FM 17-34

DEPARTMENT OF THE ARMY FIELD MANUAL

AMPHIBIOUS TANK AND TRACTOR BATTALIONS

DEPARTMENT OF THE ARMY • JUNE, 1950

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This manual supersedes FM 60–20, 24 February 1945

AMPHIBIOUS TANK AND TRACTOR BATTALIONS

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This manual supersedes FM 60–20, 24 February 1945

PART ONE

AMPHIBIOUS TANKS AND TRACTORS IN AMPHIBIOUS OPERATIONS

CHAPTER 1

GENERAL

1. PURPOSE AND SCOPE. This manual is intended as a guide for officers and men assigned to units of the amphibious tank and tractor battalions. Part One covers vehicle characteristics and the general aspects of amphibious operations as they apply to amphibious tanks and tractors (LVT's). Part Two gives the organization, missions, and tactical employment of the units operating LVT's. Part Three covers individuals and unit special training. The manual also includes six appendixes, which comprise a list of references, the characteristics of naval landing craft and ships, a glossary of nautical terms, a glossary of terms peculiar to amphibious operations, and suggested programs of instruction.

2. REFERENCES. See appendix I.

3. CHARACTERISTICS. **a.** Amphibious tanks and tractors are full-track vehicles designed to operate on both land and water. While the term LVT (landing vehicle, tracked) applies to both tanks and tractors, LVT is used to refer to amphibious tractors only; LVT(A) (landing vehicle, tracked, armored) refers to amphibious tanks. The LVT(4) tractor and the LVT(A)(5) tank are the models which currently are used by the Army.

b. Amphibious tanks and tractors have all-metal tracks on which are grousers designed to provide propulsion in the water and traction on land. The vehicles are steered by varying the speed of the tracks.

4. CAPABILITIES. Amphibious tanks and tractors are relatively seaworthy because of their watertight compartments and efficient bilge pumps. Seaworthiness and ability to operate in surf are related directly to driver skill, discipline, and proper maintenance. They have a land speed of up to 20 miles per hour and a maximum water speed of 5.7 miles per hour in a calm sea. The water speed is reduced in proportion to the roughness of the seas, and is affected further by loads carried. A speed of 5 miles per hour in calm water should be used for planning purposes for long water movements. The cruising range is 50 miles on water and 150 miles on land. The vehicles have limited mobility on swampy ground and mud flats, but often may negotiate areas that are impassable to other vehicles. They can cross coral reefs and sand bars which are obstacles to landing craft.

5. LIMITATIONS. The design of amphibious tanks

and tractors for both land and water operation results in limitations on both types of operation. To operate in water they are lightly armored; therefore, they are highly vulnerable to large-caliber fire. Their design for land operation limits their maneuverability in water. Their characteristics create a serious maintenance problem, which is amplified by their operation over rough shores and by the corrosive action of salt water. While they can operate effectively in rough water, waves eight feet or more in height, and landing in 10-foot surf, present serious hazards. During land operations their grousers create a twofold maintenance problem—the grousers are easily bent or broken, and they cause severe damage to roads. Extended operation on land also is undesirable because it results in extensive wear on final drives, engines, and steering bands.

6. AMPHIBIOUS OPERATIONS. a. Definition. "An amphibious operation is a landing made from ships or craft to achieve an objective on land in which the forces involved are dependent primarily upon waterborne means for transport to the objective area, for initial tactical and logistical support, and in which special techniques and equipment are used in debarking on a shore.

b. Nature of an amphibious operation. An amphibious operation includes preparation of the objective for the landing, and operations of the forces involved in over-water movements, assault, and support. An amphibious operation is a joint amphibious operation when the assigned forces are composed of significant elements of more than one service of the Department of Defense. An amphibious operation usually involves the following:

(1) The preparation of plans and the training of attack force units for the particular operation.

(2) Movement of forces to the objective, their protection and support by naval and air operations.

(3) Preparation of the objective for the landing.

(4) Landing troops, equipment, and supplies over a beach, and seizure of the objective.

(5) Support of the landing and operations ashore by naval gunfire and air bombardment.

7. EMPLOYMENT IN THE ASSAULT LANDING. Landing vehicles (or landing craft) support and carry the assault boat teams of the organized waves when a landing is made on a hostile shore. They permit dispersion of troops and materiel, and render enemy fire less effective by presenting smaller targets. Amphibious vehicles normally do not make long open-sea movements. They may travel for considerable distances between islands and in quiet waters by refueling en route; however, on long movements they are carried aboard ship. Amphibious tanks are employed in leading assaults (fig. 1) against beaches, and are especially valuable where offshore conditions such as rocks or coral reefs, sand bars, shallow approaches, or man-made obstacles will prevent or impede the passage of propeller-driven craft or tanks using flotation devices. Amphibious tractors are used primarily for the transporting of troops and supplies from ship to shore (fig. 2) where the above-discussed offshore conditions preclude the use of faster landing craft.

8. PHASES OF OPERATION. An amphibious operation consists of four general phases which, although

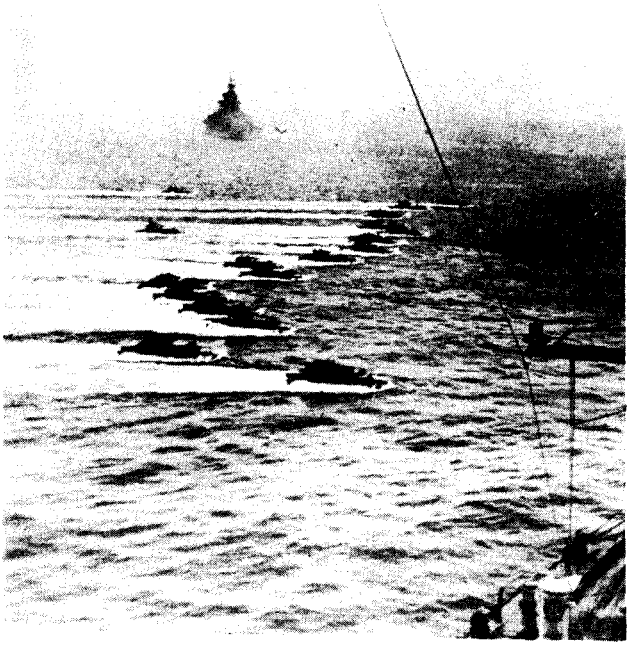


Figure 1. LVT(A)'s lead the assualt.

