wt Payload/Troops

Aircraft Basic Weight (w/Armor, One GAU-2B/A Minigun, and One M60D) 6,205

Crew ( ) and Equipment 1,000

Fuel 1,271

OPERATING WEIGHT 8,476

*Maximum Gross Weight (Internal Load) 10,000

Operating Weight 8,476

PAYLOAD 1,524

NOTES:

1. Table figures based on hover out of ground effect, no wind, with full fuel load.

2. Payload may be increased by reducing the operating weight.

* Maximum gross weight with external load is 10,500.

Figure 16.--Maximum Gross Weight Table (UH-1N).

Provided by www.marines.cc

ELEVATION	Temp °F/°C 41/5	50/10	59/15	67/20	76/25	86/30	95/35	104/40	113/45
Sea Level	41,500 12,670/52	41,200 12,370/51	40,000 11,170/46	38,500 9,670/40	37,100 8,270/40	36,000 7,170/29	34,600 5,770/24	33,300 4,470/18	31,900 3,070/12
1000	40,600 11,770/49	40,000 11,170/46	38,600 9,770/40	37,200 8,370/34	36,000 7,170/21	34,700 5,870/24	33,500 4,670/19	32,300 3,470/14	30,900 2,070/18
2000	39,800 10,970/45	38,500 9,670/40	37,200 8,370/34	36,000 7,170/29	34,800 5,970/24	33,500 4,670/19	32,300 3,470/14	31,000 1,170/9	29,900 1,080/4
3000	38,200 9,370/39	37,000 8,170/34	35,900 7,070/29	34,700 5,870/24	33,500 4,670/19	32,200 3,370/14	31,100 2,270/9	30,000 1,170/4	
4000	36,800 7,970.33	35,700 6,870/28	34,500 5,670/23	33,400 4,570/19	32,200 3,370/14	31,100 2,270/9			
5000	35,500 6,670/27	34,500 5,670/23	33,500 4,670/19	32,300 3,470/14	31,100 2,270/9				
6000	34,700 5,270/21	33,100 4,270/17	32,100 3,270/13	31,000 2,270/9					
7000	32,900 4,070/16	32,000 3,170/13	30,900 2,070/8						
8000	31,600 2,770/11	30,800 1,970/8							

KEY

Gross Wt
Payload/Troops

Aircraft Basic Weight (Including Fixed Armor Plate) ...	23,490
Guns and Ammunition (Two XM-218 Caliber .50 Machineguns)	193
Crew (4) and Equipment	1,000
Full Fuel Load	4,147
OPERATING WEIGHT	28,830
Maximum Gross Weight	42,000
Operating Weight	28,830
PAYLOAD	13,170

NOTES:

1. Table figures based on hover out of ground effect, no wind, with full fuel load.
2. Payload may be increased by reducing the operating weight.
3. More than 35 troops may be carried if seats are not used for each man.

Figure 17.--Maximum Gross Weight Table (CH-53A).

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ELEVATION	Temp °F/°C	41/5	50/10	59/15	67/20	76/25	86/30	95/35	104/40	113/45
	Sea Level	42,000 13,761/57	42,000 13,761/57	42,000 13,761/57	42,000 13,761/57	41,800 13,561/56	40,600 12,361/51	39,100 10,861/45	38,100 9,861/41	36,500 8,261/34
	1000	42,000 13,761/57	42,000 13,761/57	42,000 13,761/57	41,800 13,561/56	40,500 12,261/51	39,200 10,961/45	38,000 9,761/40	36,700 8,461/35	35,500 7,261/30
	2000	42,000 13,761/57	42,000 13,761/57	41,200 12,961/54	40,000 11,761/49	38,900 10,661/44	37,800 9,661/40	36,500 8,261/34	35,200 8,961/29	34,200 5,961/24
	3000	42,000 13,761/57	41,000 12,761/53	39,800 11,561/48	38,500 10,261/42	37,500 9,261/38	36,300 8,061/33	35,200 6,961/29	34,000 5,761/24	
	4000	40,300 12,961/50	39,200 10,961/45	38,300 10,961/41	37,100 8,861/36	36,100 7,861/32	35,000 6,761/28			
	5000	38,900 10,661/44	38,000 9,761/40	36,900 8,661/36	35,900 7,661/31	34,800 6,561/27				
	6000	37,300 9,061/37	36,300 8,061/33	35,500 7,261/30	34,400 6,161/25					
	7000	36,000 7,761/32	35,200 6,961/29	34,200 5,961/24						
	8000	34,500 6,261/26	33,800 5,561/23							

KEY

Gross Wt Payload/Troops

Aircraft Basic Weight 22,900.0

Crew (4) and Equipment 1,000.0

Fuel 4,338.4

OPERATING WEIGHT 28,238.4

NOTES:

1. Table figures based on hover out of ground effect, no wind, with full fuel load.

2. Payload may be increased by reducing the operating weight.

Maximum Gross Weight 42,000.0

Operating Weight 28,238.4

PAYLOAD 13,761.6

Figure 18.--Maximum Gross Weight Table (CH-53D).

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TYPE HELICOPTER		UH-1E/N	CH-46	CH-53	AH-1G	AH-1J
Cruise Speed/Knots		100	120	150	120	120
Airspeed With External Load		-	100	100	N/A	N/A
Nautical Miles Per Minute		1.5	2	2.5	2	2
Fuel	Gallons	230/212	380	638	270	270
Capacity	Pounds	1498/1378	2470	4147	1836	1836
Fuel	Pounds Per Hour	400/600	1200	2000	560	690
Consumption	Pounds Per Minute	8/10	20	35	9.5	12.5
Time/Fuel Required at Cruise Speed for 100 NM Combat Radius Mission		2+00 1000#/1200#	1+40 2000#	1+20 2670#	1+40 950#	1+40 1250#
Safe Fuel Reserve 20-30 Minutes		160#/200#	400#	700#	190#	250#

Figure 19.--Average Figures for a Typical Mission.

	AH-1J/G	UH-1E/N	CH-46	CH-53
Load Troops	N/A	2	4	5
Pickup/Land External Cargo	N/A	2	4	8
Takeoff, Climb, & Rendezvous (Both Land and Shipboard)	4	4	4	4
En Route Time (Miles/Minutes)	2.0	1.5	2.0	2.5
Approach and Land	2	2	2	2
Unload Troops	N/A	1	1	1
Unload Internal Cargo	N/A	2	3	10
Refuel Hot (Full Load)	30*	6	4	5
Shipboard Recovery	15	15	15	15
*30 minutes to refuel and rearm in the case of the AH-1G/J.				

Figure 20.--Time Factors.

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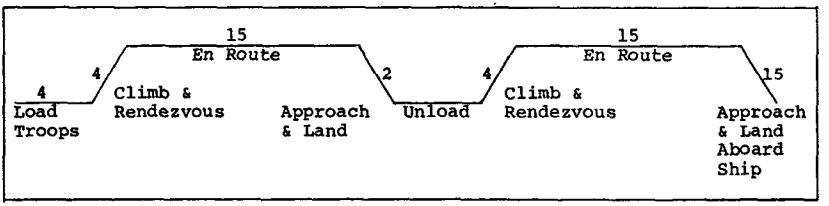

Figure 21.--Flight Profile.

5. TROOP CARRYING EQUIPMENT/INSTRUCTIONS

a. The troop seats in the assault support helicopters are of metal frame construction with attached fabric seats and backrests. Each seat incorporates a removable safety belt which must be used during all phases of flight. For overwater phases of flight, 782 gear must be unbuckled to facilitate rapid removal in case of ditching. On administrative or training flights, floatation (troop) vests are provided when operating over water, and protective headgear is provided for those persons not wearing helmets. Chinstraps must be secured on all helmets and headgear.

b. Tactical troop loading and unloading is normally accomplished via the rear ramp on aircraft so equipped to speed combat exit and entrance. UH-1 helicopters are boarded and exited through the side doors. Persons wearing soft covers should remove them when approaching an area of rotor downwash, since they can easily be unseated by the force of the winds created. Movement around the helicopters must be made to the front of the aircraft, and either well outside the rotor area, or close in to the nose section, but always where the pilot(s) can observe such movement. Cargo and vehicular movement must be well outside the rotor area, except when making approaches for loading.

c. Examples of typical troop seating and cargo carrying arrangements are shown in figure 22.

