FMFM 8-4

DOCTRINE FOR RIVERINE OPERATIONS

U.S. MARINE CORPS

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

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FOREWORD

1. PURPOSE

To set forth doctrine, tactics, techniques, and procedures to be employed by operating forces of the Marine Corps when conducting, or training for, operations in a riverine environment. It is made available to other Services for information and use as desired.

2. SCOPE

The classification of riverine environments; concepts of operation; employment of combat, combat support, and combat service support units; and information on usable craft and vehicles are discussed.

3. SUPERSESSION

Tentative FMFM 8-4, Interim Doctrine for Riverine Operations, April 1966, is superseded by this publication.

4. CHANGES

Recommendations for improvements to this manual are invited. Comments and recommended changes should be forwarded to the Coordinator, Marine Corps Landing Force Development Activities, Marine Corps Schools, Quantico, Virginia 22134.

5. CERTIFICATION

Reviewed and approved this date.

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Chief of Staff

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RECORD OF CHANGES AND CORRECTIONS

Change No.	Date of Change	Date of Entry	Name of Organization	Rank	Signature

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CHAPTER 1

INTRODUCTION

1001. GENERAL

a. Coverage.--This manual covers those aspects of riverine operations pertaining to the landing force. It includes concepts derived from a consideration of the effect of the riverine environment on tactics and techniques, and applies in varying degrees to operations conducted in limited and general war in a riverine environment. The doctrine, tactics, and techniques of other Services relating to the conduct of riverine operations are discussed only as they relate to the employment of the landing force.

b. Applicability.--The concepts of tactics and techniques presented in this manual have their principal application to riverine operations against guerrilla-type forces. In the event the enemy presents military formations employing conventional tactics of positional warfare, the landing force will likewise resort to the familiar doctrine for land warfare.

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Certain of the techniques of movement, communications, and combat support suggested herein will prove useful in such operations.

c. Related Operations.--Internal defense and counterguerrilla operations are discussed only as they relate to the riverine environment since they are adequately covered in other doctrinal publications. Non-combat aspects of riverine operations, such as civic action and political, economic, and psychological matters, are not within the scope of this manual.

d. Operational Consideration.--Riverine operations require the employment of tactics, techniques, organization, and equipment particularly suited for and adapted to the amphibious nature of the environment. Depending on the extent to which the landing force operations are affected by the environment, riverine operations may be conducted unilaterally; in coordination with U. S. Navy and other U. S. forces; or as combined operations with Allied forces.

1002. BACKGROUND

Riverine operations are not new types of military operations. Marines conducted them in the Florida Everglades from 1837 to 1842, and in Nicaragua in the late 1920's. The U. S. Navy conducted riverine operations along the Yangtze River in China from 1927 to 1932. The U. S. Army conducted riverine operations along the James and Mississippi Rivers during the Civil War, and in Mindanao in the Philippines during World War II. Riverine operations were conducted by the British along the Nile River in 1898, by the Japanese along the Yangtze from 1937 to 1945, and by the French in Indo-China from 1946 to 1954. These are but a few of many examples. Although much has been written in the historical vein, little treatment has been given the subject from a doctrinal viewpoint.

1003. DEFINITIONS

a. Riverine Operations.--Riverine operations are those operations necessary to achieve and maintain control of a waterway system and its contiguous areas for the purpose of denying their use to the enemy. They include operations which emanate from, or which are conducted on, across, or along the waterway system; and which combine the characteristics of ground, naval, and air operations.

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b. River Operations.--River operations are those operations, essentially but not exclusively waterborne, necessary to achieve and/or maintain control of a waterway as a line of communications or to deny such use to the enemy.

1004. CONTENT

This manual presents a general description and classification of the riverine environment based on its relative effect on operations of the landing force. General concepts of landing force missions, operations, and command relationships are presented. These concepts are supported by discussion and examination of certain aspects of combat operations such as:

a. Planning and task organization.

b. Tactics and techniques for landing force units.

c. Air operations.

d. Intelligence.

e. Combat support.

f. Logistic support.

g. Communications.

h. Usable landing craft and amphibian vehicles.

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CHAPTER 2

ENVIRONMENT

Section I. ENVIRONMENTAL DESCRIPTION

2101. GENERAL

The need of a doctrine for riverine operations stems from the nature of the environment and its effect on techniques normally employed by the landing force. Sharply contrasting riverine environments are found throughout the world and their impact on landing force techniques varies from negligible to significant. Consequently, a thorough knowledge and appreciation of the general and physical environment assumes vital importance in planning and conducting riverine operations.

2102. GENERAL CHARACTERISTICS OF WATERWAYS

In certain areas of the world, extensive river and canal systems provide the principal means of transportation. People tend to settle along

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these waterways which frequently provide their only lines of communications. To enemy forces, these waterways represent a means for clandestine movement under the cover of civilian traffic and congested settlements, and provide favorable conditions for mining and ambush tactics. The countering of such tactics is particularly difficult because of danger to the civilian population. Thus, general characteristics of the environment, which include economic, social, and civil considerations, are closely tied to physical characteristics. To establish and maintain control under such conditions requires extensive use of the waterways.

2103. PHYSICAL CHARACTERISTICS OF MAJOR DRAINAGE SYSTEMS

Major drainage areas can be divided generally into three longitudinal sectors, each of which has certain general characteristics. These three longitudinal sectors are the upper sector or headwaters, the middle sector or central valley, and the lower sector or delta.

a. Upper Sector or Headwaters. --This sector is generally a mountainous region drained by numerous large and small tributaries, many of which merge to form a river system. Characteristics of the headwaters are variable and unpredictable. Navigation is difficult or impossible. Headwaters are characterized by waterfalls, rapids, high banks, steep gradients, and local variations in water depth which complicate the design of watercraft for use in this sector.

b. Middle Sector or Central Valley. --This sector is generally a broad river valley into which numerous smaller tributaries feed. The middle sector is wider and slower than the upper sector and is often interspersed with obstacles.

(1) In the upper part of the middle sector, the erosional process is dominant; whereas, downstream the depositional process becomes progressively more active. Consequently, in the upper part, navigation is more heavily influenced by river-bedrock formations and often approaches conditions similar to those of the headwaters.

(2) In some parts of the middle sector, braiding (multiple channeling) sometimes occurs and successful navigation depends heavily on determining the principal channel. Deep channels are usually scarce in braided middle sectors; consequently, navigation is often a severe problem. In addition, braided channels constantly change their course and characteristics.

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(3) In that part of the middle sector where meandering occurs, navigation problems are greatly simplified by relatively regular and predictable characteristics. At low to average river stages, the location of maximum water depth is usually close to the location of the maximum current. Meandering river channels change more gradually than do channels in braided streams and, thus, are more predictable.

c. Lower Sector or Delta. --The lower sector is generally the widest of the sectors, and the speed of the current may change or even reverse with the tide. The lower sector is usually navigable by ships in natural or manmade channels. When a delta is formed, it is usually characterized by a flat depositional plain formed by a number of river distributaries disbursing sediment and water into a gulf, bay, or ocean.

(1) Dominant water courses in the delta are relatively straight distributaries, assisting in the identification of navigable channels. Bottoms of distributaries normally slope up to a crest at all river mouths and form a critical dimension that requires the use of high tides for watercraft of marginal drafts.

(2) Water depth throughout the delta area is roughly predictable at various river and tidal stages.

(3) Tidal activity can influence waterway velocity radically, but in a roughly predictable manner.

(4) Delta areas located in favorable climates are extremely productive agricultural areas. Natural levees, river flood plains, flat terrace land, and distributary levees are converted to productive crop land in many of the world's major river deltas. In addition, large areas of land are reclaimed from natural swamp or marsh conditions and converted into productive wet and dry crop fields.

2104. CANALS

a. Characteristics. --Canals have highly predictable characteristics and retain dimensions closely related to initial construction through upkeep dredging activity and the depositional and scouring characteristics of waters in the canal.

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Section II. ENVIRONMENTAL EFFECTS ON LANDING FORCES

2201. GENERAL

The environment of riverine areas varies depending on the geography and the seasonal climatic conditions. This in turn causes varying environmental effects on the operations of the landing force. In its most severe form, the environment becomes a dominant military consideration. The generally accepted military concepts and techniques of mobility, combat support, and combat service support must be modified to overcome handicaps imposed by the environment.

2202. CLASSIFICATION OF ENVIRONMENTAL CONDITIONS BY TYPES

Because of the broad spectrum of environmental conditions, a classification of riverine environments is necessary in order to provide a basis for planning operations and facilitating discussion. Consequently, the spectrum has been divided into three categories which will be defined and hereafter referred to in this manual as type I, type II, and type III environments. These type environments generally reflect the extent of waterborne operations in overall landing force operations, with waterborne operations increasing in significance as the categories progress from type I to type III.

2203. TYPE I ENVIRONMENT

a. Waterways. --A type I environment contains only minor rivers, usually not navigable by medium or deep draft boats except in their lower reaches, but too deep to be forded without difficulty. As a result, the waterways are primarily obstacles as opposed to lines of communication.

b. Watercraft. --Only small, shallow draft boats can be used in the type I environment. These boats will be either organic to the landing force or procured locally. They will be operated and maintained by troop units without Navy involvement. In addition, organic amphibian vehicles will be used extensively where conditions permit.

c. General Effect. --This is the least adverse of the representative types of riverine environments. Operations are conducted in accordance with established procedures with only minor modifications necessary.

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Extensive river patrolling will be required to obtain intelligence and to deny use of the waterways to the enemy.

2204. TYPE II ENVIRONMENT

a. Waterways. --A type II environment contains one or more major rivers. There also may be numerous smaller streams, canals, and paddies. These waterways may present serious obstacles, but may also be useful as lines of communications.

b. Watercraft. --This environment permits operational support by craft which are larger than anything organic to the landing force. Typical are amphibious landing craft and modified local craft of comparable size. These boats normally will not be manned by troops, but will require crews and support from the Navy or indigenous sources. Amphibian vehicles will be used extensively.

c. General Effect. --Landing force operations will be essentially normal, but the waterways will be exploited to a significant extent. Waterborne operations will augment or support land operations whenever advantageous. Major waterways permit the use of larger boats and landing craft which can be employed in both tactical and logistic operations. Sufficient dry land areas exist to permit normal siting of landing force installations.

2205. TYPE III ENVIRONMENT

a. Waterways. --A type III environment is dominated by water. There may be several major waterways in the area in addition to an extensive network of lesser waterways, canals, and irrigation ditches. In tropical and subtropical areas, the banks may be covered with a dense growth that precludes visibility inland from the water. Waterways are the predominant lines of communications; usable roads are scarce; cross-country mobility is drastically curtailed; and suitable land area for command, control, fire support, logistic, and air installations frequently is not available.

b. Watercraft. --This environment will accommodate all sizes of watercraft from small local craft to ships of the size of an LSM/LST. Barges and floating helicopter pads possess useful potential. Amphibian vehicles can be used selectively; but they are not suited to long-distance

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water movement, particularly against currents, and have limited mobility through soft paddies and swamps where deltas exist.

c. General Effect. --Landing force operations will be affected significantly by this environment. Waterways must be exploited to exercise control over the area of responsibility. Extensive support by Navy elements will be required. The unavailability of land sites for installations and the limited usefulness of wheeled and tracked vehicles are major considerations in planning operations in this environment. When necessary, facilities for command and control, combat support, and combat service support must be waterborne. The type III environment is the most adverse riverine environment for the conduct of riverine operations.

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CHAPTER 3

CONCEPTS OF MISSIONS, OPERATIONS, AND COMMAND RELATIONSHIPS

Section I. REQUIREMENT FOR CONCEPTS

3101. GENERAL

The conduct of operations in a riverine environment may necessitate significant departures from traditional concepts applicable to the landing force in the amphibious assault and subsequent operations ashore.

3102. AREAS INFLUENCED BY A RIVERINE ENVIRONMENT

a. This chapter provides the commander and his staff with concepts which will facilitate the planning and execution of operations in a riverine environment in the following areas:

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(1) Assignment of missions and tasks to the landing force and its subordinate elements.

(2) Development of a general concept of operations.

(3) Establishment of command relationships.

b. Succeeding chapters describe appropriate concepts relating to tactics and techniques employed by the landing force and its subordinate elements in a riverine environment.

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Section II. LANDING FORCE MISSIONS AND TASKS

3201. GENERAL

The familiar statements of missions and tasks found in operation plans and orders for conventional amphibious operations will not always convey a clear picture of the job to be done in riverine operations. This section establishes three mission terms which are considered more precisely descriptive of missions and tasks likely to be assigned to the landing force and its subordinate unit. They are: seize and occupy, search and destroy, and clear and hold.

3202. MISSIONS

a. Seize and Occupy. --The objective of this mission is the seizure and occupation of a designated area for development of a shore base to be used for subsequent operations. It is a likely initial landing force mission, particularly in the type I or II environment. This mission may be repeatedly assigned subordinate elements of the landing force as the required network of combat bases is developed.

b. Search and Destroy. --The objective of this mission is to locate the enemy and either destroy him or drive him from the area. Troop units are assigned this task when the exact location of the enemy is unknown. This mission is sometimes referred to as "search and clear." The terms are essentially synonymous.

c. Clear and Hold. --Although similar to a "search and destroy" mission, the main emphasis of this mission is to hold the designated area. Elements of the landing force are most likely to receive a clear and hold mission when sufficient forces are available to consolidate and control the designated area; or when participating in internal defense operations, the host country military, paramilitary, or governmental agencies are prepared to follow up with measures designed to restore an area to firm, friendly government control on a permanent basis.

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3203. TASKS

a. Any of the foregoing missions may be assigned as tasks to be accomplished as part of a larger operation.

b. In addition, subordinate elements of the landing force may be assigned one or more of the following combat tasks:

(1) Combat, reconnaissance, or security patrolling on waterways.

(2) Mining or mine clearing of banks or shallow waterways.

(3) Barrier operations on waterways.

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Section III. COMMANDER'S CONCEPT OF OPERATIONS

3301. GENERAL

a. Basic Concept. --The mission assigned, the enemy situation, and the nature of the terrain are the factors which will bear heaviest on determining the commander's concept of operations. In a type III environment it is anticipated that an enemy will seldom be disposed in great force or strength because of the physical characteristics of the area. The lack of cross-country mobility, difficulties inherent in reinforcing, susceptibility to envelopment, and the great vulnerability to supporting arms fire indicate guerrilla-type operations rather than a formal position defense. Consequently, the landing force commander's first concern will be the securing of lines of communications and the establishment of fixed or floating bases from which to conduct further operations. Normally, tactical areas of responsibility (TAOR) are assigned to reinforced infantry battalions. Sectors within these TAORs are assigned to rifle companies and combat bases are established. Appropriate elements of the landing force are held under centralized control for employment as reaction forces.

b. Application. --The remainder of this section covers the application of this concept to the different types of environment encountered in a riverine operation.

3302. OPERATIONS IN A TYPE I ENVIRONMENT

The waterways encountered in the type I environment seldom provide the landing force with opportunities for advantageous exploitation. They more frequently constitute obstacles to be crossed rather than useful lines of communications. Amphibian vehicles, inflatable boats, and other shallow draft craft will prove useful in crossing and patrolling operations. The inland waters, although minor in nature, must be kept under surveillance to deny their use to the enemy. Conventional techniques of land warfare are applicable without significant modification in a type I environment.

3303. OPERATIONS IN A TYPE II ENVIRONMENT

a. General. --Operating techniques of the landing force remain essentially normal in the type II environment. Land areas are used for

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command posts, logistics installations, and artillery batteries. Tracked and wheeled vehicles are usable, but their full capability may be reduced due to varying trafficability of roads and cross-country terrain.

b. Factors Requiring Modification of Techniques. --The need for modification of techniques arises from the existence of inland waters of such size and location as to constitute advantageous routes for tactical maneuver and logistics lift. Deployment on inland waters of one or more reinforced rifle companies, in coordination with operations of other units on land, will become highly likely. Neither amphibian vehicles nor the shallow draft craft suitable for a type I environment will be adequate because of their marginal water performance characteristics. While adequate fire support can normally be provided by air and land-based artillery, the employment of armed river boats will be of considerable assistance in most situations. Exploitation of waterways as supply routes requires provision of suitable cargo craft.

c. Boat Unit Support. --Waterways encountered in a type II environment will require the inclusion of a boat unit in the landing force task organization. The hydrographic characteristics of waterways found in this environment, and the nature of troop and cargo lifts to be performed, indicate that the requirement can best be met by standard landing craft and/or boats furnished and operated by the U.S. Navy. Emergency expedients include utilization of host government boat units or acquisition by purchase or lease of suitable indigenous craft.

d. Boat Unit Employment. --In the type II environment, the principal departure from conventional tactics and techniques arises from the introduction of boat units into the task organization and the attendant requirement for techniques to ensure their efficient utilization, support, and control. Riverine operational concepts are more thoroughly developed in the discussion of operations in a type III environment. Portions dealing with boat units associated with reinforced rifle companies in a type III environment are fully applicable to the type II environment.

3304. OPERATIONS IN A TYPE III ENVIRONMENT

a. General. --Wide departure from normal land operations becomes necessary in the type III environment. In many areas, suitable land sites will not be available for some or all of the required combat bases, command and logistics installations, air control agencies, fire support position

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areas, helicopter bases, and SATS installations. In other areas, availability of suitable land sites will be influenced by seasonal weather variations. The scarcity of all-weather roads, coupled with an abundance of unbridged, unfordable waterways and generally untrafficable terrain, renders wheeled vehicles almost useless and drastically reduces the effectiveness of most tracked vehicles. Frequently, wire and ground radio relay communications will not be practicable. Substitute means and unusual techniques must be employed by a landing force committed to a type III riverine environment.

b. Basic Maneuver Element

(1) Size. --The reinforced rifle company constitutes the optimum sized basic maneuver element for combat operations in a type III environment. In most terrain the company is assigned a sector of responsibility and conducts operations from a combat base as in counter-guerrilla operations.

(2) Mobility. --Mobility is achieved by bold, imaginative use of helicopters in conjunction with the use of boats. The tactics and techniques to be used with helicopterborne forces are outlined in FMFM 3-3, Helicopterborne Operations.

(3) Organization. --Typically, a rifle company deployed in a type III riverine environment will be reinforced or supported by a forward air control team; artillery forward observer team; naval gunfire spot team; gunboats, LVTHs, or self-propelled artillery embarked in landing craft; and indigenous guides, interpreters, and psychological warfare personnel. With reinforcements of this type and magnitude, a rifle company will require 12 to 16 basic river boats in addition to any gunboats provided. A shallow draft boat capable of 15-20 knots with an endurance of 300 to 400 miles is desired. In spite of certain undesirable characteristics, Navy landing craft may be used as an interim substitute.

(4) Combat Bases. --The company combat base may be located on land in the normal manner. However, it is likely that suitable land sites will not be available in the type III environment. In this event, a floating combat base, or "company mother ship," is required. The mother ship provides troop support such as hot meals, showers, and stowage of

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personal gear; supply support of the reinforced company for 15 to 30 days; medical support; potable water by purification or evaporation; and organizational maintenance facilities for troop equipment and the river boats. The ship must be armed for self-protection and should not exceed a draft of 10 feet; however, a draft of 7 feet is preferred. A ship comparable to the LSM is considered suitable. Expedients might include an LST, when hydrographic conditions permit; two or three LCUs; or one LCU and one or more barges.

(5) Operating Area. --The dimensions of a typical company sector of responsibility will depend on the level of enemy strength and activity and cannot be precisely prescribed. For conceptual purposes, it is envisioned that a riverborne rifle company will be capable of operating at distances up to 50 miles from its combat base, or mother ship, providing enemy activity in the area so permits. The probable shape of a company sector is a long, narrow rectangle with the long axis oriented to the pattern of the principal waterways.

c. Concentration of Combat Power. --It is characteristic of riverine operations that continuous contact with the enemy can seldom be maintained and is unpredictable from day to day. Provision must be made for very rapid concentration of adequate combat power whenever enemy elements are located. In some instances, it may prove tactically feasible to mass two or more riverborne rifle companies, or at least exploit the advantages of mutual support. In the great majority of cases, commitment of a helicopterborne reaction force will offer superior chances of tactical success in fixing and destroying located enemy elements. It may be desirable to include portable assault boats with the reaction force in order to achieve mobility for the force after landing.

d. Minimum Size Landing Force

(1) Organization. --The normal necessity for employment of a reaction force indicates that a reinforced infantry battalion is the smallest unit that can be effectively employed in a riverine environment, but only so long as there is a higher echelon headquarters providing supporting arms coordination or liaison. The smallest individual task organization capable of independent operations is the Marine expeditionary unit (MEU). For the purpose of simplification, the following subparagraphs will apply to either type unit. In either case, the vital role to be played by helicopters dictates their inclusion in any riverine force.

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(2) Employment. --Under most riverine circumstances, the MEU/battalion commander should deploy a minimum of two reinforced rifle companies on the waterways, holding the other two for reaction missions, security missions, rest, and rehabilitation. It is possible to organize an MEU or to reinforce an infantry battalion up to a strength of six rifle companies. In such cases, up to four companies could be deployed with two held as the reaction force.

(3) Headquarters Functions. --Functions performed by MEU/battalion headquarters include coordination of the operations of river companies and the reaction force, arrangement for and coordination of air support and fire support, and provision of logistic support.

(4) Combat Bases. --When suitable terrain can be found, the unit may be land-based; but this choice entails severe problems of base construction, security, and support. Utilization of amphibious ships offers significant advantages; such as mobility, flexibility, and quality of troop support. The LPH permits collocation of the reaction force and the helicopter unit and provides the capability to react more rapidly. The LPD or LSD offers the additional feature of excellent boat haven facilities. LSTs are useful in a variety of tasks, while the APA provides superior troop billeting, command post facilities, and expedient hospitalization. An AKA offers protected, high capacity stowage for landing force supplies, while the aircraft carrier solves all problems associated with providing a base for the fixed-wing aviation element of the MEU. Positioning of these vessels may be limited to anchorages offshore or in estuaries, depending on river depths and widths. If the enemy presents no air or sea threat, the choice of mobile sea bases eliminates most of the problems of base security and permits the landing force to concentrate primarily on offensive missions. In the event offshore anchorage denies penetration inland to the required depth, utilization of land bases is required.

(5) Operating Area. --The depth and width of an MEU/battalion area of responsibility are directly dependent on the number of rifle companies deployed, the size of their assigned sectors, and the mission assigned. As stated earlier, a rifle company sector can extend up to 50 miles from the company base or mother ship. Under favorable circumstances, the mother ship, in turn, is considered capable of operating 100 miles or more from rear support. Penetration to a depth of 150 miles or more cannot be achieved, or even reasonably attempted, unless the water route from the base ship to company mother ship can be kept open as a

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line of communications. An equally vital tactical restraint is the range of transport helicopters. Only when the enemy is limited to small guerrilla bands can rifle companies be assigned sectors extending beyond practicable reach of helicopterborne reaction forces.

(a) Measuring inland from the sea, the depth of the MEU/battalion area of responsibility will initially not exceed 50 miles, and may be much less depending on enemy strength in the area. Gradually, as the area is cleared and control over the area of responsibility is consolidated, the depth may be extended to 150 miles or more.

(b) Width of the area of responsibility is dictated by the pattern of company deployments. If deployed side-by-side and oriented on parallel waterways, the width of the area is the sum of the company sector widths. If deployed along a single main waterway in column configuration, the area is not wider than the company sectors.

e. Larger Landing Forces. --The foregoing criteria concerning the dimensions of an MEU or reinforced battalion area of responsibility permit determination of the optimum size landing force for any given riverine mission. If higher authority assigns an area of operations within the coverage capability of 4 river rifle companies, a 6-company MEU/battalion will suffice. If from 5 to 12 riverborne rifle companies are required, formation of a Marine expeditionary brigade (MEB), composed of 2 to 4 battalions, is necessary. When requirements exceed the 4 battalion level, a suitably task organized Marine expeditionary force (MEF) will be formed.

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Section IV. CONCEPT OF COMMAND RELATIONSHIPS

3401. GENERAL

The command relationships set forth in this section are those concerning the U.S. Navy and Marine Corps elements of a riverine force. Normally, the higher authority assigning the riverine mission will specify the command structure above the riverine task force level. When riverine operations are conducted as an integral part of internal defense operations, appropriate relationships with host government agencies located within the area of operations will also be prescribed.

3402. RELATIONSHIPS IN A TYPE I ENVIRONMENT

Command relationships for riverine operations in a type I environment require no modifications of conventional concepts, since only landing force elements are employed.

3403. RELATIONSHIPS IN A TYPE II ENVIRONMENT

The need for Navy boats and craft in this environment requires the incorporation of a Navy boat unit into the landing force task organization. The boat unit will constitute a "type command" within the landing force structure. Circumstances may require elements that are deployed with reinforced rifle companies to be attached to the company, but normally they will be placed in a direct support role. The boat unit commander, with appropriate assistants, will serve as a special staff officer on the staff of the landing force commander. Fire team assault boats will be organic to the Marine Corps and will be operated by Marines.

3404. RELATIONSHIPS IN A TYPE III ENVIRONMENT

a. General

(1) No single pattern of command relationships will fit all of the varied circumstances to be encountered in the type III environment. Some sets of circumstances combine many of the characteristics of an amphibious operation; others more closely resemble "subsequent operations ashore" or "a land campaign"; still others constitute a blend of the two.

(2) The location and nature of type III environments are such that any riverine force will probably be brought to the area of operations

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in amphibious ships. Therefore, the command relationships described in LFM 01 (NWP 22_), Doctrine for Amphibious Operations, will apply during the planning, embarkation, and movement to the objective phases.

b. Circumstances Resembling an Amphibious Operation

(1) Riverine operations assume certain of the characteristics of amphibious operations when the terrain denies establishment of landing force installations ashore and plans are based on operating from mobile sea bases. The substantial Navy involvement in this circumstance supports the appropriateness and applicability of the command relationships prescribed in chapter 2 of LFM 01; i.e., the amphibious task force commander has full responsibility for the entire force and for the operation. Subject to the overall authority of the amphibious task force commander, full responsibility for the conduct of operations ashore is vested in the landing force commander.

(2) The appropriateness of this command relationship concept is reinforced when the operations to be conducted include Navy patrolling of major waterways over a wider area than the specific area of responsibility assigned to the landing force.

c. Circumstances Resembling Subsequent Operations Ashore. -- When the type III riverine environment permits establishment of landing force installations ashore, the requirement for continuing Navy support is reduced to the provision of boat units, naval gunfire ships, and ocean shipment of replenishment supplies. Under this circumstance, overall command is passed to the landing force commander after establishment of the landing force ashore.

d. Circumstances Having Combined Characteristics. --The type III environment may present a situation wherein some, but not all, landing force installations can be shore based; significant continuing Navy support of the landing force is required; and Navy patrolling of certain waterways may be required to supplement landing force operations. Under this set of circumstances, depending on the degree of Navy support required and the availability of Navy support means, one of the following situations will prevail:

(1) A Navy subordinate command comprised of all Navy elements required for subsequent operations is formed. The landing force

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commander in this situation exercises command through the Navy subordinate commander.

(2) A Navy task force commander is assigned specific supporting tasks by the common superior.

(3) Specific Navy elements are assigned to the operational control of the landing force as in the type II environment.

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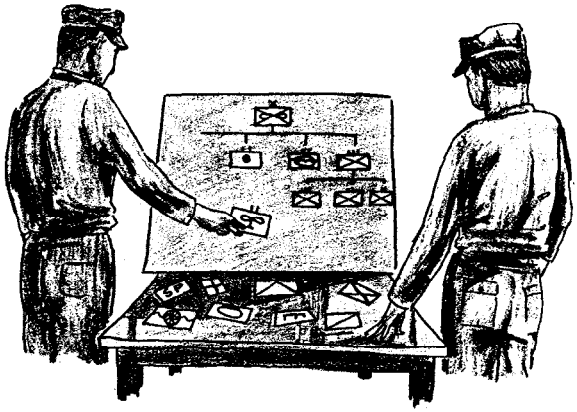

CHAPTER 4

PLANNING AND TASK ORGANIZING

Section I. PLANNING

4101. GENERAL

The approaches to planning which are described in LFM 01, Doctrine for Amphibious Operations, and the fundamentals of landing force planning which are stated in LFM 02, Doctrine for Landing Forces, are fully applicable to planning for riverine operations. Since military operations in riverine environment are often of a counterguerrilla nature, the planning guidance contained in FMFM 8-2, Operations Against Guerrilla Units, and FMFM 8-1, Special Operations, chapter 5 (Jungle Warfare), are also pertinent. The concepts set forth in the preceding chapter indicate that planning riverine operations will involve some unfamiliar aspects and will require shifts in emphasis.

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4102. BASIC DECISIONS

a. General.--As current doctrine for amphibious planning points out, certain basic decisions must be made at the highest level before detailed planning can proceed. In riverine operations, the number of basic decisions required may be reduced, but each will have a profound effect on subsequent planning; for example, a decision to employ mobile sea bases instead of land bases will affect planning accomplished at all echelons of the riverine force.

b. Effect of Environment.--Because of environmental variations found in riverine operations, the basic decisions required will change with each operation. One basic decision to be made in all cases will be to categorize the type of riverine environment. Planners should use the basic decisions common to amphibious operations as an initial guide.