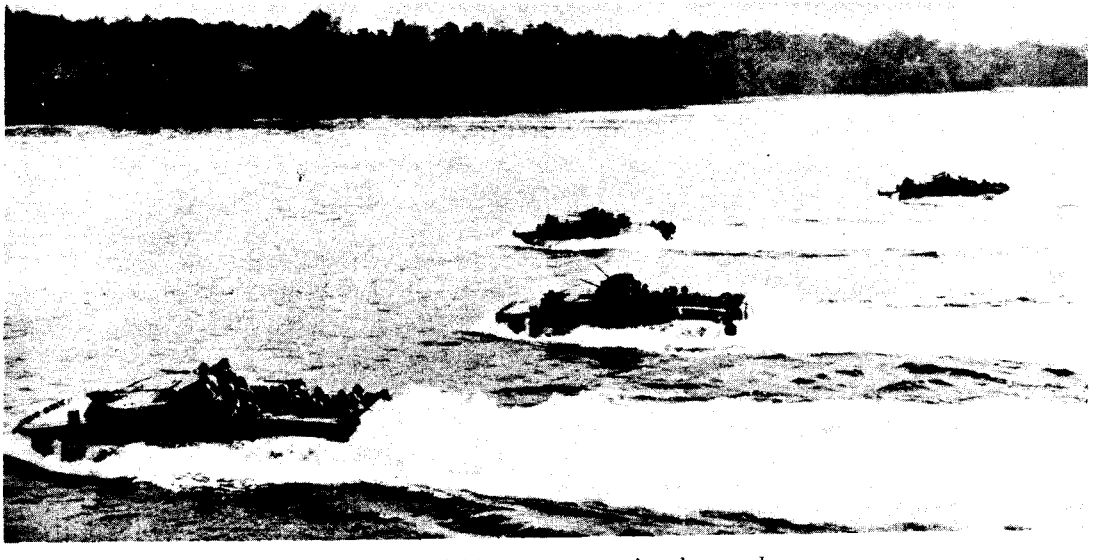


Figure 2. Amphibious tractors moving shoreward.

well defined, may overlap in execution—preparatory, movement, assault, and final.

a. Preparatory phase.

(1) The preparatory phase begins with the initial conception of the operation and concludes with the completion of actual embarkation of the amphibious forces, although softening-up action may continue until the actual assault begins. It includes all planning, training, rehearsals, mounting, staging, embarkation, and such "softening-up" actions as may be taken in connection with the operation.

(2) The interest of all three Services is equal during this phase. The authority constituting a joint force will provide for the control or coordination of this phase when no joint force commander has been designated to control the entire operation.

b. Movement phase.

(1) The movement phase begins with the completion of embarkation of the amphibious forces and concludes with the beginning of the assault as defined below.

(2) The Navy has dominant interest during this phase and control should be exercised by or through the senior naval commander.

c. Assault phase.

(1) The assault phase begins when the Naval and/or Air Force components of the joint force are prepared to support the Army assault forces in the execution of the assault substantially as planned, and terminates with the establishment of the force beachhead. The

Army has dominant interest during the assault phase and control should be exercised through or by the senior army commander.

(2) Each action of the supporting Services must be planned and executed to facilitate the assault. The success of the assault is basic to the success of subsequent operations of Army forces ashore in achieving the objective for which the operation was undertaken.

(3) Except for the inability of assault units to employ organic fire power and close with the enemy prior to arrival ashore, there is no dissimilarity in principles involved in an assault launched from the sea and an assault launched on land.

d. Final phase.

(1) The final phase of the joint amphibious operation begins with the termination of the assault phase. It terminates when the normal logistical services of the Army and Air Force are established ashore. This phase includes seizure of the objective unless it is included within the beachhead, and logistical operations incident to the consolidation of the objective. The amphibious operation terminates upon announcement to that effect by the commander of the next higher joint force or by the Joint Chiefs of Staff.

(2) Plans must be made by the Army, Navy, and Air Force for the continued mutual tactical and logistical support throughout this phase.

(3) The Army has dominant interest during this phase and control should be exercised by or through the senior army commander.

CHAPTER 2

LVT UNITS ATTACHED TO INFANTRY FOR AMPHIBIOUS OPERATIONS

Section I. PLANNING AND COMBINED SPECIAL TRAINING

9. OPERATION PLAN. Headquarters of the joint force issues the operation plan, which assigns the mission, designates components of the force, and names commanders. The landing force headquarters prepares the attack plan. It includes alternate plans for employment of units. In large operations, alternate plans may permit choice of landing beaches in the target area to suit the situation. Administrative and tactical planning develop concurrently; the administrative plan must be adequate to support the tactical plan.

10. OPERATIONAL INTELLIGENCE. a. Intelligence requirements for an amphibious operation are comprehensive and detailed. Intelligence information provided by naval and air reconnaissance often may be the only information available to commanders relative to—

(1) Beach approaches, including depth of water.
(2) Probable surf conditions.
(3) Offshore obstacles, man-made and natural.
(4) Width, depth, and composition of beach.
(5) Slope of beach, obstacles, and height of bank.
(6) Beach exits.

(7) Terrain adjacent to and inland from the beach.

(8) Location of possible enemy defenses.

b. The above are major factors to be considered when determining the number and type of amphibious vehicles that most effectively can support the assault troops.

c. For a detailed discussion of intelligence requirements and procedures for amphibious operations, see FM 31–5.

11. OPERATIONAL COUNTERINTELLIGENCE.

The success of an amphibious operation depends largely upon its secrecy. All commanders take elaborate precautions to preserve this secrecy. Troops must be cautioned that the drawing of new equipment, issuance of special clothing, and storage of administrative property are bits of intelligence which, if revealed to the enemy, may serve to confirm other facts already known. Usually, no commander below the battalion level knows the actual place and,only until movement to objective, the time of landing. The operation and its phases have code names; all personnel use the code names in discussion and planning. All orientation and planning requiring personal contact between unit commanders must be completed prior to embarkation, as the use of radio between ships ordinarily will be forbidden while en route to the landing area. When the length of the voyage does not provide sufficient time for shipboard briefing, the briefing should be accomplished prior to embarkation in carefully guarded areas, such as the mounting area. When pre-embarkation briefing is conducted, severe security measures must be enforced from the time briefing begins until units embark and get under way.

12. ORGANIZATION OF THE LANDING FORCE.

The landing force consists of all troops to be put ashore for execution and support of the assault. This includes service troops as well as combat units. The infantry division usually is the basic organization in a landing operation. As is the case in all military operations, organization for an amphibious operation is flexible. Any unit may be required to modify or curtail its organization to meet limitations imposed by availability of shipping. One battalion of amphibious tanks and two battalions of amphibious tractors generally will be sufficient to perform the normal missions of such units in the assault landing of an infantry division. Engineer special brigade units (fig. 3) or other specially trained nondivisional troops are attached to perform shore party missions for the division. The organization of the landing force will vary with the situation, the hydrographic and terrain conditions, and the availability of attachments.

13. REGIMENTAL COMBAT TEAM (RCT). Each division forms three regimental combat teams. Two RCT's may make the assault landing, with one in reserve; or all three may make the landing, either in column or abreast. If one RCT is to be in reserve, it must be organized and prepared to replace an assault RCT, if the necessity arises. As is the case with the division, organization of the RCT is flexible. Amphibious tank companies normally are distributed so that a company can support each assault battalion landing team. The amphibious tractor battalion is organized to provide the necessary landing vehicles to transport the assault troops of an RCT in a beach assault or river crossing.