6. *INTERNAL CARGO LOADING/UNLOADING*

a. Figure 23 is a table of characteristics of the cargo compartments of assault support transport helicopters. It will be of use in the preparation of cargo for internal transport. See paragraph 1 above, for the determination of payload capacity in a given circumstance.

b. Vehicles are either backed up the ramp into the cabin under their own power or winched in. For unloading, tiedowns are removed and the vehicles are driven down the ramp out of the cabin. Vehicles exiting the CH-53 must make an immediate left turn on leaving the ramp to avoid the tail rotor. Average loading and unloading time for vehicles is 2 minutes per vehicle.

c. Palletized cargo may be placed on the ramp by a forklift, or dragged onto the ramp by winch. (NOTE: Due to the height of the 6,000-pound, rough terrain forklift, it is not compatible with the CH-46 or CH-53; however, the 3,000-pound, rough terrain forklift is compatible.) From the ramp, pallets

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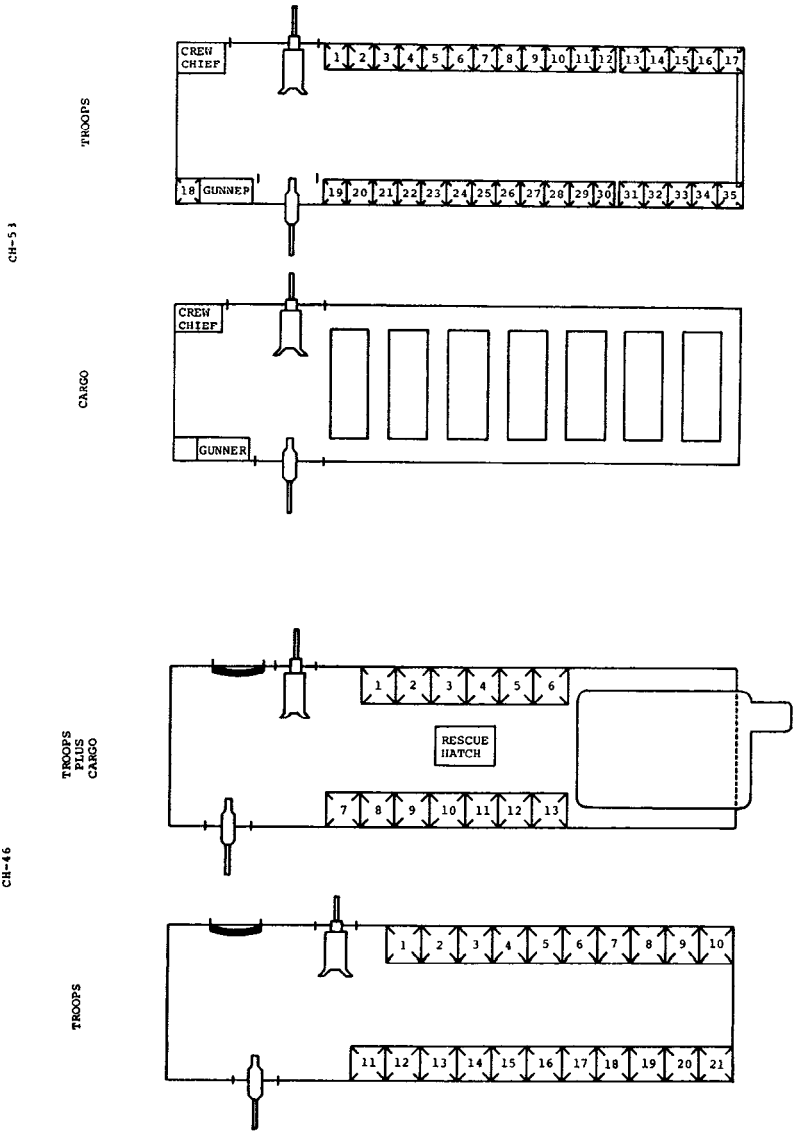

Figure 22.--Typical Troop Seating and Cargo Carrying Arrangements.

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	CH-46	CH-53
Cabin:		
Width	69 inches	90 inches
Height	69 inches	77 inches
Length	24 feet 2 inches	30 feet
Vehicle wheel load treadways	1,000 pounds/wheel	1,725 pounds/wheel
Floor load:		
Between rails	300 pounds/square foot	300 pounds/square foot
Outside rails	200 pounds/square foot	300 pounds/square foot
Maximum pounds per 40x48 pallet	3,000 pounds	2,200 pounds
Maximum number of pallets	3	7
Winch capacity	2,000 pounds	2,100 pounds

Figure 23.--Characteristics of the Cargo Compartments of Assault Support Transport Helicopters.

may be winched into the cabin or pushed in by manpower over rollers in the helicopter deck. Due to limits on winch speed, pallets are loaded two to three times faster by manpower. Loading times will vary from 4 to 12 minutes, depending upon methods used and terrain.

d. Loose cargo may be loaded in the CH-46, CH-53, and UH-1N. Due to the time delays in handlng and securing loose cargo, however, CH-46 and CH-53 loads are normally palletized; the UH-1N can be used to haul emergency supplies as loose cargo should the situation warrant such methods. Although loose cargo is normally strapped down or otherwise secured, it does create a potential flight hazard from possible load shifting. This results in a shift of center of gravity and possible loss of full or even total flight control.

7. EXTERNAL CARGO

a. The external cargo hook on both the CH-46 and CH-53 is structurally designed to hold an external load which is equal to the maximum payload of the helicopter. Flight characteristics while carrying external loads are good for all weight ranges. Loads with large frontal areas or items such as light aircraft will swing or oscillate, and care must be taken to ensure that this type of load is securely rigged so as not to shift in the sling. The airspeed limits with external loads, shown in paragraph 2, are imposed to preclude loss of flight control due to the pendulum effect of oscillating loads. The advantage of external cargo loading is the speed of operation. Average loading or unloading time for external loads is 1 minute.

b. External cargo can be rigged as pallets with slings, in cargo nets, or in baskets. Some types of cargo, such as combat rations and ammunition which have been historically palletized for external lift, may be lifted in larger quantities by placing the individual boxes in a cargo net to eliminate pallet bulk. Although vehicles can be carried externally, no handling devices or equipment have been developed to permit carrying more than one vehicle externally. Figure 24 lists the major items of helicopter transportable equipment, internal and/or external.

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DESCRIPTION	LENGTH INCHES	WIDTH INCHES	HEIGHT INCHES	WEIGHT POUNDS
Comm Central, AN/MRC-35A; Trk Mtd	139	65	64	3,865
Radar, Course Directing Cen; AN/TPQ-10	222	83	114	6,864
Radio Set, AN/GRC-109	-	-	-	81
Radio Set, AN/GRC-83, Trk Mtd (M151)	143	62	70	3,116
Radio Set, AN/GRC-87, Trk Mtd (M151)	160	61	73	3,489
Radio Set, AN/MRC-109, Trk Mtd (M151)	132	63	71	2,535
Radio Set, AN/MRC-110, Trk Mtd (M151)	-	-	-	2,535
Radio Set, AN/PRC-6	-	-	-	10
Radio Set, AN/PRC-25	-	-	-	25
Radio Set, AN/PRC-41	-	-	-	45
Radio Set, AN/PRC-47	-	-	-	145
Radio Set, AN/PRC-77	-	-	-	25
Radio Set, AN/TRC-27	-	-	-	659
Radio Set, AN/TRC-75	-	-	-	548
Radio Terminal Set, AN/MRC-135	-	-	-	3,390
Compressor, 125CFM, Pwr Mtd	136	69	85	5,225
Floodlight Set, Elec, Essex Mod No A265	132	71	72	2,820
Gen Set, PE-75, 2.5kw, 60hz, Skid Mtd	165	84	78	416
Gen Set, PU708/G, 30kw, 60hz, Skid Mtd	-	-	-	3,100
Gen Set, PU709/G, 30kw, 40hz, Skid Mtd	-	-	-	2,960
Gen Set, PU667/G, 5kw, 60hz, Skid Mtd	48	30	27	1,050
Mixer, Concrete, Mod 165-2A	162	100	122	6,200
Trk, Forklift, RT, 3,000 Lb, Cap	-	-	-	3,000
Water Purification Unit, Trlr Mtd, 600GPH	147	85	77	5,820
Cleaner, Steam Pressure, Jet, Trlr Mtd	85	58	57	1,100
Lube and Serv Unit, Power Op, 2 1/2T, Trlr Mtd	175	96	80	5,117
Trlr, Amphib, Cargo, 1/4T, 2 Whl, M416	109	61	42	570
Trlr, Cargo, 3/4T, 2 Whl, M101A1	147	74	83	1,340
Trlr, Cargo, 1 1/2T, 2 Whl, M105A2	166	83	98	2,650
Trlr, Tank, Water, 400 Gal, M149	161	83	77	2,280
Trk, Ambulance, 1/4T, 4x4, M718	150	63	71	2,780
Trlr, Firefighting, 1/4T, 4x4, Mod N01051	139	66	69	3,450
Trk, Cargo, 3/4T, 4x4, M37B1	190	74	64	6,000
Trk, Util, 1/2T, 4x4, M274A2 (LIWC)	119	49	43	955
Trk, Util, 1/4T, M151A1	132	63	71	2,400
Howitzer, Lt, Towed, 105mm, M101A1 W/E	198	85	62	4,980
Howitzer, Med, Towed, 155mm, M114A1 W/E	288	96	81	12,700
Guided Missile Control Center, AN/TSW2	190	85	82	5,400
Launcher, Zero Length, GM, Hawk XM78E3	184	96	92	4,380
Loader, Transporter, Trac, GM, Hawk XM501	198	75	113	5,400
Radar Set, AN/MPQ-34 Series, Hawk	202	110	87	4,900
Radar Set, AN/MPQ-39, HiPwr Illum, Hawk	195	119	152	9,200

Figure 24.--Major Items of Helicopter Transportable Equipment.

c. The UH-1N is capable of carrying cargo externally. However, the cargo hook is normally not rigged on the UH-1 and its use must be preplanned to allow for rigging of the cargo hook.