4103. PLANNING FACTORS

a. Time.--The time factor in planning riverine operations merits special consideration at all levels of command. A longer-than-normal planning phase may be required for riverine operations because of the likelihood of extensive task organization, or for modifying tables of organization and the unusual logistics planning involved.

b. Tactical Operations.--The typical riverine operation may not include a classic beach assault, the event of principal interest in conventional amphibious planning. In addition, the scheme of maneuver ashore may not be depicted by a series of terrain objectives or phase lines. Tactical planning for riverine operations will be chiefly concerned with selection of tactical areas of responsibility and provision for adequate reaction forces at suitable locations. As in other operations, the requirement for route and installations security will influence tactical planning.

c. Intelligence.--Weather, terrain, and hydrography have long been identified as key factors in landing force planning. They take on added importance in planning riverine operations and, in type III environments, will most likely become the controlling factors. (In contrast, the limited combat power of deployed hostile forces tends to reduce the normally critical importance of the enemy situation as a planning consideration.)

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d. Supporting Arms.--Determination of fire support requirements for a riverine operation cannot be made by tabulating known and suspected targets and calculating the number of guns and aircraft required for their destruction or neutralization. For riverine operations, supporting arms planners will focus attention on:

(1) Allocation of adequate close fire support for reinforced rifle companies deployed on the waterways.

(2) Arrangements for support of committed reaction forces and attendant techniques of fire support coordination.

(3) Ensuring that fire support elements of the riverine force possess the capability to deliver fire throughout the area of operations.

(4) Solution of fire support coordination problems arising from the fact that the objective area will probably be densely populated. The discussions of artillery and naval gunfire in chapter 7, and air operations in chapter 8, provide additional factors to be considered in supporting arms planning.

e. Logistics.--Estimating overall requirements and the subsequent task of computing detailed requirements will be slow and laborious because most available experience factors and staff officer's handbooks will not be applicable to riverine operations.

(1) Mobile Sea Bases.--An early basic decision regarding utilization of mobile sea bases is vital to logistics planners. The entire combat service support structure will change when mobile sea bases are employed, and continuous liaison with the Navy must be established early in the planning phase.

(2) Civic Action.--Missions assigned in riverine operations may include the responsibility for providing food and medical treatment to the indigenous population. This probability must be considered in logistics planning.

(3) Other Considerations.--The logistics planning phase may be longer and more complex because of the following considerations:

(a) T/E equipment and associated mount-out supplies must be tailored to the riverine operation.

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(b) Additional quantities of certain items and some new items must be acquired.

(c) Unfamiliar equipment and techniques may require additional training of otherwise combat ready troops.

(d) Unit standing operating procedures may have to be revised.

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Section II. TASK ORGANIZING

4201. ENVIRONMENTAL AND TACTICAL CONSIDERATIONS

Riverine operations are characterized by a large variety of environmental and tactical situations. The nature of the opposition may range from lightly armed guerrilla bands to conventional military formations of regimental or larger size. An operation initiated in a delta may progress through the middle river type II environment and culminate in the type I environment of the upper river region. Seasonal effects can change an environment from type II to type III and then back again.

4202. OBJECTIVE OF TASK ORGANIZING

Judicious task organizing can give the landing force the high order of flexibility required to cope with this broad range of possible circumstances. The objective in organizing for riverine operations is the formation of fully integrated air, ground, sea, and river teams precisely tailored to ensure superior mobility, overwhelming firepower, and unity of command.

4203. EQUIPMENT AND PERSONNEL CONSIDERATIONS

a. Equipment. --Certain types of units and their equipment customarily found in landing forces will be of very limited usefulness in a type III riverine environment. Examples include motor transport, tank, and light antiaircraft missile battalions; the heavy equipment elements of engineer and shore party battalions; combat service support units; and the normal air base operations units. There should be no hesitation in excluding from the task organization units or elements not suited to the expected type of riverine environment. Realistic tailoring is particularly important when operations are to be conducted from mobile sea bases since the space aboard ships will be at a premium.

b. Personnel Utilization. --It may prove advantageous or necessary to temporarily modify the structure and mission of a T/O unit which is unsuited to operations in a type III environment so that its personnel can perform a needed function. For example, a motor transport battalion could be the source for outboard motor repair teams; and MACS personnel and equipment, not needed for AAW functions, could assist in meeting the increased requirement for direct air support centers (DASCs).

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4204. PHASED INTRODUCTION

The mission and plan of operation may involve initial operations in a delta and subsequent operations in type II or type I environments. In this event, units not needed initially may be formed in task groups and phased into the objective area as they are needed. Similarly, it may be judged operationally unacceptable to leave excluded units at their distant home station because of the contingency that the landing force may be withdrawn from the riverine operation and committed to conventional operations. In this case, the excluded units may be formed in a task group and positioned at an available base facility near the objective area.

4205. REINFORCEMENT OF SMALL UNITS

a. General.--The concept described in chapter 3 highlights the key role of rifle companies deployed in sectors of responsibility on the waterways. It is essential that they be provided means to accomplish their mission. Therefore, task organizing for riverine operations is characterized by a downward flow of reinforcing elements to lower than normal levels.

b. Rifle Company.--A rifle company assigned a sector of responsibility normally will require augmentation by many or all of the following personnel: cooks, armorers, outboard motor mechanics, indigenous guides and interpreters, a modest intelligence section, major communication augmentation, an engineer squad, a supply section, and corpsmen.

c. Infantry Battalion.--An infantry battalion assigned a tactical area of responsibility in a riverine environment also will require augmentation, not only to provide rifle companies the augmentation listed above, but to increase its own organic capabilities.

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CHAPTER 5

TACTICS AND TECHNIQUES OF THE RIFLE COMPANY AND SMALLER UNITS

Section I. GENERAL

5101. CONCEPT OF OPERATIONS

Rifle companies will be assigned sectors of responsibilities within the battalion or Marine expeditionary unit (MEU) tactical area of responsibility. Company combat bases will be established afloat when suitable land sites are not available. Companies will conduct operations from these bases in their assigned sectors as directed by higher headquarters. One or more companies will be held under centralized control of higher echelons for employment as a helicopterborne reaction force.

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5102. ORGANIZATION FOR COMBAT

The mission, enemy situation, and environmental conditions will influence the organization for combat at all levels. The following considerations are applicable in a riverine environment:

a. Boat Elements.--In addition to the shallow draft assault craft issued to the company in a type I environment, larger naval craft, with associated personnel and equipment, should be made available in a type II or type III environment. Normally, these boat elements should be placed in direct support or under operational control, rather than be attached to the company, in order to relieve the supported infantry commander of logistic responsibility for Navy peculiar items. However, when the infantry is deployed in an area where distance precludes effective control of the boat element by its parent boat unit headquarters, it will be necessary to attach the boat element to the infantry unit. Under these conditions, the infantry unit must assume normal logistic and administrative support responsibilities for the attached boat element.

b. Company Level Attachments.--In order to provide maximum operational effectiveness of the rifle company or comparable unit, consideration should be given to the following attachments:

(1) Artillery forward observer (FO) team.

(2) Elements of the 106mm recoilless rifle platoon.

(3) Elements of the 81mm mortar platoon.

(4) Naval gunfire (NGF) spot team.

(5) Forward air control (FAC) party or elements thereof.

(6) Ground surveillance radar equipment and operators.

(7) Local guides.

(8) Intelligence team.

(9) Assault boat repairmen and outboard motor mechanics.

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(10) Interpreters.

(11) Psychological operation (psyop) advisor.

(12) Engineer elements.

(13) Communication elements.

(14) Helicopter support team or elements thereof.

c. Other Considerations.--In the task organizing of landing force units with boat elements to achieve mobility in any environment, infantry unit integrity rather than boat element integrity must be stressed. "Spread loading" of critical items such as radios, weapons, and ammunition should be practiced as in amphibious operations. Single boat employment is not encouraged. A minimum of two boats should support any task or maneuver. It is not intended that embarked troops will fight from the boats; however, the transported unit must contain sufficient combat power to react aggressively to an ambush or a meeting engagement on the waterway.

5103. EMPLOYMENT OF INFANTRY WEAPONS

After the waterborne force moves ashore, the employment of infantry weapons is governed by existing doctrine. The procedures outlined below will facilitate the gaining of maximum benefit from organic infantry weapons while waterborne.

a. Assignment of Zones and Sectors.--Zones of observation and sectors of fire are assigned to all personnel of the transported unit while waterborne in order to provide maximum security against surprise attack and maximum firepower in reaction to an ambush.

b. Machineguns.--If suitably armed boats have not been provided, mounting of weapons on boats may be necessary. The basic river boat/squad boat should have one machinegun mounted forward and one aft. Arming of the plastic assault boats is not contemplated except for special situations.

c. Rocket Launchers.--Rocket launchers of 3.5" or similar size may be used effectively by waterborne forces. They can be fired from any boat of reasonable stability, provided that precautions regarding back blast are observed.

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d. Mortars.--Both the 81mm and 60mm mortars may be fired from LVTPs and boats of LCVP size or greater. However, unless the amphibian vehicle or boat is run aground, employment in this manner will not provide satisfactory results except in area fire missions. Such craft afford excellent ammunition storage capabilities.

e. Recoilless Rifles.--The 106mm recoilless rifle has been used successfully in waterborne situations by weighting down the tripod with sandbags on the top deck of an LVTP-5. In this direct fire role, accurate long-range fire may be placed on enemy caves and fortifications in cliff sides and on hills overlooking the waterways. Firing this weapon from boats is not recommended, however, because of the dangers inherent in the severe back blast.

f. Grenade Launchers.--The 40mm grenade launcher offers excellent fire support from any size boat.

5104. EMPLOYMENT OF SUPPORTING ARMS

Because of the extreme limitations on cross-country movement of artillery, naval gunfire and close air support assume increased importance in riverine operations. Application of the following techniques will maximize the potentialities of supporting arms.

a. Cross-Training.--The widely dispersed company areas generate a requirement for greater numbers of FAC parties and NGF spot teams than are provided by current tables or organization. Cross-training of NGF spotters and artillery forward observers will assist in alleviating the problem and is discussed further in chapter 7. Chapter 8 discusses methods to provide adequate control for close air support. In addition, company officers and NCOs must gain and maintain proficiency in requesting, coordinating, and controlling artillery and NGF missions.

b. Planning.--Small unit commanders must be impressed with the advantages of full utilization of supporting arms and the necessity for detailed planning for each operation. At all times the commander must know the:

(1) Types and numbers of supporting arms available.

(2) Area coverage of each available fire unit.

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(3) Priority of support to his unit.

(4) Ordnance available for each weapon type.

(5) Coordination and communications required and available.

(6) Locations of friendly military, paramilitary, or civilian groups.

(7) Rules of engagement (restricted areas, targets).

(8) Capabilities and limitations of each type unit.

5105. SPECIAL CONSIDERATIONS

a. Observation. --The limited observation capabilities of riverine surface forces require that air observation be provided to the front and flanks of surface forces for all movements except night and covert movements.

b. Helicopterborne Forces. --Whenever possible, helicopterborne forces should be planned for employment in coordinated attacks, or as reserves to exploit the actions of surface forces.

c. Utilization of Boats, Landing Craft, and Amphibian Vehicles. --Small boats and unarmored landing craft are not considered to be "fighting vehicles" in spite of their speed, mobility, load capacity, and fire support capabilities. In those cases where a direct assault approach into an enemy position is anticipated, the LVT is considered a suitable "fighting vehicle." The protection offered to embarked troops, plus its maneuverability and shock effect, can be exploited on selected occasions.

d. Infiltration. --Infiltration is best accomplished by the employment of native boats, moving during the hours of darkness at a rate of speed which will avoid creating suspicion.

e. LVT Employment. --LVTs may be used successfully in all environmental conditions; however, care must be exercised to avoid:

(1) Attempts to move against currents equalling or exceeding the water speed of the LVT.

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(2) Movement into areas where neither floatability nor firm traction is afforded, particularly areas of deep silt.

(3) Movement along the edges of banks where undercutting currents have produced probable cave-in areas. A dropoff under one track can cause the vehicle to overturn.

(4) Situations which will require extended water travel.

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Section II. TACTICAL OPERATIONS

5201. OFFENSIVE OPERATIONS

a. General. --FMFM 6-4, Marine Rifle Company/Platoon, prescribes the role of the rifle company in conventional and counterinsurgency operations. Whether operating independently, as a reaction force, or in a sector of responsibility, the primary mission of the rifle company is to locate, close with, and destroy the enemy by fire and maneuver, or to repel his assault by fire and close combat.

b. Riverine Peculiar. --In delta areas all company operations will be influenced by the necessity to bring combat power to bear against an elusive enemy by means of boat and helicopter mobility coordinated with all available fire support means. Existing doctrine adequately covers the subject of helicopterborne operations; therefore, the following paragraphs are devoted to considerations raised by the use of boats in riverine operations.

(1) Shallow draft craft and Navy boats may be employed by the company to:

(a) Transport foot troops to the line of departure.

(b) Position blocking forces.

(c) Conduct reconnaissance, combat, and security patrols.

(d) Assist in displacing crew-served weapons.

(e) Transport reserves.

(f) Perform resupply and evacuation tasks.

(g) Serve as command/utility vehicles.

(2) Boats may move attacking elements directly to their objectives; however, it is preferable to debark and deploy the troops before approaching known or suspected enemy positions.

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(3) All boats must be provided with security after the transported troops debark. The time or conditions under which the boats revert to parent unit control should be specified.

(4) Shallow draft craft must not be loaded with more equipment than the transported troops can carry if the operation is planned for continuation on foot.

(5) All boats will adopt a normal march formation while waterborne. Advance and rear guard boats will be posted, and flank security will be provided in adjacent streams or by foot elements, or both. If feasible, control of the banks and likely ambush sites must be obtained.

5202. PATROLS

a. General.--Patrols are used to deny the waterways to the enemy, to provide security for friendly traffic, and to gather intelligence. Whenever possible, surface patrols should be coordinated with aerial reconnaissance of the waterways and their surrounding areas. The most effective flights are those executed by the same observers flying over the same area each day. This permits the aerial observer to detect any deviation from normal patterns of activity and report such activity to surface patrols for prompt investigation. Aerial reconnaissance aircraft can also detect ambushes, or direct air or surface units to assist in the withdrawal of ambushed surface patrols. Mobile reserves should be available to assist the patrol or to exploit intelligence collected by the patrol force. Dependent upon the primary purpose of the patrol, they may be categorized as reconnaissance patrols, combat patrols, or security patrols.

b. Reconnaissance Patrols.--Reconnaissance patrols normally use at least two boats to provide mutual support. They may move by successive bounds, alternate bounds, or by continuous movement. The movements described below for reconnaissance patrols apply equally to boat elements performing march security, advance guard, or flank guard for a larger force.

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(1) Successive Bounds. --During movement by successive bounds, the boats in the patrol keep their relative places in the column. (See fig. 1.) The two leading boats work as a team moving from one point to another along the stream. The second boat takes a concealed position and troops debark, if necessary, to cover the movement of the first boat to the next observation point. At the observation point, troops debark to observe and to reconnoiter. When it is determined that all is clear, the leader of the lead boat signals the second boat forward to the lead boat's position. Personnel from the lead boat select their next reconnaissance point and then move forward while the second boat remains in place to furnish fire support. The process is repeated. The lead boat and personnel may be rotated. Other craft in the patrol move by bounds from one concealed position to another behind the leading boats. Sight contact is maintained, but boats avoid closing on the craft in front of them.

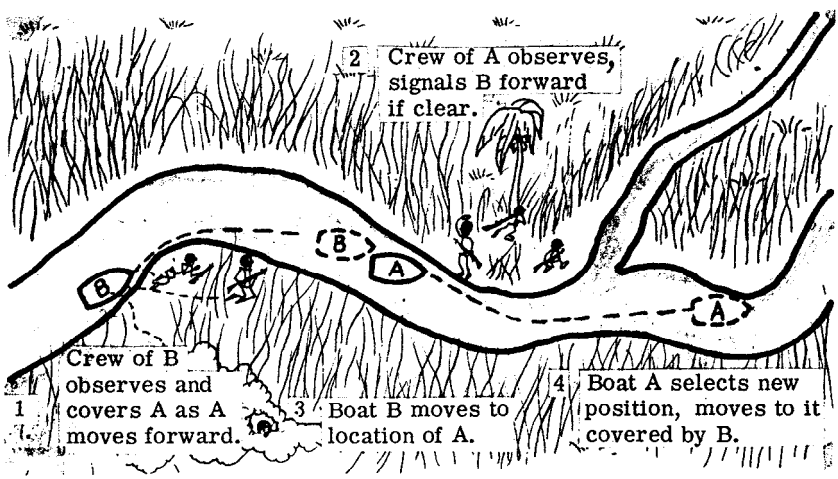

Figure 1. --Example of Movement by Successive Bounds.

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(2) Alternate Bounds.--During movement by alternate bounds, the two leading boats alternate as the lead craft on each bound. (See fig. 2.) This method is more rapid than successive bounds, but it does not allow men in the second boat an opportunity to observe carefully before they pass the halted lead craft.

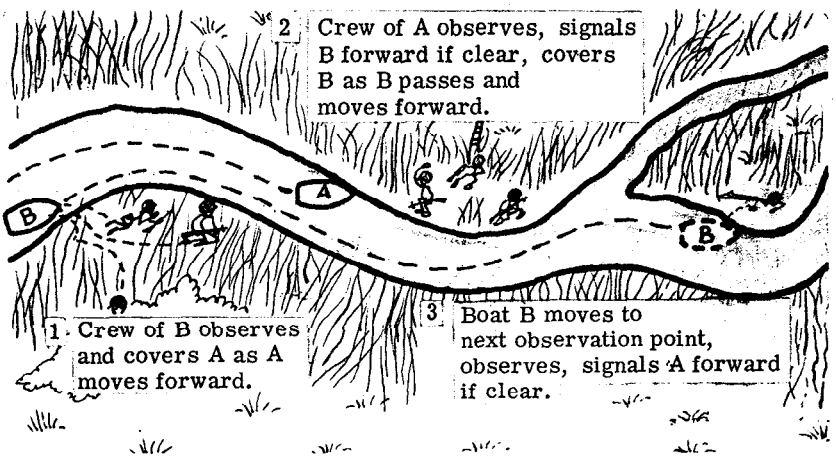

Figure 2.--Example of Movement by Alternate Bounds.

(3) Continuous Movement.--During continuous movement, all boats move at moderate speed and maintain security by careful observation. Leading boats stop to investigate areas that seem particularly dangerous. This is the fastest, but least secure, method of movement.

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Security is obtained by frequent halts to observe the stream, its banks, and surrounding terrain. Men and weapons are debarked to observe and to furnish fire support if required. Members of the boat team are designated to protect the boats when the patrol debarks. Specific responsibility for zones of observation and sectors of fire is assigned to men in each boat. Visual contact is maintained between boats. Each boat, or each major element of larger patrols, is provided with a radio if possible. Men, weapons, and equipment should be distributed among the boats in such a way that the patrol will remain effective even if one boat and its equipment are lost. One member of the patrol is designated to observe and record the condition of the waterway and banks.

c. Combat Patrols.--Waterways provide the opportunity to conduct long combat patrols while avoiding the extreme fatigue which limits ground patrol activity in tropical climates. Since a waterborne combat patrol can carry more weapons and ammunition than a land combat patrol of comparable size, it can strike harder over more protracted periods. Where hydrography permits, Navy boats, rather than indigenous craft, should be used since they provide better speed, firepower, personnel protection, and lift capability.

d. Security Patrols.--The employment of security patrols is applicable in a riverine environment. Security patrolling is conducted in shallow draft craft or Navy boats, as appropriate, to:

(1) Prevent infiltration of enemy personnel for purposes of sabotage, reconnaissance, or observation of friendly units or installations.

(2) Prevent surprise attack.

(3) Provide security for friendly traffic on the waterway.

e. Movement of Patrols by Helicopter.--Small reconnaissance patrols with assault boats are capable of being transported by helicopter to points upstream within the sector or responsibility. This eliminates the time and effort involved in working against a current and enables the patrol to make a reconnaissance downstream, or further upstream,

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as desirable. When patrols are advanced by helicopter, planning should include measures for emergency recovery or reinforcement of the patrol.

5203. AMBUSHES

Small boats can be used to position an ambush force and to permit such a force to conduct a pursuit or withdrawal along the waterway. Boat-transported forces are not limited to laying waterway ambushes; they may operate in any area reasonably accessible by water.

a. Movement Techniques.--Stealth in movement can be achieved by using paddles or poles instead of motors to propel the boats. Boats can drift to position with the current or tide. Even when paddling or drifting to position, motors are affixed to the boats in the up position so that they can be used upon enemy contact. Small ambush parties can be left behind when patrols stop and dismount to observe or to reconnoiter. This technique is useful only if boat forces commonly operate with frequent halts and debarkations; and, if the stay-behind ambush party is small in comparison to the total force.

b. Deployment Techniques.--Whether the ambush is laid to cover a road, trail, or waterway, the force normally debarks and takes up concealed positions. Boat crewmen remain in or near their craft, which are carefully concealed. The ambush security team leader is responsible for the security of the boats, and boat crewmen are under his control during occupation of the ambush site.

c. Environmental Considerations.--Because several hours of waiting are usually required at the ambush site, changes in level and direction of stream flow often occur. The ambush commander must anticipate these changes and plan his ambush around them. Changes in water level may require the relocation of weapons in a waterway ambush. At ebb tide, boats may be stranded or withdrawal routes may become too shallow for use. The direction of approach of enemy boats may be based on the direction of current flow. All environmental factors must be considered when the location, time, and method of ambush is selected.

5204. COUNTERAMBUSH TECHNIQUES

Enemy ambush, including mine emplacement, must be anticipated at all stages of waterborne movement. Strict adherence to the principles

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of security on the march will greatly increase the capability of the force to overcome these hazards. Techniques and countermeasures to lessen the effects of ambushes and emplaced mines include the following:

a. Avoiding Ambushes

(1) Never return from an operation, patrol, or administrative movement by the same route used in going unless absolutely necessary, since the vast majority of ambushes of waterborne units occur during the return movement.

(2) Vary time schedules, routes, and destinations for administrative movements.

(3) Include aerial observation in the security measures taken for major moves or large patrols.

(4) Emphasize dispersion, combat formations, and observation by all hands.

(5) Employ waterborne advance, rear, and flank guards. Flank guards can often be employed in adjacent and parallel waterways.

(6) Employ boat patrols to investigate potential ambush sites and to search the banks for indications of mines, trip wires, electrical wires, chains, or cables.

(7) Observe local activity along the waterway, or lack thereof, to detect unusual patterns of behavior. The absence of traffic is a danger sign.

(8) Halt frequently to question civilians about recent enemy activity. The absence of men in the village or field may indicate the presence of a guerrilla force in the vicinity.

b. Countering Ambushes.--Immediate, positive, and aggressive action is required to counter an ambush. Embarked troop personnel and supporting boat personnel must be thoroughly indoctrinated as to the basic measures to be initiated in case of ambush. Rehearsals should be conducted to develop speed and coordination. The basic principles to be applied are:

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(1) Return Fire.--All available weapons must be brought to bear immediately on the enemy.

(2) Clear the Killing Zone.--It is vital for the boats to clear the killing zone. Unless fire superiority can be gained at once, an immediate movement toward the enemy bank for a direct assault, flanking movement, or encirclement is an effective way to clear the killing zone and close the range to the enemy.

(3) Utilize Smoke.--Request smoke from supporting arms or employ a small, fast boat equipped with smoke generating equipment.

c. Rallying Points.--Rallying points should be established at periodic intervals along the route to facilitate the collecting of stragglers or members of the unit who have become separated from the main body.

5205. RAIDS

Boats may be used to conduct raids in the same way as they are used to support other offensive operations. Motor-powered craft provide a means for rapid withdrawal after the raid. A boatborne raiding party should debark some distance from the objective and approach stealthily on foot. However, when the objective is close to the shore, the assault force may use motor-driven boats to storm directly to the objective area. The storming tactic should be used only when surprise can be achieved and when the waterway is large enough to permit some evasive action by the assaulting boats. Supporting fires and smoke should be planned to cover the withdrawal of the raiding force.

5206. RIVER TRAFFIC CONTROL

Enemy logistic movements on the waterways must be interdicted. Effective interdiction operations require a constant checking of boats and ships to prevent illegal movement of cargo and personnel.

a. River Traffic Control Points.--Control points must be established in all sectors of responsibility to deny or interrupt the enemy use of the waterways. These control points will be characterized by:

(1) Small, well-armed teams conducting searches at well-defined traffic points such as the intersection of waterways. Teams

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should contain interpreters and relocate periodically so as to harass the enemy rather than the honest traveler.

(2) Navy patrol craft with embarked company personnel and interpreters conducting searches of suspected boats and ships in the major waterwaterways.

b. Curfew Enforcement.--The establishment of a curfew is normally the prerogative of the local civilian authority. However, military assistance may be needed to enforce the curfew. The curfew may be enforced along a specified stretch of waterway by embarked security patrols, the use of radar and illumination, checkpoints backed up by shore directed fires, or armed helicopters or light armed reconnaissance aircraft. Since a curfew will normally work a hardship on farmers, fishermen, and other early risers, there is a need to publicize the reasons for and the specific rules of the curfew in order to minimize alienization of the local population.

5207. DEFENSE OF THE COMPANY BASE

a. Ashore.--The fundamentals applicable in defense do not change in a riverine environment since the defense of any land-base is oriented toward the retention of specific terrain. In order to defend the fixed land-base, the rifle company will have to repel the enemy assault by fire, close combat, and counterattack.

(1) Utilization of Terrain.--The selection of a land base away from inhabited areas may be difficult but is desirable.

(2) Security.--All normal security measures will prevail with emphasis on employment of listening posts, counterintrusion devices, night patrols, and ambushes.

(3) Defense in Depth.--Primary, alternate, and supplementary positions will often have to be prepared above ground resulting in increased requirements for timbers, sandbags, and other fortification materials. If the environment permits, tanks, Ontos, and amphibian vehicles can be used in fixed positions as well as to support counterattacks.

(4) All-Around Defense.--The isolation of units in large areas of responsibility will necessitate a perimeter defense. A riverbank will often be a portion of this perimeter.

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(5) Barriers. --Artificial obstacles should be used to supplement natural barriers to restrict, delay, block, or stop the movement of enemy forces. Moats, wire entanglements, mines, booby traps, wooden stakes, and other field expedients may be used.

(6) Fire Planning. --The fires of artillery, naval support ships, and air, if available, should be coordinated with the fires of infantry weapons.

(7) Flexibility. --Each unit conducting an area defense must retain a reserve to block enemy penetrations or to counterattack.

b. Afloat. --Security of the afloat base must be all-around and continuous. Embarked troops may be employed to augment security of afloat bases, but should be done only with the concurrence of the landing force commander or the commanding officer of troops, as appropriate.

(1) Waterborne Security. --Security elements will be required in the waters around the afloat base to prevent infiltration or penetration by enemy demolition teams.

(2) Shore-Based Security. --Security elements may be required ashore to prevent the enemy from firing on the afloat base from adjacent land.

(3) Deck Sentries. --Ship sentries must maintain 24 hour observation of assigned sectors to augment the waterborne security.

(4) Other Security Measures. --Radar/sonar scanning and searchlight or flare illumination will add to the effectiveness of security during periods of reduced visibility and darkness.

(5) Sectors of Fire. --All weapons, including those of embarked troops, will be assigned sectors of fire for defense of the floating base.

(6) Countermine Measures. --Countermine measures are the responsibility of the Navy for all Navy manned ships and craft, with landing force assistance in rigging countermine nets as required and available.

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Section III. FORMATIONS AND MANEUVERS ON THE WATERWAYS

5301. GENERAL

The concepts set forth in this section apply primarily to shallow draft craft, military and nonmilitary, used by the landing force within the limits of the individual craft. However, under certain circumstances, some of the tactics and techniques presented may be adapted for use by larger craft. Where possible, signals used to control tactical formations of craft will parallel those used for land formations.

5302. UNIT INTEGRITY

Formations should ensure that subordinate elements of the unit remain intact if a hasty landing is necessary. Each platoon should be embarked in three squad-sized assault boats. Formations will vary depending on the width of the waterway.

a. Narrow Stream. --The platoon positions boats on each side of the stream for mutual support. If a landing is required, all boats can move quickly to the desired side, remaining intact to operate as a unit. Figure 3 shows an example of the formation for two platoons in a narrow stream.

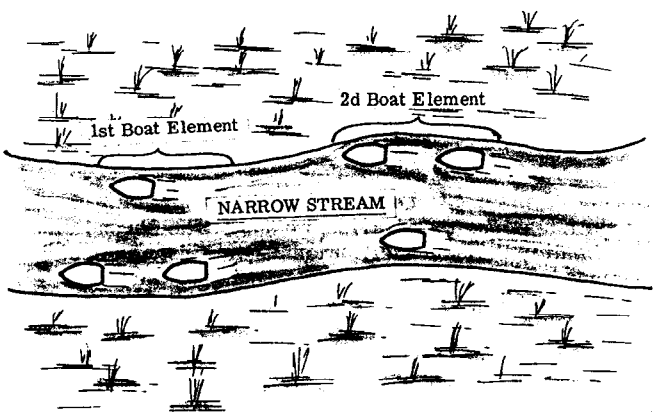

Figure 3. --Example of a Boat Formation on a Narrow Stream.

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b. Wide Stream.--On a wide stream, the formation used in a narrow stream would separate the boats of the platoon too much. The formation shown in figure 4 for movement of two platoons on a wide stream allows each platoon to land as a unit and to retain unit integrity.