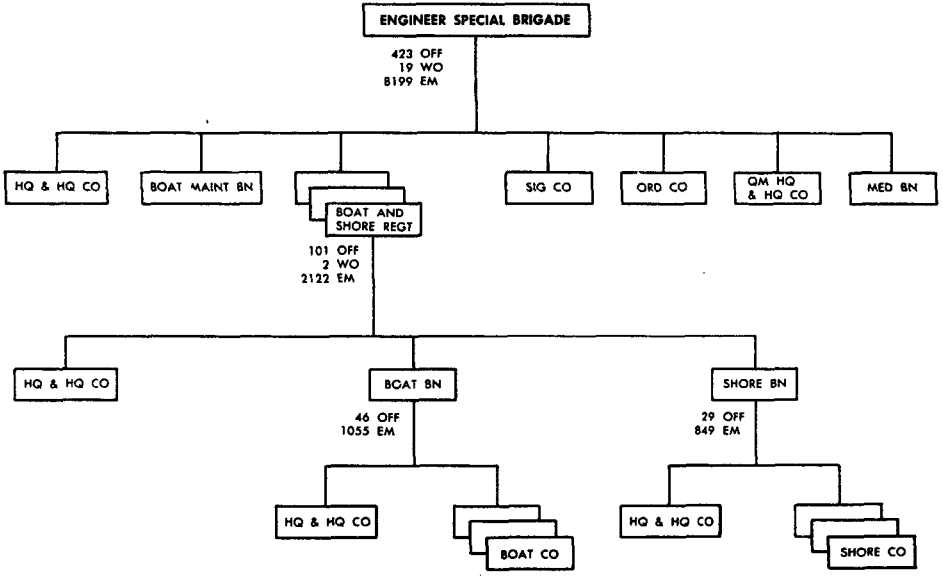


Figure 3. Composition of engineer special brigade.

14. BATTALION LAND TEAM (BLT). Each RCT forms three battalion landing teams. The battalion landing team is the basic task organization for assault landing. For that purpose it includes those elements of the basic battalion organization and attached units that are required in the actual assault on the beach. It actually is an independent unit in the initial stages of the landing before reserves and support elements land. It is considered desirable to provide one company of amphibious tractors and one company of amphibious tanks for each of the assault BLT's. The RCT may use two BLT's in the assault, abreast or in column, with one in reserve. A reserve BLT must be prepared to replace an assault BLT, if necessary. The RCT also may use all three BLT's in the assault landing.

15. CONCENTRATION OF LANDING FORCE. As soon as possible, the landing force commander assembles all units and organizations that will participate in the operation, with their equipment and supplies. Units then formulate detailed plans and conduct combined and joint training for the operation.

16. LANDING FORCE PLANNING. Planning differs from that of normal land warfare because of the necessity for joint planning, concurrent planning in subordinate units, detailed coordination, and the necessary flexibility due to the time required between issuance of the operational directive and the actual assault. The time required may be 150 days or more for large-scale operations; however, under favorable conditions, the normal over-all time should be about 90 days, but may be as short as 60 days. Because of the time factor, the enemy and our own situation

may change considerably; and weather conditions, enemy threats to the task force while en route, or other considerations may necessitate last-minute changes in decisions as to the plan to be adopted and the time of the landing. For these reasons, D-day, H-hour, and the plan to be used generally are designated by signal, 12 to 48 hours prior to the assault.

17. INSPECTIONS OF LANDING FORCE. Units preparing for amphibious operations undergo rigid inspections in compliance with directives. Higher headquarters conduct initial showdown inspections of equipment, supplies, and materiel; physical inspections of troops; and inspections of records. Division and subordinate headquarters supplement these, and conduct individual and unit training inspections.

18. ASSAULT DIVISION PREPARATIONS. At the earliest possible time after receipt of an alert order, the division—

a. Prepares detailed plans for maintenance of security, and checks their implementation by all command echelons.

b. Assigns missions and attaches supporting units to RCT's.

c. Designates beaches and boundaries.

d. Prepares requests for naval gunfire and air support, with concentration overlays.

e. Obtains intelligence information, including maps and aerial photos, and distributes it to the RCT's.

f. Obtains special equipment, such as vehicle waterproofing kits, flotation devices for tanks, and waterproof bags, for issue to assault troops.

g. Issues signal operation instructions.

19. CONDUCT OF TRAINING, LANDING FORCE.

a. Assuming that the landing force has completed tactical training in land warfare and technical training in the operation and care of organic weapons and equipment, the objective of amphibious training is the attaining of proficiency by individuals and units in the following:

(1) Embarkation of troops, equipment, and supplies aboard ship.

(2) Methods of physical conditioning of troops and maintenance of equipment aboard ship.

(3) Debarkation and ship-to-shore movement in accordance with prepared tactical plans.

(4) Aggressive assault against prepared beach positions by boat teams, followed by reorganization and a sustained coordinated attack to secure the beachhead.

(5) Coordination of artillery, air, and naval gunfire support during all stages of the landing operation.

(6) Logistical support of the attack, emphasizing operations of the shore party.

b. The BLT's conduct all training, under supervision of RCT and division. Each assault BLT forms its troops into boat teams, each consisting of the tactical unit or units that can be carried in an amphibious tractor or assault landing craft. This training should be based on a series of tactical exercises appropriate to the locale and the number of troops involved. The training stresses the fact that when each team lands it must be able to act independently and must be self-sufficient until again coming under platoon, company, or battalion control.

c. Amphibious tank and tractor platoon leaders and company commanders should be trained to operate independent of their parent unit in support of infantry; because tactical plans, organization for landings, width of beaches, logistical considerations, and other factors often prevent the employment of these units under company or battalion control.

20. INDIVIDUAL TRAINING, LANDING FORCE. Individual training must be conducted, in so far as possible, concurrently with the various specialist schools and unit training so that all personnel, including specialists, will receive instruction in the following subjects:

a. Characteristics of, and general orientation on, amphibious operations.

b. Naval customs and shipboard routine.

c. Care and maintenance of equipment aboard ship.

d. Use of landing nets for embarkation and debarkation.

e. Tying of knots and use of lowering and guide lines.

f. Boat team embarkation plans and arrangement of personnel and equipment in landing craft or vehicles.

g. Boat or vehicle discipline.

h. Debarkation from landing craft or vehicles.

i. Passage of man-made and natural obstacles.

j. Characteristics of naval gunfire and air support.

k. Transfer from landing craft to amphibious tractors.

l. Methods of beach marking and organization.

m. Recognition of antiboat mines, obstacles, and enemy installations expected in the landing area.

n. Enemy language (key phrases).

o. Recognition of enemy personnel, weapons, and air-craft.

p. Swimming, special survival methods, and use of life belts and rafts.

q. Control of diseases anticipated in the landing area.

r. Recognition and preparation of edible fruits, vegetables, nuts, fish, and wild life.

21. AMPHIBIOUS VEHICLE TRAINING, LANDING FORCE. Amphibious tank and tractor units emphasize phases of training pertaining to anticipated conditions in the assault area. Amphibious tank personnel train with the artillery observers who will control their fires, the artillery battalions which they will reinforce, and the infantry units which they will support with direct and indirect fire. This training should be presented in the form of tactical exercises. Tractors make practice landings with infantry boat teams to familiarize troops with landing capabilities of the tractor and to give tractor personnel training in organization of waves and control of vehicles for assault landings (see parts two and three of this manual). Vehicle crews will receive training in—

a. Maintenance of vehicles and equipment, to include spraying of rust-preventive compounds on engines, linkages, wiring, housings, and suspension systems.

b. Loading vehicles aboard landing ships.

c. Debarkation of vehicles from landing ships.

d. Launching and landing vehicles through surf.

e. Beach driving and wading (driving through shallow water).

f. Recognizing and avoiding underwater and beach obstacles which the enemy is known to be using.

g. Practice firing from water to shore, during landing

exercises, by infantry in tractors and by crewmen of the amphibious tanks.

h. Use of cover and concealment for vehicles.

i. Special maintenance problems arising from operation of vehicles in sand, over rocky shores, and on and near salt water, with stress on preventive maintenance.

j. Stowage of ammunition and equipment in amphibious tanks and tractors.

k. Coming alongside ships with LVT's, use of boat hooks, and towing vehicles in the water.