8. HELICOPTER LITTER CARRYING CAPABILITY

The UH-1N has provision for six litters in two tiers of three litters each. The UH-1E has provision for three litters in one tier. The CH-46 has provision for 15 litters and the CH-53 has provision for 24 litters.

9. RESCUE SYSTEM

a. The CH-46 utility winch doubles as a rescue system. It has 150 feet of steel cable, a detachable cable weight and rescue hook assembly, and controls for crew use when performing personnel rescue. When operated as a rescue hoist, the winch capacity is limited to 600 pounds.

b. The CH-53 cargo winch has 245 feet of cable with a 600-pound weight capacity. (CARGO WINCH SHOULD BE USED AS A RESCUE HOIST ONLY IN THE MOST DIRE EMERGENCY.)

c. The UH-1N rescue hoist has 256 feet of steel cable with weight capacity of 600 pounds.

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APPENDIX B

SHIPBOARD CONSIDERATIONS

1. GENERAL

The LPH, LPD, and the new LHA, which is now being readied for future amphibious and helicopterborne assault support, are the three types of ships from which Marines will be operating in ship-to-shore movements. The Navy has seven LPH's, the first of which was the IWO JIMA, constructed in the late 1950's. This ship and all subsequent LPH's were designed and constructed from the keel up specifically to support helicopterborne operations. Each LPH has the capacity to transport one battalion landing team, together with its associated equipment and vehicles, plus a composite squadron of transport helicopters.

a. The LHA is a more sophisticated and recent vessel but with the same general purpose as that of the LPH: to support over the beach assault by helicopter. The LHA has about the same troop carrying capacity as the LPH, but it has the added features of a docking well which accommodates four LCU 1610's and more flight deck space for the launching and recovering of helicopters. The first model, the TARAWA, is undergoing trials in the spring of 1976, and four additional vessels of this type are projected.

b. The LPD must also be mentioned in any discussion of shipboard helicopter operations, although by design, the LPD is just as likely to be involved in supporting landing craft operations, which she carries in a well deck, as those of a vertical assault nature. The LPD has about one-half the troop carrying capacity of the LPH and LHA and only two deck launching spots for helicopters to use during normal operations. Recent experience has shown that the AH-1J/T is well-suited to the LPD during helicopterborne operations due to its smaller size. Unfortunately, the LPD has no hangar deck on which aircraft can be protected during transportation, which makes this vessel relatively undesirable when compared with the LPH and the LHA in this regard.

2. SHIPBOARD DECK LAUNCH SPOTS

a. A deck launch spot is an area on a flight deck where a helicopter can be parked, its rotorblades spread, turned up, and operated or launched without endangering other aircraft, material, or personnel.

b. Since the more launch spots available the faster assault troops can become airborne, ships with larger flight decks providing more launch spots are the most useful in helicopter operations. These are the LPH and the LHA. (See fig. 25.)

3. LAUNCH OPERATIONS

A number of options are available to commanders in getting troops airborne, each of which requires planning and coordination between ships, air, and ground unit commanders to achieve the optimum effect. Experience has shown Marines the following viable possibilities for launching helicopterborne units; each involves a different level of complexity.

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	CH-46	CH-53	UH-1N/E
LHA	16	9	6
LPH	7	4	6
LPD	2	2	2

Figure 25.--Maximum Deck Launch Spots.

a. Orbit Method.--Usually this method is employed only if the landing zone is relatively close to the ship; therefore, flight time en route, which translates into fuel consumed, is not great. Helicopters are simply loaded and launched, orbiting a preselected fix until subsequent launches join them, and the desired initial assault manpower level is reached. Whereupon, they proceed to the landing zone. Since the first launched helicopters must wait in orbit for others to join them, this may not be the most efficient means of employing the aircraft. Yet, it is effective and, when the orbit method is conjoined with "deck packing" or "spread loading," it becomes more efficient.

b. Deck Packing.--Deck packing means that only part of the flight deck is used for the launching of helicopters and the remainder for positioning closely packed helicopters that have their blades folded, but are otherwise ready for spotting and takeoff; the deck is packed, so to speak. Though fewer helicopters are able to be launched at one time due to the reduced spaces available for launching, valuable minutes are saved for succeeding launches since helicopters do not have to be brought up from the hangar deck and must simply be spotted, unfolded, loaded, and launched. Thus, deck packing reduces orbit time, should the first launch size be too small to provide transport for the desired initial assault manpower.

c. Spread Loading.--Another means of overcoming limited helicopter launch capability is to employ two or more launch ships. This sort of operation requires more planning, since the BLT must be "spread loaded" as well as the helicopters, and has the drawback of tying up more shipping for the assault. Yet, it can be very effective. Increased helicopter deck space has the obvious effect of increasing the simultaneous lift capacity of the helicopters. In this case, the lift may be limited by the helicopters available, rather than the deck space.

4. LAUNCH AND RECOVER TIME

Base reference data is essential for planning a helicopterborne assault from amphibious ships. Figure 26 is useful in making such determinations and is based upon experience in the fleet.

5. HELICOPTER OPERATING AND STOWAGE/TRANSPORTATION CAPACITIES

a. Figure 27 indicates the ability of the LHA, LPH, and LPD to operate and stow or transport helicopters. This information is based, however, upon the employment of the CH-46 only. For information concerning other helicopter types, one must be familiar with "aircraft equivalents."

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	UH-1E/N	CH-46	CH-53	AH-1G/J/T
Launch Intervals Between Waves:				
1. Using flight deck packed helicopters.	10	10	10	10
2. Using helicopters from the hangar deck.	16	16	16	16
Takeoff and Flight Rendezvous (for Ship-to-Shore Movements)	4	4	4	4
Flights to Landing Zone (Miles Per Minute)	1.5	2.0	2.5	2.0
Shipboard Recover Time Per Wave	15	15	15	15
NOTE: Times are expressed in minutes.				

Figure 26.--LPH/LHA/LPD Launch and Recovery Time Factors.

	Normal Operations*	Stowage/Transport
LHA	38 (Est.)	(Figures Unavailable)
LPH	27	40
LPD	6	11

*Normal operations is, as the term suggests, the condition of operating the maximum number of aircraft possible from a ship while adhering to the necessary safety regulations.

Figure 27.--Operational and Stowage/Transportation Capabilities.

Helicopter	Aircraft Equivalents
CH-46	1.00
CH-53A/D	1.70
UH-1N	.80
UH-1E	.75
AH-1G/J/T	.75
AV-8	1.20

Figure 28.--Aircraft Equivalents of Marine Helicopters and the AV-8.

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b. Mixed Loading and Aircraft Equivalents.--It is often advantageous to operate or stow/transport more than one type of helicopter on the same ship. In which case, equivalencies have been established in order for planners to know how many aircraft of the different kinds can be embarked. The formula involves an expression of the relative size of the various helicopters to that of the CH-46, the most common type helicopter in the Marine Corps. These relative sizes are expressed as ratios or "aircraft equivalents" to the CH-46, which is assigned the numerical value of 1.00. All other helicopters, being either larger or smaller than the CH-46, have an operational equivalency which reflects the size differential. Figure 28 shows the aircraft equivalents of Marine helicopters and the AV-8.

(1) From the aircraft equivalents, it becomes immediately apparent that the UH-1E is, for instance, smaller than the CH-46, whereas the CH-53E is larger. Thus, one can determine the number of helicopters of a given kind transportable or operable from any ship.

(2) As a more specific demonstration of the use of the aircraft equivalents, let us suppose that one wished to know the number of CH-53's that an LPH can operate. If such were the case, he would divide the aircraft equivalents of the CH-53 (1.70) into the maximum number of CH-46's operable on an LPH (27); e.g., 27 ÷ 1.7 = 16. Thus, 16 CH-53's can be transported or stowed aboard an LPH, whereas space for only 27 CH-46's is available.

(3) Using helicopter aircraft equivalents, one can determine not only how many aircraft of a certain type will fit aboard a given ship, but he can know the amount of shippage needed to transport his helicopter force, or make decisions about mixed loading options as well.

	Total of Man Spaces Available
LHA	1,854
LPH	1,969
LPD	905

Figure 29.--Troop Carrying Capacities of the LHA, LPH, and LPD.

6. TROOP CARRYING CAPACITIES OF THE LHA, LPH, AND LPD

Precise information concerning the troop transport capability of amphibious assault ships is often of great importance to the planner. Figure 29 provides approximate data concerning the three types of ships from which helicopters most often operate in assault situations--the LHA, LPH, and LPD. Because each ship's capacity varies among ships of the same type and class, the figures shown are estimations. For precise information about specific ships, the planner should consult the appropriate Ship's Loading Characteristics Pamphlet, an unclassified document available at FMF, division, wing, and amphibious squadron command headquarters, as well as from the individual ships upon request.

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APPENDIX C

LANDING ZONE SELECTION, PREPARATION, OPERATION, AND MAINTENANCE

1. LANDING ZONE

Critical to the success of helicopterborne or helicopter supported operations is the landing zone. The landing zone is a specified ground area for landing assault helicopters to embark or disembark troops and/or cargo. All commanders must be aware of the criteria for selection, preparation, operation, and maintenance of a landing zone.