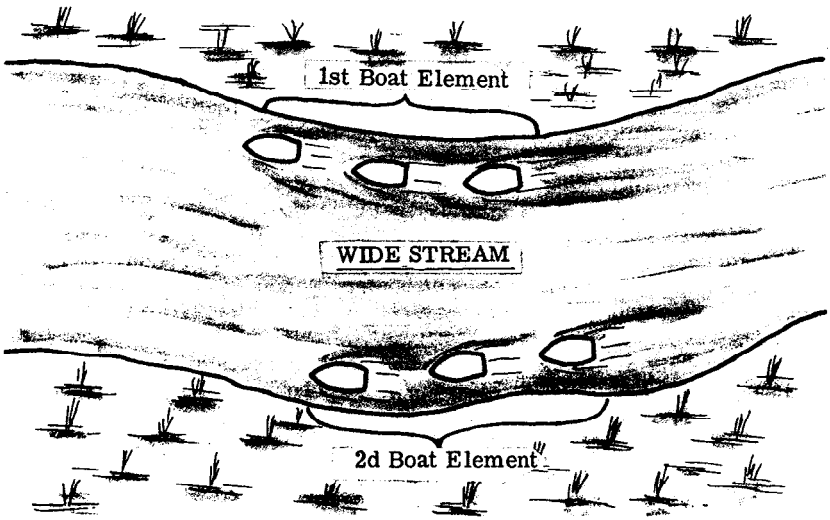

Figure 4.--Example of a Boat Formation on a Wide Stream.

5303. BASIC FORMATIONS

a. Normal Cruise.--Normal cruise is a formation with great flexibility of position among the individual boats. The second element takes up approximately the same formation as the first, and holds an interval on number three boat that is roughly equal to the interval between number one and number two boats.

(1) Boat Position.--Intervals between boats may vary between 15 and 150 feet depending upon the tactical situation. Number two boat may take up position on the right or left as desired or as required by

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the maneuver. Generally, number three boat takes position on the opposite side. (See fig. 5 for signal and boat positions.) The important points to remember about the normal cruise formation are these:

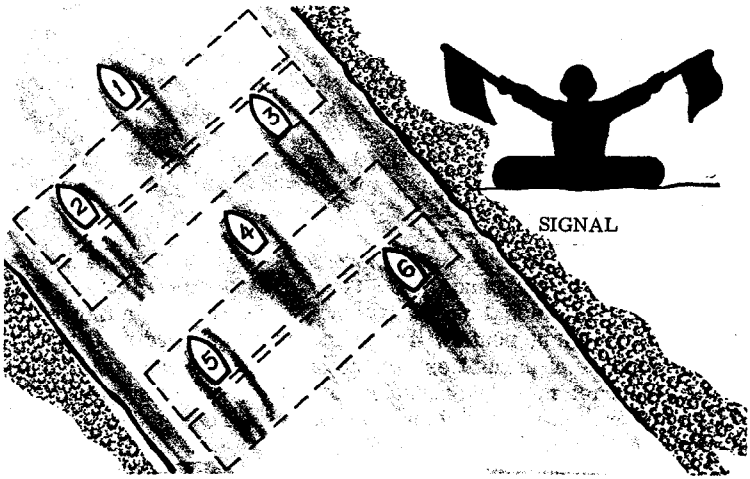

Figure 5. --NORMAL CRUISE Formation.

(a) Position of wing boats is flexible; there is no precise position they must maintain.

(b) Wing boats remain generally astern and on the flanks of their leader. They must not drift too far astern so as to disturb the maneuver of wing boats of the element to the rear.

(c) Only for short periods will wing boats move far enough ahead of the leader so that they are unable to pass safely astern of him if they put their rudders hard over.

(2) Boat Maneuvers. --During turns or other maneuvers, it may be necessary for number two or number three boats to slide from one side to the other in order to prevent overrunning or falling behind without excessive use of the throttle. The ability to judge the time to slide to the inside or outside of a turn is one of the most valuable assets of a coxswain. It is essential that coxswains learn to use this sliding technique in turns and maneuvers because it is desirable that the leader run at near maximum speed.

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(a) Turn Execution. --While executing turns, the "wing-boats" (2 and 3, 5 and 6) must not fall behind since full power is not adequate for them to close up and the leader must slow down the entire formation to permit them to catch up, thus endangering the entire formation.

(b) Maneuver Technique. --The use of maneuver instead of throttle changes to keep the column closed up may appear difficult at first; however, the key to this technique is for the wing boat coxswains to keep their boats pointed just slightly ahead of the lead boat in turns. If the coxswain points the wing boat too far inside, he will move ahead of the leader and confuse the formation. By pointing his boat too far astern of the leader, he will be behind his proper position when the leader has again settled down on a course.

(3) Action After Special Maneuvers. --The force usually travels in normal cruise formation and returns to it after special maneuvers. The signal for normal cruise formation is as shown in figure 5. When the signal is given, boats will take up position according to original assignment. In case of casualties, where boats have been lost from the formation, the leader may designate individual boats to take up other positions. For example, if number two boat becomes a casualty, the unit leader may point to number six boat, show two fingers, and then signal the boat forward. In addition, the unit leader may point to a boat which is a casualty, then turn to one of his wing boats and signal him to remain with the casualty and give assistance.

b. Column Formation. --The column formation is closely related to the normal cruise formation. Upon signal or command, the wing boats slide over to align themselves behind their leader. (See fig. 6 for signal and boat positions.) This formation is useful in moving through restricted waterways or in moving close alongside one bank of a waterway.

c. Scout Formation. --This formation is normally used for mutual security on an inland waterway where ambushes might be encountered. (See fig. 7 for boat positions.) For an enemy ambush set on one bank, the near boats present a more difficult target since they offer a rapidly changing deflection shot and are so close to the bank as to make early observation difficult. The boats traveling along the far bank offer a target at greater range depending on the width of the waterway. If the enemy springs the ambush against the boats along the far shore, the near boats can put ashore quickly to flank the ambush. If the ambush is sprung against the near boats, the troops are in position to close quickly in

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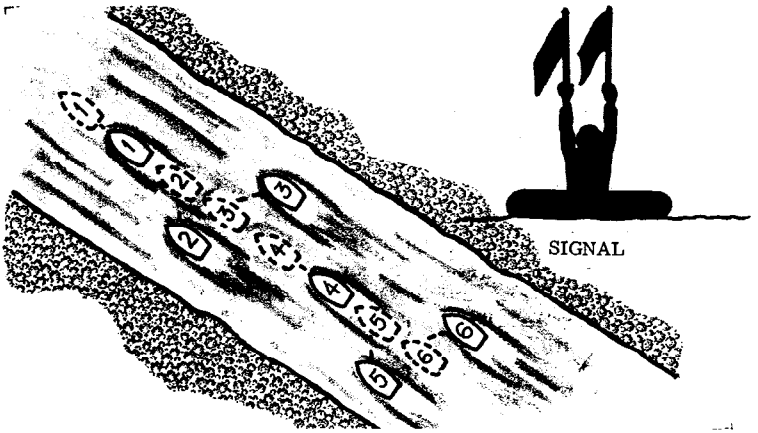

Figure 6. --COLUMN Formation.

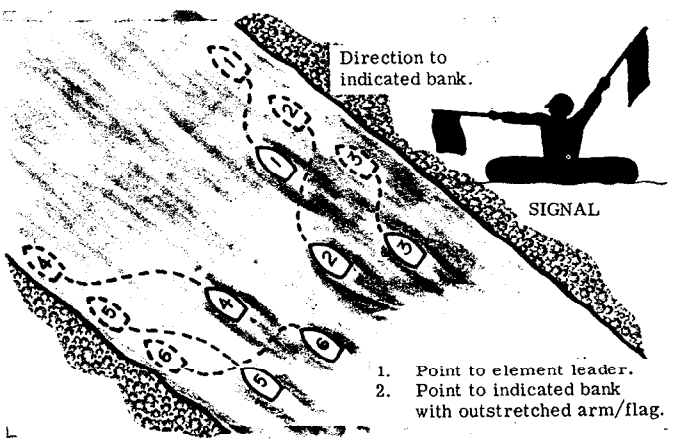

Figure 7. --SCOUT Formation.

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direct assault. The far boats maneuver into a position for a landing to flank the ambush. The signal is as shown in figure 7. Upon receipt of the signal, the element moves toward the bank indicated, adding power to move ahead to a position more abreast of the guiding element, if required.

d. Flanking Movement.--The purpose of this movement is to cause each boat in the formation to execute a 90° turn upon signal or command of the leader. This movement is used either to put the boats on line in order to land troops as quickly as possible on the bank of a waterway or to close toward one bank or another. (See fig. 8 for boat positions and boat movements.) In order to distinguish between a flanking movement and a flanking movement to a landing, the leader must give an additional signal. Therefore, after the first turn, each wing boat keeps watch on its leader for a signal to indicate whether the formation is to resume its original direction, to take up a new direction, or is to continue to a landing.

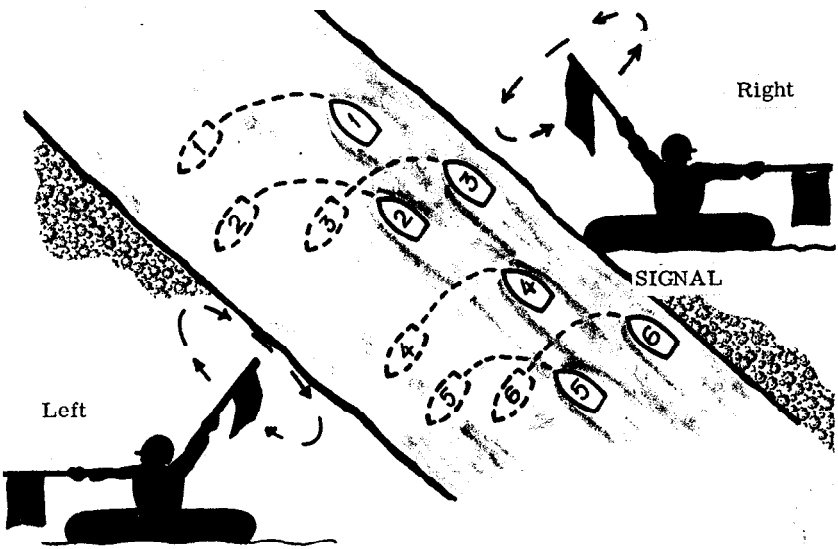

Figure 8.--Example of Flanking Movement.

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e. On Line. --This formation is normally used when executing an operation in a large body of water. The leader gives the signal, as shown, and the rear elements move up smartly to the designated side of the lead element. (See fig. 9 for the signal, boat positions, and boat movements.)

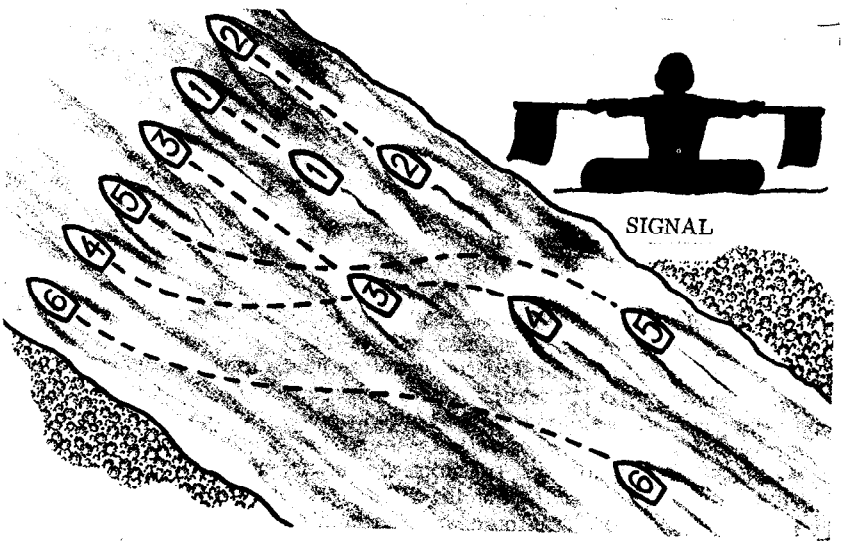

Figure 9. --ON LINE Formation.

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Section IV. RIVERINE TECHNIQUES

5401. PLANNING TECHNIQUES

a. General. --The first step in planning offensive boat operations is to determine the scheme of maneuver at the objective. Actions which precede the assault are then planned in reverse time order; i.e., positions from which the assault will be launched are selected; movement from boats to those positions is planned; boat debarkation procedure is established; order of march on waterways is determined; boat allocations are made; and requirements for special equipment determined. Backward planning helps ensure that no major factor affecting the operation is overlooked and that the attack will progress smoothly.

b. Zones of Observation and Sectors of Fire. --Assignments of individual responsibilities must be made. Boat commanders designate individual zones of observation and sectors of fire. At least one man observes overhead into trees, bridges, and tall structures. Boat-element leaders specify how mutual protection will be accomplished by boats in the element. Individuals are designated to act as navigators, distance recorders ("pacers"), depth takers, observer/recorders of stream conditions, and guards to help secure the boats when they land.

c. Special Equipment. --Equipment is assembled and checked before departure in order to permit time for required repairs and replacement. Checklists help to ensure that nothing is forgotten. Special equipment may include spare outboard motors and parts, tow ropes, depth-sounding poles, hand tools, lines for tying items to the boat, fuel cans, and demolitions for destroying water obstacles. Outboard motors are started and checked; weapons may be test-fired; paddles may be wrapped in cloth to reduce noise for silent movements; and fuel cans checked to ensure they are free from contaminating materials.

d. Boat Employment

(1) As described in chapter 3, plastic assault boats are normally carried in the basic river boats and launched for purposes of deployment or reconnaissance, while the mother ship serves as the company combat base. There should be no hesitation in deviating from

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this pattern when a different scheme better fits the situation; e.g., basic river boats may tow rather than carry the assault boats. When the relief of a deployed river rifle company is being effected, the relieving mother ship may carry or tow the basic river boats to the operating area.

(2) To facilitate the launching of assault boats from basic river boats, greased wooden skids should be superimposed on the bow ramp. Assault boats are launched backwards with motors attached to the stern in the "up" position. Troops enter the boats either at the ramp or when brought alongside.

e. Rehearsals.--Rehearsals are conducted as often as possible considering time available, security requirements, and the general state of the unit's training in boat operations. Ambushes, raids, patrol techniques, and immediate-action drills should be thoroughly rehearsed.

5402. OPERATIONAL TECHNIQUES

a. Alertness.--As the boat-transported force moves on the waterway, leaders at all echelons observe the area, locate potential danger spots, and plan action to be taken in the event of enemy contact.

b. Immediate Action Drills.--Immediate action to be taken upon unexpected contact with the enemy is similar to that taken by a force on land. A boat force often has the advantage of having heavier weapons available than does a force on foot. When a boat force makes unexpected contact with the enemy, boats land and troops debark, promptly assaulting the enemy.

c. Night Movements.--Night boat movements are more secure from enemy observation than day movements, but the danger of navigation hazards increases. Night operations on fast-moving streams should be avoided. Good intelligence concerning waterways and their banks is essential to night movement.

d. Observation.--Lead elements carefully observe for waves and ripples that may indicate the recent passage of other craft or the presence of submerged objects. The movement of birds or water fowl may indicate activity on or near the waterway. As boat operations increasingly damage the enemy, he will intensify countermeasures such as mining waterways and stretching wires above streams. Constant alertness is essential.

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e. Time-Distance Computations.--It is difficult to estimate distance traveled on water surfaces since pacing techniques cannot be used. The time-distance technique is useful in judging the distance traveled. The time required to travel from a starting point to a check-point of known distance can be determined. This provides a time-unit of measure for other distances when boat speed is kept fairly constant.

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Section V. BOAT HANDLING

5501. NAVY CRAFT

Navy manned craft will operate in accordance with Navy boat handling techniques and procedures.

5502. LANDING FORCE SHALLOW DRAFT CRAFT

a. General.--Proficiency in waterway navigation depends on skills developed through experience and training. Boat handlers work to improve their skill in assessing the effect of river conditions on operations. FM 21-50, Ranger Training and Ranger Operations, includes some details on river navigation.

b. Signals.--Where appropriate, signals used in land operations should be used for boat operations to simplify training and to avoid misunderstanding. The same arm signal can be used to order dismounting from trucks and debarking from boats.

c. Towing.--Boats are attached to loops in the tow line by a quick-release hook. Release lines are rigged so that each boat can release itself or the towing boat can release the entire tow. Boats on the tow line are staggered on either side with a distance of 9 to 15 feet between boats. To release from the tow, coxswains start their engines and boats cast off in succession from aft forward.

d. Swamp Operations.--Military small-boats, with their shallow draft, can be used extensively in swamp areas and in tidal runs connecting to larger streams or rivers. Without motor, the fire team boat (see app. D, pg. 208) draws approximately 7 inches and can be poled or paddled silently. When an obstacle is encountered, personnel can debark and carry the boat for a short distance around or over the obstacle.

e. Motors Unlocked.--When the boat is running forward, the motor should always be in the unlocked position so that it can move up and back if the boat runs aground or passes over debris.

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f. Clearing Propellers.--The propeller may pick up debris from the river. If the propeller fails to disengage itself from this debris, the boat should be stopped and the engine reversed. This procedure will clear the propeller in most instances. If this procedure fails, the engine should be stopped, the propeller shaft lifted from the water, and the propeller cleared by hand.

g. Maintenance.--All outboards may be characterized as being undependable and short-lived without proper and constant maintenance. Units operating with outboard motors must establish a rigorous maintenance program.

5503. INDIGENOUS CRAFT

a. Types.--Rowboats, dories, sampans, or other local boats can be used to perform the missions and tactics described herein. Indigenous personnel can be employed to train selected landing force personnel in their use. Special attention to safety measures is required.

b. Employment.--Military motor-powered boats may be used to tow local craft loaded with troops, equipment, or supplies. Towing speeds should be kept low. In addition, local boats may be used for infiltration and disguised movements. Under these circumstances, boats should be operated in the same way as other local boats. Obvious military formations and boat tactics should be avoided.

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Section VI. TRAINING

5601. GENERAL

Effective cooperation between the transported troop unit and the boat unit is essential in riverine operations. This cooperation is developed by combined team training, which integrates the troop and boat elements into a unified military team. Personnel develop confidence in the boats, the tactics, and in each other, through a well planned and conducted integrated training program.

5602. SCHEDULING

The training program is not rigidly phased. Generally, early training is devoted to developing individual and team technical and physical skills. Personnel must learn to handle boats and related equipment proficiently, to load and unload, observe safety precautions, and so forth. The latter portion of training stresses realistic combat exercises integrating technical and tactical requirements which the boat-transported force must be capable of meeting.

5603. SAFETY PROCEDURES

a. Tying Equipment. --Crew-served weapons and other equipment should be tied to the boat with short lines to prevent loss if the boat is capsized. Slip knots should be used to permit quick-release on landing.

b. Life Preservers. --Life preservers should be provided for troops and boat crew and should be used when the tactical situation permits. Troops should be trained to remove them quickly.

c. Frequent Soundings. --A sounding pole, appropriately marked to show the average height to the neck of personnel, can be improvised to determine if the water is shallow enough for wading in emergencies.

d. Action if Swamped. --Should the boat swamp, all hands remain in place, being careful not to shift weight to either side of the boat so as to cause it to capsize. The boat, if self-bailing, will eventually drain itself of water. All personnel should remain with the boat, whether it has capsized or swamped, since it usually will retain sufficient buoyancy to support its entire payload.

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e. Capsized Boats. --A capsized boat can be righted by its crew. Crew members climb on one side of the upturned boat so as to lift it. They grasp the handlines on the outside of the boat and pull the other side toward them. The list increases until the crew members pull the boat over and it is righted.

5604. TRAINING PROGRAM

The subjects enumerated below are the minimum which should be incorporated into the training program before boat operations are undertaken. Basic skills such as paddling or immediate-action drills should continue to be practiced regularly after combined training is complete.

a. Demonstration of Boat Capabilities. --Speed, maneuverability, load-carrying capacity, and buoyancy of plastic assault boats.

b. Water Safety. --Safety procedures, use of life jackets, actions to be taken in swamped boats, and righting of capsized boats. If time permits, survival swimming should be included. This training should be oriented toward eliminating the fear of water.

c. Basic Knots. --Tying and quick release of basic knots used in lashing equipment and securing boats.

d. Boatmanship. --Paddling techniques, operation and maintenance of outboard motors, and launching and landing of boats.

e. Use of Local Craft. --Orientation, demonstration, and brief practice. Landing force personnel with experience or skill in handling local craft are identified for future contingencies.

f. Techniques of Weapons Firing From Boats. --Most suitable weapons, positions, and safety precautions.

g. Basic Boat Formations. --Types of formations, boat positions, signals, maneuver techniques, actions after maneuvers, zones of observation, sectors of fire, safety procedures, and effect of river characteristics on selection of formations. FMFM 8-1, Special Operations, provides expedient techniques for determination of river characteristics. Prime emphasis should be placed on the proper selection and control of formations. Troops are checked on their responsibility for zones of observation and sectors of fire.

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h. Immediate-Action Drills. --Actions by formations, individual boats, and troops. These drills should be integrated into all subsequent training and are made progressively more realistic.

i. Tactical Exercises: Day and Night

(1) River Patrol. --Movement by bounds, selection of formation, and immediate-action drills. Include debriefing on river and bank conditions observed.

(2) Assault of Shoreline Objective. --Coxswain techniques, speed in debarkation, and assault procedures.

(3) Raid or Ambush. --Emphasis on plans and preparations by small unit leaders and navigation techniques.

(4) Additional Exercises. --Emphasis on missions normally performed by unit and correction of deficiencies noted in earlier training.

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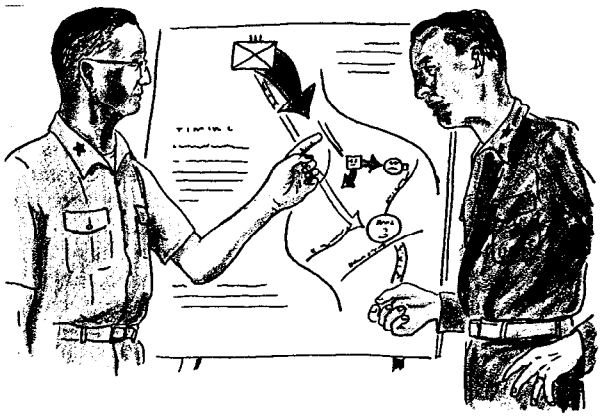

CHAPTER 6

OPERATIONS OF LARGE TACTICAL UNITS

6001. GENERAL

Operations in type I and II riverine environments remain essentially normal above rifle company level. Chapter 3 sets forth the criteria for determining the optimum size landing force for employment in a type III environment. The extended nature of riverine operations in a type III environment will require the special attention of commanders of large tactical units to ensure necessary control and communications. The use of an airborne observation post, as described in paragraph 8204, can provide a means for control, coordination, and support of widely separated subordinate units. Commanders of large tactical units may be confronted with situations requiring large scale tactical maneuvers; however, most activities of these units will be typified by the functions described in the two following paragraphs.

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6002. THE MEU/INFANTRY BATTALION

a. Unit Separation. --Whether the MEU/infantry battalion is operating from land combat bases or from floating combat bases, deployed rifle company sectors may extend many miles from the parent MEU/infantry battalion base. This separation distance is likely to become extreme when operating from floating combat bases. Separation in terms of distance is not a significant factor provided communications are assured and a rapid means of mobility is available to lift the reaction force. However, time is a significant factor. A reserve located two miles from an engagement, and provided only foot mobility, is no "closer" to the scene of action than a helicopterborne reaction force located on an LPH 50 or more miles away.

b. Unit Readiness. --Assuring complete readiness of the reaction force, and perfecting techniques for its rapid commitment, will be key functions of the MEU/infantry battalion commander. Closely related is the vital task of establishing standing operating procedures for effective coordination of fire and movement at the scene of action. Other activities typical of the MEU/infantry battalion headquarters in riverine operations include:

(1) Arranging and coordinating day and night surveillance of waterways throughout the assigned area of responsibility.

(2) Devising the optimum system for rotation of rifle companies to and from deployment on the waterways.

(3) Providing and coordinating combat and combat service support to subordinate and attached units.

(4) Aggressive intelligence support including, in particular, exploitation of all host country and U.S. agencies located in or near the area of operations.

6003. THE MEB/INFANTRY REGIMENT AND HIGHER LEVELS

Commanders and staffs of MEB/infantry regiment and higher levels will be concerned with the same general problems as the MEU/infantry battalion commander and his staff. In addition, these larger units must deal with the following types of problems:

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a. Deployment and Rotation of Units. --An MEB/infantry regiment commander must specify a system of rotating either rifle companies or infantry battalions between deployed duty and reaction force duty. Rotation by rifle company will be advantageous when it is estimated that enemy contacts will require application of no more combat power than is available in one reinforced infantry battalion. This system presents a situation wherein the deployed rifle company making the contact and the rifle company or companies making up the reaction force dispatched to encircle and destroy the located enemy are all from the same battalion, thus facilitating coordination at the scene of action. Conversely, if larger scale actions are anticipated, rotation by infantry battalion appears preferable. The MEF/division commander, similarly, must select a deployment and rotation pattern suited to the larger size and particular circumstances of his command.

b. Standby Forces. --Commanders of large units may be presented opportunities to mount preplanned attacks when enemy locations are uncovered by intelligence processes. The organization for combat should provide for forces to launch such an attack without denuding the command of standby reaction forces which may be needed unexpectedly to assist an engaged rifle company.

c. Coordination and Support. --Larger riverine forces are more likely to encounter situations requiring use of a mix of land and mobile sea bases. Consequently, commanders and staffs will face complex problems of communications, coordination, and logistic support.

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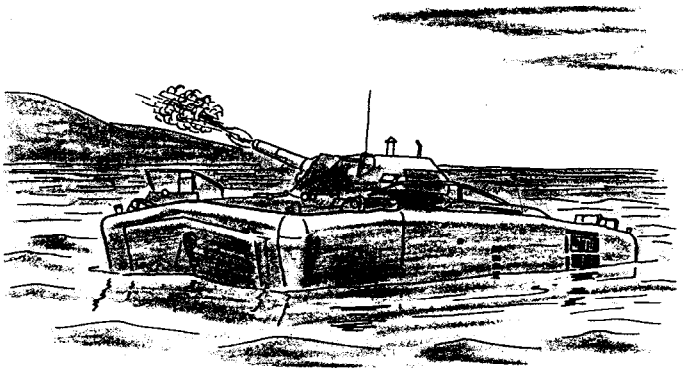

CHAPTER 7

COMBAT SUPPORT

7001. GENERAL

The environment may place limitations on the availability of combat support because of restricted mobility, weather, and inadequate terrain identification (maps, survey, and target location). Although the magnitude of support requirements may be less than for normal combat, speed of response may be vital. Supported units may be widely dispersed and environmental restrictions may preclude mutual reinforcement. Lack of suitable position areas for substantial numbers of artillery units, the limited range of naval gunfire, and the widespread nature of operations may preclude appreciable fire support except by air. See chapter 8 for a discussion of air support.

7002. FIELD ARTILLERY

a. General. --Although normal fire support procedures will be followed whenever possible, artillery units must be ready to adjust to the

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situation as it exists. The environment may impose restrictions, some peculiar to and others only aggravated by the riverine environment. In a severe environment, operations may be characterized by inadequate survey control, poor maps, lack of suitable position areas, difficulties in accurate target location, and decentralized tactical and/or technical fire direction with the resultant curtailment of the ability to mass fires. The basic information contained in FMFM 8-2, Operations Against Guerrilla Units, remains valid and should be followed where applicable.

b. Problems Posed by Riverine Operations

(1) Mobility. --Restricted mobility has already been emphasized. The difficulties associated with displacement make the selection of firing positions assume major and perhaps critical importance.

(a) Even in type I or II environments, mobility may be hampered by terrain or restricted by seasonal effects. Movement may be channelized, requiring engineer support for constructing and maintaining roads and bridges and for clearing mines.

(b) In type III environment, artillery units may become temporarily static, requiring resupply by air or water. When ground movement is possible, roadways may provide the only usable firing positions. Displacement by helicopter is limited to light artillery and is dependent upon favorable weather conditions. Landing craft may provide the only feasible means of movement. The nature of waterway banks requires that consideration be given to the debarkation of equipment.

(2) Fire Control. --The probable necessity for decentralization of tactical and/or technical fire direction, the probable density of the local civilian population, and the extensive commitment of small combat units emphasizes the necessity for detailed fire support coordination.

(a) If survey control is lacking, the ability to deliver accurate surprise fires requires that an observer shift from a previously fired concentration upon which all units to fire have adjusted.

(b) Channelized routes of movement make it desirable that concentrations be preplanned on likely areas such as ambush sites.

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However, such preplanning is meaningless and may be dangerous without good maps and adequate survey control unless firing data is obtained by previous adjustments on the sites.

(c) In the absence of good maps and adequate survey control, combat units anticipating possible requirements for artillery support should not hesitate to adjust artillery units on convenient reference points from which subsequent shifts can be made, or to call for marking rounds; i.e., mark center of sector with high air burst; from which subsequent shifts can be made.

(d) Artillery units operating under decentralized control and in support of wide ranging operations over poorly mapped terrain may find it convenient to use a simplified method of fire control such as is found in chapter 6, FM 6-40, Field Artillery Gunnery.

(3) Target Acquisition.--Since targets may be difficult to locate and identify, all available target acquisition means must be employed. When visual ground observation is limited, extensive use of artillery air observers will be necessary.

(a) Although T/Os provide for an artillery forward observer team with each rifle company, there may be situations in which this team even though split cannot provide for observation throughout the company zone of action. Therefore, all infantrymen should, and small unit commanders and patrol leaders must, master the techniques of calling for and adjusting artillery fires.

(b) Normally, only two naval gunfire spotting teams are available for each infantry regiment. If additional teams are required, they may be improvised by employing a part of the naval gunfire liaison team as a spotting team or, for limited periods, splitting a naval gunfire spotting team. As a practical expedient, naval gunfire support can be obtained by any artillery forward observer through a battalion fire support coordination center.