22. LIAISON TEAMS, LANDING FORCE. a. The amphibious tank battalion sends a liaison team consisting of a battalion staff officer and two radio operators with radio to division headquarters, and a similar team to the headquarters of the division artillery. If an amphibious tank company is attached to a BLT or RCT, an appropriate liaison team is sent to that headquarters.

b. The amphibious tractor battalion sends liaison teams, similar to those of amphibious tank battalions, to division and regimental headquarters. A specially trained NCO with two radio operators may be used for liaison from amphibious tractor companies, and from amphibious tank companies when necessary, to BLT's.

c. On the platoon-to-company level, the liaison will consist of command liaison wherein appropriate radio communication must be established. The establishing of efficient liaison between these units and supporting infantry is imperative in an assault against defended beaches. Gaps in the infantry's communication net resulting from enemy action in the early stages may be closed by the liaison net of the amphibious units.

Section II. LOADING FOR COMBAT

23. LOADING PLANS, GENERAL. **a.** After the landing force (assault division) receives its allocation of transports and landing ships for the operation, it allots a proportionate share to the RCT's. It also allocates special-purpose ships and craft (app. I) to assigned and attached units, according to the tactical plan.

b. Each battalion and larger unit designates an officer as loading officer (BLO for battalion, RLO for regiment, DLO for division) to plan and supervise the loading of ships. These officers should have received previous training in the principles and techniques of loading and unloading types of ships on which their units are to be transported. They coordinate with the TQM assigned to each ship, and with commanders and S–3's, in the planning and loading of each unit's troops, vehicles, equipment, and supplies. They must plan the loading completely and exactly, preparing detailed loading diagrams and priority tables for debarkation of vehicles and equipment.

c. So far as possible, loading plans should conform to the general principle of combat loading. Combat loading is the loading of assault troops, together with their essential combat equipment and initial combat supplies, in a single ship and in a manner permitting selective and rapid debarkation in accordance with the tactical plan. Key personnel, materiel, essential supplies, maintenance equipment and personnel, and vital communication equipment should be dispersed throughout the ships assigned to an amphibious tank or tractor battalion.

24. LANDING CRAFT AND SHIPS. Landing craft and ships furnished by the Navy for transport, control, and use in conjunction with amphibious vehicles in a landing will include—

a. PC(C), PCE(C) and DE(C):	Landing Craft, Control.
b. LCVP:	Landing Craft, Vehicle, Personnel.
c. LCM:	Landing Craft, Mechanized.
d. LSU:	Landing Ship, Utility.
e. LSM:	Landing Ship, Medium.
f. LST:	Landing Ship, Tank.
g. LSD:	Landing Ship, Dock.
h. LSV:	Landing Ship, Vehicle.

i. Rhino ferries.

For descriptions, characteristics, and capacities of these ships and craft, see appendix II.

25. LOADING LANDING VEHICLES. **a.** Amphibious tanks and tractors normally load on LST's for the voyage to the assault area. They may load on LSD's, LSV's, or LSM's.

b. Amphibious units and the infantry units which they are to support or transport coordinate plans for loading. If the voyage is not too long or too arduous, assault troops and their supporting amphibious units should make the voyage on the same ship; or the troops may make all or part of the voyage on transports,

transshipping to the vessels carrying amphibious units at a rendezvous area, or in the transport area off the assault beaches, prior to the landing.

c. An amphibious tank company which is to support a BLT to form the first assault wave may load on one LST; or part of the company may load on each LST carrying an assault infantry company. The decision as to whether the company should load on more than one LST will be made after a careful consideration of the following:

(1) Is it more desirable to keep the company intact aboard one ship to facilitate briefing and study of the assault plans by the company commander and his platoon leaders, and run the risk of possible loss of the entire unit should that ship be lost en route, or—

(2) Is it more desirable to organize the company into two units, each to support the assault infantry landing on half the beach? The latter method will allow for half the amphibious tanks and sufficient tractors, loaded aboard one LST, to support and land the assault boat teams of one infantry company; and it will assure the BLT commander a 50 per cent better chance of having not less than half of the amphibious tanks to form the first wave and furnish the planned support.

d. The amphibious tractor battalion loads in accordance with the landing plan. Four LST's normally are assigned to carry the amphibious tanks and tractors of a BLT. The amphibious tractor company commander and BLO coordinate loading with the BLT commander so that sufficient tractors are loaded aboard each LST to land the infantry boat teams in accordance with the landing diagram. The tank deck of an LST can be

loaded with 17 LVT's or LVT(A)'s. During combat operations, tractors to be used for landing the assault waves and maintenance tractors will be loaded on the tank deck, while supply and spare tractors may be loaded on the top or weather deck (fig. 4).

e. Amphibious tanks and tractors loaded on any type of landing ship must be secured by appropriate lashings and shorings. The Service agency responsible for the operation of the port of embarkation furnishes dock equipment, technical assistance, dunnage, finger lift trucks and other aids to loading, but the responsibility for their use and for checking and adjusting rests with the commander of the unit having vehicles aboard. In the absence of such Service agency the senior landing force commander present will be responsible for providing such facilities.

26. LOADING PLANS, LVT's. a. For LST's. See figure 5 for loading plan of an LST tank deck by use of templates. A scale drawing is made of the tank deck, and on it are fitted templates of the amphibious vehicles made to the same scale. The loading officer aboard an LST normally is from the tractor battalion; he coordinates the loading plans with the infantry BLO.

b. For LSD's. Amphibious tanks and tractors are placed in the open tank (well) deck of the LSD in a priority for unloading, in accordance with the BLT plan for organization of the landing waves. The LSD can carry 39 LVT's in the tank deck. If the ship is equipped with two temporary decks it will carry up to 90 LVT's.

c. For LSV's. Amphibious vehicles are backed up the rear ramp of the LSV. The LSV holds 21 LVT's, which are loaded aboard so they can be launched as