2. LANDING ZONE SELECTION

a. General.--The commander landing force selects the landing zones, but his selection is made in consultation with his staff and is based upon the recommendations of the helicopterborne and helicopter unit commanders. He then advises the commander amphibious task force. In reviewing these selections, the commander amphibious task force considers the ability of his forces to support the proposed assault at the landing zones selected. There is a continuing need for concurrent and parallel planning at all command echelons involved in the helicopterborne operation. Coordination is necessary between helicopterborne units and helicopter units, with the helicopter transport group, between the senior aviation and ground units, and at the amphibious task force and landing force level. The selection of landing zones and helicopter lanes is of importance to all of these echelons Therefore, their recommendations and requirements must be carefully considered in making these selections. The principal factors in the selection of helicopter landing zones are:

(1) The landing force concept of operations ashore.

(2) Enemy capabilities and dispositions, particularly the location, type, and density of enemy antiaircraft installations.

(3) Nature of the terrain over which the helicopterborne units contemplate maneuvering after landing and proximity to initial objectives.

(4) Requirements for logistic support.

(5) Requirements for air, naval gunfire, and artillery support.

(6) Available helicopter lanes to and from the landing zone and their respective effects on the employment of air, naval gunfire, artillery, and the fire support of other forces.

(7) Ease of identification from the air.

(8) Suitability and capacity for the landing and takeoff of helicopters.

b. Physical Characteristics.--The physical characteristics of a landing zone dictate its suitability for helicopter operations. In addition to the factors mentioned above, the following physical criteria have been established for landing zone selection:

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(1) Slope must not exceed 14 percent or 8 degrees. A slope greater than 8 degrees may result in tipping of the helicopter or insufficient rotor clearance on the uphill side for safe operation.

(2) Surface materials must be stable to prevent debris from clogging engines, loss of visibility, possible personnel injury, or damage to the helicopter from flying objects. Trafficability for vehicular, troop, and logistic mobility is a consideration which dovetails with that from the purely helicopter point of view. The following specific surface conditions should be evaluated:

(a) Grass and vegetation from newly mowed fields can clog engine intakes.

(b) Loose dirt and sand can cause damage to engine and rotor blades, temporary loss of visibility, and a safety hazard for both the aircrew and the lifted troops.

(c) Snow is not recommended as a landing zone surface without prior reconniassance because it may restrict visibility, the underlying surface may be unsatisfactory, it may be too deep for landing, and surface unevenness may be obscured by drifts.

(d) Dry grasslands represent a fire hazard when exposed to hot exhaust gases.

(e) Flooded rice fields often contain mire and water of greater depth than is anticipated, both of which greatly hinder troop movement.

(3) Obstacles in the landing zone must be evaluated. Tall grass or brush which appears relatively smooth from the air may conceal humps, boulders, or terrain faults which could damage or tip a landing helicopter. The landing zone should be free of debris, stumps, rocks, holes, and trenches that exceed 10 inches in height or depth. Brush, if over 3 feet high, is usually considered restrictive to landing helicopters because of likely damage to fuselage and tail rotors.

(4) The nature of approaches to and exits from the landing zone must also be evaluated. It is undesirable to establish landing zones in locations that require vertical ascent or descent by helicopters operating from them. To permit the most effective use of helicopters, approaches to and exits from landing zones must be clear of communication wire, trees, powerlines, and

TYPE	OVERALL LENGTH (FEET)	LANDING ZONE DIAMETER OBSTRUCTION HEIGHT (FEET) 5-40	40-80	80-
UH-1E/N	57/57	100	150	200
AH-1G/J	53/53	100	150	200
AH-1T	58/58	100	150	200
CH-46	46/84	175	250	350
CH-53	56/89*	175	250	350

* CH-53E lengths are 60/99.

Figure 30.--Minimum Landing Zone Diameter, Single Helicopter.

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other vertical obstacles, particularly when conducting mass landings. Required landing zone size (diameter) is directly associated with the height of the obstructions surrounding the landing zone and the number of helicopters to be landed at one time. (See fig. 30.)

c. Size and Arrangement.--Size of the landing zone is dependent upon the height of the obstacles surrounding the zone and the number and type of helicopters needed on the largest wave planned. Landing zone size should be determined by using figure 30 and computing the number of landing points needed to support the operation. Simple multiplication should provide good planning data.

(1) A landing point is a specific point where one helicopter can land. Landing points collectively form landing sites.

(2) A landing site is an area within a large landing zone used by the helicopterborne unit as a tactical control designator in order to land certain subordinate units in predetermined locations. These units are usually given specific missions; e.g., land and secure the east side of the landing zone. When such separation of units and functions is not required, the helicopter wave or flight leaders should be given the prerogative to land where safety and flight characteristics dictate.

(3) The marking of landing zones varies from the initial marking with smoke for landing zone identification and wind direction to elaborate markings such as depicted in figure 31. When using panels, care must be exercised to ensure proper security from the effects of rotor wash, either by distance separation or staking and typing of the panels. Smoke is best used downwind from the landing points so as not to obscure vision during landing.

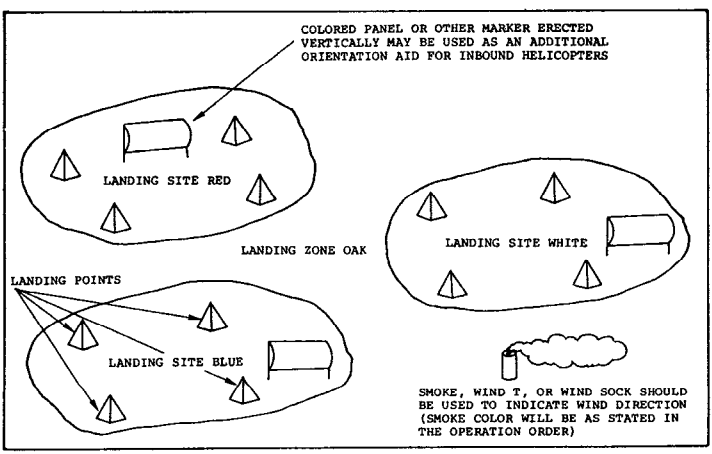

Figure 31.--Helicopter Landing Zone.

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3. LANDING ZONE PREPARATION

a. Landing zone preparation covers a variety of tasks dictated by the level and type of bombardment the planners desired. The principal purpose of preparation is to hold and destroy or neutralize enemy forces permitting the attacking forces to move under the cover of fire and to preclude stiff enemy resistance to the landing. The fact that the attacking force moves by air rather than on foot alters only the distances and times involved, not the prerequisites for assaulting a position. Some munitions may be expended in the landing zone itself to burn dry grasses, explode mines, trip booby-traps, and destroy landing obstacles. It should be cautioned, however, that often these latter measures achieve only limited effects. In some cases, it may be deemed best to avoid any form of landing zone preparation in order to maximize the element of surprise.

b. Of vital importance in helicopterborne operations is a SEAD effort. Due to the concentration of aircraft in a restricted airspace, they are extremely vulnerable to antiaircraft weapons in the area of landing zones. In addition to the fire of the landed friendly ground forces, the helicopterborne assault should be afforded SEAD fires. These fires must be prearranged and immediately responsive to the needs of the helicopter force. These fires normally will be provided by air, artillery, or naval gunfire.

(1) SEAD is provided by fixed-wing aircraft whenever the landing area is beyond the range of artillery or naval gunfire support. The quantity and variety of support weapons provided is a reflection of the threat analysis. Due to the proximity to friendly forces, an airborne forward air controller will normally be required to support the helicopterborne assault until the forward air controller with the landing unit has established his control nets. When facing a limited threat that is highly mobile and within or on the borders of the landing zone, armed helicopters, normally the AH-1J/G, can provide SEAD. They have the advantage of on-the-spot rapid response to enemy threat from light antiair weapons and small arms. In a sophisticated environment, however, the vulnerability of armed helicopters is greater than that of fixed-wing aircraft and this factor must be weighed accordingly.

(2) The antiair threat that faces transport helicopters is by its very nature a threat to fixed-wing or armed helicopters; therefore, whenever range will permit, SEAD fires provided by artillery or naval gunfire should be planned. An airborne spotter will be necessary to adjust such fires. Although the response time will often be slower than that of SEAD fires provided by air, artillery and naval gunfire are effective in neutralizing enemy weapons which lack a high degree of mobility.

4. LANDING ZONE OPERATION

The operation of a landing zone will vary with the use for which it is intended. The information in this appendix is intended to augment that information found in section V, chapter 3. Within this paragraph, embarkation of troops, terminal guidance, and helicopter handling signals will be discussed. The tactical debarkation of troops, the administrative organization associated with landing zone operations, and related matters that reflect the prerogative of the commander overseeing the landing zone are not discussed.

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a. Embarkation of Troops

(1) As the amphibious operation progresses, troops, supplies, and equipment will be lifted from landing zones ashore, as well as from the ships of the amphibious task force. If a large tactical lift of troops is to be conducted, loadmasters should be used. Yet, even if they are not used, the concepts discussed in the following subparagraphs remain valid in establishing guidelines of operation. For clarity, the zone from which troops, supplies, and equipment are to be lifted is referred to as the loading zone; the zone in which they are to be landed is referred to as the landing zone.