(c) Observation by units moving along waterways or other channelized routes of advance may be severely restricted, thus requiring constant use of artillery air observers.

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(4) Security.--Security techniques used in counterguerrilla operations are generally valid in riverine operations. The need for adequate security may require that artillery units be positioned within the perimeter of other force elements or that infantry units be assigned to augment their organic security.

(a) As a last resort, the artillery weapon is a most effective means of defense. Plans should provide for complete perimeter coverage and the aggressive use of direct fire to repel attempts to overrun the position.

(b) Anti-intrusion and detection devices should be used extensively.

(c) Movement by land or water may require mine countermeasures or special escort. Adequate protection of survey teams poses an additional security problem.

c. Organization for Combat.--As in counterguerrilla operations, the organization for combat will be tailored to meet the requirements of each specific operation. The type of environment will have a significant effect upon the organization for combat. The fundamental concept of maximum feasible centralized control remains valid. However, as environmental conditions become more severe, a lesser degree of overall centralized artillery control is necessary, and the responsiveness of the artillery task organizations becomes more sharply focused upon the specific fire support requirements of the supported unit.

(1) In type I and II environments, operations will probably permit the retention of medium and heavy artillery under centralized control with missions of general support or general support reinforcing.

(2) While light artillery (towed, airlifted, or waterborne) may be predominant in a type III environment, operations may require that medium and heavy artillery units be assigned reinforcing missions or be task organized with light artillery units which have a mission of direct support. Self-propelled artillery may be relatively immobile unless waterborne; however, their range and firepower dictate employment wherever possible.

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d. Expedients. --Some weapons and equipment may be developed specifically for riverine operations. However, it is unreasonable to assume that all of the problems of environment will be solved by the introduction of relatively few items. Therefore, imagination and foresight are necessary to devise expedients which will permit the effective employment of existing weapons and equipment.

(1) Landing craft can provide both mobility and a firing platform for self-propelled artillery. If employed as a firing platform, limitations must be recognized. Unless the platform is stable and stationary, direct fire will be inaccurate and indirect fire impossible. Survey control may be nonexistent with the attendant problems of fire control previously mentioned.

(2) Otherwise insurmountable obstacles to land movement may often be overcome by the simple expedient of including filled sandbags and sections of steel matting or planking as a part of the load of designated cargo vehicles.

(3) Where conditions permit, amphibian artillery (LVTH) will be used extensively. When conditions are not favorable for employing the LVTH; e.g., long-distance water movement or strong currents; it can be employed in or towed by landing craft. Considerable flexibility is inherent in these expedients. The landing craft overcomes the LVTH's limited water mobility while permitting exploitation of its amphibious capability whenever desired. The LVTH can fire from landing craft, from the water, or from positions ashore when egress from the water is possible. Except for direct fire, the problems of fire control previously mentioned apply to this weapon.

7003. NAVAL SUPPORT

a. General. --The general nature and extent of naval participation in riverine operations was described in paragraphs 2203, 2204, and 2205 together with the definitions of the three types of riverine environments. Although not integral to riverine operations of the landing force, Navy coastal and river surveillance forces may provide related support.

b. Naval Gunfire. --The demoralizing effect of naval gunfire, combined with the difficulty of providing artillery fires in the normal volume, justifies heavy usage of naval gunfire whenever range permits.

(1) In delta areas, the distance to which naval gunfire can extend inland may be restricted by mudflats and sandbars extending

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several miles to sea. Under optimum conditions, destroyers or other shallow draft ships may be able to provide support from principal rivers.

(2) Observation of fires is in accordance with existing doctrine, modified as required. Air-spot aircraft, when required, must be provided by landing force or other aviation elements. When practicable, radio frequencies should be assigned which permit artillery forward observers to enter naval gunfire spotting nets and naval gunfire spotters to enter artillery conduct of fire nets without the requirement to carry additional radios.

c. Armed Craft.--Additional fire support can be provided by armed craft in a number of configurations. Armament may include machineguns; rapid fire guns, through 40mm; mortars; and grenade and rocket launchers. In addition, as previously discussed, landing craft may be used as floating platforms (or means of displacement) for mortars, artillery, and tracked vehicles. All specifically designed or adapted watercraft, LCVP size and larger, should be armed prior to use in riverine operations. Such armed craft can provide transport, patrol, escort, and fire support for riverine forces. Descriptions of certain potentially usable craft and armament are contained in appendix B.

7004. MECHANIZED UNITS

a. Tanks.--Tank support may be limited, even in type I and II environments. Mobility considerations may tend to confine use to fixed defensive positions. Tanks may be used to augment artillery fires. The tank gun and tank-mounted xenon searchlight can contribute to the effectiveness of a river blockade.

b. Ontos.--The lightweight Ontos can be used extensively during the dry season in type I and II environments, particularly for escort security. In a type III environment it may be fired from the decks of certain type ships and landing craft; however, adequate precautions must be taken to avoid injury or damage from backblast. Ontos may also be used to provide indirect fire support.

c. Amphibians.--The LVT can be a particularly useful vehicle in a riverine environment. Some of the techniques used in the employment of amphibian tractors are described in the following paragraphs:

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(1) LVTs may be used for river blockade purposes. A minimum of two should be used, although more may be required depending on the width of the waterway and the amount of traffic encountered. The vehicles should be worked in teams. One vehicle is used to intercept, search, and seize while the other provides cover. A fire team size unit should be aboard to provide for search and security. Additional security posts should be established on the banks and may include Ontos, LVTH-6s, or gun tanks with tank-mounted searchlights.

(2) LVTs may be used for fire support. Their .30 caliber machinegun can be augmented by automatic weapons to provide for firing in all directions. When the LVT is used in this role, sandbags can be placed on top of the vehicle to provide parapets for the crew and passengers. While operating on land, improvised firing ports can also be provided on the sides by removing or tying open the escape hatches. It must be remembered, however, that the vehicle cannot float unless these hatches are in place. The LVT can also be used as a firing platform for recoilless rifles.

(3) The LVT can be used as a floating medical aid station to support tactical units or to gain the confidence of indigenous personnel through an effective civic action first aid/medical treatment program.

(4) LVTs also may be used as waterborne supply point support and as crash/rescue vehicles.

(5) LVTHs used as amphibious artillery to augment artillery. LVTHs should be used as direct fire support for river blockades and crossings.

d. Marginal Terrain Vehicles.--Marginal terrain vehicles, some of which are described in appendixes A and C, are particularly suited for employment in a riverine environment. Their characteristics presuppose a wide application to a variety of tasks in riverine operations.

(1) Their amphibious capability and excellent angles of approach and departure allow relatively free movement in marsh, swamp, and paddy areas. Low ground pressure and water speed provide a wide range of flexibility to the commander.

(2) Units can be transported through soft soils to an area from which they can engage without being physically exhausted.

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(3) The Xenon searchlite kit is available for certain vehicles and therefore allows movement of the lights into areas which could not otherwise be traversed.

(4) Litter brackets can be installed to facilitate casualty evacuation.

(5) It is not intended that troops fight from the vehicles, due to inadequate armor protection; however, certain vehicles can be adopted for use as assault or convoy escort use in addition to troop and cargo transportation.

(6) Vehicles, when utilized in pairs, provide mutual support and a recovery capability when operating in waterways or inundated areas.

e. Operations in Inundated Crop Areas.--Operations in inundated crop areas such as rice paddies can severely restrict the mobility of tracked vehicles. While these areas may differ in nature, certain general rules can be applied to crossing them with tracked vehicles:

(1) Drive perpendicular to the cultivated rows.

(2) Keep vehicles at a high constant rate of speed in high range.

(3) Do not lose forward momentum in any case.

(4) Do not change direction while crossing.

(5) Do not follow tracks of the vehicle in front.

7005. COMBAT ENGINEER SUPPORT

a. General.--Combat engineer support is vital in a riverine environment. The mission of engineer units with the landing force is normal, but their tasks will be more diversified. Engineer units operate under centralized control when stability permits; however, as units become more dispersed and support requirements more varied, decentralized employment of engineer teams will be required to a greater than normal extent. In type III environments commanders must plan for

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and be prepared to accomplish their mission with little, if any, of their heavy equipment due to the environment in riverine operations. Maximum use of initiative, imagination, and field expedients must be stressed at all levels.

b. Special Requirements of Riverine Operations

(1) Type I Environment. --Engineer support will be normal.

(2) Type II Environment. --Engineer support will be normal with increased emphasis on road construction and road maintenance due to the channelized movement along limited, therefore highly vulnerable, lines of communications.

(3) Type III Environment. --The nature of operations in a type III environment will require special emphasis during planning and subsequent employment in the following areas:

(a) Construction and preparation of riverbank landing sites.

(b) Preparation of helicopter landing sites throughout the objective area or tactical area of responsibility (TAOR).

(c) Construction of protective storage/shelter facilities necessitated by unusual drainage and moisture problems.

(d) Arrangements for maintenance of canals by other services.

7006. INTELLIGENCE AND RECONNAISSANCE SUPPORT

a. General. --Intelligence and reconnaissance support for riverine operations is essentially that set forth in existing doctrinal publications such as FMFM 8-2, Operations Against Guerrilla Units; FM 31-16, Counterguerrilla Operations; and FMFM 2-2, Amphibious Reconnaissance. Only those considerations requiring special emphasis for a riverine environment are discussed in the following paragraphs.

b. Special Requirements for Riverine Operations. --The criticality of terrain intelligence and route reconnaissance places unusually heavy

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demands on reconnaissance elements. While heavy reliance is placed on aerial reconnaissance as a source of intelligence, significant intelligence can be produced from information provided by boat reconnaissance. As the environment becomes more severe, the dominance of waterways will require that emphasis be placed on the following areas:

(1) Determination of Waterway Characteristics.--Gathering information regarding waterway characteristics is a prerequisite to the proper use of waterways. Because waterway characteristics are constantly changing due to seasonal effects, this requirement is continuous throughout the operation. Practical techniques for determining waterway characteristics, such as those contained in FMFM 8-1, Special Operations, should be included in training since gathering reliable information involves techniques that are not necessarily familiar to all personnel. Information to be gathered includes:

(a) Width, depth, and bottom characteristics of waterways.

(b) Velocity and nature of current and tidal effects.

(c) Height, slope, and condition of banks.

(d) Location of obstacles and potential ambush sites.

(e) Location of possible crossing sites.

(f) Gradient of possible landing areas.

(2) Reconnaissance of Contiguous Land Areas.--Concurrent with the determination of waterway characteristics, contiguous land areas should be checked for type and condition of roads, routes of approach to waterways, and location of villages.

(3) Production of Map Substitutes.--There will be an extensive need for aerial mosaics from current and continuing photographic support since extensive networks of constantly changing waterways are not accurately mapped. Use of color and infrared photography will be particularly valuable. Gridded aerial mosaics made available to ground, air, and naval elements will assist considerably in the problem of mutual ground orientation.

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(4) Utilization of Interpreters and Waterway Guides. --There will be an increased need for indigenous interpreters and waterway guides due to the nature of the environment and the density of civil population on and along the dominant lines of communications.

(5) Augmentation of Rifle Company Intelligence Capability. --Many factors complicate and amplify the intelligence function and requirements of a rifle company when it is deployed in an extensive sector of responsibility in riverine operations. They will often require an intelligence capability that can be met only by augmentation. Therefore, consideration should be given to attaching intelligence personnel and providing indigenous personnel to provide a capability for:

(a) Interrogation and POW processing.

(b) Utilization of indigenous guides and interpretors.

(c) Maintenance and updating maps, charts, and aerial mosaics.

(d) Maintenance and promulgation of waterway data.

c. Employment of Reconnaissance Units

(1) In a type I environment, the employment will be normal, with special emphasis on river reconnaissance by boat.

(2) In a type II environment, in addition to usual employment, reconnaissance units may be employed as waterborne units in support of normal land operations.

(3) In a type III environment, the employment of reconnaissance units is limited only by imagination and effective range of communication equipment and supporting arms. Their organization and equipment renders them ideal for establishing a reconnaissance screen on the perimeter of the objective area or TAOR, as well as conducting deep patrols within the area of operations. The communication equipment organic to reconnaissance units enables them to not only function as the eyes of the commander, but to call supporting arms fires on targets of opportunity in what could be normally considered as "safe" areas by the enemy.

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7007. NUCLEAR, BIOLOGICAL, AND CHEMICAL

a. General. --The normal considerations for defense against or employment of nuclear, biological, and chemical weapons will prevail in all types of riverine environments although the dispersal of landing force units inherent in type III environments will tend to work to the overall advantage of the landing force.

b. Position Warfare. --In the event an enemy is encountered in great strength or is employing a position defense, the lack of cross-country mobility found in type II and III areas would favor the use of nuclear fires, if available, by the commander landing force (CLF). Conversely, the same is true for the landing force if its units are massed and the enemy has a nuclear capability.

c. Smoke. --The employment of smoke as a screening agent presents marked advantages to units of the landing force, particularly in type II and III environments. Its use as a counterambush measure was discussed in paragraph 5204. If small craft navigation devices become available, the use of smoke could be of material assistance in clandestine movement of waterborne patrols. Other uses of smoke should become readily apparent as the situation develops.

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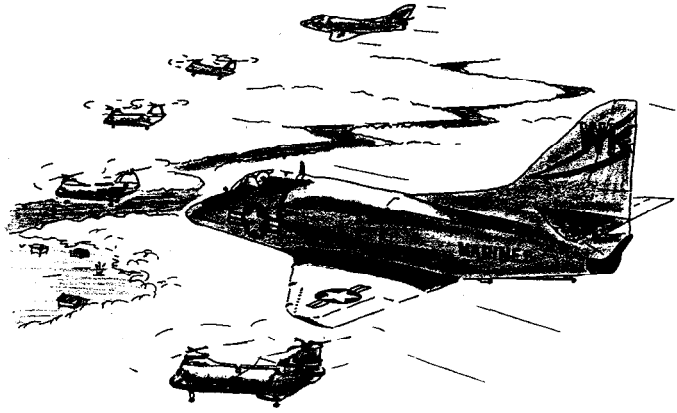

CHAPTER 8

AIR OPERATIONS

Section I. EFFECT OF ENVIRONMENT

8101. GENERAL

Present doctrine, tactics, techniques, equipment, and organization for aviation units are readily adaptable to riverine operations. Although current publications do not use the term "riverine," they provide much of the information and doctrinal guidance required to plan and execute the aviation tasks and missions in riverine operations. Consequently, this chapter covers only those aspects of air operations which require emphasis or special aviation equipment because of environmental considerations peculiar to riverine operations. A detailed description of personnel, billets, and related materiel depicted in this chapter may be found in FMFM 7-3, Air Support.

8102. MISSIONS, TASKS, AND FUNCTIONS

Riverine operations do not require changes to the principles of air support or the basic missions, tasks, or functions of aviation units since

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they are equipped and trained to operate from either land or ship bases. However, the environment and nature of the enemy opposition will influence tactical employment and the degree of emphasis within the various functional areas. There are requirements in the riverine environment for mobility, firepower, reconnaissance, observation, and night operations that aviation units are uniquely capable of accomplishing. The troop and logistic mobility provided by aviation enables ground units to operate against riverine enemy forces without being overburdened with equipment and supplies.

8103. ORGANIZATION FOR COMBAT

a. Composition. --The Marine aviation component of an air-ground task force committed to riverine operations must be a flexible task organization. Its composition is determined by the mission, enemy threat, operational environment, available resources, and support requirements. The forces assigned must be those necessary for successful accomplishment of the mission assigned. Antiaircraft warfare units and the full complement of Marine fighter squadrons will only be employed if a firm requirement exists. The task organization will usually require more helicopter and reconnaissance units than normal because of restricted land mobility and the extensive reconnaissance requirements of riverine operations.

b. Unit and Installation Location. --Normally, a riverine objective area does not exist in isolation; consequently, consideration should be given to positioning certain units or installations along its periphery or at external bases. Some of the heavier and less mobile units, such as the Marine wing service group (MWSG) and Marine air control group (MACG), may be partially positioned at support bases external to the riverine objective area.

8104. TRAINING

Doctrine for the conduct and support of riverine operations should be reflected in training. Peculiar aspects should be incorporated into the ground and flight training program of all aviation personnel. Escape, evasion, and survival training for pilots should include information on exfiltration routes, friendly areas, villages and hamlets, ethnic customs and traditions, advantageous use of the waterways, and use of environment-oriented survival equipment. These aspects should also be included in the training program of Navy aviation elements which could conceivably be called on to provide close air support to forces engaged in riverine operations.

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Section II. HELICOPTER OPERATIONS

8201. GENERAL

The helicopter has an indispensable role in riverine operations. It can not only place forces on otherwise inaccessible terrain, but can sustain them or withdraw them, as desired. The capabilities and limitations of the helicopter of particular interest in riverine operations are listed below:

a. Capabilities

(1) Operates into and out of areas denied other modes of transportation.

(2) Provides superior speed, mobility, and flexibility in comparison with motor transport and watercraft.

(3) Delivers rested troops to or near the objective. When troops are delivered with small watercraft, they are capable of accomplishing subsequent operations after capture of the objective.

(4) Increased payload capabilities because of low, near sea level operations.

(5) Provides an observation platform for all functions related thereto in an environment characterized by a lack of natural elevated observation points.

b. Limitations

(1) Detection by sound and sight is easier in this environment in that it offers little cover and concealment. This can be partially offset by night operations.

(2) High temperatures and humidities in tropical regions reduce helicopter lift capabilities.

(3) Visual navigation at low altitudes over large riverine areas is difficult due to the scarcity of prominent landmarks. Use of homing beacons will greatly assist in overcoming this limitation. Expedients, such as the use of artillery illumination, can be used to assist in night navigation of helicopters.

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(4) Normally, requirements exceed helicopter resources. Helicopters should be considered complementary to, not as a total replacement for, foot movement, vehicles, and boats.

(5) Special high flotation pontoon devices are required for some operations on water and marsh terrain.

8202. SUPPORT OF DEPLOYED WATERBORNE UNITS

a. Appropriate Support Tasks. --Helicopters will be required to support widely dispersed waterborne operations of reinforced rifle companies and other units in accordance with the concept for riverine operations. Some of the more appropriate tasks for helicopters in support of these operations are to:

(1) Lift reaction forces. (See par. 8203.)

(2) Conduct visual reconnaissance and maintain observation and surveillance over known or suspected enemy positions on land and waterway areas. The helicopter is an ideal airborne platform for detailed investigation and surveillance of a specific area. However, its vulnerability to ground fire must be considered. Utilization of stabilized, gyro-mounted binoculars will increase the reconnaissance/surveillance capability.

(3) Provide rapid command liaison and administrative lift which otherwise would require an excessive time by water or land.

(4) Assist commanders in reconnoitering terrain and areas of operation during an operational planning phase.

(5) Provide an airborne observation post when required.

(6) Evacuate casualties and POWs.

(7) Recover, by air-to-surface tug techniques, stranded watercraft and land vehicles.

(8) Evacuate personnel from boat units that have been cut off by a superior enemy force or abnormally low tide conditions.

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(9) Conduct minesweeping operations along the waterways.

(10) Post reliefs and provide assistance to combat or security outposts.

(11) Position artillery and mortars on suitable terrain.

(12) Provide emergency resupply.

(13) Provide night battlefield illumination using flares or spotlights.

(14) Position and evacuate small patrols and reconnaissance units.

(15) "Leapfrog" units providing flank security for waterborne patrols.

b. Planning Techniques. --These support tasks should be arranged on a daily preplanned basis. When units are operating at great distances from land combat or floating combat bases, helicopters may be staged or temporarily based for limited periods at unit floating or forward refueling points, as required, to reduce reaction time.

8203. REACTION FORCE LIFTS

a. Employment of Reaction Forces. --Lift of reaction forces will constitute one of the principal tasks for helicopters in riverine operations. It permits the ground commander to react immediately when enemy forces are located by providing the means to:

(1) Commit and position reserves, reinforcements, and blocking forces.

(2) Commit and position ambush or counterambush forces.

(3) Commit forces for encirclement or rapid pursuit.

b. Conditions of Readiness. --The fleeting nature of many enemy targets necessitates rapid response by reaction forces. This type of operation requires careful preplanning, coordination, integrated training, and

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reliable communications between all elements. Arrangements must be made for escort, control, and close air support (CAS) aircraft to be in the same alert conditions as the alerted helicopters and reaction forces. To accomplish rapid response, reaction elements, air and ground, are maintained in the following conditions of readiness:

(1) Airborne alert.

(2) Five-minute alert.

(3) Thirty-minute alert.

(4) One-hour standby.

c. Airborne Alert. --The airborne alert reaction force can respond directly against the enemy when located. Airborne alert helicopter tactics are expensive in terms of resource expenditure and should be utilized judiciously. Commanders must ensure that a firm requirement exists prior to requesting and committing the rapid reaction force.

d. Deck/Strip Alert. --The deck/strip alert reaction force may be located at land combat or floating combat bases in the desired preplanned conditions of readiness. The helicopter commander and pilots in readiness conditions of 5 and 30 minutes should ensure that the helicopters are ready for flight; that spares are available in case of aborts; and that loading and landing plans are coordinated with the supported commander.

e. Reducing Reaction Time. --Prior to assuming any condition of readiness, all possible preparations must be completed in order to facilitate launching the reaction force with minimum delay. Maximum use of SOPs should be made to reduce alert preparation and planning times.

f. Alert Elements. --As forces in the highest condition of readiness are committed, other elements assume the next higher alert status and a new force is constituted for the one-hour standby. The alert aviation elements may be assigned in direct support of a specific operation underway by land, water, or helicopter; or they may be assigned in general support of the entire area of operations.

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8204. OTHER HELICOPTER OPERATIONS

a. Helicopter Observation Post. --Troop commanders will often require an airborne observation post because of restrictions imposed on surface observation by the riverine environment coupled with the necessity for rapid estimates of the situation and timely tactical decisions. The helicopter observation post (HOP) is a technique that may be employed in riverine operations. It may be used advantageously for command and control of land, water, and air operations. It may also be used by airborne tactical air controllers, as a helicopter direction center (airborne) or a direct air support center (airborne). The HOP should have a pontoon capability to facilitate transfer of commanders from boat to helicopter. An HOP command and control console, consisting of two VHF-FM, one UHF, and one HF SSB channels of communication and associated antennas, must be configured for quick installation and removal so that it may be shifted expeditiously from one helicopter to another.

b. Armed Helicopters. --Targets encountered in riverine operations are often fleeting and require very rapid application of fire. Most targets are "soft," consisting of lightly armed foot troops rather than armored vehicles or fortifications. Therefore, the armed helicopter is a valuable weapons system providing close-in fires in support of riverine assault forces and helicopterborne reaction forces.

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Section III. OTHER AIR OPERATIONS

8301. GENERAL

This section includes offensive air support, aerial reconnaissance, fixed-wing transport, and anti-air warfare operations. These operations remain essentially normal and require little modification in riverine operations.

8302. OFFENSIVE AIR SUPPORT

a. Close Air Support. --Close air support (CAS) for waterborne units will be provided by utilizing current doctrine, principles, and procedures. The following discussion extends those proven concepts and addresses the peculiar features and requirements associated with riverine operations.

(1) Troop Safety. --Effective and safe CAS requires prominent marking of friendly elements to ensure identification. Panels may be displayed on watercraft, and pyrotechnics, flares, lights, or electronic identification means may be employed. While pilots can normally determine the proper direction for attack and pullout without instructions, these instructions should be provided whenever possible.

(2) Target Location. --Although gridded mosaics may assist in target acquisition, target designation by grid coordinates normally will not be required. Instead, the attack flight may receive target designation and identification information from the waterborne force in terms of "right bank opposite the lead boat element," "100 yards inland from left bank opposite the rear boat element," and so forth. Terrain features such as waterway intersections and river bends may be utilized as reference points. Targets may often be self-evident when the ground elements are exchanging fire with the enemy. Targets may be marked with air-delivered smoke rockets, smoke grenades, 20mm tracer, or bombs. Supported waterborne units can mark targets with mortars, grenade launchers, or rocket launchers. The flat terrain and sharp contrast between water and land may improve the capability of target location under marginal visibility conditions.

(3) Communications. --Positive and reliable communications between the supported unit and attack aircraft remain essential to safe and effective CAS.

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(4) Categories of CAS Missions. --Riverine operations do not require additional categories of CAS missions; i. e., the normal categories of preplanned (scheduled or on call) and immediate air request (call) missions are envisioned. However, the nature of the threat to waterborne units will require an emphasis on the immediate air request category.

(5) Coordination. --CAS missions for waterborne units should not require extensive briefings and therefore may be more responsive and easier to coordinate. In some situations, naval gunfire and artillery may not be present in significant amounts, thus simplifying the fire support coordination problem.

(6) Control Agencies. --Enemy threats, such as mortars, located at some distance from the waterway will be more difficult to locate. These threats may require that a tactical air coordinator (airborne) (TAC(A)), a tactical air observer (TAO), or an airborne air controller (AC(A)) be employed in addition to the ground-based forward air controller. Where terrain and security considerations permit its employment, the air support radar team (ASRT) would be capable of directing CAS missions against targets beyond control of ground-based forward air controllers (FACs).

(7) Ordnance Selection. --The riverine terrain and the nature of the target will be the controlling factors in the selection of CAS ordnance.

b. Deep Air Support and Interdiction. --Deep air support missions are conducted against targets not in the immediate vicinity of friendly forces. Their purpose is to prevent or hinder enemy movement within the objective area and to destroy his forces, supplies, and support installations. Missions of this type are normally flown in response to information compiled from intelligence and reconnaissance sources.

(1) Hawk-Owl Mission. --This type mission is flown to deny the enemy use of waterway lines of communications at night. It is flown against suspected areas of enemy waterborne activity by a flight composed of aircraft capable of providing both illumination and firepower. The illumination may be provided by flares, searchlights, or high intensity

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light amplification devices. Firepower can be provided by the illumination aircraft or separate aircraft. Both helicopters and fixed-wing flights, either separate or in conjunction with each other, are suitable for this role. Accurate intelligence and "friend-or-foe" identification are vital requirements.

(2) Chemical Employment.--Smoke missions may be executed to hide boat movements from enemy observation or as a ruse. The concealment afforded the enemy by foliage along the waterway banks may require discriminate defoliation missions, for which a variety of aircraft, including helicopters, can be equipped. Objectives on which both friendly and enemy personnel are located may require attack by aircraft employing nonlethal, riot control type chemical munitions.

c. Light Armed Reconnaissance Aircraft (LARA)

(1) Employment.--LARA are particularly well suited for this environment. Pontoon modifications for water operations will be required in a type III area. Its versatility and usefulness is illustrated by the following list of potential tasks:

(a) Visual and photo reconnaissance.

(b) Resupply by airdrop or air landing.

(c) TAC(A), TAO, AC(A), and artillery and naval gunfire spotting.

(d) Armed reconnaissance, day or night.

(e) Close and deep air support.

(f) Helicopter and boat escort.

(g) Smoke and chemical spray dissemination.

(2) Operational Characteristics.--LARA are able to operate more easily than high performance aircraft from sites of 1500 feet or less in length, located within the objective area. They may operate from mobile sea bases such as LPH or World War II type aircraft carriers; or, if fitted with pontoons, from sheltered water areas.

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8303. AERIAL RECONNAISSANCE

Visual, photographic, and electronic reconnaissance missions will play a vital role in riverine operations. Land reconnaissance is restricted by the nature of the terrain, resulting in greater reliance on aerial reconnaissance.

a. Resources. --All aircraft involved in the landing force objective area should contribute to the total reconnaissance effort by visual observation. The type and capability of each aircraft which may be assigned reconnaissance tasks in a riverine operation are shown in figure 10.

TYPE A/C	TYPE RECONNAISSANCE
RF-4B	PHOTO/MULTI-SENSOR & VISUAL
EA-6A	ELECTRONIC
OV-10A	VISUAL, PHOTO & ARMED
UH-1E	VISUAL, PHOTO & ARMED
A-4/A-7	ARMED & VISUAL

Figure 10. --Reconnaissance Capability of Selected Aircraft.

b. Visual Reconnaissance. --Visual reconnaissance, coupled with reliable communications, constitutes the best method of obtaining immediate information required in riverine operations. It is most effective when a trained pilot/observer team performs this mission as a full time assignment. It is even more effective when the same pilot/observer team is assigned responsibility for a specific area on a daily, sustained basis. This technique will reveal signs of enemy existence, movement, and activity which might otherwise remain undiscovered.

c. Aerial Photographic Reconnaissance

(1) General. --Aerial photographic reconnaissance is a primary method for obtaining information on the enemy and terrain conditions

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in a riverine area of operations. It provides accurate, permanent, and unprejudiced information that can be reproduced in quantity and distributed to all echelons. The equipment which can be employed ranges from the most sophisticated camera and in-flight processing equipment to pod mounted or hand-held polaroid cameras. Riverine operations will require aerial photographs to assist waterborne elements in determining their own locations because of the difficulty in measuring distance traveled on lengthy and meandering waterways, through flat terrain with few reliable landmarks. Inland landmarks will often be masked from waterborne units by high, densely overgrown banks.

(2) Rapid Response Capability. --Aerial photographic support should be provided waterborne elements on a rapid response basis. This mission may be flown by high performance aircraft, LARA, or helicopters over the intended boat landing zone or unit objective area a short time prior to H-hour. The film may then be processed in flight and airdropped, or delivered to the waterborne commander for ground processing.