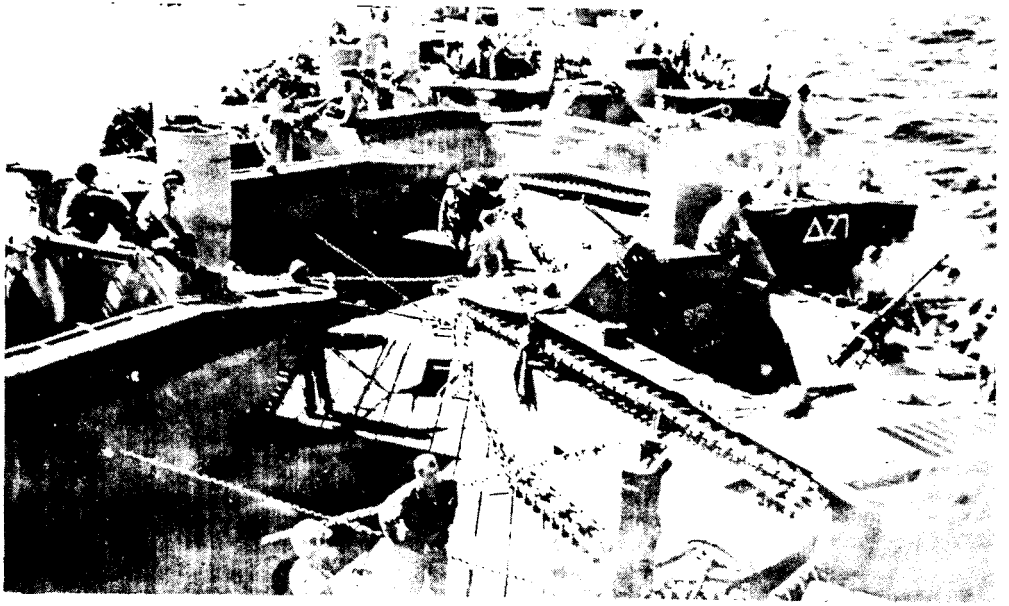


Figure 4. LVT's on top deck of an LST.

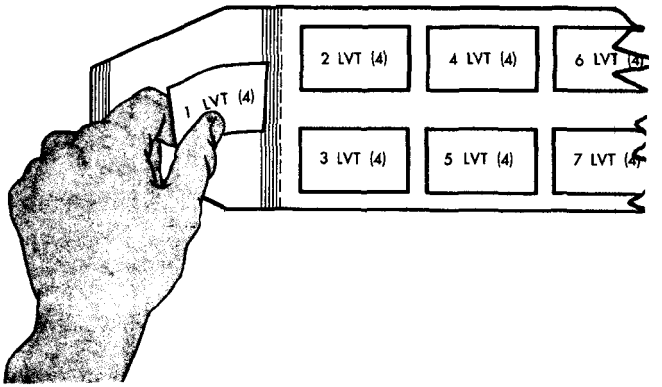


Figure 5. Planning loading of LST by use of templates.

waves, moving directly from the LSV to the rendezvous area, seaward from the line of departure (LD). The vehicle deck of an LSV is constructed in the manner of a ferry, with a compartment on each side which is long enough for 10 LVT's and with room for one additional vehicle on a centerline with the stern ramp.

d. For LSM's. Plans for loading aboard LSM's are relatively simple, as the open tank deck will accomodate only six LVT's. The use of LSM's for transporting LVT's is impracticable except for raids or secondary landings on a small scale.

27. LOADING OF SUPPLIES. a. The administrative annex of the operation plan or the administrative order, covers the issue of ammunition, rations, water, fuel, and lubricants to assault units. Each unit is responsible for its own initial supply until dumps are established on the beaches. The normal method is to

load these initial supplies, such as ammunition, water, and rations, on the tank deck. They may be stacked in the rear; or as an expedient they may be placed on the deck and covered with dunnage to form a false deck. Amphibious tractors then load on top of this false deck; but amphibious tanks normally are not loaded in this manner. Supplies should be tier-loaded; that is, loaded so that each item can be reached without the necessity of moving other items. When supplies are stacked in single tiers on the sides of the tank deck they must be braced by construction of temporary bulkheads.

b. LSD's and LSV's do not permit loading of supplies other than in preloaded vehicles; however, LSM's may be loaded with vehicles and supplies as described above for the LST except that supplies would not be placed on the deck and covered with dunnage to form a false deck. Supplies loaded on the open well deck of an LSM should be covered to propect them from effects of salt-water spray.

c. Amphibious tank and tractor units should include a stock of high-mortality parts with their initial maintenance supplies. These parts must be readily available during the early stages of the operation, in order that maximum vehicular strength can be maintained. Special equipment and supplies for amphibious units participating in an operation will include replacement parts usually found only in higher category shops, since these units will not be available until after the beachhead is secure.

d. Transports and cargo ships assigned to the division carry supplies other than those carried on LST's with assault units. Some space is left in the hold, and supplies are stowed as in tier-loading so that any item, such as rifle ammunition or operational type rations,

can be unloaded quickly as needed. Supplies may be stowed in bulk or secured on *pallets* (wooden platforms suitably constructed for assault handling, with sled runners to facilitate movement over beaches) (fig. 6). Tier-loaded LST's with emergency supplies may be loaded so that exact supplies requested by troops on the beach will be available for rapid dispatch. These supplies are transported from the ships to shore party supply dumps on LCVP's or other landing craft, whenever practicable, rather than on LVT's (par. 24).

Section III. REHEARSAL

28. DEFINITION. A rehearsal is an amphibious exercise which is planned and executed to test actual plans prepared for a specific, assigned combat mission. Its purpose is to insure familiarity with, and test the adequacy of, the details of the tactical and administrative plans. It is conducted to prove the soundness or uncover the weaknesses of these plans. A rehearsal logically follows the first phase of amphibious operations and is conducted only in preparation for a specific operation.

29. REHEARSAL PHASES. The phases of the rehearsal are—

a. Assembly of equipment and supplies as directed by various annexes to the operation order.

b. Assembly of transports and other naval ships and craft.

c. Loading of supplies in sufficient quantities for both the rehearsal and the actual operation.

d. Combat loading of supplies, equipment, and troops.

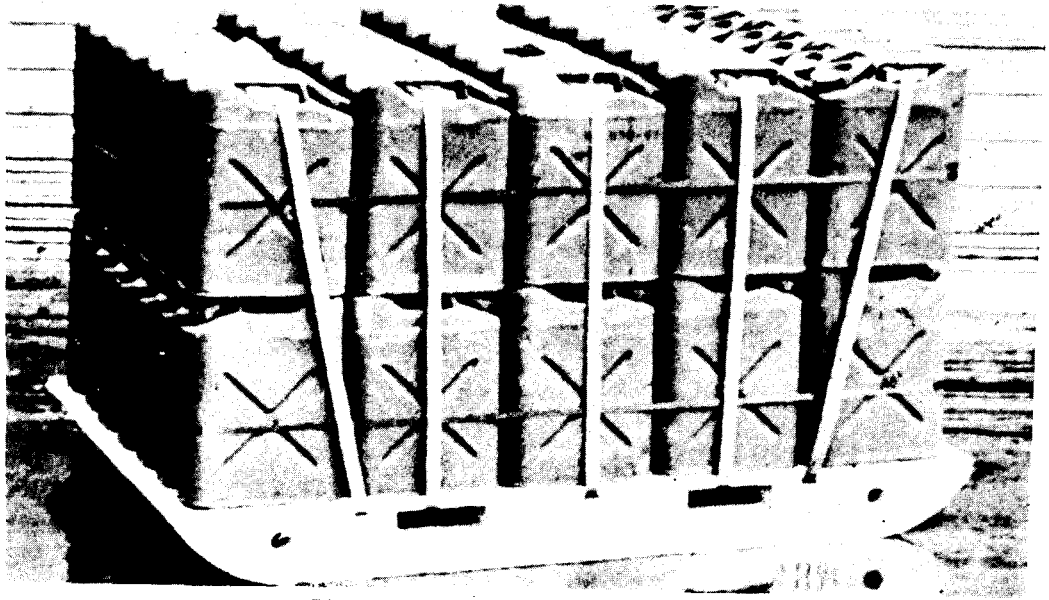


Figure 6. Water cans loaded on a pallet.

e. Voyage to rehearsal area, with concurrent briefing of troops.

f. Transshipment of troops and vehicles into assault landing craft.

g. Assembly and organization of landing waves in the rendezvous area, and movement to the line of departure.

h. Assault landing.

i. Movement inland by combat units, and organization of beach by shore party.

j. Re-embarkation.

k. Repetition of landing and shore phases on different beaches.

l. Landing under naval gunfire and air support.

m. Final critique.