(2) The size of the landing zone is critical to the success of the entire operation and the loading zone should accommodate at least as many helicopters as the landing zone. This will save the time which would otherwise be required to rendezvous several flights for the formation of assault waves, and it will allow a continuous flow of helicopters throughout the lift. The loading zone, just as the landing zone, should be free of obstacles and debris and be well organized to allow the uninterrupted loading of troops, supplies, and equipment. It may be expeditious to establish separate loading zones for these three.

(3) The loading zone will normally be organized with landing points for each of the helicopters which constitute one wave. There should be designated ready points for the troop heliteam formations located abeam the helicopter landing points, and specified areas for staged cargo. Some flexibility in setting up the zone must be allowed, however, in the event of a major shift in wind direction.

(4) The key personnel in the loading zone are the loadmasters from both the helicopterborne and helicopter unit, who must be thoroughly knowledgeable concerning the loading plan. The loading plan should be designed to provide the loading sequence that supports the ground scheme of maneuver, provide troop unit integrity, and is conclusive to the maintenance of helicopter formation flight integrity. A conference between the loadmasters prior to the start of loading is advisable. The loadmasters must keep the transport commander advised on the status of the lift so that the plan can be revised while the lift progresses, as the situation dicatates. They should also establish necessary control measures, such as: the designation of troop assembly areas, loading sites, or points, and assigning of heliteams to the appropriate loading point. However, these measures are to expedite the lift and not hinder it; planning in too much detail at this level can create confusion.

(5) Many last-minute problems in loading can be resolved by providing the loadmaster with a radio for communications with the transport commander. The assigned frequency should, obviously, not be the same fre quency used in the landing zone. Use of this frequency by the helicopter pilots to relay such information as discrepancies in loading or when ready for takeoff will expedite the loading operation.

(6) Whenever possible, transport helicopters should be loaded in the most efficient way. This is achieved by palletizing cargo. Such cargo is more compact, is easily loaded and secured, and easily off-loaded at the landing zone. The support units must be made aware of thse advantages whenever possible.

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(7) Each helicopter pilot must know the size, commodity, and geographic destination of his load. When insufficient planning time has precluded the preparation of embarkation rosters, each individual to be lifted will be provided with an embarkation card of local origin. The minimum information necessary is name, rank, service number, parent unit, and destination. As the heliteams board the aircraft, the cards will be collected and marked with the aircraft number to provide an accurate embarkation roster. Normally, these rosters will be retained by loading zone personnel.

(8) If the loading zone will accommodate an entire wave of helicopters, the flight will usually hold in the loading zone until a precalculated takeoff time in order to arrive at the landing zone precisely at L-hour without making any en route delaying turns or orbits. If the loading zone is in an area that is not secure, the loaded helicopters will normally take off and orbit over safe areas until directed to proceed to the landing zone.

b. Terminal Guidance

(1) Often a need exists for terminal guidance assistance in helicopter operations. This need normally occurs during a period of darkness or inclement weather. The assault transport helicopter pilot must find the intended point of landing to ensure the success of the helicopterborne operation. As a result, various means have been developed to assist the pilot in this task.

(2) Landing zones may be marked by a lighting system installed by reconnaissance units serving as initial terminal guidance teams. Whenever the terrain and situation permit, the glide angle indicator light (GAIL) system should be employed. The GAIL should be placed so that it will project its beam along the avenue of approach, and the angle of the glide slope must provide a safe margin of clearance over the highest obstacle. Angles of glide slope from 3 to 10 degrees are common and acceptable. Glide slope angles of greater than 10 degrees cause increased difficulty in maintaining the aircraft on its path. The relatively narrow beam width of the GAIL makes its unaided acquisition difficult. To aid the pilot in finding the GAIL, additional lights should be placed as indicated in figure 32. When the zone is so small that, in order to clear obstacle, the glide slope angle must exceed 10 degrees, the zone should not be used unless there is no option. The approach should be into the wind, but if obstacles make such an approach direction inadvisable, it should be along that axis closest to the windline that will permit a glide slope angle of 10 degrees or less. Approach azimuth and glide slope angle information should be transmitted to the pilot in the prelaunch briefing.

(3) Landing zones may be marked in the future by the Marine remote area approach and landing (MRAAL) system. This equipment, which is composed of a unit that operates from the ground and a subunit from the aircraft, provides both glide slope and distance information to the pilot. Instrument approaches may be made to areas, such as landing zones, which heretofore would have been impossible. This system could also replace, or be used in conjunction with, the GAIL lighting system for night approaches. In short, the Marine Corps is on the verge of an all-weather day and night system for helicopter operations, and although the MRAAL system is still in its development stages, it is highly regarded as a likely future addition to the inventory.

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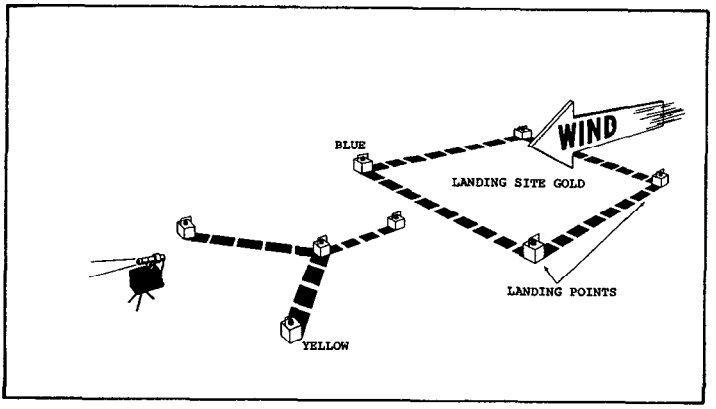

Figure 32.--Glide Angle Indicator Lighting System in Helicopter Landing Site.

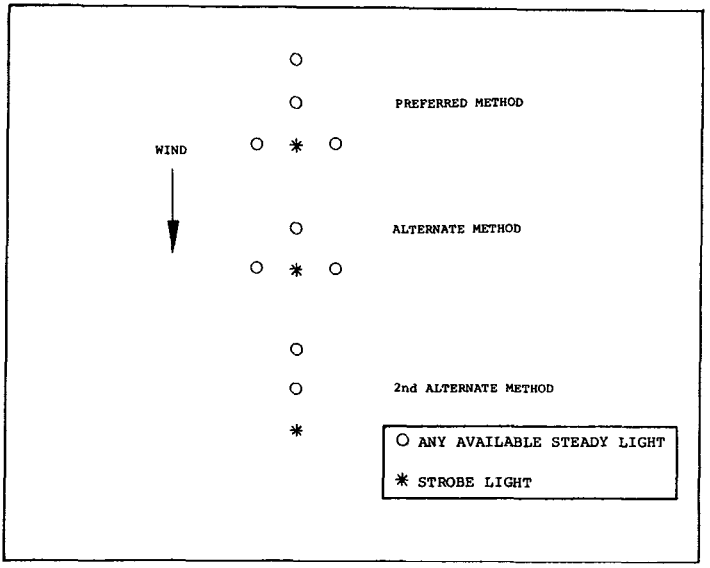

Figure 33.--Night Landing Zone Marking With Expeditionary Lights.

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(4) When terminal guidance is required at night, one of the expeditionary light patterns depicted in figure 33 should be displayed to assist the pilots in locating and landing in the zone if neither the GAIL or MRAAL systems are available.

(5) If light conditions or cloud cover permit operations in the landing zone area, but prohibit visual flight en route to the landing zone, the ASRT may be employed to accurately position helicopters over the landing zone. The landing may then be accomplished by the pilot making visual approach or using electronic landing aids if it is necessary and such aids are available.

(6) Other methods of assisting the pilots in locating and landing in a zone have been used as field expedients: flares dropped from aircraft or fired from artillery pieces and naval guns may be employed; and under extreme circumstances, a single light, a fire, or even moonlight may be used. Although limits in this area are formed only by imagination and pilot skills, the commander must recognize the improbability of effecting a rapid force buildup or relying in any important way upon these expedient methods in assault planning.

5. LANDING ZONE MAINTENANCE

a. When a landing zone is established, the responsibility for its maintenance is a matter of command attention for the ground unit commander. The landing zone must be cleared of foreign objects. Debris, such as ammunition boxes, combat ration cartons, pieces of canvas, and external loading equipment must be removed to prevent injury to personnel and damage to helicopters or ground unit equipment. Landing site/point markers must be secured. Communication wire in the landing zone must be buried. All pilots using a landing zone are responsible for informing the ground unit commander if his zone becomes dangerous due to debris or piling up of cargo.

b. Any type of low flash point fuel or fuel combined with oil may be used to stabilize dust in a landing zone. This is especially important to remember when a zone becomes semipermanent or permanent, and emphasis can be shifted somewhat from immediate needs to position improvement. If water is available, it will also serve to stabilize dust for short periods of time. It should be noted, additionally, that dust accumulates large quantities of static electricity which is transmitted to the helicopter and discharges when an external load touches the ground, or when a ground crewmember touches the helicopter during a hookup. The shock does not produce a serious injury, but a resultant fall could. At best, it is a discomfort to a hookup crew. Heavy gloves and some type of grounding device should be provided for ground hookup crews.

c. After the initial opening of a landing zone, approach obstructions should be cleared to permit subsequent approaches and departures into the prevailing wind and more acceptable glide/takeoff slopes. Communication wire in the immediate vicinity of approach and retirement routes must be secured at a minimum of 10-foot intervals to prevent rotor wash from lifting it into helicopter control linkages, rotor systems, or engines. In operational areas where the enemy is likely to be close to a heavily used zone, more than one route of approach and departure for the zone ought to be used to prevent the loss of personnel and equipment.