(3) Aerial Mosaics. --Medium to small scale aerial mosaics of the entire landing force area of responsibility will be required at frequent intervals because of the constant shifting and changes in the riverine environment. These changes take place because of seasonal variations and effects, drainage and flow patterns, river flow sediment deposits, agricultural activities, erosion, and sandbar buildup. Where evidence or suspicion of such changes are indicated in photo mosaics, then large scale selected coverage of the area of concern should be obtained.

d. Aerial Multisensory Imagery Reconnaissance. --Multisensory imagery reconnaissance can provide aerial photographic, side looking radar (SLAR), and infrared detection (IR) reconnaissance. The side looking radar and infrared detection systems will often reveal information not obtainable by photographic reconnaissance.

e. Aerial Electronic Reconnaissance. --The sophisticated electronic countermeasures (ECM) aircraft will not have an opportunity to utilize its full potential in this type warfare. Its primary mission is to detect, identify, and locate the enemy electromagnetic radiating devices, such as gun laying and fire control radars. Once the location and identification is known, the aircraft can jam the radars and make them unusable. The electronic countermeasures features of this system will be utilized if the enemy employs electromagnetic devices.

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8304. FIXED-WING TRANSPORT OPERATIONS

Fixed-wing transport operations may be conducted in the riverine objective area from external or peripheral bases, or from within the area using SATS sites or austere land bases. However, the long-range, high speed, and heavy lift capability of fixed-wing transport aircraft supports the desirability of choosing to operate them from fixed bases external to the riverine objective area.

8305. ANTI-AIR WARFARE (AAW)

If an air threat should develop or be anticipated, fighter aircraft and light surface-to-air missile teams are considered the most practical means for air defense. The type III riverine environment normally precludes employment of vehicle mounted or towed AAW weapons in the objective area.

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Section IV. AIR COMMAND AND CONTROL

8401. GENERAL

Riverine operations require the highest degree of coordination of air, land, water, and sea forces into a single, integrated instrument of combat power. The concept of unified packages of air, land, water, and sea task forces is compatible with the basic combat structure, doctrine, and traditional experience of the Naval service.

8402. CONCEPT OF COMMAND AND CONTROL OF AIR SUPPORT IN RIVERINE OPERATIONS

The effective employment of aviation elements requires centralized command and coordination of all air operations by a single commander. His air control system has subagencies which exercise detailed control of aircraft to provide quick response to the requirements of supported units. In riverine operations further decentralization of control may be necessary to meet the needs of widely dispersed elements. Air control elements must be tailored to support ground or waterborne forces operating at a distance too great for efficient control by the parent air control agency. Under this concept, the tactical air commander (TAC) retains the capability and authority to allocate aviation resources to provide air support that is most advantageous to the force as a whole. This he accomplishes through his centralized command and coordination agency.

8403. AIR COMMAND AND CONTROL ORGANIZATION

a. Marine Aircraft Wing Control Agencies.--All MAW control agencies, with the exception of Marine air traffic control units (MATCUs), are contained in the Marine air control group (MACG). The MACG consists of a Marine aircraft wing headquarters, a headquarters and headquarters squadron (H&HS), a Marine air support squadron (MASS), and three Marine air control squadrons (MACSs). The air control agencies within the group are a tactical air command center (TACC) or tactical air direction center (TADC) furnished by H&HS, three tactical air operations centers (TAOCs) furnished by MACS, and a direct air support center (DASC) and three air support radar teams (ASRTs) furnished by MASS. For a detailed discussion of these control agencies see FMFM 7-3, Air Support. Current plans outlined in MCO 5400.15 provide for activation, deactivation, and redesignation of certain Marine aviation units and will be implemented when directed.

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b. Organizational Considerations. --The air command and control organization requires tailoring to meet the unusual requirements of riverine operations. Some of the factors affecting the air command and control organization are as follows:

(1) Physical Environment. --Suitable sites may not be available for establishing facilities ashore. Therefore, consideration must be given to the use of ships, landing craft, or aircraft to provide for the establishment of required air command and control facilities. If facilities are established ashore, it may be necessary or desirable to collocate air control units with ground unit headquarters to minimize security problems, or to make maximum use of available sites.

(2) Deployment of Ground Forces. --Since ground forces may be deployed over extensive areas in riverine operations, the present air command and control system may require special tailoring to provide for the necessary mobility and decentralized location of facilities to control air support. If regiments are operating 35 to 50 miles apart, the use of abbreviated forms of direct air support centers (DASCs) would achieve better control of air support and provide faster response to the needs of the ground commander; e. g., heli-hut mounted airborne mobile DASC packages now in final development.

(3) Enemy Capabilities. --Air superiority, with little threat of enemy air attack, will render anti-air warfare functions less critical. The volume and characteristics of enemy ground antiaircraft fire may preclude the use of either helicopters or lightly armed reconnaissance aircraft in portions of the objective area, thereby placing the burden of forward control on FACs and ASRTs.

(4) Size of the Marine Air-Ground Task Force. --The aviation combat element is a task organization tailored for the conduct of tactical operations. Based on the size of the Marine air-ground task force and the air requirements specified by the CLF, the air commander will tailor his resources to provide the agencies required to control all the aircraft in the objective area.

8404. LOCATION OF AIR CONTROL AGENCIES/FACILITIES

a. General. --In type I and type II riverine operations, suitable terrain is normally available for erecting control sites; however, type III

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terrain seldom provides suitable sites for erecting air control facilities. Furthermore, in type III terrain, the possible absence of well defined frontlines and lack of exact knowledge of the whereabouts of enemy forces creates a severe security problem for land-based installations. Therefore, it will be advantageous to use amphibious ships at anchor or operating offshore for command and control facilities, provided the objective area is near the coastline. When ships are used, airborne control agencies may be required for deep inland operations to provide the close integration of air and ground elements fundamental to Marine air-ground operations. For a detailed discussion of the airborne command and control systems, see paragraph 8405.

b. Collocation With Ground Element CPs. --Aviation command and control facilities should be collocated with their associated CPs. Difficulties in communications and lack of close liaison caused by widely separated ground elements may preclude effective air support from a central air control facility. Such circumstances require the collocation of light mobile air control facilities with ground elements of regimental and battalion size. These air control facilities must be tailored to perform the required tasks, and could be a complete, mobile DASC; a heli-hut sheltered detachment of a DASC; an airborne DASC; or air controllers in a helicopter. The air control facilities deployed, each in support of a specific ground element, would be under centralized command and coordination of the TACC/TADC collocated with the landing force or senior ground element CP.

c. Utilization of Inland Waterways. --Some inland waterway systems are compatible with the operations of ships or landing craft of a size that would permit installation and operation of air control facilities. Inland waterways which may not be navigable by ships or landing craft may be able to accommodate a towed barge or floating platform which could accommodate a heli-hut shelter for command and control facilities. These floating facilities may exercise all or a portion of the air control functions with attendant advantages of mobility, and reduced security and logistical problems.

8405. AIRBORNE COMMAND AND CONTROL SYSTEMS

a. Requirement. --The rapid reaction, flexible positioning, and visual/electronic capabilities inherent to an airborne command, control, and coordination system are considered essential for on-station, decentralized, responsive control of air support in riverine operations. The airborne command and control functions, types of aircraft, and capabilities of each are shown in figure 11.

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b. Airborne DASC. --An airborne control and coordination facility can be operated by a DASC team in a specially configured aircraft of the C-130 type or a helicopter of the CH-53A type. The airborne DASC may be employed whenever advantageous during riverine operations. When the ship or ground-based DASC is ready to assume control, the airborne DASC relinquishes control; monitors the nets; and, when satisfied that positive control has been effected, assumes standby alert. In addition

TYPE AIRCRAFT	FUNCTIONS	COMMUNICATIONS	REMARKS
KC-130F	Command Post, DASC/ HDC Radio Relay	Air-to-air Air-to-surface	Useful for specific time periods. May relieve on-station.
UH-1E, CH-46, CH-53A	Comdr's OP, TAC(A), AC(A), AC(A), DASC	Air-to-air Air-to-surface	Useful for specific time periods. May relieve on-station. UH-1E can mark targets and deliver ordnance.
OV-10A	AC(A), TAC(A), HC(A)	Air-to-air Air-to-surface	Useful for specific time periods. Can mark targets and deliver ordnance. May relieve on-station.
High Performance	TAC(A)	Air-to-air Air-to-surface	May mark targets, coordinate CAS missions, deliver ordnance, and relieve on-station.

Figure 11. --Airborne Command and Control Agencies.

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to the normal DASC functions, the airborne DASC may serve as a radio relay to control agencies aboard amphibious ships or to operational airfields. The organization of an airborne DASC is shown in figure 12.

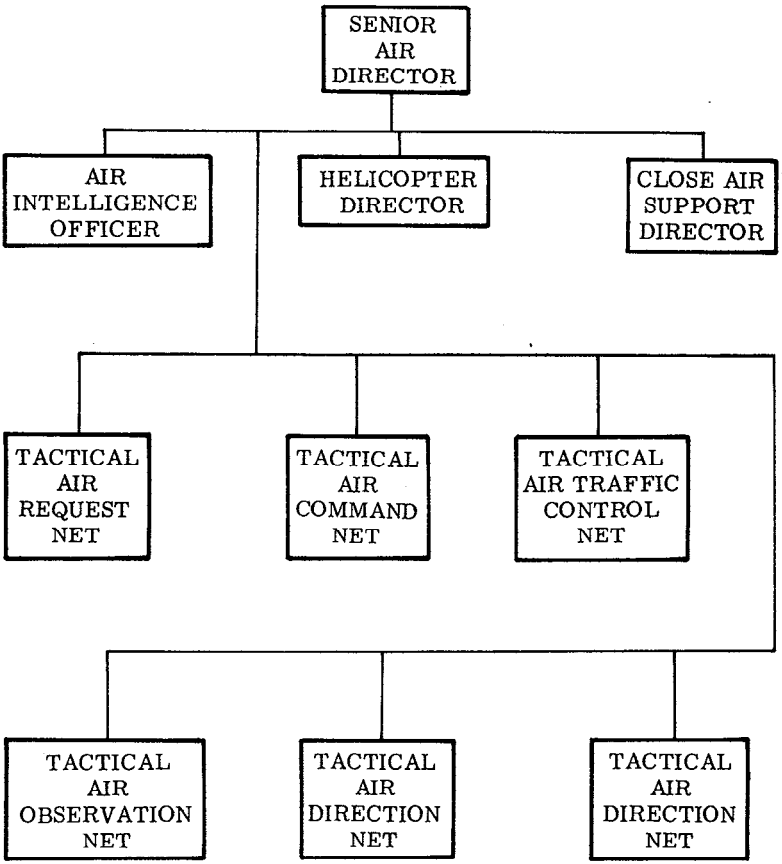

Figure 12. --The Airborne Direct Air Support Center.

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8406. AIR CONTROLLERS

a. Forward Air Controllers. --In a heavily populated riverine environment it is necessary to exercise positive control over all offensive air support missions because of the difficulty of differentiating between friend and foe. Therefore, there is an urgent need for each rifle company deployed on the waterways to have an FAC attached for their own immediate needs, even though this will require that additional FACs be assigned to battalion TACPs.

b. Airborne Air Controller (AC(A)). --The dense vegetation and foliage likely to be encountered in riverine operations limits ground observation and causes considerable difficulty in marking friendly positions. Employment of an AC(A) working in conjunction with an FAC on the ground will lessen these problems. Tactical air observers (TAOs) and tactical air coordinators (airborne) (TAC(A)) have frequently worked together in this same manner. However, a firm requirement exists for trained, experienced AC(A)s.

c. FAC/AC(A) Concept of Employment. --The AC(A) cannot normally replace the FAC in control and direction of CAS missions against close targets due to the need for accurate identification of friendly troop positions. However, in this type of operation, it is considered necessary to employ the AC(A) and the FAC as a team. The AC(A) from his airborne vantage point can often pick out targets not visible to the FAC. On the other hand, the FAC is needed to advise ground commanders on the use of CAS; to initiate requests for airstrikes; to brief the AC(A) on target locations and the disposition of friendly forces; and to control those strikes which can be best controlled from the ground.

d. Implementation of FAC/AC(A) Concept. --In order to implement the FAC/AC(A) concept, some expedients are offered as possible solutions:

(1) Training for all FACs could include both ground and airborne control techniques to allow flexibility in their use in either role.

(2) Provide additional training for TAOs in control techniques and employ them as AC(A)s in time of need.

(3) Conduct ground school and airborne controller training for all junior pilots in observation squadrons in order to provide resources to fill the FAC/AC(A) billets.

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(4) Utilize O-1s and UH-1Es as platforms for AC(A)s until such time as a light armed reconnaissance aircraft is in service.

(5) Employ pilots of transport helicopters with FAC/ALO experience as AC(A)s.

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Section V. AVIATION LOGISTICS

8501. GENERAL CONSIDERATIONS

a. Logistic Support Requirements. --Discussion of normal logistic support requirements and considerations for aviation units may be found in FMFM 4-1, Logistic and Personnel Support; FMFM 7-3, Air Support; and LFM 02, Doctrine for Landing Forces. This section outlines those aviation logistic support considerations peculiar to riverine operations.

b. Air Base Location. --The governing factor in planning and executing aviation logistic support in riverine operations is whether air bases are to be established ashore in the objective area; on ships; or at new or existing airfields external to, but within operating range of, the objective area. Due to the difficulties encountered in establishing and supporting land air bases in a riverine environment, mobile sea bases such as LPH and aircraft carriers or existing fixed base facilities should be chosen whenever possible. Expeditionary air bases should be established in a type III riverine environment only when adequate air support cannot be provided from other bases.

8502. SUPPLY

Air bases established in a type III riverine environment may be dependent on waterborne craft for delivery of the large quantities of aviation fuel, ordnance, and heavy equipment required for sustained operations. Landing ships, landing craft, or barges may be employed to introduce fuel into a tactical airfield fuel dispensing system (TAFDS) and to deliver ordnance to selected beaching or waterport sites.

8503. MAINTENANCE

The heat, humidity, and heavy rainfall characteristic of many riverine environments will magnify problems of fuel and oxygen contamination, ordnance storage, and maintenance of complex electronic systems.

8504. ENGINEER SUPPORT

Extensive engineer support will be required if air bases are to be constructed in a type III environment.

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8505. SHORT AIRFIELD FOR TACTICAL SUPPORT (SATS)

The SATS concept is suitable for employment in some riverine environments. The problems of drainage, soil stabilization, and access routes may be sufficiently severe to limit or completely negate their use. The area of operations should be thoroughly reconnoitered to locate suitable SATS sites.

8506. AUSTERE SITES AND STAGING BASES

In riverine operations, SATS bases may also be used as helicopter and LARA staging bases to extend the depth of inland penetration. This technique serves to deny the enemy a "safe haven" beyond normal operating range from mobile sea bases. When hard terrain is not available, small platforms or bases can be constructed from AM-3 type floatable matting. Figure 13 depicts a helicopter landing on this type of floating platform.

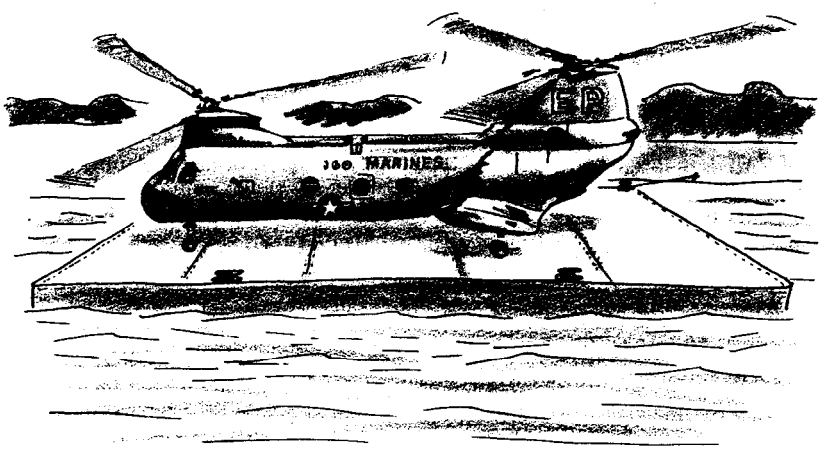

Figure 13. --Helicopter Landing on Floating Platform.

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CHAPTER 9

LOGISTIC SUPPORT

Section I. BASIC CONSIDERATIONS

9101. GENERAL

The mission of the riverine force will determine the logistic support required. Although accepted logistic principles remain unchanged, some variation from normal logistic techniques will be necessary in order to cope with the peculiarities of the riverine environment. Consideration must be given to special items of equipment, prescribed loads, levels of supplies, distribution, services, transportation, and medical support.

9102. VARIATION FROM NORMAL TECHNIQUES

a. Factors Causing Variation. --Variation in logistic techniques for riverine operations are necessary because of the:

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(1) Isolation of company size elements from parent units.

(2) Lack of suitable land sites for logistic installations.

(3) Greater limitations on normal means of logistic lift.

(4) Requirement to support boat units.

(5) Severe maintenance problems occasioned by the effects of climate and terrain (mud, sand, and vegetation).

b. Effect of Environment on Planning.--Logistic planning must be based on an intimate knowledge of the environment, since each type of environment poses different logistic problems.

(1) Type I Environment.--Logistic techniques will be basically normal except that consideration must be given to the supply and maintenance of the assault boats and outboard motors operated by small units.

(2) Type II Environment.--Logistic techniques remain essentially normal. However, some variation is necessary due to the availability of waterways for tactical maneuver and logistic lift. The presence of Navy boat units will require that provision be made for the support of the personnel, boats, equipment, and supplies associated with the boat units.

(3) Type III Environment.--This type of environment requires the widest variation from normal techniques due to the near nonexistence of roads and the lack of suitable land sites for logistic installations. In the succeeding sections of this chapter, logistic support is discussed in relation to a type III environment.

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Section II. SUPPLY

9201. DETERMINATION OF REQUIREMENTS

Normal techniques for determining the quantities of consumable supplies and equipment required for an operation often will not be applicable. For example, boats may be utilized in lieu of wheeled vehicles and fuel requirements must be computed accordingly. Other areas in which estimating procedures must be modified will be covered throughout this chapter.

a. Class I.--The procedures for determining the quantities of rations required will remain normal. The type of rations to be provided may differ from normal, depending upon the nature of the operation and the storage and refrigeration facilities available. The reaction force, when deployed, normally will be limited to individual packaged rations only. The rifle companies deployed on the waterways should be able to handle additional water and rations, as well as individual packaged rations. Consideration should be given to the possible requirement of providing rations to indigenous personnel if the situation warrants. If ships are utilized as bases for larger units, the ships should be able to provide messing, and must be alerted to plan accordingly. Techniques for providing an adequate supply of drinking water are discussed in paragraph 9303.

b. Class III.--In addition to normal considerations, the introduction of boats and outboard motors will require that fuel consumption rates for these boats and outboard motors be determined. Some new types of fuel will be required; e.g., suitable oil for addition to the gasoline for outboard motors. Consumption estimates, available delivery means, and storage facilities and containers are key considerations in class III planning.

c. Class V.--Expenditure of heavy caliber ammunition will probably be less than normal; whereas, small arms ammunition, flares, pyrotechnics, smoke, and riot-control chemical agents will be needed in greater quantities.

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BUOYS, SMALL MARKER	MAPS, WATERPROOF
BOXES, MATCH, WATERPROOF	PADDLES
CREAM, SUNBURN	POLES, SOUNDING & POLING
GUN, LINE PROPELLING	POWDER, FOOT
LADDERS, SCALING	REPELLENT, LEECH

Figure 14.--Examples of Required Items Not Listed in the Tables of Allowance or Tables of Equipment.

9202. REQUIREMENTS FOR SPECIAL ITEMS OR UNUSUAL QUANTITIES OF EQUIPMENT

The riverine force should turn in, pool, or delete, all nonessential standard equipment and store it at locations which have been designated by higher authority. Certain standard items of supply may require modifications in order to be suitable for use in the riverine environment. In addition, increased quantities of certain items may be required. Figures 14, 15, and 16 list examples of some items that may be required, either in unusual quantities or as new items, to be added to appropriate tables of allowance or tables of equipment. Items such as individual stoves and sun

CANS, FUEL	LANTERNS
CANS, WATER	LIFE PRESERVERS
CANTEENS	MOTOR, OUTBOARD
COTS, CANVAS	RADIOS
HATS, W/MOSQUITO NET	STOVES, SMALL UNIT
KIT, ARMORER	TARPAULINS
KIT, MEDICAL	

Figure 15.--Examples of Class II Type 1 Items Required in Unusual Quantities.

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BAGS, WATERPROOF	LINES, LASHING & LOWERING
BATTERIES, DRY CELL	REPELLENT, INSECT
CANDLES	SALVE, LIP
COMPASSES	TABLETS, WATER PURIFICATION
DUNNAGE	TOOLS, HAND
KNIVES, POCKET	

Figure 16.--Examples of Class II Type 2 Items Required.

glasses should be considered. Consideration must also be given to the stockage of additional repair parts for all items of equipment, as well as their special packaging to prevent deterioration caused by the riverine environment.

9203. PRESCRIBED LOADS

a. Individual.--The individual must not be overloaded. His prescribed load generally can be limited to ammunition and water, with the exception of reaction force personnel who must also carry some rations. The employment of boats with rifle companies facilitates carrying such items as rations, sleeping gear, extra clothing, and additional ammunition and water.

b. Unit.--The optimum composition of the prescribed load for units will be determined by the unit commander based on considerations of unit location, and the type and duration of the operations in which it is engaged.

(1) The prescribed load for a rifle company, operating from a land combat base will depend on the planned frequency of resupply from the rear support area.

(2) Reinforced rifle companies, operating from a floating combat base, should be logistically self-sufficient for periods of 15 to

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30 days. Therefore, a heavier-than-normal prescribed load, stored at their supporting base, is required for separated or deployed units.

(3) Reaction force troops possess only foot mobility once they debark from the helicopters or other mode of transportation, therefore, all items must be man-carried. In order to achieve maximum combat mobility, the prescribed load must be kept to a minimum. Frequent resupply by helicopter will be required for these units.

(4) The prescribed loads of other land-based units do not differ significantly from normal.

(5) In the case of larger units based on ships, the ship becomes the supply source.

9204. LANDING FORCE SUPPLIES

a. Supply Levels. --The normal quantities of landing force supplies to be held in beach support areas (BSAs) and logistic support areas (LSAs) are not appropriate in the type III riverine environment. The selection of levels must be based on the following considerations:

(1) Planned resupply schedule of the landing force from external sources.

(2) Storage capacities of ships assigned to the landing force as floating bases.

(3) Anticipated duration of the assigned mission.

(4) Probable absence of BSAs and LSAs ashore within supporting distance.

b. Storage Sites

(1) Ashore. --In types I and II environments, storage sites will normally be land-based. Since the climate and weather cause rapid deterioration of supplies, adequate protective material such as tarpaulins, dunnage for platforms, and special packaging is required. Adequate local security must also be provided.

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(2) Afloat. --It is probable that in the type III environment, landing force supplies will be maintained aboard support ships. One ship might be capable of providing support to more than one area of responsibility by moving from place to place along the coast. An LSD, LST, APA, or AKA would be suitable for such a mission. The requirement for protective material and local security for landing force supplies are considerably reduced when they are maintained aboard support ships.

9205. DISTRIBUTION

Unit distribution to a committed reaction force is essential and must be preplanned. The employment of helicopters for this task will be necessary in the majority of situations. Unit distribution is the preferred technique for the resupply of rifle companies that are deployed on the waterways. Routine resupply should be executed by boats whenever feasible, reserving the heavily committed helicopters to emergency resupply missions.

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Section III. SERVICE SUPPORT

9301. GENERAL

Service support requirements in riverine operations will vary because of the isolation of small units from organizational and field maintenance installations. Emphasis should be placed on providing on-site service support in lieu of requiring deployed elements to return to the service installation. Parent units probably will find it necessary to attach cooks, mechanics, armorers, and supply personnel to deployed reinforced rifle companies.

9302. FOOD SERVICE

a. Deployed Rifle Companies.--Since reinforced rifle companies will operate away from parent units for extended periods of time, provision should be made for establishing a company messing system to provide for frequent hot meals. This messing system could be established ashore or aboard a barge or LCU. If a larger mother ship is utilized for the floating combat base, the Navy may be able to assist in messing.

b. Reaction Force.--Messing is no problem for the reaction force between periods of commitment, since it will be located at a land or floating combat base. However, the reaction force must rely entirely on individual packaged rations when committed.

c. Other Units.--Most other units will be located at a land or floating combat base capable of providing adequate messing services. Warm seasons or tropical climates will impose a heavy requirement for the refrigeration of perishable foods.

9303. WATER SUPPLY

In a riverine environment ground water must be considered unsafe for drinking until proven otherwise. Since storage of large quantities of potable water will be impractical, continuous supply must be provided by using standard water purification or distillation equipment. For small units operating independently, this may necessitate use of portable equipment and extensive use of water purification tablets.

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9304. POL SUPPLY

The storage of bulk POL will be required aboard mother ships in containers suitable for use ashore. These containers must be helicopter-transportable. Five-gallon cans should be provided for use in the small boats that are powered by outboard motors. Required greases, lubricants, and preservatives can be stored in their standard packages. In all cases, measures must be taken to reduce spillage, so as to decrease the inherent danger of fire.

9305. MAINTENANCE

a. Organizational. --Preventive maintenance will be of paramount importance. The severe climate and likelihood of frequent immersion of equipment demands the execution of a rigorous preventive maintenance program. Maintenance support is complicated by limited mobility and the isolation of reinforced rifle companies from maintenance facilities. Battalion commanders will in all probability find it necessary to attach organic armorers and mechanics to rifle companies deployed on the waterways. Landing force units based on ships should be able to obtain maintenance assistance from the Navy.

b. Field

(1) Third Echelon. --The difficulties of evacuating inoperable major items of equipment will require emphasis upon component replacement. Contact repair teams should be employed to the maximum. When land-based, field maintenance units will utilize T/E tools and equipment. When based on ships, T/E equipment must be adapted to the establishment of expedient floating workshops in cooperation with the Navy.

(2) Fourth Echelon. --With the exception of communication-electronic equipment, it is envisioned that fourth echelon maintenance capability will be limited. Major items of equipment requiring repairs that cannot be accomplished by use of component replacement generally will be evacuated/replaced. The increased use of the maintenance float for component replacement will facilitate flexibility.

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Section IV. TRANSPORTATION

9401. GENERAL

Because of the varied terrain conditions that will be encountered in the riverine environment, the landing force must be prepared to use a variety of vehicles and watercraft. Transportation means are essentially normal in type I and II environments. However, in a type II environment, the extensive use of boat lift may be advantageous. All ground vehicles, including amphibian vehicles, which possess the necessary mounts should be equipped with winches and cables to assist in immediate retrieval.

9402. PLANNING CONSIDERATIONS

a. Type I and Type II Environment.--Procedures for estimating the amounts and type of transportation needed to successfully meet logistic lift requirements are essentially normal for operations in the type I and II environments.

b. Type III Environment.--In order to determine the amount and type of transportation needed in a type III environment the planner must:

(1) Become intimately familiar with the intended pattern of unit deployment.

(2) Know the terrain in detail, with particular emphasis placed on the speed of currents and usability of waterways, and the trafficability of roads.

(3) Compute daily, weekly, and monthly logistic lift requirements.

(4) Be familiar with the capacity and speed of boats and craft to be utilized.

9403. WATERCRAFT

Watercraft are the primary means of movement in the type III riverine environment. These craft may be native boats; boats organic to the landing force; or Navy barges, boats, and ships. All craft should be

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supplied with tarpaulin covers to protect troops, supplies, and equipment from the weather. When used for logistic lifts, craft should move in escorted convoys for protection against ambush.

9404. AMPHIBIAN VEHICLES

Amphibian vehicles will have considerable application in type I and II environments. However, as the environment deteriorates, the value of the amphibian vehicle decreases because of the strong river currents, the softness of marshy areas adjacent to the rivers, and the general unsuitability of amphibians for long distance water transit.

9405. HELICOPTERS

Helicopters are especially well-suited for resupply and evacuation missions because of their speed and high degree of flexibility. However, as previously discussed, helicopters will play a variety of important roles in riverine operations and, therefore, alternate means of transportation should be used for lifts not demanding the speed of the helicopter.

9406. FIXED-WING AIRCRAFT

Another means of supply delivery to riverine forces is by parachute drop or freedrop from fixed-wing aircraft. Utilization of buoyant packaging will permit drops in the river where the risk of damage is minimal and recovery by boat is possible.

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Section V. MEDICAL SUPPORT

9501. GENERAL

Medical support techniques do not differ from normal in type I and type II environments. In the type III environment, the companies of the medical battalion will operate without serious difficulty at land combat bases or floating combat bases. Additional medical supplies may be required to render medical care to the indigenous population; and hospital corpsmen should be capable of instructing volunteer civilians in the techniques of first aid.

9502. MEDICAL ORGANIZATION AND FACILITIES

Reinforced rifle companies deployed on the waterways must be provided with on-the-scene medical support. Judicious task organizing will be required to ensure the availability of a medical officer and appropriate corpsmen in order to provide aid station treatment of casualties. A sound policy for medical evacuation and treatment must be established. When ships are employed as bases for larger units, ship and troop medical personnel should be blended into a coordinated medical service. This should result in economy and make medical personnel available for employment with the isolated rifle companies. Planning must include the procurement, distribution, and storage of sufficient medical supplies to support riverine operations.

9503. HOSPITALIZATION

When riverine operations are conducted from mobile sea bases, the ships can provide adequate hospital facilities; however, utilization of a hospital ship would be ideal, providing the deployment is of sufficient magnitude. LPH, LPD, and APA, fitted with a helicopter platform, are also well-suited for this function.