30. REHEARSAL AREA. The rehearsal area will resemble the assault area as closely as possible. Dummy installations, underwater and beach obstacles, and other defensive measures will be set up to simulate actual conditions on the enemy beach. Shore installations also will be constructed for practice in land operations. The area should include beaches of various types for rehearsal of alternate plans. Training in the rehearsal area is conducted under simulated battle conditions.

31. LOADING VEHICLES FOR REHEARSAL. Just prior to loading, all commanders assemble vehicles to be loaded, by ship assignment, in the order shown by the vehicle debarkation priority tables (par. 23). The commander makes a final check of special equipment, waterproofing, and general readiness at the assembly of the vehicles. If plans call for wheeled vehicles to be

unloaded over the ramp of a landing craft or ship, crews of vehicles must have waterproofed them for fording maximum depths. At a time specified by the TQM, vehicles to load aboard that ship move to the docks or embarkation beaches in inverse order of debarkation priority (pars. 23 and 25). Vehicles that are to debark first will load last. The vehicles are loaded aboard landing ships, in a manner to insure that they can debark rapidly and without confusion. Amphibious tank and tractor commanders should make arrangements with the Navy to load their LVT's from a beach or at sea in the immediate vicinity of their base or training area. When serviced and stowed for combat, movement of these vehicles on land should be held to a minimum.

32. LOADING TROOPS FOR REHEARSAL. The BLO and commanders of troops, using previously prepared loading lists for troops, carefully check each man aboard ship. Unit commanders will have troops organized in accordance with the loading list by compartments or holds which they are to occupy. An advance detail (party), consisting of mess personnel, billeting details, and guards, goes aboard early to prepare for the arrival of the troops. Guides from the advance detail will meet the troops as they come aboard to lead them to their berthing space. Troops go aboard ship just prior to sailing.

33. VOYAGE TO REHEARSAL AREA. The Navy is responsible for the operation of the convoy. The Army is responsible for discipline, conduct, and training of its personnel. The Army furnishes details for guard duty, some naval antiaircraft gun watches,

mess, and police. During the voyage Army officers, together with naval guide boat officers, study the rehearsal plan. They brief troops on plans, hydrographic and beach conditions, terrain ashore, and simulated enemy positions, using maps, aerial photos, and relief maps. Special training may include manning and familiarization firing of the ship's antiaircraft guns. Troops are given instruction on ship regulations relative to their stations for abandon ship in case of fire, collision, or enemy action, and rehearse these procedures. The boat teams practice obtaining equipment, moving by designated routes to their assigned landing craft or amphibious vehicles, and loading. Mechanical equipment which deteriorates from lack of use is operated, and batteries are charged, as required. Final checks of waterproofing are made, and all weapons are checked to insure that they are in perfect operating condition.

34. TRANSSHIPMENT OF TROOPS. Troops aboard LST's which also carry amphibious tractors transship merely by loading on the tractors, which are then launched over the bow ramp for the movement to the beach. When assault troops who are to be landed by LVT's make the voyage aboard transports, small landing craft transship them to LST's carrying amphibious tractors. Small naval landing craft may bring support and reserve troops from their transports to the beach. If the landing craft cannot reach the beach because of hydrographic conditions, they may bring troops to a *line of transfer* where they transfer into amphibious tractors for the landing. Supplies are similarly transferred (fig. 7).

35. CONTROL OF LANDING WAVES. **a.** Naval personnel in control craft, assisted by repre-

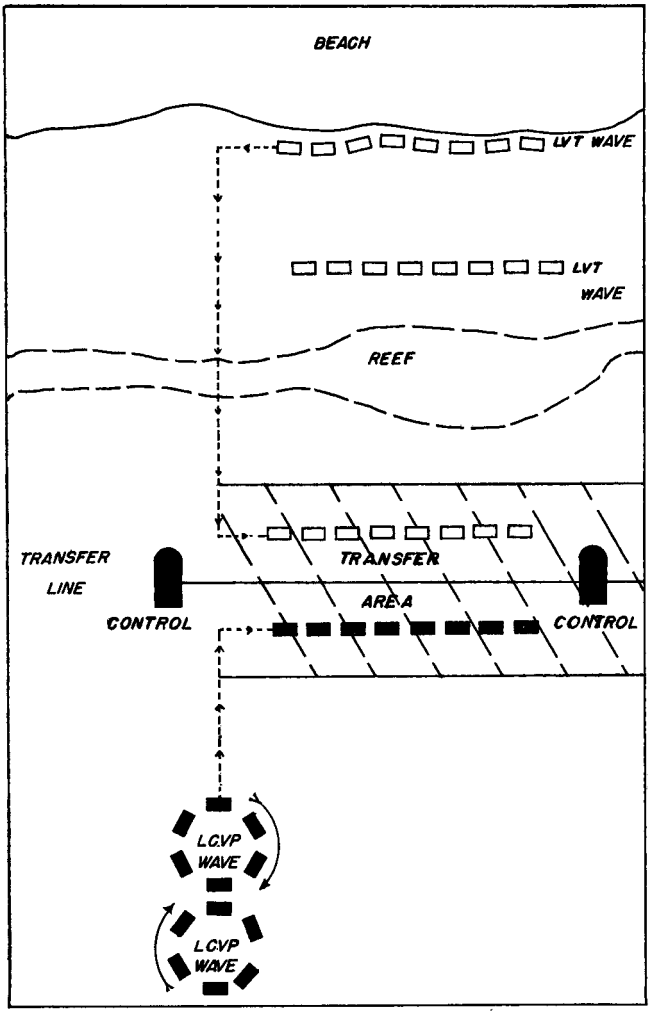


Figure 7. Troops and supplies may be transferred to amphibious tractors at the transfer line.