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d. Many landing zones are at altitudes ranging from 1,500 to 3,000 feet above sea level. Since altitude is one of the main factors limiting helicopter lifting capability, a clear approach and retirement route which allows a helicopter to obtain some 15 to 20 knots of speed before rising vertically will greatly assist in maintaining maximum lift capability. The ability to maximize helicopter lift potential determines how fast and in what amounts a ground unit receives its needed supplies.

e. If the landing zone is permanent or semipermanent, every effort should be made for permanent surfacing. This could be either T-17 membrane, SATS matting, or "MOMAT."

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APPENDIX D

COMBAT DOCUMENT EXAMPLES

This appendix contains combat document examples relating to the assault support role.

List of Examples

Title	Page Number
Vertical Assault Plan	140
Helicopter Availability Table	142
Helicopter Landing Diagram	143
Helicopter Control Instructions	144
Helicopter Employment and Assault Landing Table	145
Heliteam Wave and Serial Assignment Table	146

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TAB D (Vertical Assault Plan) to Appendix 5 (Landing Force Landing Plan) to Annex R (Amphibious Operations) to IV MAF OPLAN 9999 (U)

Ref: (a) As appropriate

1. GENERAL

This paragraph provides the general guidance for the conduct of the vertical assault. It details the time relationship to the surface assault and the distance between the surface beaches and the landing zones. The time when the particular tab is effective is covered.

2. PROCEDURES

Outline the procedures for the accomplishment of the vertical assault.

a. Helicopter availability in accordance with enclosure (1).

b. Helicopter landing zones, approach and retirement lanes, and navigation/checkpoints in accordance with enclosure (2).

(1) Altitudes to the landing zone.

(2) Altitudes from the landing zone.

(3) Special instructions regarding landing zone traffic (i.e., external loads will be delivered to landing site Green in landing zone _____ to facilitate handling and provide access to trafficable terrain).

c. Landing zone identification methods.

d. MEDEVAC/SAR procedures including composition, providing agency, station, and casualty receiving and treatment ships.

e. Fire support.

3. CONTROL MEASURES

a. Helicopter control instructions in accordance with enclosure (3).

b. Change of landing zones and approach and retirement lanes.

(1) Approving authority.

(2) Request channels.

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c. Establish weather criteria for conduct of operations.

d. Instructions for changing landing sequence.

e. Criteria for termination of the troop lift and reversion to normal operations.

BY COMMAND OF MAJOR GENERAL TUFF

D. U. LEONARD
Colonel, U.S. Marine Corps
Chief of Staff

ENCLOSURES:

1 - Helicopter Availability Table
2 - Helicopter Landing Diagram
3 - Helicopter Control Instructions

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ENCLOSURE 1 (Helicopter Availability Table) to Tab D (Vertical Assault Plan) to Appendix 5 (Landing Force Landing Plan) to Annex R (Amphibious Operations) to IV MAF OPLAN 9999 (U)

HELICOPTER UNIT AND DESTINATION	NUMBER OF A/C	A/C AVAILABLE NUMBER		MODEL	CARRIER	DECK LAUNCH CAPACITY	TENTATIVE LOAD PER A/C		REMARKS*
		FIRST TRIP, 90 PERCENT	OTHER TRIPS, 75 PERCENT				TROOPS	CARGO	
HMM-163 (Ridge Runner)	21	18	14	CH-46D	LPH-1	7	18	4,000	All external lift capable.
HMH-463 (Bomber)	24	22	18	CH-53A	LPH-2	4	35	8,000	Equipped with aircraft recovery slings.
HML-267 (Deadlock)	24	22	18	UH-1N	LPH-3	10	4	1,000	*Flight radius 30 N.M.

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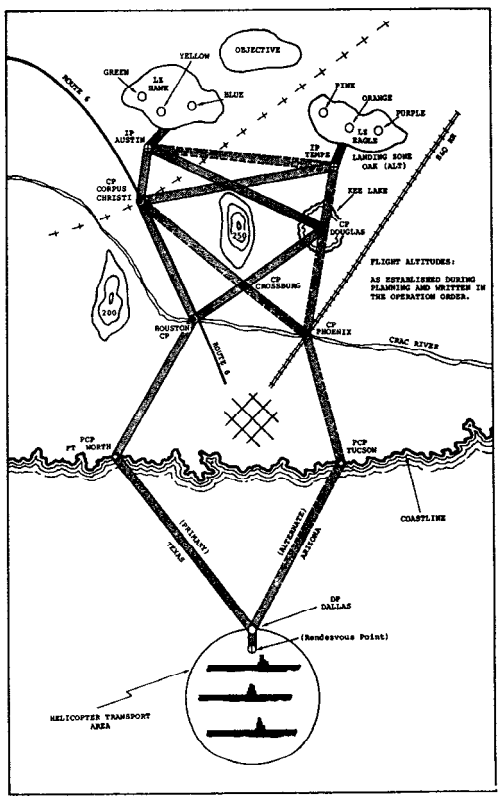
ENCLOSURE 2 (Helicopter Landing Diagram) to Tab D (Vertical Assault Plan) to Appendix 5 (Landing Force Landing Plan) to Annex R (Amphibious Operations) to IV MAF OPLAN 9999 (U)



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ENCLOSURE 3 (Helicopter Control Instructions) to Tab D (Vertical Assault Plan) to Appendix 5 (Landing Force Landing Plan) to Annex R (Amphibious Operations) to IV MAF OPLAN 9999 (U)

Ref: (a) NWIP 22-3

1. GENERAL

a. Identify HCS, HDC, TAC(A), HC(A), and alternates as appropriate.

b. Define control responsibilities of airborne agencies.

c. Identify approving authority for tactical, administrative, logistic, and utility helicopter requests.

2. HELICOPTER OPERATIONS

a. Delineate land/launch procedures or refer to SOP's, NATOP's, etc.

b. Establish rendezvous altitudes, departure point altitudes, airspeeds, etc.

c. Provide RIO instructions at appropriate checkpoints.

d. Give guidance regarding HDC reports to HCS on progress of assault waves.

e. Establish procedures for processing LF requests until control is passed ashore.

f. Establish flight following and coordination procedures.

g. Identify SACC coordination measures.

h. Fuel and maintenance status reporting procedures.

3. COMMUNICATIONS-ELECTRONICS

a. Provide or make appropriate reference regarding IFF/SIF mode/code assignments.

b. Provide land/launch communication frequencies and guidance.

c. Identify command channels between control agencies and between ships.

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ENCLOSURE 6 (Helicopter Employment and Assault Landing Table) to Tab E (*Division Landing Plan*) to Appendix 5 (*Landing Force Landing Plan*) to Annex R (Amphibious Operations) to IV MAF OPLAN 9999 (U)

WAVE	HELICOPTER UNIT & FLIGHT NO.	NO./MODEL A/C	FROM CARRIER (ORIGIN)	TO REPORT (LOAD)	TIME LOAD	TIME LAUNCH	TIME LOAD	DESTINATION LZ	DESTINATION LS	TROOP UNIT, EQUIPMENT, AND SERIAL EXTERNAL LOADS
1st	ANVIL-1	10 CH-46D	LPH-5	LPH-5	Pre-load	H-26	H-Hour	Code Name	Color	CoA(-)(Rein) Ser 101
2d	ANVIL-2	12 CH-46D	LPH-5	LPH-5	H-18	H-16	H+10	Code Name	Color	CoB(-)(Rein) Ser 105
3d	ANVIL-3	9 CH-46D	LPH-5	LPH-5	H+39	H+45	H+71	Code Name	Color	Elms CoA, 2 LIWC w/106RR Ser 102 Elms CoC, Ser 110
4th	ANVIL-4	5 CH-46D	LPH-5	LPH-5	H+49	H+53	H+79	Code Name	Color	Elms CoB, 2 LIWC w/106RR Ser 106
	ANVIL-5	6 CH-46D	LPH-5	LPH-5	H+106	H+110	H+136	Code Name	Color	CoC(-), 2 LIWC w/106RR Ser 111

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ENCLOSURE 7 (Heliteam Wave and Serial Assignment Table) to Tab E (Division Landing Plan) to Appendix 5 (Landing Force Landing Plan) to Annex R (Amphibious Operations) to IV MAF OPLAN 9999 (U)