9504. SANITATION AND PREVENTIVE MEDICINE MEASURES

Basic hygiene and sanitation practices are of greatest importance in the riverine environment. Preventive medicine measures for both individuals and units are vital at all echelons. The supervision and

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technical direction of preventive measures are a function of the medical personnel assigned to the landing force. All troops must receive indoctrination in preventive medicine measures prior to being committed to the riverine area.

9505. MEDICAL INTELLIGENCE

The inland waters may be contaminated with organisms that can penetrate the skin and produce illness. Personnel assigned to the riverine force should be briefed on the disease vectors present, and any other medical information pertinent to the area of operations.

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CHAPTER 10

COMMUNICATIONS

Section I. COMMUNICATION REQUIREMENTS

10101. GENERAL

The fundamental purpose of communications is to provide the commander with an effective means to control subordinate units and to coordinate the efforts of attached and supporting units. Operations in the riverine environment do not change this fundamental requirement. It is the dispersed pattern of deployment, the unusual terrain, and the nature of base facilities that necessitate departure from normal techniques. These changes in normally accepted techniques are described in the following paragraphs:

a. Reduction of Communication Means. --The riverine areas are characterized by reduced road networks and untrafficable terrain which

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limits or denies the use of vehicular communication equipments with their higher power and longer range radio sets. Communication personnel participating as members of patrols or other larger tactical units in areas of dense undergrowth or waterways face severe limitations in the prescribed load they carry. Every effort must be made to lighten the load of the individual if foot movement is anticipated. Sustained or rapid movement can restrict the communication means to man-pack/hand-pack radio equipment.

b. Dispersed Units. --Dispersed units operating at extended distances for protracted periods require additional radio equipment plus substitution or addition of man-pack radios vice hand-pack radios normally found at the company and platoon level. Companies operating at extreme distances from the parent battalion may require the augmentation of radio teams and team pack equipment of sufficient range to span the distance and provide positive communications for tactical and logistical support. Preparation for the possibility of increased radio communications will necessitate accelerated cross training within communication units and radio operator training of selected personnel in all noncommunication units.

c. Planning Requirements. --Tactical operations in riverine environments increase the requirement for communication support. When this support is viewed in the light of the disadvantages encountered in this type terrain, it becomes obvious that the detailed planning and execution associated with normal landing force operations must be increased and amplified through the ingenuity and imagination of communication personnel.

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Section II. COMMUNICATION SUPPORT CONCEPT AND PROCEDURES

10201. GENERAL

The following paragraphs describe the means of communication as applied to the riverine environment and tactical operations therein. Also discussed are the communication requirements of the commander and his staff.

10202. MESSENGER COMMUNICATIONS

Messenger communications remain the most secure means of transmission. Scheduled, special, or courier messenger are employed when necessary and are categorized by their mode of travel including foot, vehicular, boat, helicopter, and airborne. FMFM 10-1, Communications, describes in detail the functions of each category of messenger.

a. Foot and Vehicular Messenger.--Lack of road mobility, irregular terrain, dense undergrowth, and the extended operating distances encountered during operations in riverine areas greatly restrict the use of foot and vehicular messengers. When used, foot messengers should always be employed in pairs and it should be remembered that passage through this type of terrain is time consuming and delivery will be very slow. Vehicular messengers will encounter impassable roads, unfordable waterways, and will be constantly subjected to the possibility of road ambush and mines.

b. Boat and Helicopter Messenger.--To counteract the difficulties faced by foot and vehicular messengers, maximum use of boats, amphibian vehicles, and helicopters should be made. All units must be made aware of the desirability of employing these means to transmit message traffic and to realize that any boat, amphibian vehicle, or helicopter arriving at their position is a potential means of transport for message traffic. Organizations may embark a messenger aboard the helicopter/craft, utilize transit personnel, or present the message traffic to a member of the crew for transport to an appropriate landing zone or boat landing. In some instances the traffic may not proceed directly to the action addressee and delay must be anticipated. Messages should be properly packaged and clearly display the following information:

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(1) Action addressee.

(2) Originator.

(3) Priority of delivery.

(4) Location of addressee (coordinates or landing zone code name).

(5) Classified or unclassified.

Message center personnel or unit personnel should meet all arriving helicopters and craft to immediately assume custody of message traffic.

c. Message Drop and Pickup.--Message drop and pickup by fixed-wing aircraft is another method of effecting messenger communications. Extreme care must be taken to prevent loss during delivery drop, particularly when units are operating in or near waterways, dense undergrowth, or heavy jungle cover.

10203. WIRE/RADIO RELAY COMMUNICATIONS

a. Wire communications are utilized primarily within the CPs and between multichannel radio relay equipment and switching centrals. The echelon of command, length of time a CP is to remain in one location, size and extent of the CP complex, and the personnel available to install the wire and equipment are the primary factors in determining the feasibility of establishing a wire communication system. If a combat base and/or logistic support area is to be established and maintained, an extensive wire system may be required. Wire lines should be installed in trees or from poles, if possible, to reduce the detrimental effects of rain and constant moisture. Switchboards, terminals, and telephones must be kept sheltered and free from dampness. Extreme care must be exercised in the maintenance of field wire circuits to prevent the wire repair crews from ambush, mines, and booby traps.

b. The utilization of radio relay equipment within the riverine environment will depend primarily on the type and size of combat bases established ashore. Multichannel ship-to-shore links may be established between the ashore command post and ships possessing compatible

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equipment such as AGCs, LPHs, and command APAs. The lightweight multichannel radio relay equipment adopted by the Marine Corps will lend itself towards riverine operations and its use will establish a multicircuit capability at any position in which a portable radio can be carried.

10204. RADIO COMMUNICATIONS

Radio is the primary means of communication utilized by tactical forces engaged in riverine operations. Normal employment of organic equipment on standard radio nets may be inadequate to provide positive communications for units operating at extended distances due to adverse terrain conditions which tend to reduce the normal operating capabilities of the radios. Radios with higher power and greater range plus activation of additional nets may be required to provide commanders with the means through which to effectively exercise command and control.

a. Rifle Company Communications.--The company operating from a mother ship or combat base may have subordinate units deployed in its assigned sector of responsibility at distances up to 50 miles. The radio equipment and techniques necessary to maintain communications should be considered in conjunction with the mission and mobility of each unit.

(1) Patrol Base Communications.--A semipermanent or fixed patrol base will allow for the installation of team-pack radio equipment and/or special antenna configurations which extend the range of HF and VHF FM portable radios. (See fig. 17.) A rapidly moving patrol may prevent the inclusion of heavier team-pack equipment. In this case, the range of portable VHF FM sets can be extended through the use of field expedient antennas. These antennas can be constructed prior to the commencement of the patrol, are lightweight, and take a very short period of time to install or remove. Additionally, units operating at maximum ranges from combat bases may employ any of the following means to maintain contact with their parent unit when distances are too great for direct communications:

(a) Voice radio retransmission teams positioned at regional force outposts, U. S. forces camps, or aboard river patrol craft.

(b) Voice manual retransmission by airborne observers or from other aircraft equipped with VHF FM radios.

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Figure 17. --Field Expedient Antennas.

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(c) Automatic retransmission equipment (Autocat), installed at secure ground locations or airborne in specially equipped aircraft.

(2) Platoon Tactical Net. --Due to the wide ranges over which platoons may operate, it may be necessary to activate a platoon tactical net. Stations on this net can include the platoon commander, squad leaders, patrol base, and the section leader of any attached elements. When embarked aboard rivercraft, this net may serve as a boat control net over which the platoon commander exercises command and control of all subordinate units.

(3) Supporting Arms. --Usually a rifle company will be reinforced or supported by forward air controllers, artillery forward observers, and naval gunfire spot teams. These groups all have a requirement for positive radio communications with their respective fire support agency. These teams must be considered and augmented with radios of sufficient range to permit the accomplishment of their fire support mission.

(4) Call Signs and Frequencies. --The company commander and his subordinate commanders should be provided with a current list of battalion frequencies and call signs as well as the frequencies and call signs of the following:

(a) Rivercraft: U. S. and Allied (if accompanied by advisor).

(b) Air observers: Marine, Air Force, and Army.

(c) Helicopter squadrons FM: including Army aviation units.

(d) Adjacent Allied forces.

(e) U. S. Special Forces or local forces with U. S. or Allied advisors.

Knowledge of these frequencies and call signs can, at a given time, provide the company or any of its dispersed units with a means to request and adjust additional fire support, request immediate assistance or

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reinforcements, request medical evacuation, receive air observation or airborne control of close air support, or receive assistance in unit extraction, as well as provide an alternate means of communication to its higher headquarters.

b. Infantry Battalion Communications.--The infantry battalion operating with two or more of its companies ashore or on the waterway may itself be positioned aboard ship or at a combat base. The battalion is required to maintain tactical radio communications with its subordinate units as well as circuits to the senior commander, supporting arms agencies, and reinforcing units. Additional nets may be required to link the battalion headquarters with the U. S. Navy commands, other U. S. forces, or Allied forces.

(1) Battalion Radio Nets.--As previously mentioned, reinforced rifle companies may operate from combat bases located at a distance that exceeds the operating range of VHF FM radios normally utilized on the battalion tactical net. When this situation occurs, operating techniques must be changed to provide the necessary communications. Examples might be the utilization of a high-frequency battalion tactical net or a series of relay teams positioned within the operating area.

(a) Communication Teams.--The communication platoon of the infantry battalion may be required to reinforce the rifle companies with a communication team and radio equipment such as the AN/PRC-47. The AN/PRC-47 with its rechargeable batteries places a requirement on the battalion for continual resupply of recharged batteries. If the company is positioned aboard a mother ship, it may be feasible to include a battery charger with the radio for on-site recharging.

(b) Retransmission.--The tactical situation may allow the positioning of operators and equipment at various safe locations throughout the area of operation to operate voice manual radio retransmissions or automatic retransmission. The AN/PRC-25 and AN/VRC-12 series FM equipment provide a reliable source of automatic retransmission equipment. This same equipment, when installed in aircraft, can greatly increase the effective range and provide continuous communications during a critical period. The system is limited by the on-station time of the aircraft and the overall aircraft availability. Use of automatic retransmission should be planned for far enough in advance to allow for the requesting of additional frequencies which must be compatible for this type of operation.

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(2) Airborne Communications.--Operations under the direct tactical control of the battalion commander may require that he be airborne over the battle area. Adherence to the following practices can greatly enhance the success of utilizing aircraft as a temporary command post:

(a) Familiarization With Aircraft.--Each type of helicopter provides a different communication capability. In some models the ground commander has direct access to one or more aircraft radios while in others the commander must utilize portable ground equipment carried aboard with him or previously installed aboard the aircraft.

(b) Planning.--By prior planning and coordination with the aviation unit involved, the ground commander will have reliable information on the communication support he can expect while airborne and take what steps are necessary to provide for any shortage of communication capability.

(3) Fire Support Coordination Communications.--Nets to be used in fire support coordination will be established on an as-required basis. The primary departure from normal procedures is that certain fire support coordination may be performed aboard a deployed company mother ship because of distances involved. In these instances the deployed company will assume certain functions normally associated with the battalion FSCC. The type of communication equipment employed will depend upon the relative location of fire support units and supported units.

(4) Installation of Radio Equipment Aboard Rivercraft.--HF radio installations aboard rivercraft require a special technique to ensure maximum performance. Resonant whip antennas should be constructed and installed. Grounding plates, affording a good ground return to the radio set, should be semipermanently affixed below the bilge waterline. This will substantially reduce noise from the engine, generator, voltage regulator, and other noise sources aboard the craft.

(5) Maintenance of Radios.--Special attention must be given to first and second echelon preventive maintenance. The riverine environment is unusually destructive to all electronics equipment. Sets should be weatherproofed to counteract the effects of humidity and moisture. Equipment utilized on the waterway are required to be waterproofed. All radios should be subjected to frequent second echelon

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maintenance checks by the battalion's electronic technicians on a scheduled basis. Whenever possible, this should include the radios of supporting and reinforcing units who do not possess the capability themselves.

10205. SOUND COMMUNICATIONS

Sound equipment, such as amplifier AN/PIQ-5 or AN/UIH-5, is particularly effective in the riverine environment. Relative low-level audio signals are capable of traveling great distances over water and flat marshland. Extensive use of helicopter-mounted sound systems can be expected in support of psychological operations and civic action programs.

10206. VISUAL COMMUNICATIONS

Visual communications consist of air panels, pyrotechnic signals, flashing light, and semaphore flags. They are a supplemental means of communication usually employed within the smaller units such as platoons, squads, and fire teams. FMFM 10-1, Communications, contains a detailed description of visual communications. The following information concerns visual means as applicable to the riverine area:

a. Air Panels. --The dense natural growth of the riverine environment requires the use of air panels to designate CP locations and frontline positions. Proper employment will facilitate the timely delivery of close air support.

b. Pyrotechnic Signals. --The use of pyrotechnics as a signalling device is limited to prescribed or prearranged signals as each unit must be aware of the meaning of each signal. The signals are visible over a greater distance when employed against terrain of contrasting color. Green and white smoke are considered poor signalling devices in jungle terrain. Green, once dissipation begins, tends to blend with the green foliage. White, once it begins to rise, resembles ground fog or low hanging clouds or haze. Red and yellow smoke are very effective signalling colors in the riverine areas.

10207. COMMUNICATION CENTER

Communication center operation does not change within the riverine environment. However, dispersion of units may cause the communication center personnel to place greater emphasis on delivery

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of administrative traffic by nonelectrical means such as helicopter or boat. Because of this, it is important to establish procedures which enable communication center personnel to have advanced notice of helicopter and boat arrivals and departures.

10208. COMMUNICATION SECURITY

Communication security must be rigidly practiced to prevent compromise of classified material, loss of communication equipment, and the disclosure of information of an intelligence value.

a. Physical Security. --Operations within the riverine environment necessitate an increase in the physical measures required to safeguard communication equipment, materials, and documents. Destruction plans should be reviewed, updated, and frequent destruction drills held. Personnel who possess classified material such as frequencies, call signs, operational codes, shackles, and authenticators must be made aware of the importance of denying access of this material to the enemy.

b. Crypto Security. --In addition to the conventional application of cryptographic devices, the use of low-level operational codes is well suited to small units dispersed throughout a tactical area. Care in proper use and the destruction of superseded codes is mandatory.

c. Transmission Security. --The increase of stations on the functional and administrative radio circuits requires stringent adherence to the two principles of transmission security:

(1) Minimum use of electrical communication means.

(2) Proper use of electrical communication means through strict conformity to radio procedure and concise, clear, brief conversations.

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APPENDIX A

MILITARY VEHICLES AND CRAFT OF POTENTIAL USE IN A RIVERINE ENVIRONMENT

This appendix contains a catalog of vehicles and craft presently in inventory within the Services. The vehicles and craft shown are not necessarily the only ones usable, but are representative of those with potential use by a riverine force. General characteristics, specific data, capacities, and other data pertinent to operations in a riverine environment are shown for the following vehicles and craft:

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7-MAN U.S. NAVY PNEUMATIC BOAT

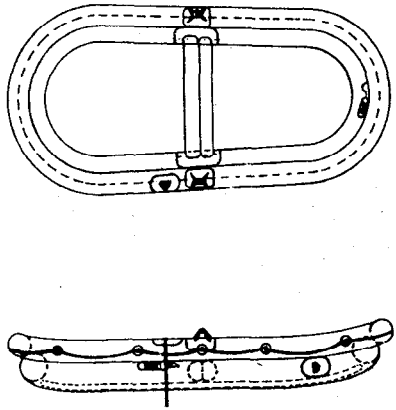

Figure 18. --7-Man U.S. Navy Pneumatic Boat.

General Characteristics:

This craft is an inflatible boat with good steering and maneuvering capabilities. The boat is well compartmented and has a noninflatable, rubberized canvas bottom. This craft is suitable for use during silent water operations and against low speed river currents.

Specific Data:

Length:	12 feet
Width:	6 feet
Height:	1 foot 5 inches
Weight:	125 lbs.

Capacity:

Weight:	1,500 lbs. (est)
Cargo:	11 feet by 5 feet by 2 feet
Personnel:	7

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Speed:

Water: Paddle speed or higher towed speed.

Armor Protection:

None

Armament:

None

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TRUCK, CARGO, 1 1/4 TON, 6X6, M-561

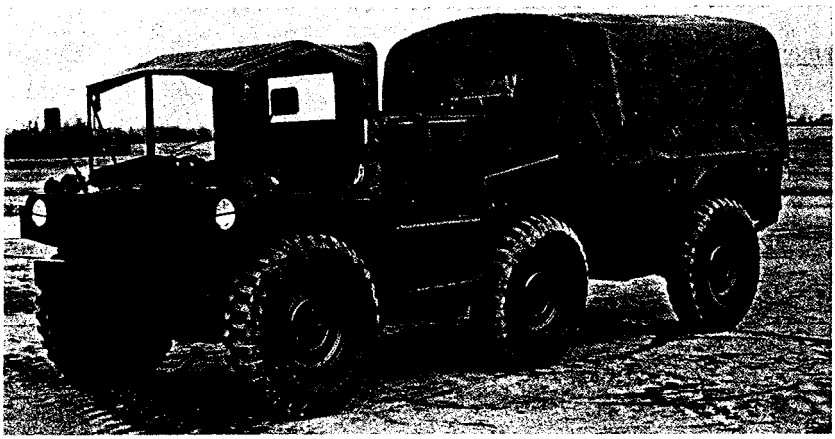

Figure 19. --Truck, Cargo, 1 1/4 Ton, 6x6, M-561.

General Characteristics:

The M-561 is a dual body, wheeled, 6x6 vehicle. Its oversize, low-pressure tires permit an average ground pressure of 4.8-6.0 PSI. The vehicle is floatable and can navigate streams and slow moving rivers, and has the ability to negotiate moderately firm structured banks.

Specific Data:

Length:	19 feet 2 inches
Width:	7 feet
Height:	5 feet 2 inches
Weight:	6,310 lbs.

Capacity:

Weight:	2,500 lbs.
Cargo:	255 cubic feet (54 square feet)
Personnel:	10 including operator

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Speed:

Improved Roads:	55 miles per hour
Cross-Country:	8-12 miles per hour
Water:	1 1/2-2 miles per hour

Armor Protection:

None

Armament:

None

Range:

520 miles highway cruise, 350 miles (est) cross-country

Gradeability:

60 percent

Ground Clearance:

1 foot 3 inches

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LIGHTER, AMPHIBIOUS, RESUPPLY, CARGO, 5 TON, LARC V

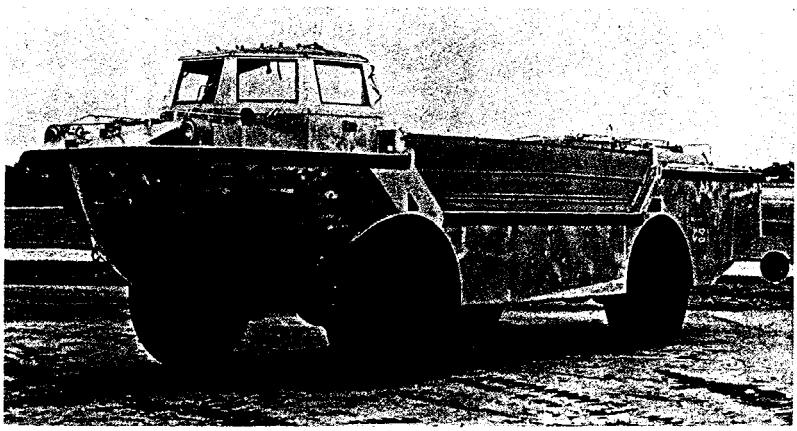

Figure 20.--Lighter, Amphibious, Resupply, Cargo, 5 Ton, LARC V, Design 8005.

General Characteristics:

The LARC V is a lightweight, aluminum hulled, terratired amphibian having moderate water speed and good surfing ability. This vehicle is not suitable for swampy terrain and would not be mobile in heavily irrigated terrain. It is suitable for transporting cargo from ship-to-shore, to beaches, or up fairly wide rivers and canals to semi-prepared landing areas.

Specific Data:

Length:	35 feet
Width:	10 feet
Height:	10 feet 2 inches
Weight:	19,980 lbs.

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Capacity:

Weight:	10,000 lbs.
Cargo:	16 feet by 9 feet 9 inches by 2 feet 5 inches
Personnel:	35 including crew

Speed:

Improved Roads:	30 miles per hour
Water:	9.14 miles per hour

Armor Protection:

None

Armament:

None

Range:

200 miles land (est)

Gradeability:

60 percent

Ground Clearance Variable:

1 foot 3 3/8 inches to 2 feet 1/4 inch

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LIGHTER, AMPHIBIOUS, RESUPPLY, CARGO, 15 TON, LARC XV

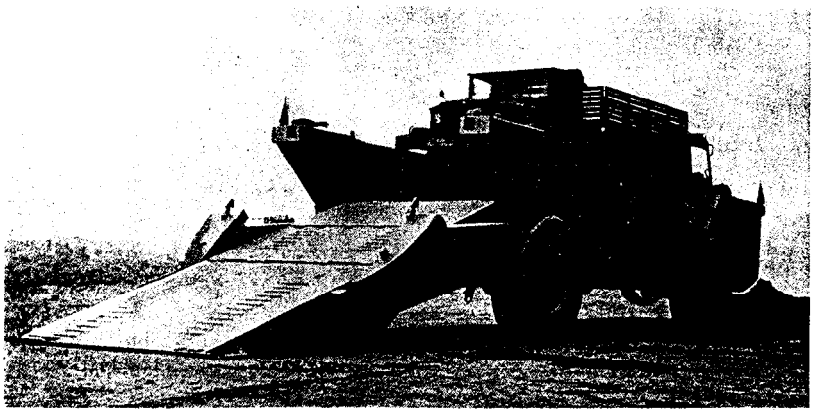

Figure 21. --Lighter, Amphibious, Resupply, Cargo, 15 Ton, LARC XV, Design 8004.

General Characteristics:

The LARC XV is a medium weight, aluminum hulled, terratired amphibian with propulsion in water provided by propellers. This vehicle has demonstrated good water handling characteristics and mobility on firm and semifirm soils. This vehicle would be suitable for supply and resupply operations from offshore ships to prepared landing areas along riverbanks.

Specific Data:

Length:	45 feet
Width:	14 feet
Height:	13 feet 4 inches
Weight:	45,200 lbs. with crew and fuel

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Capacity:

Weight:	30,000 lbs.
Cargo:	24 feet by 13 feet 6 inches by 3 feet 2 3/4 inches
Personnel:	56 including crew

Speed:

Improved Roads:	29.9 miles per hour
Cross-Country:	8-12 miles per hour
Water:	9.5 miles per hour

Armor Protection:

None

Armament:

None

Range:

200 miles land (est)

Gradeability:

40 percent

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LIGHTER, AMPHIBIOUS, RESUPPLY, CARGO, 60 TON, LARC LX

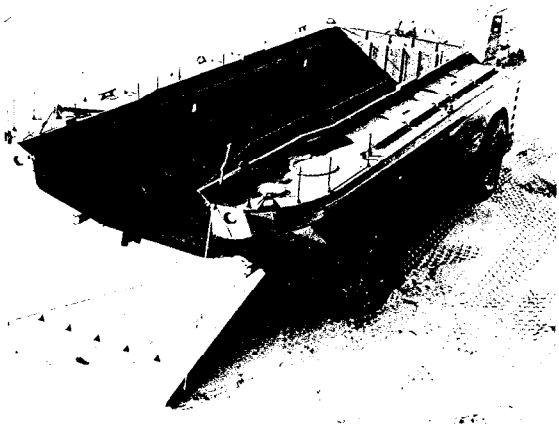

Figure 22.--Lighter, Amphibious, Resupply, Cargo, 60 Ton, LARC LX, Design 2303.

General Characteristics:

The LARC LX (formerly designated as Barge, Amphibious, Resupply, Cargo, BARC) is a large, wheeled, unarmored, cargo and personnel carrier. This vehicle is limited to transporting cargo or personnel from ships to landing areas or readily accessible inland points. The draft of 8 feet 8 inches requires a firm beach extending into the water for a considerable distance. Its maneuverability is limited by a turning radius of 75 feet.

Specific Data:

Length:	62 feet 6 11/16 inches
Width:	26 feet 7 inches
Height:	19 feet 5 inches
Weight:	197,000 lbs.

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CARRIER, CARGO, AMPHIBIOUS, M76

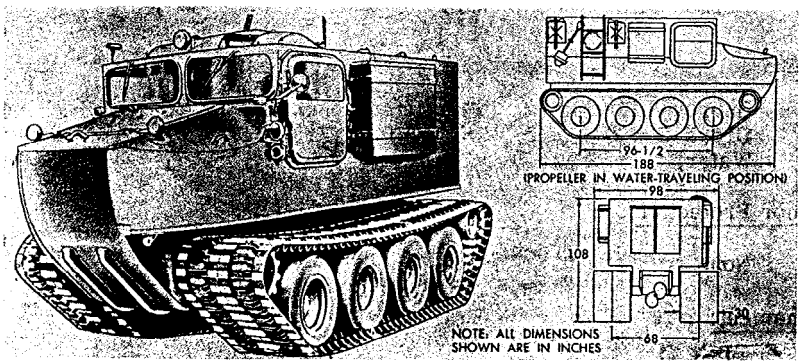

Figure 23. --Carrier, Cargo, Amphibious, M76.

General Characteristics:

This marginal terrain vehicle is designed to transport general cargo and personnel on land or water. It is powered by a gasoline, 4-cylinder, air-cooled engine. It is a highly mobile vehicle with good cross-country capabilities and a low ground pressure of 2.1 PSI. The M76 is a standard class IV item in the Marine Corps inventory.

Specific Data:

Length:	16 feet 7.4 inches
Width:	8 feet 2 inches
Height:	9 feet
Weight:	8,813 lbs.

Capacity:

Weight:	3,349 lbs.
Cargo:	20.8 cubic feet
Personnel:	10 including crew

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Speed:

Improved Roads:	28 miles per hour
Cross-Country:	8-12 miles per hour
Water:	4 1/2 miles per hour

Armor Protection:

None

Armament:

One machinegun, caliber .50

Range:

160 miles land, 23 miles water

Gradeability:

60 percent

Ground Clearance:

1 foot 4 3/4 inches loaded

Other:

A Xenon searchlight kit is available for use with this vehicle.

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CARRIER, CARGO, AMPHIBIOUS, 1 1/2 TON, M116

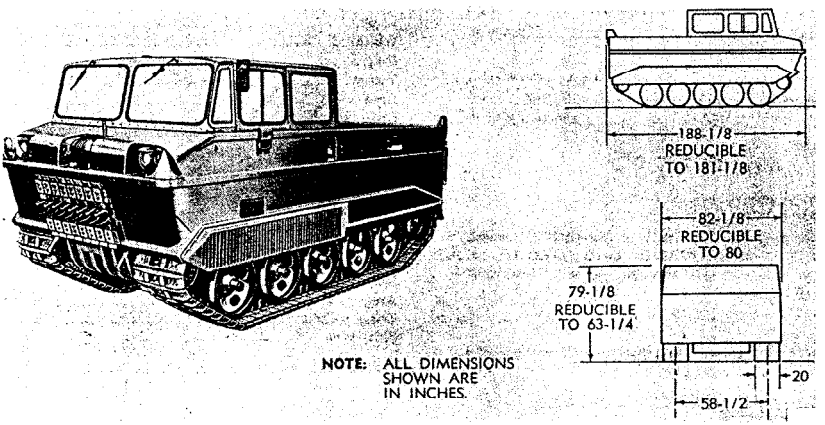

Figure 24. --Carrier, Cargo, Amphibious, 1 1/2 Ton, M116.

General Characteristics:

The carrier, cargo, amphibious, M116, is a marginal terrain, lightweight, low-silhouette vehicle designed to transport cargo or personnel. The vehicle is capable of operation with full-rated loads over unimproved roads, loose sand, muskeg, soft marshy terrain, and inland waterways. It has considerable mobility in the weak soils of delta areas due to its low ground pressure of 1.67 PSI to 2.74 PSI loaded, but has limited mobility in traversing the dikes and steep river or canal banks. The M76 Xenon searchlight kit can also be used on this vehicle. It is anticipated that this vehicle will be in the Marine Corps inventory in the near future.

Specific Data:

Length:	15 feet 6 inches
Width:	6 feet 10 inches
Height:	6 feet 8 inches
Weight:	7,400 lbs.

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Capacity:

Weight:	3,000 lbs.
Cargo:	8 feet by 6 feet by 4 feet (est)
Personnel:	11-14 including driver

Speed:

Improved Roads:	37 miles per hour
Cross-Country:	8-12 miles per hour
Water:	3.7 miles per hour

Armor Protection:

None

Armament:

None

Range:

22 miles water, 300 miles land

Gradeability:

60 percent

Ground Clearance:

1 foot 3 1/2 inches - 1 foot 2 inches

Other:

A Xenon searchlight kit is available for use with this vehicle.

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CARRIER, CARGO, AMPHIBIOUS, M733

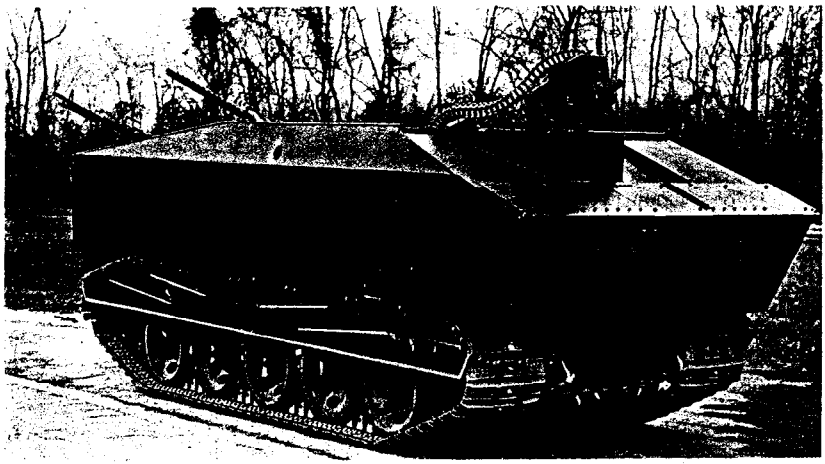

Figure 25.--Carrier, Cargo, Amphibious, M733.