sentatives of the LVT battalions and BLT's, guide and control the landing waves. In a typical landing there are two guide craft for each wave of a BLT. Each wave guide craft flies a navy numeral flag designating its wave. Guide craft meet amphibious vehicles that are loaded with troops as they leave the ramps of LST's. One guide craft leads each LVT wave to a rendezvous area located between the landing ship area and the line of departure; another guide craft follows. When all assault waves reach the rendezvous area, components of the first wave, on signal from the boat group commander who is in the BLT control craft, move in column to the line of departure, led by one guide craft and followed by another. Additional control craft mark the location and width of the line of departure. BLT control craft receive directions from RCT control craft (Transdiv control, see app. IV), which in turn take orders from the division control vessel (Transron control, see appendix IV). The wave takes up its formation for movement to the beach-line, wedge, echelon, etc., prior to reaching the line of departure (fig. 8). Its movement is timed so that it does not slow or stop at the LD, but hits this line at the proper time and speed to insure its landing on the beach on schedule. The wave then moves to shore, guided by naval craft which accompany the wave as far as necessary to insure its landing on the proper beach. Careful timing puts the first wave ashore at the predetermined time known as *H-hour*. Successive waves follow at predesignated intervals, using the same procedure. Other duties of the wave guide and his assistant are to maintain proper interval from the next wave ahead and proper distance between LVT's within the wave, and to prevent straggling. After guiding the wave to the limit of landing

boat navigation, they take station seaward at a designated flank of the boat lane and are available to assemble and guide returning LVT's to the transfer line or landing ship area. The wave guides further assist the boat group commander by supervising transfer operations.

b. Distinctive marking on each landing vehicle or craft indicates the beach on which it is to land. A beach usually is identified by a color and a numeral. For example, a BLT may be ordered to land on Red Beach 1. All landing vehicles and craft to be used by that BLT may have one vertical red stripe, approximately 8 inches wide, painted on one or more prominent surfaces that can be seen when the vehicle is afloat. Amphibious tractors in assault waves will carry appropriate boat team signs (fig. 9), which are three-or four-sided boxes with faces approximately 1 foot square, mounted on staffs at least 6 feet long. The signs are painted white, with 7-inch black numbers. The first digit of each number indicates the wave; the second digit indicates the position in the wave. For example, a landing vehicle carrying boat team sign 36 is the sixth vehicle in the third wave. The vehicle (or boat) with sign 00 carries the BLT commander and party and is a *free* vehicle (or boat); that is, free to land at any time or at any location in the beach area. The leading vehicle of each wave, such as 21, 31, etc., also carries a navy numeral flag to designate the wave. These flags should be removed before reaching the beach, because they draw fire to the leader's vehicle. Landing vehicles of each wave are numbered consecutively from right to left. Vehicles also are marked with company and battalion symbols and numbers for operations ashore.

Figure 8. Amphibious tanks cross a line of departure.

Figure 9. LVT(4) with boat team sign and vehicle markings.

36. COMPOSITION OF WAVES (fig. 10). When amphibious tanks are used, they form the first assault wave of each BLT. Amphibious tractors carrying infantry, artillery liaison personnel and engineer troops, with their equipment and essential supplies, form succeeding waves; usually five waves of tractors complete the landing of assault units.

37. REHEARSAL LANDINGS. Rehearsal landings will correspond as closely as possible to the anticipated assault landing. Special emphasis is given to the composition of the waves, organization of the control system, and time of day of landing. Amphibious tanks and troops will land, engage simulated targets, and move inland to designated phase lines. Supporting units will perform their missions; plans for maintenance, medical evacuation and resupply will be thoroughly tested. The goal will be realism. Commanders will make on-the-spot corrections and conduct critiques at the conclusion of appropriate phases. During all rehearsal landings, the tactical employment of LVT's on land should be held to the minimum commensurate with adequate training. This is particularly true where beaches are rocky or hard and inland terrain is rough. These vehicles will have been tuned and conditioned for combat; and since convoys normally depart for the landing area shortly after rehearsals, time will not permit extensive maintenance or welding repairs prior to sailing.

38. SHORE PARTY ORGANIZATION AND DUTIES. **a.** The shore party is a composite army and naval unit formed for the purpose of facilitating the landing and movement of troops and material across

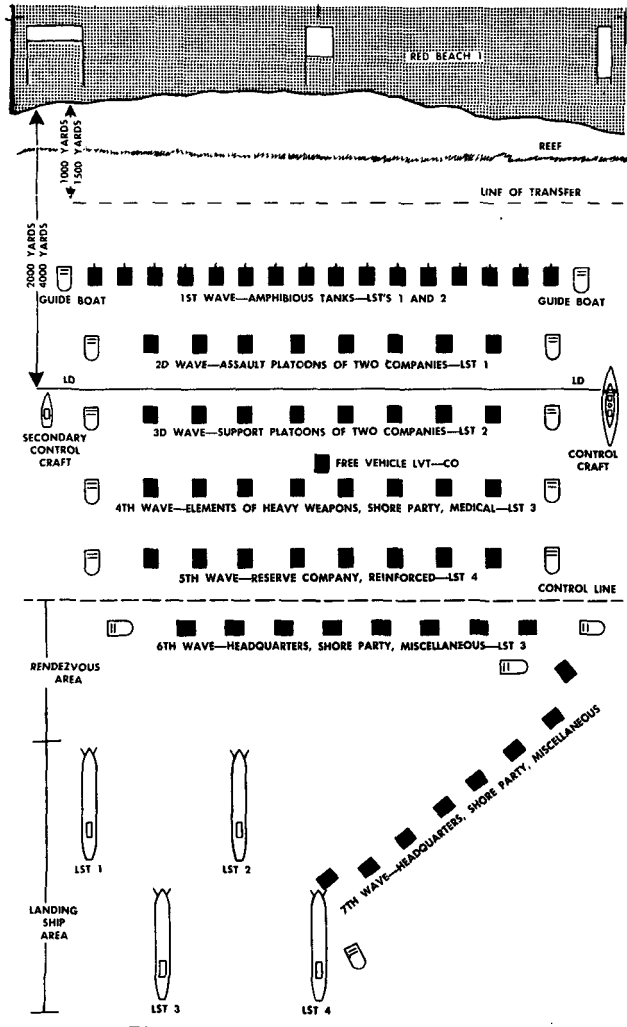


Figure 10. Landing waves of a BLT.

the beach. It is commanded by an officer of the landing force. The landing force component may be a combat engineer unit that is augmented by military police, motor transport, quartermaster, ordnance, special equipment, and amphibious vehicles, or it may be the shore elements of an engineer special brigade. The shore party assigns areas (fig. 11) for such purposes as supply points, dewaterproofing of tanks and wheeled vehicles, and beach aid stations. It assists vehicles and craft that broach or become mired. It improves the beach for landing of tanks and heavy vehicles by clearing obstacles and by grading routes from the water's edge to firmer ground inland. Amphibious tractors land the supplies needed for the initial phases of the operation. The shore party uses these supplies to set up and operate supply points. First elements of the shore party will land as early as possible in the assault waves. In addition to the organization of the beach for landing of equipment and supplies, the shore party operates an aid station and is responsible for the evacuation of casualties by landing craft or vehicles to designated ships in the transport area.

b. The naval component of the shore party is the beach party, commanded by the beachmaster, a naval officer who assists and advises the shore commander on naval matters. The beach party, through its sections, provides lateral communication between adjacent beach parties, maintains visual and radio communication between the beach and the ships being unloaded, makes hydrographic reconnaissance, marks obstructions and channels, removes underwater obstacles, designates best landing sports for landing craft and ships, and assists in repair of damaged craft and retraction (refloating) of stranded craft.