WAVE	HELITEAM FLIGHT SERIAL	PERSONNEL			WEIGHT (4,000# MAX)		
		TROOP UNIT	NO.	SUPPLIES & EQUIPMENT	PERS	EQUIP	TOTAL
1	ANVIL 101 100-1	1st Sqd, 1st Plat, Co A Asslt Tm, 1st Asslt Sqd, Wpns Plat	13 3 16	1 Rkt Lchr (14#) Rkt Lchr Ammo (105#)	3,585	119	3,704
	ANVIL 102 100-2	2d Sqd, 1st Plat, Co A Asslt Tm, 1st Asslt Sqd, Wpns Plat	13 3 16	1 Rkt Lchr (14#) Rkt Lchr Ammo (105#)	3,585	119	3,704
	ANVIL 103 100-3	Plat Cdr, 1st Plat, Co A Msgr 3d Sqd(-) Corpsman Sqd Ldr, 1st MG Sqd MG Tm, 1st MG Sqd, Wpns Plat	1-0 1 9 1 1 4 1-16	1 AN/PRC-25 (26#) 1 MG (24#) MG Ammo (80#)	3,825	130	3,955
	ANVIL 104 100-4	Elms 3d Sqd, 1st Plat, Co A MG Tm, 1st MG Sqd, Wpns Plat LS Clt Tm (RED) Plat Sgt, 1st Plat, Co A Msgr Plat Guide, 1st Plat, Co A Corpsman Sqd Ldr, 1st Asslt Sqd, Wpns Plat	5 4 3 1 1 1 1 1 17	1 MG (24#) MG Ammo (80#)	3,825	130	3,955

NOTE: The heliteam flight serial is as follows:

ANVIL: Heliteam Squadron Radio Call Sign
01 Heliteam Position in the Wave

1-- Heliteam Wave Number
100 Troop Unit Serial Assignment
1 Troop Unit Heliteam Number

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APPENDIX E

ASSAULT SUPPORT REQUEST FORM

1. Mission requests of both the preplanned and immediate type may originate at any echelon of the landing force/MAGTF. The same request form should be used by the requesting unit, the controlling agency, and the helicopter unit. The assault support request form (see fig. 34) has been developed to satisfy both immediate and preplanned mission request needs and to prevent misunderstanding by failing to ensure all elements of the landing force when they submit or process an assault support request.

a. When submitting a preplanned request, the form will be completed in its entirety. To expedite an immediate mission request, only the items necessary for decision and execution will be completed and forwarded to the air control agency. Those items are numbered (1) through (6), below. The additional items (7) through (16), will be provided to the pilot upon initial contact with the requester.

(1) Requester's identification.

(2) Mission precedence.

(3) Type of mission.

(4) Mission description.

(5) Landing zone coordinates.

(6) Landing zone communications.

(7) Landing zone description, especially enemy positions.

(8) Landing zone marking.

(9) Direction from which the helicopter should approach the landing zone.

(10) Possible obstacles in the approach path.

(11) Direction from which enemy fire is most likely.

(12) When enemy fire was last received.

(13) Positions of any suspected heavy caliber automatic weapons.

(14) Directions in which aircraft is cleared to fire if enemy fire is received.

(15) Location of nearest friendly positions (direction north, south, etc.) and distance from landing zone.

(16) Size of the defensive perimeter from the landing zone.

b. Figure 34 is an example of the assault support request form and the instructions for use of this form. These instructions will be used by all agencies in completing the form.

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ASSAULT SUPPORT REQUEST FORM

1. ACTION ADDRESSEE THIS IS (Call Sign) REQUEST NO. _____

2. REQUEST FOR
   [ ] HELICOPTER [ ] FIXED-WING TRANSPORT [ ] OV-10

3. MISSION PRECEDENCE
   [ ] EMERGENCY [ ] PRIORITY [ ] ROUTINE

4. TYPE OF MISSION - TACTICAL OR ADMINISTRATIVE
   [ ] TROOP LIFT [ ] SAR [ ] RETRACTION
   [ ] LOGISTIC [ ] VIP CODE ____ [ ] PHOTO
   [ ] RECON INSERT [ ] SPOT/OBS [ ] UNIT COMDR
   [ ] MEDEVAC [ ] LIAISON [ ] OTHER _____

5. MISSION DESCRIPTION
   NUMBER OF TROOPS
   INTERNAL CARGO: WEIGHT/CUBE
   LARGEST ITEM (LxWxH) ___x___x___
   EXTERNAL CARGO: WEIGHT _____

6. INSTRUCTIONS

	PICKUP TIME	COORDINATES	LZ TIME	COORDINATES
A.	_____	_____	_____	_____
B.	_____	_____	_____	_____
C.	_____	_____	_____	_____
D.	_____	_____	_____	_____

7. LZ DESCRIPTION
   SIZE _____
   OBSTACLES _____
   WIND DIRECTION _____
   FRIENDLY POSITION _____
   SECURE/INSECURE _____
   ENEMY POSITION _____ TYPE WEAPONS _____

8. LZ WILL BE
   [ ] UNMARKED [ ] PANELS [ ] FLARES
   [ ] MARKED WITH _____ (Color) [ ] SMOKE [ ] LIGHTS
   [ ] OTHER _____

9. COMMUNICATIONS (For Aircraft and LZCP/TACP)
   P/U ZONE CALL SIGN CHANNEL _____ FM/UHF FREQ. _____
   LZ CALL SIGN CHANNEL _____ FM/UHF FREQ. _____
   (Do not give frequency unless no color code designated. If possible, provide both primary and alternate channels.)

10. LOCAL DATE/TIME AUTHENTICATION

FOR USE BY
TACC/TADC/MDC/DASC/SACC/FSCC

11. AIRSPACE COORDINATION AREA TYPE _____
   LOCAL TIME _____ TO _____
   COORDINATES (SHACKLE) _____ TO _____ (UNSHACKLED)
   COOR (Encode/Decode) _____ TO _____
   WIDTH FROM CENTERLINE TO EACH SIDE _____ (Meters)
   ALTITUDE FROM _____ TO _____ (Feet)

12. ESCORT
   [ ] REQUESTED NO./TYPE/A/C _____
   [ ] ASSIGNED CALL SIGN _____
   COMMUNICATIONS _____
   ARMAMENT CODE _____

13. BASIC MISSION NO./TYPE/A/C _____
   ASSIGNED TO _____ (Unit/Call Sign)
   COMMUNICATIONS _____

14. MISSION CANCELLED [ ] BY WHOM _____

15. MISSION REQUEST
   SENT TO _____
   RECD BY _____

16. TERMINATE REQUEST
   A. IF UNABLE TO COMPLETE BY: DTG _____
   B. WHEN COMPLETED _____

17. MISSION RESULTS
   COMPLETED
   OTHER _____
   (Include pilot reports. Use back of this form when necessary.)

Figure 34.--Assault Support Request Form.

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INSTRUCTIONS FOR USE OF THE ASSAULT SUPPORT REQUEST FORM	
(Unit Called)	
Line 1. Action Addressee	1. Identifies the unit called by unit designation/call sign.
a. This Is (Call Sign)	a. Identifies the request originator by unit designation/call sign.
b. Request No.	b. Indicates the originator's request number in series.
Line 2. Request For	2. Indicates whether request is for helicopter/fixed-wing transport/OV support.
Line 3. Mission Precedence	3. Precedence established by requestor based on precedence criteria.
Line 4. Type of Mission	4. Indicates type of mission.
a. Tactical or Administrative	a. Indicates whether contact with enemy is expected or whether mission is in a secure area.
Line 5. Mission Description	5. Provides description of troops and cargo to be lifted.
Line 6. Instructions	6. Identifies pickup zone coordinates, time of pickup, LZ coordinates, and time of landing.
Line 7. LZ Description	7. Provides detailed information to helicopter planners.
a. Size	a. Identifies size in meters and shape of LZ.
b. Obstacles	b. Describes obstacles in LZ such as trees, trenches, stumps, etc.
c. Wind Direction	c. Describes wind direction on the ground (N, S, E, W).
d. Friendly Position	d. Identifies friendly position in relation to landing coordinates (200 meters SE).
e. Secure/Insecure	e. Describes tactical situation, considered insecure if troops cannot stand in LZ.
f. Enemy Position and Type Weapons	f. Identifies enemy position in relation to landing coordinates and type of weapons identified.
Line 8. LZ Will Be Unmarked/Marked	8. Defines if LZ will be marked for positive location and identification.
a. Type of Marking	a. Defined to ensure positive verification of LZ coordinates.
Line 9. Communications	9. Lists all FM/UHF radio frequencies and call signs in pickup/landing zone to ensure positive radio contact.
Line 10. Local Date/Time	10. Identifies time and date support requested by requestor.

Figure 34.--Assault Support Request Form (Continued).

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APPENDIX F

HELICOPTERBORNE OPERATION PLANNING CHECKLIST

1. CONCEPT OF OPERATIONS

   a. Mission(s).

   b. Objective(s).

   c. Alternate objective(s).

   d. Distance/altitude of objective(s).

   e. D-day.

   f. Special mission(s).

   g. Assets available:

      (1) Ground element.

      (2) Aviation element:

         (a) Assault helicopters.

         (b) Heavy helicopters.

         (c) Light helicopters.

         (d) Attack helicopters.