General Characteristics:

The M733 is a marginal terrain, lightweight, low-silhouette, armored vehicle designed to transport personnel and cargo. This vehicle is capable of providing protected tactical mobility in soft marshy terrain and inland waters.

Specific Data:

Length:	16 feet 3 inches
Width:	6 feet 9 1/2 inch
Height:	6 feet 3.6 inches
Weight:	8,760 lbs.

Capacity:

Weight:	2,000 lbs.
Cargo:	8 feet by 6 feet by 4 feet (est)
Personnel:	8-9 including crew of one

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Speed:

Improved Roads	35 miles per hour
Cross-Country:	8-12 miles per hour
Water:	3.5 miles per hour

Armor Protection:

Steel plate

Armament:

Machinegun
Grenade launcher, 40mm or .50 caliber machinegun
4 M60 machinegun firing positions
Mortar, 81mm (presently undergoing evaluation)

Range:

22 miles water, 300 miles land

Gradeability:

60 percent

Ground Clearance:

14-15 1/2 inches

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ARMORED PERSONNEL CARRIER, M113

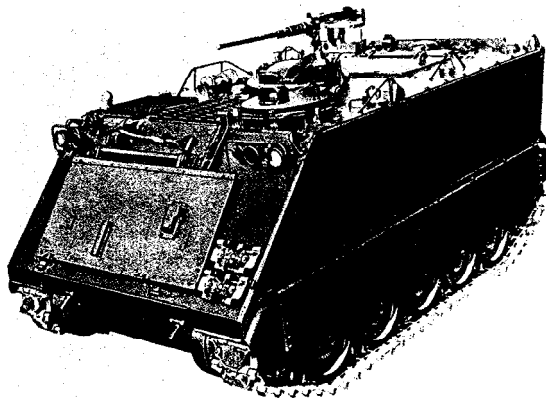

Figure 26. --Armored Personnel Carrier, M113.

General Characteristics:

The M113 is a lightweight, armored, air-droppable vehicle designed to transport personnel and cargo. It is capable of water operations on inland lakes and streams, of extended cross-country travel over rough terrain, and of high speed over improved roads. This vehicle has limited mobility in marshy terrain. The water operation is limited by its poor ability to negotiate river and canal banks without aid.

Specific Data:

Length:	15 feet 11 1/2 inches
Width:	8 feet 9 3/4 inches
Height:	6 feet
Weight:	20,310 lbs.

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Capacity:

Weight:	3,210 lbs.
Cargo:	9 feet 2 inches by 8 feet 1/2 inch by 5 feet 2 inches
Personnel:	13 including crew

Speed:

Improved Roads:	40 miles per hour
Cross-Country:	8-12 miles per hour
Water:	3.5 miles per hour

Armor Protection:

Aluminum (small arms)

Armament:

Machinegun, caliber .50

Communications:

Vehicle is configured for installation of an FM AN/VRC-12 series radio.

Range:

200 miles

Gradeability:

60 percent

Ground Clearance:

1 foot 4 inches

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Provided by www.marines.cc

LANDING VEHICLE, TRACKED, PERSONNEL, MODEL 5, LVTP5A1

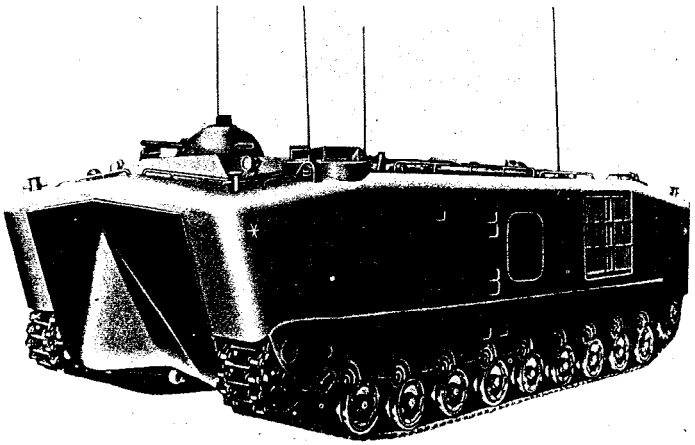

Figure 27.--Landing Vehicle, Tracked, Personnel, Model 5, LVTP5A1.

General Characteristics:

The LVTP5 (Armored Amphibian Assault Personnel and Cargo Carrier) is a tracked, armored amphibian, assault personnel carrier designed for assault operations from ship to inland areas. The mobility of this vehicle in delta regions is limited due to the ground pressure of 9.22 PSI loaded. When the cargo compartment is modified to accommodate additional communication equipment, desk space, chairs, and map boards, it is designated as an Armored Amphibian Assault Command Vehicle (LVTP5A1(CMD)).

Specific Data:

Length:	29 feet 8 inches
Width:	11 feet 8 1/2 inches
Height:	9 feet 7 inches
Weight:	65,700 lbs. (less crew, fuel, and OEM)

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Capacity:

Weight:	12,000 lbs. for water operation; 18,000 for land
Cargo:	11 feet 5 inches by 7 feet 3 inches by 5 feet 6 inches
Personnel:	28-37 including crew of 3

Speed:

Improved Roads:	29 miles per hour
Cross-Country:	8-12 miles per hour
Water:	6.7 miles per hour

Armor Protection:

Yes

Armament:

Machinegun, caliber .30

Communications:

Command Tractor

1	AN/PRC-41	UHF	225-399.9 MCS
1	AN/PRC-47	HF USB	2-12 MCS
1	AN/VRC-44	FM	30-75.95 MCS
1	AN/VRC-47	FM	30-75.95 MCS
2	AN/VRC-53	FM	30-75.95 MCS

Cargo Tractor

1	AN/VRC-44	FM	30-75.95 MCS
1	AN/VRC-46	FM	30-75.95 MCS

Range:

9 hours land; 9 hours water

Gradeability:

70 percent

Ground Clearance:

11 inches

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LANDING VEHICLE, TRACKED, HOWITZER, MODEL 6, LVTH6A1

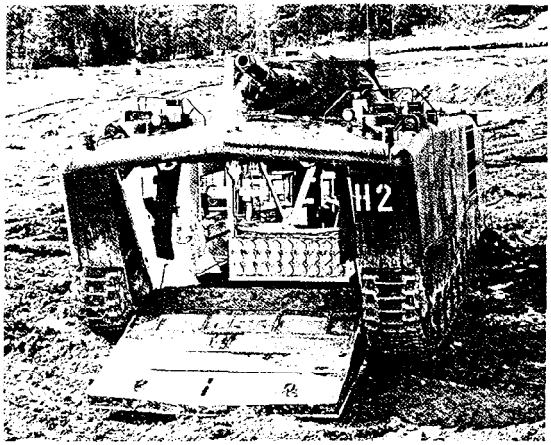

Figure 28. --Landing Vehicle, Tracked, Howitzer, Model 6, LVTH6A1.

General Characteristics:

The LVTH6 (Armored Amphibian Assault Vehicle, Turreted with a 105mm Howitzer) is a full-tracked amphibian vehicle designed to provide close fire support during landing operations by initially delivering direct fire on the landing beaches; and after landing, provide artillery fire in support of operations ashore. The mobility of this vehicle in delta regions is limited due to the high ground pressure of 9.22 PSI.

Specific Data:

Length:	29 feet 8 inches
Width:	11 feet 8 1/2 inches
Height:	13 feet 4 1/2 inches
Weight:	79,800 lbs.

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Capacity:

Weight:	5,000 lbs. (combat loaded incl. 100 howitzer rds.)
Cargo:	None
Personnel:	7 including crew and gunners

Speed:

Improved Roads:	30 miles per hour
Cross-Country:	10-12 miles per hour
Water:	6.8 miles per hour

Armor Protection:

Yes

Armament:

Cannon, 105mm howitzer
Machinegun, caliber .30
Machinegun, caliber .50

Communications:

Armored Command Tractor

1 AN/PRC-47	HF USB	2-12 MCS
1 AN/VRC-44	FM	30-75.95 MCS

Armored Tractor

1 AN/VRC-44	FM	30-75.95 MCS

Range:

Land: 190 miles @ 20 m.p.h.; Water: 57 miles @ 6 m.p.h.

Gradeability:

70 percent

Ground Clearance:

11 inches

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LANDING CRAFT VEHICLE PERSONNEL, LCVP

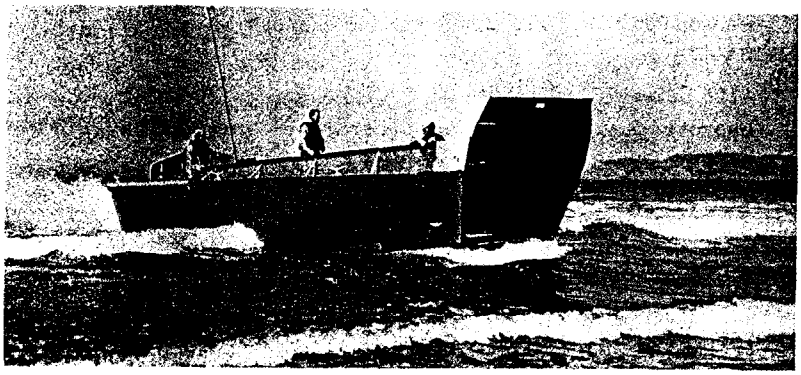

Figure 29.--Landing Craft Vehicle Personnel, LCVP.

General Characteristics:

The LCVP is constructed of wood, with 1/4 inch armor. It has a "V" bottom, and is capable of transporting supplies and personnel from ship-to-shore. It is a suitable craft for use in riverine operations in type II and III environments.

Specific Data:

Length:	35 feet 9 inches
Width:	10 feet 6 1/2 inches
Weight:	18,500 lbs.

Capacity:

Weight:	8,000 lbs.
Cargo:	17 feet 4 inches by 6 feet 4 inches
Personnel:	39 including crew

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Speed:

10.4 miles per hour

Armor Protection:

1/4 inch armor, steel

Armament:

None

Range:

110 nautical miles

Provided by www.marines.cc

36' LANDING CRAFT, PERSONNEL, LCP(R)

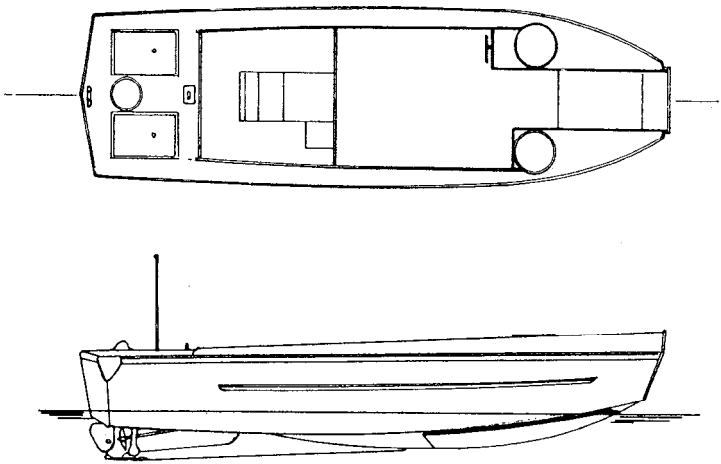

Figure 30. --36' Landing Craft, Personnel, LCP(R).

General Characteristics:

This craft is a V-bottom, wood frame, plywood sides and double planked bottom. It is designed to land and retrieve personnel in amphibious operations. With a draft of 3 feet 6 inches, it is considered to be a suitable craft in type II and III riverine environments.

Specific Data:

Length:	35 feet 11 3/4 inches
Width:	10 feet 9 1/2 inches
Weight:	16,000 lbs.

Capacity:

Weight:	8,595 lbs.
Personnel:	39 including crew

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Speed:

10 knots with full load

Armor Protection:

None

Armament:

None

Range:

110 miles at full power

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LANDING CRAFT, MECHANIZED, LCM(3)

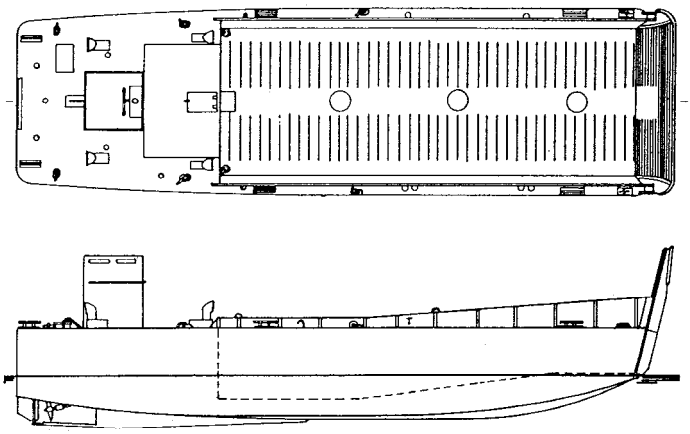

Figure 31. --Landing Craft, Mechanized, LCM(3).

General Characteristics:

The LCM(3) is designed for carrying cargo or personnel from ship-to-shore or from fixed bases or mobile sea-bases to suitable staging areas along the larger canals and rivers. Due to the craft's length, a wide turning radius would be required. Its draft of 4 feet loaded requires a fairly deep river.

Specific Data:

Length:	50 feet
Width:	14 feet
Weight:	50,700 lbs.

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Capacity:

Weight:	60,000 lbs.
Cargo:	31 feet 6 inches by 10 feet 11 inches
Personnel:	100 including crew

Speed:

11.5 miles per hour

Armor Protection:

None

Armament:

None

Range:

130 miles

Provided by www.marines.cc

LANDING CRAFT, MECHANIZED, LCM(6)

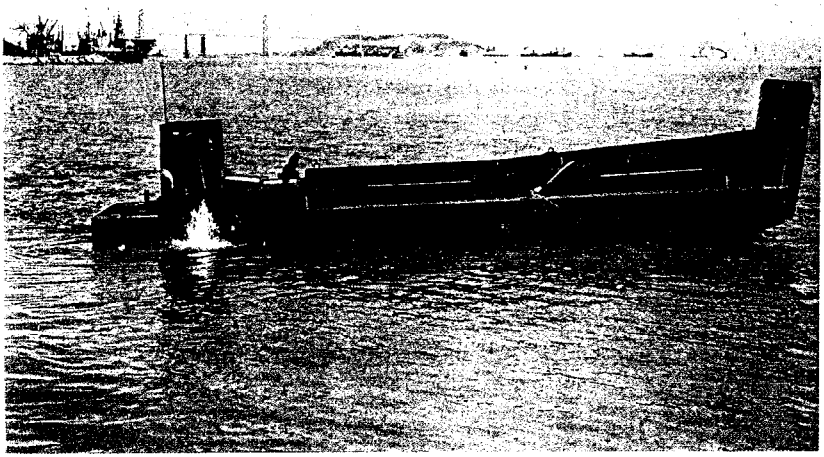

Figure 32. --Landing Craft, Mechanized, LCM(6).

General Characteristics:

The LCM(6) is designed to carry cargo and personnel from ship-to-shore or from fixed or mobile sea-bases to suitable staging areas along shores of large rivers. Due to the craft's length and draft of 3 feet 10 inches loaded, its mobility would be limited to the rivers and canals of type II and III riverine environments.

Specific Data:

Length:	56 feet
Width:	14 feet
Weight:	52,000 lbs.

Capacity:

Weight:	34 tons
Cargo:	37.5 feet by 10.9 feet
Personnel:	107-120 including crew

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Speed:

10.9 miles per hour

Armor Protection:

None

Armament:

None

Range:

130 nautical miles

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LANDING CRAFT, MECHANIZED, LCM(8)

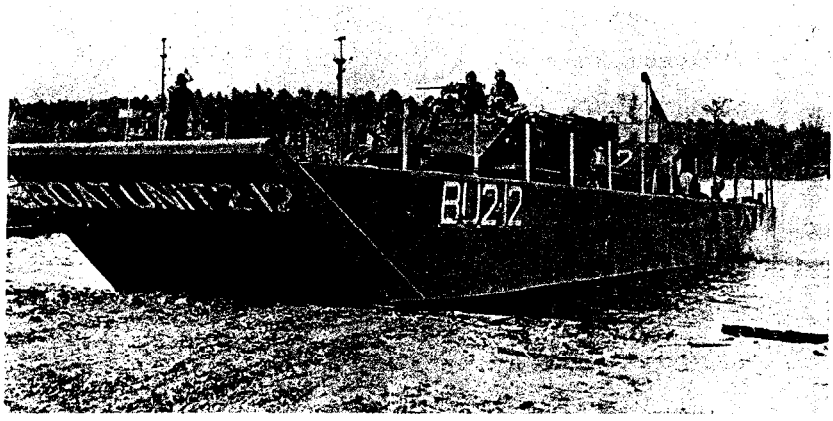

Figure 33.--Landing Craft, Mechanized, LCM(8).

General Characteristics:

The LCM(8) was designed for ship-to-shore movement of personnel and cargo. The physical size of the craft and the draft of 5 feet 2 inches loaded will limit its use to rivers and canals in the lower sector of type II and III riverine environments.

Specific Data:

Length:	73 feet 6 inches
Width:	21 feet
Weight:	134,000 lbs.

Capacity:

Weight:	120,000 lbs.
Cargo:	45 feet by 14 feet 8 inches by 4 feet 3 inches
Personnel:	200 including crew

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Speed:

10.4 miles per hour

Armor Protection:

None

Armament:

None

Range:

190 nautical miles

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UTILITY LANDING CRAFT, LCU

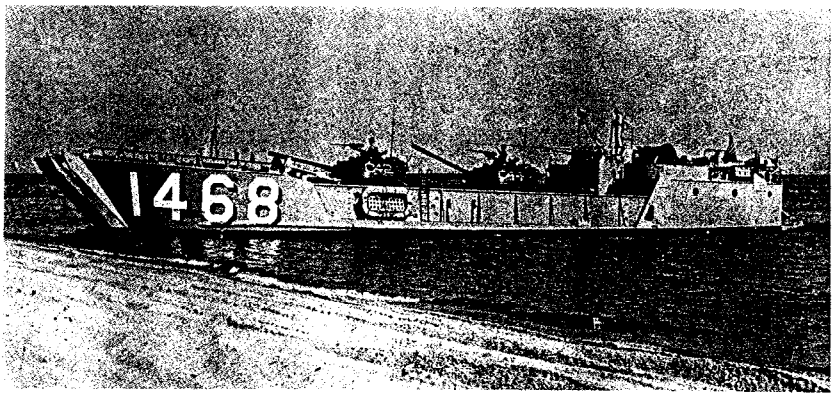

Figure 34.--Utility Landing Craft, LCU (1466 Class*).

* The superstructure is on the starboard side of the 1610 class permitting stern loading.

General Characteristics:

The LCU is employed for transporting tanks and other large vehicles from ship-to-shore in amphibious operations. General cargo and personnel may also be landed by this craft. Due to its size and a draft of 5 feet 3 inches, this craft will be limited to large rivers and canals of a type III riverine environment.

Specific Data:

	1466/1608 Class	1610 Class
Length:	118.7 feet	135 feet
Width:	34.7 feet	29 feet
Weight:	392,000 lbs.	370,000 lbs.

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	1466/1608 Class	1610 Class
Capacity:		
Weight:	340,000 lbs.	360,000 lbs.
Cargo:	Length: 76 feet Width: 14.6 feet to 30 feet	Length: 121 feet Width: 18 feet to 25 feet
Speed:		
Water:	6 knots (loaded)	8 knots (loaded)
Armor Protection:		
	None	None
Armament:		
	Two single 40mm	Two single 40mm
Range:		
	1250 nautical miles at 6 knots	1200 nautical miles at 8 knots

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PATROL BOAT RIVER, PBR

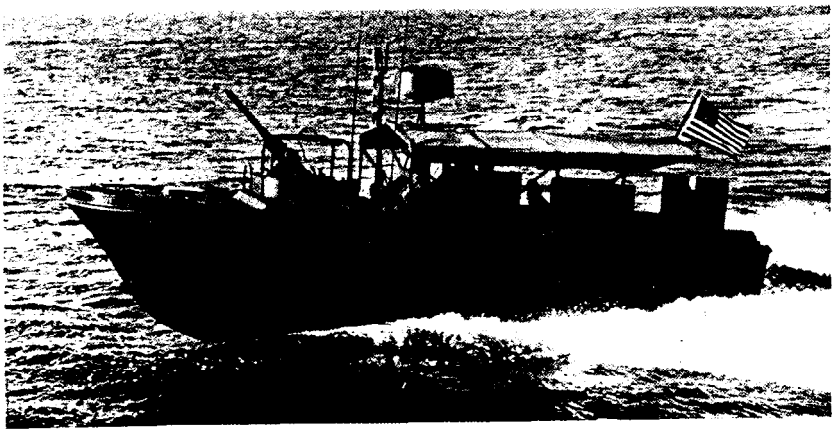

Figure 35. --Patrol Boat River, PBR.

General Characteristics:

The PBR is designed for river patrol and related missions. This craft is armored and propelled by twin water jets. This craft has a draft of two feet five inches.

Specific Data:

Length:	32 feet 7 inches
Width:	10 feet 3 3/4 inches
Weight:	14, 500 lbs. (full-load displacement)

Capacity:

Weight:	2, 000 lbs.
Personnel:	6 including crew and gunners

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Speed:

Water: 25 knots

Armor Protection:

Yes

Armament:

1 - Twin .50 cal. machinegun
1 - Single .30 cal. machingegun

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PATROL CRAFT, FAST, PCF

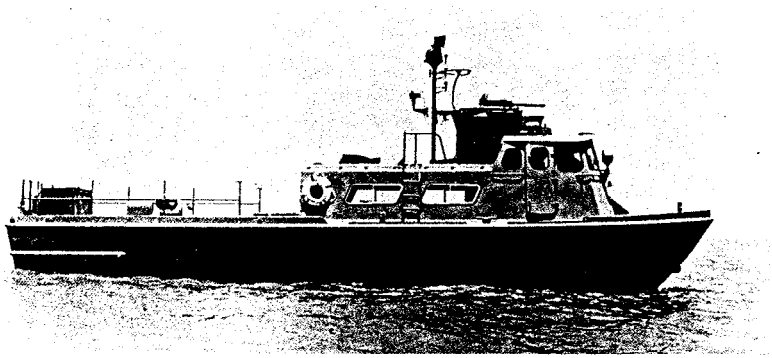

Figure 36. --Patrol Craft, Fast, PCF.

General Characteristics:

The PCF is a highly maneuverable river patrol craft. It is well armed to perform its intended mission of river patrol. It has a draft of 3 feet six inches.

Specific Data:

Length:	50 feet 1 1/2 inches
Width:	13 feet 5 inches
Weight:	43,000 lbs. (full-load displacement)

Capacity:

Weight:	10,000 lbs.
Personnel:	6 including crew and gunners

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Speed:

Water: 27 knots

Armor Protection:

No

Armament:

1 - Twin .50 cal. machinegun
1 - Combination mount consisting of an 81mm mortar and a .50 cal. machinegun

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AIR SLED

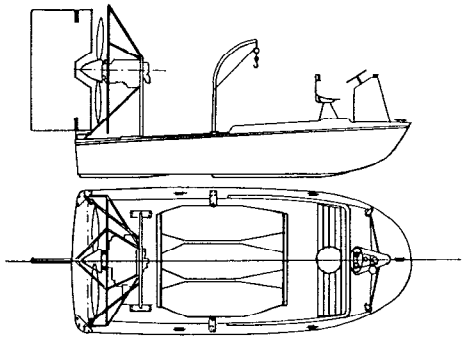

Figure 37.--Air Sled.

General Characteristics:

The air sled is a flat bottomed, fiberglass reinforced, plastic craft, designed to perform shallow water rescue operations. This craft is suitable for operations on fairly calm waters and on some vegetation choked streams. It has a draft of only 6 inches.

Specific Data:

Length:	20 feet 11 inches
Width:	7 feet 11 inches
Weight:	2,400 lbs.

Capacity:

Weight:	1,000 lbs.
Personnel:	3 litters and 2 crew members

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Speed:

27 knots

Armor Protection:

None

Armament:

None

Range:

50 nautical miles

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APPENDIX B

CRAFT INDIGENOUS TO SOUTHEAST ASIA AND CRAFT MODIFIED FOR USE IN A RIVERINE ENVIRONMENT

This appendix contains a catalog of some of the craft indigenous to Southeast Asia that have been used by forces operating in a riverine environment. Also included are U. S. landing craft that have been modified to perform special functions or make them more suitable for riverine operations. The craft shown in this appendix are simply representative craft and not a comprehensive list of craft that can be utilized by the riverine force. Prior to conducting operations in any riverine environment, the intelligence collection plan should include a determination of the number and type of indigenous craft which might be available to the riverine force. Craft included in this appendix are:

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Vedette STCAN	174
Command Junk	176
Armored LCVP	178
LCM Monitor	180
LCM Commandament	182

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DONG NAI SWIMMER SUPPORT BOAT, SSB

Figure 38.--Dong Nai Swimmer Support Boat, SSB

General Characteristics:

The SSB is constructed of bonded polystyrofoam planks covered with fiberglass. It can operate in moderately rough and vegetated waters, with a draft of one foot without engine or two feet with engine. Insufficient freeboard allows craft to take on water when in a slight chop. This craft can be manhandled by six men during difficult portage operations.

Specific Data:

Length:	14 feet 3 inches
Width:	6 feet 10 inches
Height:	2 feet
Weight:	375 lbs.

Capacity:

Weight:	2, 100 lbs.
Personnel:	14 including crew, @ 150 lbs. per man

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Speed:

25.5 miles per hour no load, 17 miles per hour loaded utilizing 40 HP outboard motor

Armor Protection:

None

Armament:

None

Range:

50 miles (est)

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VEDETTE STCAN

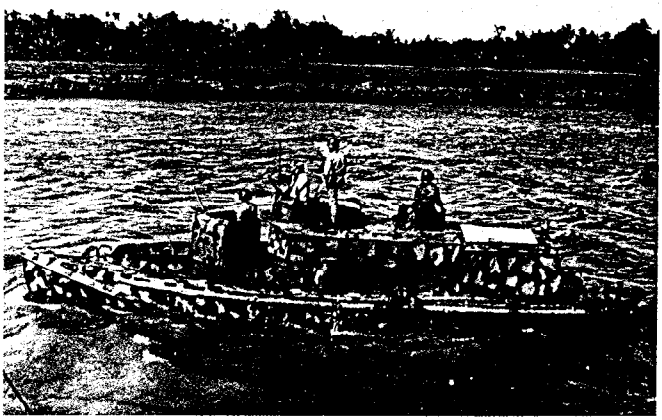

Figure 39. --Vedette STCAN.

General Characteristics:

The STCAN is used for fire support, minesweeping, and patrol missions. The basic hull is of French design, of steel, and has a V-bottom. This craft has a draft of three feet with full load.

Specific Data:

Length:	36 feet
Width:	9 feet 7 inches
Height:	8 feet
Weight:	26,000 lbs. (full-load displacement)

Capacity:

Personnel:	8 including crew and gunners

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Speed:

10 knots

Armor Protection:

Yes

Armament:

1 - .50 caliber MG
3 - .30 caliber MG
1 - .30 caliber BAR
1 - .45 caliber SMG
1 - .30 caliber rifle M1

Range:

48 miles at full speed

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COMMAND JUNK

Figure 40. -- Command Junk.

General Characteristics:

Junks can be used for patrol, surveillance, and interdiction. This craft has a shallow draft of two feet six inches. Sails can be used on this craft.

Specific Data:

Length:	55 feet 9 inches
Width:	15 feet 9 inches

Capacity:

Personnel:	35 including crew of 10

Speed:

10 knots

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Armor Protection:

None

Armament:

1 - .50 caliber MG
1 - .30 caliber MG
1 - .30 caliber BAR
1 - .45 caliber SMG
2 - .30 caliber rifle M1

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ARMORED LCVP

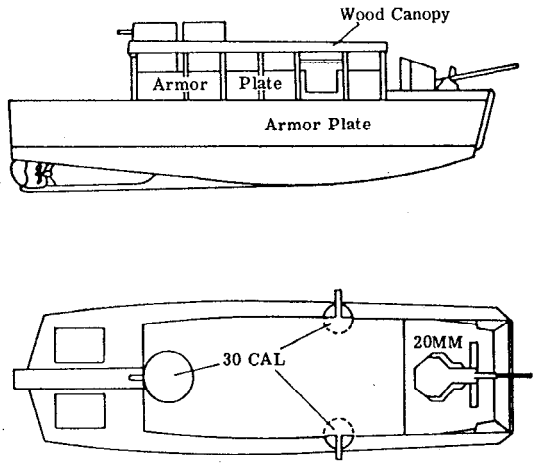

Figure 41.--Armored LCVP.

General Characteristics:

The armored LCVP is used for transporting troops, gunfire support, and minesweeping. The basic hull is that of the U. S. LCVP with armor plate added and the ramp cut down. This craft has a draft of four feet with full load.