         (e) Attack/fighter/logistic fixed-wing.

         (f) Other.

      (3) Combat service support:

         (a) Engineer.

         (b) Communications.

         (c) Medical.

   h. Fire support:

      (1) Artillery.

      (2) Aviation.

      (3) Naval gunfire.

      (4) Other.

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i. Boundaries and control measures.

j. Rules of engagement.

k. Subsequent operations.

l. Rehearsals.

2. INTELLIGENCE

a. Enemy location capabilities.

b. Commander's reconnaissance of objective area.

c. Air photos.

d. Maps.

e. Electronic countermeasure and electronic counter-countermeasure threats.

f. Terrain study.

g. Weather.

h. Map reference system.

i. H-hour.

j. Latest intelligence summary (INTSUM).

3. VERTICAL ASSAULT LANDING PLAN

a. Landing zones:

(1) Size, shape, condition, altitude.

(2) Approach, departure routes.

(3) Possible enemy positions.

(4) Identification SOP:

(a) Colored smoke.

(b) Panels.

(c) Flares.

(d) Electronic aids.

b. Landing formation.

c. Attack helicopter support.

d. Other fire support.

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e. Command and control:

(1) TAC(A)/HC(A).

(2) TAD net for close air support.

(3) HD net.

(4) Interplane net.

(5) Terminal guidance.

4. EN ROUTE PLAN

a. Flight routes (primary-alternate):

(1) Flight formations.

(2) Control points.

(3) Time-distance factors.

(4) Altitudes.

(5) Airspeeds.

(6) Command and control procedures:

(a) Reports required.

b. Fire support plan:

(1) Preparation fires.

(2) Flak suppression.

(3) Command and control.

c. Documentation:

(1) Helicopter landing diagram.

(2) Helicopter wave and serial assignment table.

(3) Helicopter availability table.

(4) Helicopter employment and assault landing table (HEALT).

d. Embarkation plan:

(1) Assembly areas.

(2) Pickup landing zones (primary-alternate):

(a) Size.

(b) Loading formation.

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(c) Location of internal and external loads.

5. SUPPORTING PLANS

a. Alternate plans due to weather:

(1) Weather minimums.

b. Deception plans.

c. Downed aircraft procedures.

d. Preplanned aircrew pickup points.

e. Quick reaction SOP:

(1) Ground unit.

(2) Aviation unit.

(3) Alert status.

f. NBC.

g. Aerial observer support.

h. Postassault aviation employment.

i. Prisoner-of-war plan.

6. OPERATIONAL REQUIREMENTS

a. Warning orders.

b. Briefings (time and place).

7. LOGISTICS

a. Class III (POL) requirements:

(1) Refueling:

(a) Location.

(b) Security.

b. Class V (ammunition) requirements:

(1) Location.

(2) Security.

c. Class I (rations/water supply).

d. MEDEVAC plan.

e. Aircraft maintenance requirements.

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8. RETRACTION PLANNING

a. Lift requirement.

b. Assets available.

c. Intelligence:

(1) Enemy.

(2) Weather.

(3) Terrain.

d. Fire support requirements.

e. Loading plan:

(1) Landing zone selection.

f. Execution:

(1) Command and control.

(2) Must be accomplished without hesitation.

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APPENDIX G

JOINT TACTICAL AIRLIFT REQUEST FORM

JOINT TACTICAL AIRLIFT REQUEST

I REQUEST

1. UNIT CALLED (IDENTIFIER) | THIS IS MY IDENTIFIER | REQUEST NUMBER | SENT TIME BY

2. I HAVE [ ] A AN IMMEDIATE [ ] B PREPLANNED MISSION RECEIVED TIME BY
[ ] [ ] ABN ALERT [ ] 2 GROUND ALERT [ ] 3 AIRLAND [ ] 4 EQUIP DROP
[ ] 5 PERS DROP [ ] 6 FLARE [ ] 7 SPECIAL [ ] 8 AIR EVAC

3. ONLOAD AIRFIELD
[ ] A NAME
[ ] B COORD _____ [ ] C CONTACT _____ [ ] D DTG _____

4. OFFLOAD AIRFIELD/DROP ZONE/EXTRACTION ZONE
[ ] A NAME
[ ] B COORD _____ [ ] C CONTACT _____ [ ] D DTG _____

5. NUMBER OF PASSENGERS
[ ] A COMBAT TROOPS _____ [ ] B PARATROOPS _____
[ ] C AIR EVACS _____ [ ] 1 AMBULATORY _____ [ ] 2 LITTER _____

6. GENERAL CARGO
[ ] A TYPE (SPECIFY POL RATIONS ETC.) [ ] B WEIGHT [ ] C LARGEST SINGLE ITEM

7. NUMBER OF VEHICLES
[ ] A ¼ TON TRK _____ [ ] B 1¼ TON TRK _____ [ ] C 2½ TON TRK _____
[ ] D ¾ TON TRL _____ [ ] E 3/4 TON TRL _____ [ ] F 1¼ TON TRL _____
[ ] G APC _____ [ ] H 105 HOW _____ [ ] I 155 HOW _____
[ ] J OTHER _____

8. SPECIAL HANDLING CARGO
[ ] A TYPE _____ [ ] B TOTAL PIECES _____ [ ] C WEIGHT _____ [ ] D CUBE _____
[ ] E CLASS _____ [ ] F NOMEN _____ [ ] G SINGLE DAGGER REQ _____

9. TOTAL WEIGHT (TOTAL ITEMS 6-8)
[ ] A WEIGHT _____

10. RECOMMENDED
[ ] A _____ (NUMBER ACFT) [ ] B _____ (TYPE A/C) [ ] C CDS [ ] D LAPES [ ] E GPES [ ] F CCT
[ ] G OTHER (SPECIFY)

11. REMARKS

ACKNOWLEDGED
BDE/REGT
DIVISION
OTHER

II COORDINATION

NGF | ARTY | AIO/G-2/3/4 | REQUEST [ ] A APPROVED [ ] B DISAPPROVED (BY)

REASON FOR DISAPPROVAL | AIRSPACE COORDINATION AREA/AIR PLAN [ ] A IS NOT [ ] B NUMBER

[ ] C _____ (FROM TIME) [ ] D _____ (TO TIME) [ ] E _____ (FROM COORD) [ ] F _____ (TO COORD)
[ ] G _____ (WIDTH-METERS) [ ] H _____ (MAXIMUM/VERTEX ALT) [ ] I _____ (MINIMUM ALT)

AIR MISSION DATA

12. MISSION NUMBER | 13. CALL SIGN | 14. NO AND TYPE ACFT | 15. EST ACFT TO

16. | 17. CONT PT-COORD/NAV AID FIX | 18. LZ/DZ/EZ COORD

19. TYPE DELIVERY | 20. INITIAL CONTACT (CALL SIGN) (FREQUENCY) | 21. CGT/FAG/ASRT (CALL SIGN) (FREQUENCY) | 22. NOTIFIED DTG _____ TUOC _____ CRC _____ TACP _____ ASRT _____

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INSTRUCTIONS FOR USE OF JOINT TACTICAL AIRLIFT REQUEST FORM

SECTION I. REQUEST

Block 1. Self-explanatory.

Block 2. Check either A or B to indicate whether request is immediate or preplanned. Also check appropriate items 1 through 8 to identify the type of mission requested. If item 7 is checked, an explanation is required in the remarks section (block 11).

Block 3. Enter name, location (military grid reference coordinates), and person/organization to be contacted at onload airfield. Also enter the date-time group (ZULU) when cargo or troops will be available for loading.

Block 4. Enter the name of the airfield, drop zone, or extraction zone, and the appropriate military grid reference coordinates. Enter the name and telephone number of the person to be contacted or the call sign and frequency of the agency (ALCE, CCT, etc.) to be contacted for delivery of the load at the destination.

Block 5. List the number of combat troops (fully equipped soldiers at 240 pounds standard weight), paratroops with one kit bag each (standard weight, 260 pounds), number of ambulatory (nonlitter patients), and number of litter patients (standard weight, 250 pounds).

Block 6. List cargo by type and weight. List dimensions for all oversize/outsize cargo.

Block 7. List the number of vehicles in the appropriate spaces. When required, vehicles may be listed by "M" series designation in block J.

Block 8. List dangerous materials, chemicals, classified materials, human remains, frozen foods, etc., which require special handling or preparation (reference AFM 71-4/TM-38-250/NAVAIR 15-03-500/MCO P4030-19/DSAM 4145.3).

Block 9. Enter the total weight of items listed in blocks 6 and 8.

Block 10. Enter the requester's recommendation for the number and type of aircraft and mode of delivery.

Block 11. Enter any remarks the requester deems necessary to clarify the request. Preplanned requests requiring other than routine handling, such as specified items requests, should contain remarks to this effect.

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DIAM 65-3-1, Intelligence Data Handling System

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LFM 02, Doctrine for Landing Forces

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FMFM 5-3, Assault Support
FMFM 5-4, Offensive Air Support
FMFM 5-5, Antiair Warfare
FMFM 5-5C, Employment of the Forward Area Air Defense Battery
FMFM 7-1, Fire Support Coordination
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