Specific Data:

Length:	35 feet 9 inches
Width:	10 feet 6 inches
Height:	8 feet 1 inch
Weight:	30,000 lbs. (full-load displacement)

Capacity:

Weight:	8,000 lbs.
Personnel:	21 including crew and gunners

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Speed:

Water: 8 knots

Armor Protection:

Yes

Armament:

1 - 20mm MK2 or MK4
3 - .30 caliber MG

Range:

80 miles

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LCM MONITOR

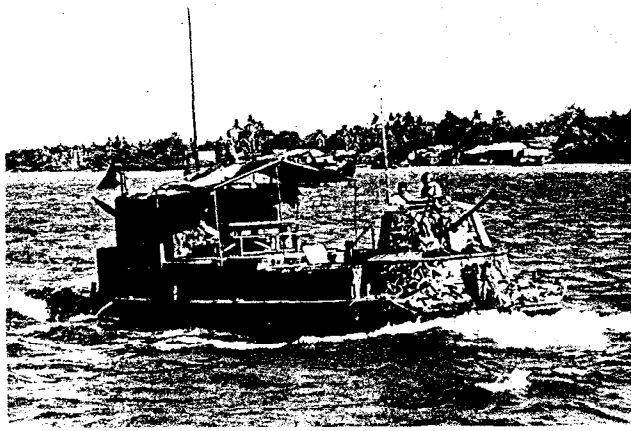

Figure 42. --LCM Monitor.

General Characteristics:

The LCM Monitor is used for gunfire support. Its basic hull is an LCM(6) with a rigid bow. With a full load this craft has a draft of four feet three inches.

Specific Data:

Length:	56 feet 5 inches
Width:	14 feet
Height:	20 feet
Weight:	112, 000 lbs. (full-load displacement)

Capacity:

Personnel:	10 including crew and gunners

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Speed:

8 knots

Armor Protection:

Yes

Armament:

1 - 40mm M3
2 - 20mm MK2 or MK4
1 - .50 caliber MG
1 - 81mm mortar
2 - .30 caliber BAR
2 - .45 caliber SMG

Range:

27 hours or 165 miles

Provided by www.marines.cc

LCM COMMANDAMENT

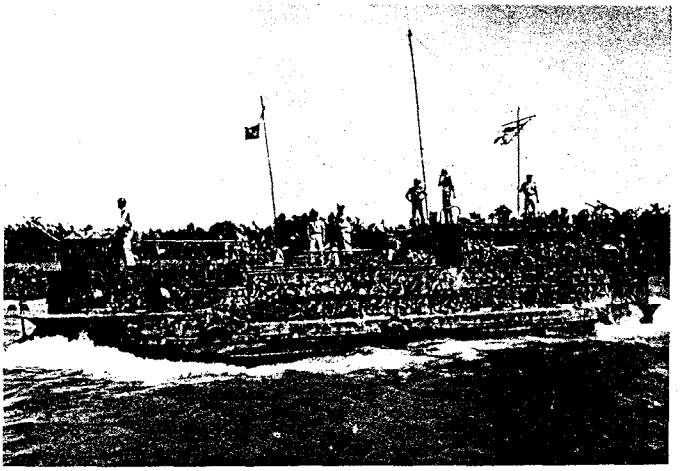

Figure 43.--LCM Commandament.

General Characteristics:

The LCM Commandament is used as a mobile command boat and for gunfire support. Its basic hull is an LCM(6) with rigid bow. This craft has a draft of four feet six inches with full load.

Specific Data:

Length:	65 feet 5 inches
Width:	14 feet
Height:	25 feet
Weight:	130,000 lbs. (full-load displacement)

Capacity:

Personnel:	10 including crew and gunners

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Speed:

8 knots

Armor Protection:

Yes

Armament:

2 - 20mm MK2 or MK4
1 - 81mm mortar
2 - .30 caliber BAR
2 - .45 caliber SMG

Range:

165 miles

Provided by www.marines.cc

APPENDIX C

PROTOTYPE VEHICLES AND CRAFT

This appendix contains a catalog of vehicles and craft in the prototype stage of development which will be of potential use to forces engaged in operations in a riverine environment. Prototype vehicles and craft included in this appendix are:

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Landing Craft, Assault, LCA-X1	194
Marsh Screw Amphibian	196
Air Cushion Vehicle, SK-5	198
Air Boat, JBX-21	200

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TRUCK, CARGO, 5 TON, 8X8, XM-656

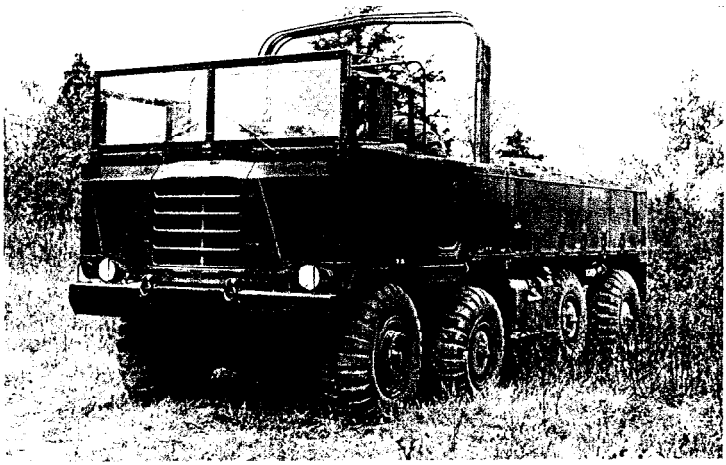

Figure 44.--Truck, Cargo, 5 Ton, 8x8, XM-656.

General Characteristics:

The XM-656 is capable of cross-country operations on semifirm, moderately-dissected terrain. This vehicle is floatable and can navigate lakes, streams, and slow moving rivers. The vehicle has the ability to negotiate gently inclined, firm structured riverbanks. The average ground pressure of 11-12 PSI is considered excessive for operations over most heavily irrigated and swampy terrain.

Specific Data:

Length:	23 feet
Width:	8 feet
Height:	8 feet 10 1/2 inches
Weight:	15,600 lbs.

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Capacity:

Weight:	10,400 lbs.
Cargo:	110 square feet
Personnel:	20 including crew

Speed:

Improved Roads:	50 miles per hour
Cross-Country:	8-12 miles per hour
Water:	2 miles per hour

Armor Protection:

None

Armament:

None

Range:

300-400 miles (approx.)

Gradeability:

60 percent

Ground Clearance:

1 foot

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CARRIER, UTILITY, ARTICULATED, XM-571

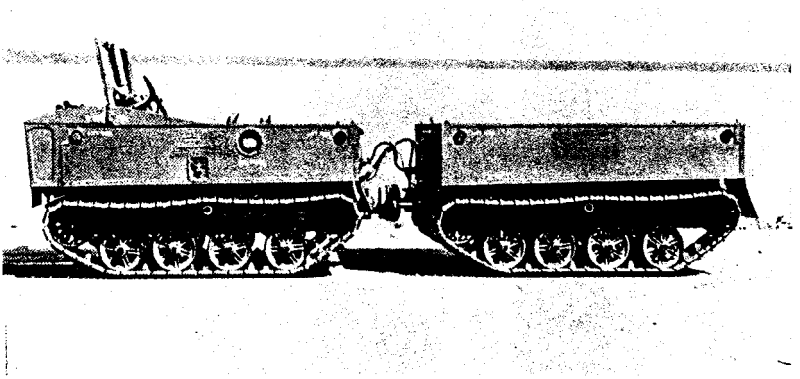

Figure 45.--Carrier, Utility, Articulated, XM-571.

General Characteristics:

The XM-571 is a dual body, articulated, tracked vehicle. This vehicle exhibits high mobility due to its low average ground pressure of 1.7-2.0 PSI. This vehicle has good mobility in marsh, swamp, and muskeg terrain. It is floatable and can navigate lakes, streams, and slow moving rivers and has the ability to negotiate moderately inclined semi-firm structured riverbanks and the dikes in the rice paddy areas.

Specific Data:

Length:	Front unit 9 feet 3 1/2 inches; rear unit 10 feet 7 1/2 inches
Width:	Front unit 5 feet 4 inches; rear unit 5 feet 4 inches
Height:	Front unit 6 feet; rear unit 6 feet
Weight:	Front unit 3,165 lbs.; rear unit 2,230 lbs.

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Capacity:

Weight:	Front 500 lbs.; rear 1,500 lbs.
Cargo:	Front 18 cubic feet; rear 60 cubic feet
Personnel:	10 including driver

Speed:

Improved Roads:	30 miles per hour
Cross-Country:	20 miles per hour
Water:	2 miles per hour

Armor Protection:

None

Armament:

None

Range:

267 miles

Gradeability:

60 percent

Ground Clearance:

1 foot

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CARRIER, CARGO, 6 TON, TRACKED, XM-548E1

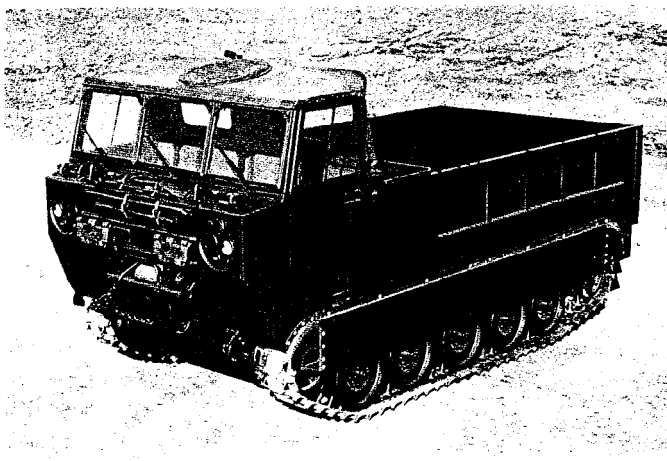

Figure 46.--Carrier, Cargo, 6 Ton, Tracked, XM-548E1.

General Characteristics:

The XM-548E1 is a lightweight, unarmored, full-tracked amphibian vehicle. This vehicle is capable of limited water, cross-country, and marshy mobility. The water operations are limited by its poor ability to negotiate river and canal banks without aid.

Specific Data:

Length:	17 feet 11 inches
Width:	8 feet 10 inches
Height:	8 feet 7 inches
Weight:	14,450 lbs.

Capacity:

Weight:	10,000 lbs.
Cargo:	10 feet 10 5/8 inches x 8 feet 1/2 inch x 6 feet
Personnel:	14 including crew

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Speed:

Improved Roads:	40 miles per hour
Cross-Country	8-12 miles per hour
Water:	3.6 miles per hour

Armor Protection:

None

Armament:

None

Range:

300 miles

Gradeability:

60 percent

Ground Clearance:

1 foot 4 inches

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CARRIER, CARGO, SOFT-TIRE TRACK, 1 1/2 TON, XM-759

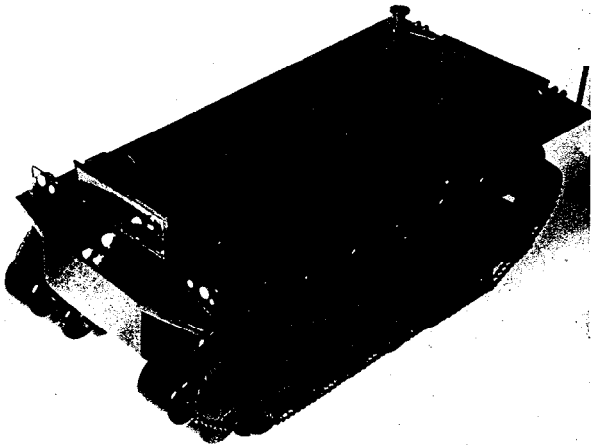

Figure 47.--Carrier, Cargo, Soft-Tire Track, 1 1/2 Ton, XM-759.

General Characteristics:

The XM-759 is a marginal terrain, pneumatic tired, full-tracked vehicle. This vehicle will have excellent mobility in delta areas. Its mobility over the canals and riverbanks will be excellent. Damage to the pneumatic tires may occur when operating in thick brush and small tree infested areas. The mechanical and maintenance deficiencies encountered during testing of prototype model have been greatly reduced in following models. The XM-759 has an average ground pressure of 1.5 PSI.

Specific Data:

Length:	20 feet 2 inches
Width:	9 feet
Height:	6 feet
Weight:	10,000 lbs.

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Capacity:

Weight:	3,000 lbs.
Cargo:	12 feet x 4 feet x 4 feet (est)
Personnel:	16 including crew of 2

Speed:

Improved Roads:	30 miles per hour
Cross-Country:	8-12 miles per hour
Water:	6 miles per hour

Armor Protection:

None

Armament:

None; however, there is a bow installation for an M60 or .50 caliber machinegun or a 40mm grenade launcher.

Range:

200 miles at 20 miles per hour

Gradeability:

60 percent

Ground Clearance:

2 feet 8 inches

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LANDING CRAFT, ASSAULT, LCA-X1

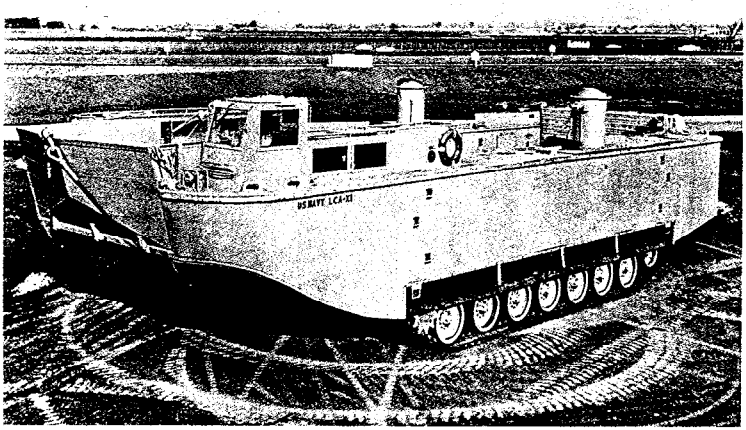

Figure 48.--Landing Craft, Assault, LCA-X1.

General Characteristics:

The LCA is a tracked amphibian designed to carry personnel and cargo ashore. This vehicle is capable of negotiating rough water, difficult beaches, sand dunes, and some inland terrain. This vehicle has a ground pressure of 10.1 PSI loaded.

Specific Data:

Length:	56 feet 9 inches
Width:	21 feet
Height:	14 feet 2 inches
Weight:	76,400 lbs.

Capacity:

Weight:	60,000 lbs.
Cargo:	47 feet 7 inches x 11 feet 6 inches x 8 feet
Personnel:	161 including crew

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Speed:

Improved Roads:	20 miles per hour
Cross-Country:	8-12 miles per hour
Water:	13.8 miles per hour

Armor Protection:

None

Armament:

None

Range:

10 hours (8 water; 2 land)

Gradeability:

60 percent

Ground Clearance:

1 foot 6 inches

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MARSH SCREW AMPHIBIAN

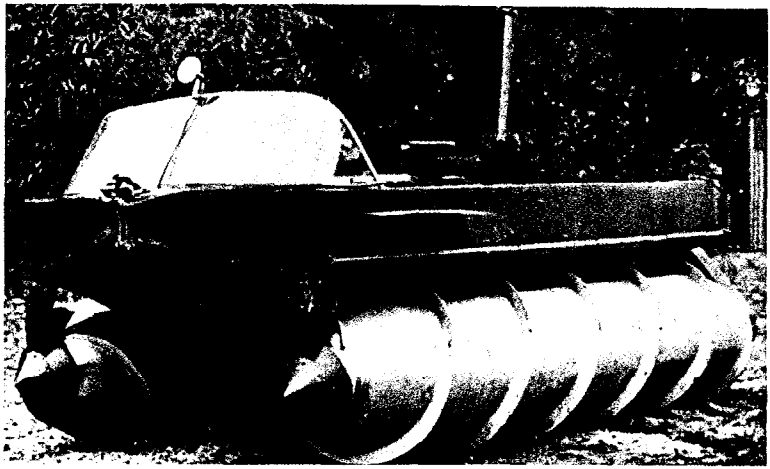

Figure 49. --Marsh Screw Amphibian.

General Characteristics:

This vehicle can travel at significant speeds over deep swamps and marshes, rice paddies, mudbanks, and bogs. The vehicle can operate well in water and wet environments. Its high water speed enables the vehicle to navigate swift rivers. The vehicle has the ability to negotiate moderately inclined, soft structured banks. It is limited in obstacle-climbing ability and cannot travel on hard ground, but it is capable of crossing roadways, dikes, and levees.

Specific Data:

Length:	13 feet 8 inches
Width:	8 feet 2 inches
Height:	5 feet 6 inches (est)
Weight:	2,825 lbs.

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Capacity:

Weight:	3,000 lbs.
Cargo:	110-120 cubic feet (est)
Personnel:	7-9 including crew

Speed:

Improved Roads:	Vehicle cannot operate on roads
Cross-Country:	8-12 miles per hour
Water:	10-14 miles per hour

Armor Protection:

None

Armament:

None

Range:

125 miles (est)

Gradeability:

60-70 percent

Ground Clearance:

1 foot 8 inches

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AIR CUSHION VEHICLE, SK-5

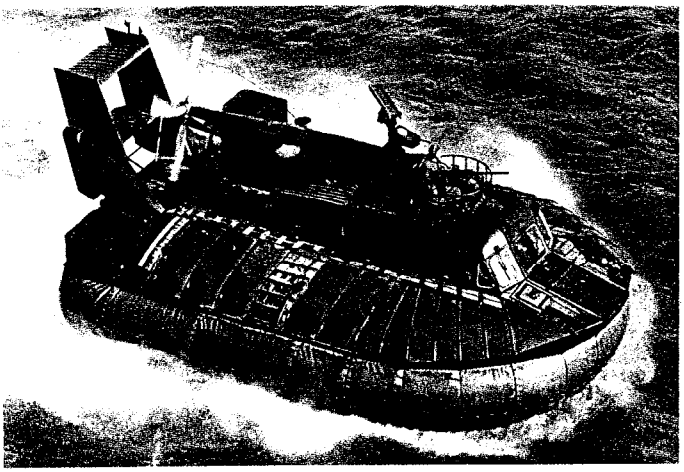

Figure 50. --Air Cushion Vehicle, SK-5.

General Characteristics:

The SK-5 has the capability of negotiating moderately inclined and near vertical banks, provided the height of the vertical bank is within its obstacle-climbing ability (3 feet 6 inches) and provided it can develop sufficient entry speed. The vehicle can cross ditches and canals up to 22 feet in width. The operation is not dependent on ground contact, permitting smooth ride over rough surfaces and exerting a surface pressure of only .20 PSI.

Specific Data:

Length:	39 feet 5 inches
Width:	22 feet 9 inches
Height:	16 feet 6 inches
Weight:	10,300 lbs.

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Capacity:

Weight:	3,000-5,000 lbs.
Cargo:	529 cubic feet
Personnel:	20 including crew

Speed:

Improved Roads:	40-50 miles per hour
Cross-Country:	45 miles per hour
Water:	40-60 miles per hour

Armor Protection:

None

Armament:

Can be configured for automatic light weapons and mortars.

Range:

200-250 miles

Gradeability:

18 percent continuous, 35 percent for 150 feet

Ground Clearance:

6-8 inch skirts, 4.5 feet hard surface

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AIR BOAT, JBX-21

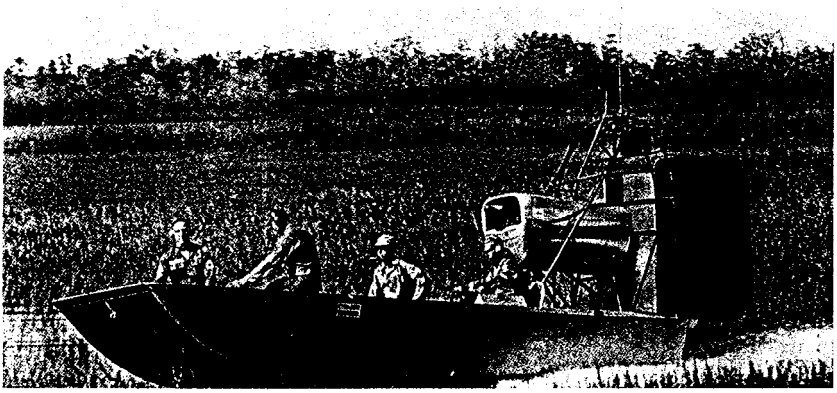

Figure 51.--Air Boat, JBX-21.

General Characteristics:

The JBX-21 is an air-propelled, flat-bottomed, shallow-draft boat. This craft is capable of negotiating swamp vegetation, mud, shallow rivers, and canals. This craft will have good mobility in a riverine environment, especially in delta regions. The only limiting feature of this craft is its very high operating noise level.

Specific Data:

Length:	20 feet 6 inches
Width:	9 feet
Height:	8 feet 6 inches
Weight:	2,650 lbs.

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Capacity:

Weight:	2,000 lbs.
Cargo:	11 feet x 7 feet x 6 feet
Personnel:	13 including crew

Speed:

30 knots

Armor Protection:

None

Armament:

Armament kit for automatic light weapons.

Range:

60 miles

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APPENDIX D

CONCEPT OF CRAFT/BOATS FOR USE IN A RIVERINE ENVIRONMENT

This appendix presents a concept of a family of boats suitable for employment by a rifle company conducting operations in a riverine environment. While all are suitable for operations in a type III environment, their use in type I and II environments will be limited.

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COMPANY MOTHER SHIP
(MODIFIED 1610 CLASS LCU)

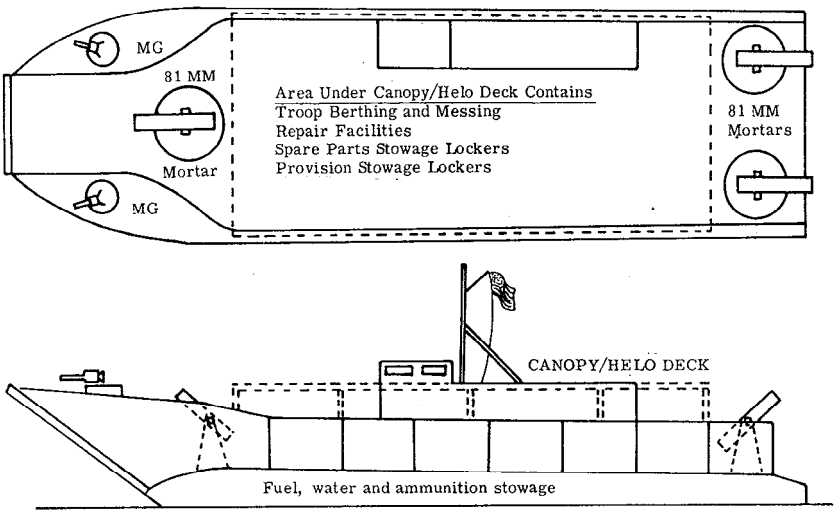

Figure 52. --Company Mother Ship (Modified 1610 Class LCU).

Length:	135 feet
Beam:	29 feet
Draft:	3 1/2 feet forward (beaching condition); 6 feet aft
Armament:	7.62mm MGs
	50 caliber MGs
	20mm Rapid Fire Cannon
	40mm Automatic Grenade Launchers
	81mm Mortars
Speed:	9 knots (loaded)
	11 knots (light)

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FIRE SUPPORT BOAT

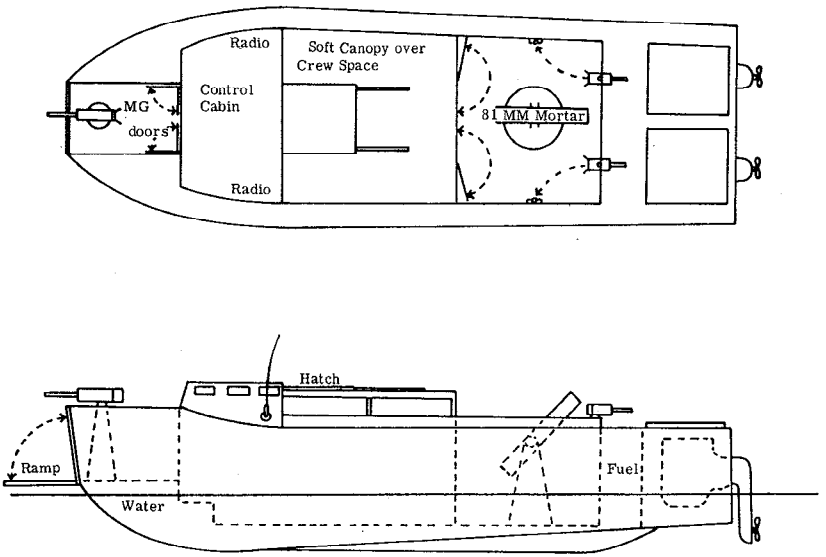

Figure 53. --Fire Support Boat.

Length:	Approximately 30 feet
Beam:	Approximately 10 feet
Draft:	Approximately 2 1/2 feet
Armament:	Two 7.62mm MGs (Pinion mount to allow shifting for best field of fire)
	One 50 caliber MG
	20mm Rapid Fire Cannon
	One 81mm Mortar
Speed:	15-20 knots
Propulsion:	Twin Diesel Inboard/Outboard Drives

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COMMAND BOAT

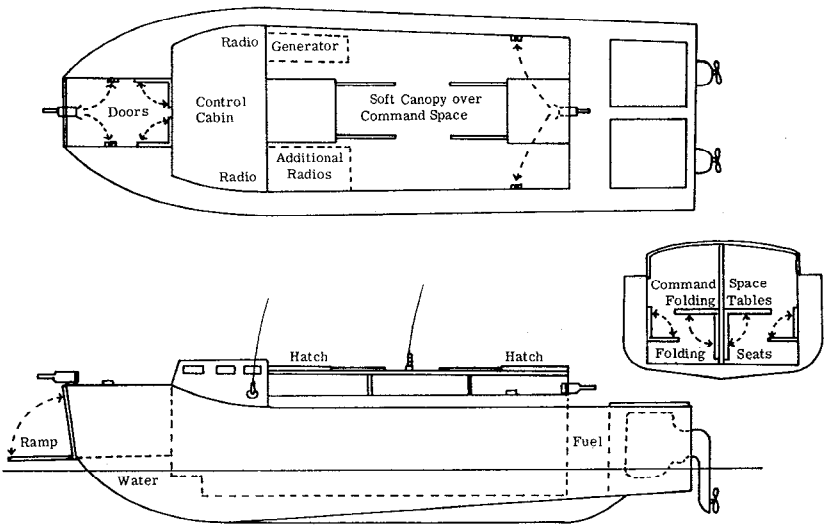

Figure 54.--Command Boat.

Length:	Approximately 30 feet
Beam:	Approximately 10 feet
Draft:	Approximately 2 1/2 feet
Armament:	Two 7.62mm MGs (Pinion mount to allow shifting for best field of fire)
	50 caliber MG
	40mm Automatic Grenade Launcher
Speed:	15-20 knots
Propulsion:	Twin Diesel Inboard/Outboard Drives

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BASIC RIVER BOAT - SQUAD BOAT

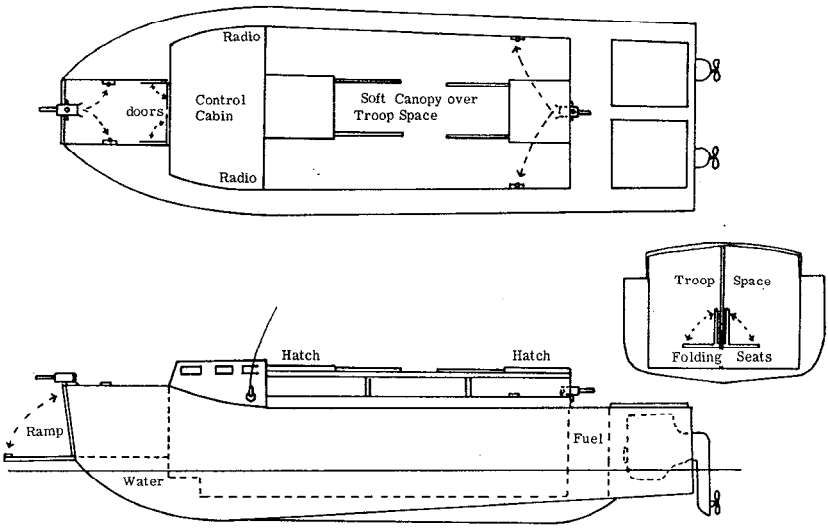

Figure 55.--Basic River Boat - Squad Boat.

Length:	Approximately 30 feet
Beam:	Approximately 10 feet
Draft:	Approximately 2 1/2 feet
Armament:	Two 7.62mm MGs (Pinion mount to allow shifting for best field of fire)
	50 caliber MG
	40mm Automatic Grenade Launcher
Speed:	15-20 knots
Propulsion:	Twin Diesel Inboard/Outboard Drives

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FIRE TEAM BOAT

Figure 56.--Three Fire Team Boats Joined.

Capacity:	6 men, combat loaded
Length:	Approximately 16 feet
Beam:	Approximately 4 feet
Draft:	Approximately 7 inches without motor; approximately 1 foot 6 inches with motor
Armament:	Receptacle to receive M60 machinegun pintle
Speed:	17-20 knots when using motor
Propulsion:	Outboard motor; 4 paddles; 2 poles
Weight:	Not to exceed 450 pounds with motor
Features:	Capable of being nested; easily portaged; simple to maintain and repair; noncritical stability; self-bailing; unsinkable
Possible Feature:	Boats capable of being joined

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FMFM 4-4, Marine Engineer Operations
FMFM 5-1, Marine Aircraft Wing (Draft)
FMFM 6-1, Marine Division
FMFM 6-2, Marine Infantry Regiment
FMFM 6-3, Marine Infantry Battalion
FMFM 6-4, Marine Rifle Company/Platoon
FMFM 7-2, Naval Gunfire Support
FMFM 7-3, Air Support
FMFM 7-4, Field Artillery Support
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