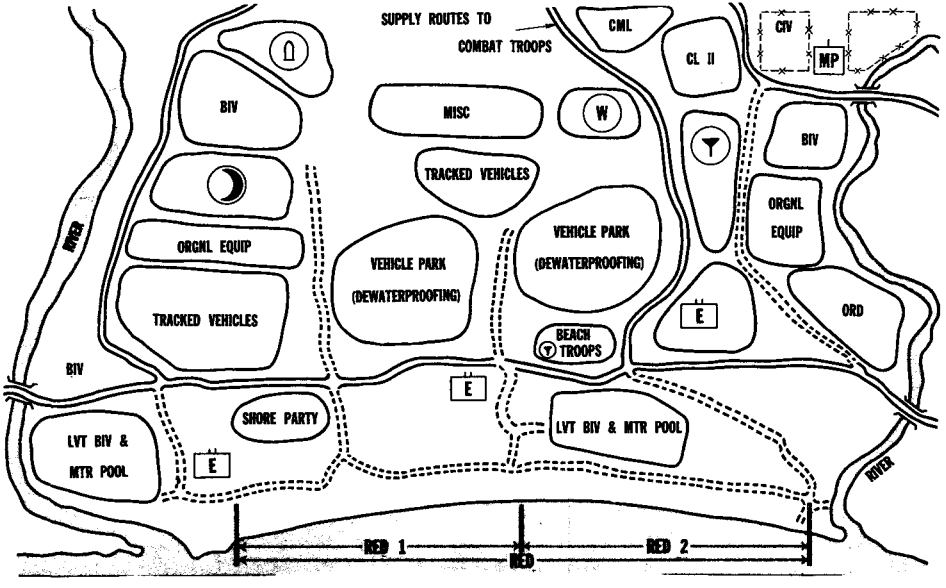


Figure 11. Organization of a beach.

39. BEACH MARKING. One of the duties of the first elements of the shore party to land is to mark the beach so that landing craft and vehicles carrying additional personnel and equipment can land on the proper beach. The markers are, in general, of two types—beach markers and debarkation point markers.

a. Beach markers (fig. 12) are of the color designated for the beach-red, green, etc. The left flank marker is rectangular, with the horizontal sides longer; the center marker is square; the right flank marker also is rectangular, but with the vertical sides longer. The number of markers indicates the number of the beach; for example, Red Beach 3 has at its left extremity three left flank type red markers, one above the other on the same staffs; at its center and at its right extremity are three center type and three right flank type red markers, respectively, alongside each other. For night landings, combinations of white and colored lights for left flank markers, and colored lights for center and right flank markers, are used as shown in figure 12.

b. Debarkation point markers and lights, as shown in figure 12, are used to designate spots on the beach at which particular types of supplies and vehicles are to be landed.

c. Other types of markers, such as range markers, debarkation points for LST's, boat markers, etc., usually are designated in the operation plan.

40. ADDITIONAL REHEARSAL LANDINGS. a. Landings on beaches of various types. Plans for amphibious operations include several alternate plans which often differ in the type of beach to be used for the landing. Therefore, the rehearsal should include landings on various types of beaches anticipated in the

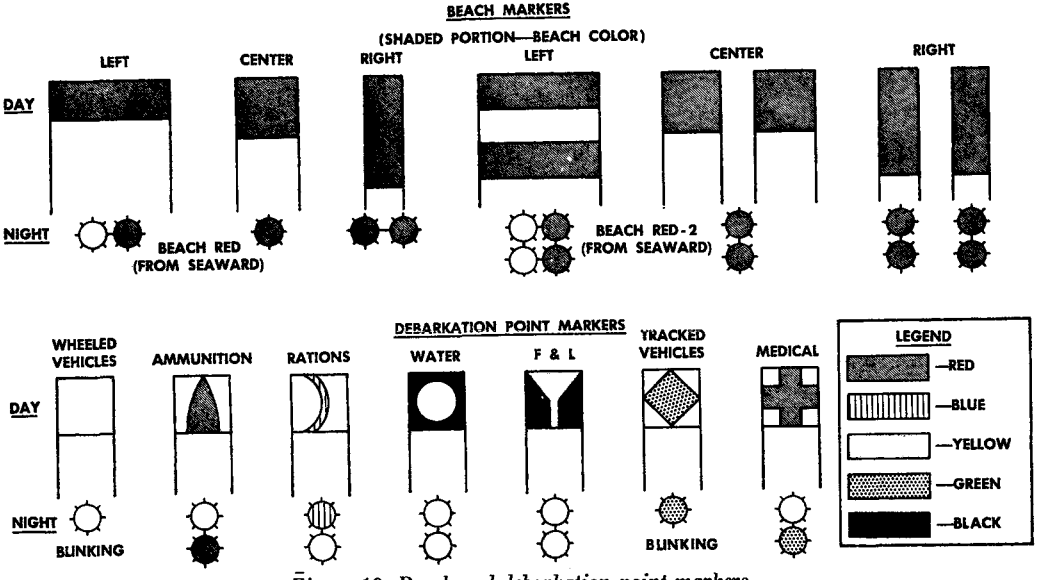


Figure 12. Beach and debarkation point markers.

assault area. The first practice landing should be on the easiest beach available, later landings on successively more difficult ones. Each practice landing is complete; it includes all practicable phases of the operation plan.

b. Rehearsal with naval gunfire and air support. The last rehearsal landing includes naval gunfire and air support. This support is provided only to the degree necessary to test the planning and perfect the required coordination.

41. CONCLUSION OF REHEARSAL. Following a joint critique of the rehearsal, there comes a short period of rest and resupply. Provision must have been made for replacement parts, replacement vehicles, and fuel. All units check waterproofing and fording devices, and give vehicles a final inspection before the task force moves out in convoy to the assault area. This rehabilitation work on LVT's must be done ashore in an area near the embarkation beaches to keep from having to drive them or transport them on low-bed trailers, during the limited time available, to and from the embarkation areas.

Section IV. THE ASSAULT LANDING

42. EMBARKATION AND VOYAGE. The embarkation and voyage to the assault area proceed much as did the embarkation and voyage to the rehearsal area. For long voyages, the attack force may form two convoys; slower ships, such as LST's, preceding faster ships by as much as several days, so that all will arrive at a designated rendezvous area off or near the assault beaches, simultaneously. Troops receive the attack order during the voyage; commanders brief men

on the coming operation. Each man should be thoroughly briefed not only on the mission of his own and supported units but also on preinvasion preparation of the assault area by air strikes and naval bombardment. Although the soldier has no part in the latter, a knowledge and understanding will contribute to his morale. Relief maps of the assault area may be available; maps and aerial photos will be available for briefing and study by officers and men.

43. NAVAL GUNFIRE AND AIR SUPPORT.

a. Naval gunfire support. The success or failure of an assault landing against opposition well may be dependent on naval gunfire support. To take full advantage of this support, infantry commanders must realize its capabilities and limitations, and carefully plan the coordination of naval gunfire with air and artillery support throughout the operation. Battleships, cruisers, destroyers, and landing ships, medium (rocket) (LSM(R)), are the principal ships employed to deliver this support. Artillery forward observers are given special training in the conduct and technique of naval gunfire. Naval gunfire may commence at any time before the assault by ground troops, but it intensifies prior to H-hour. Its purpose is to destroy the enemy's installations and render his countermeasures ineffective, and to cover the organization of the landing waves. Naval gunfire support includes prearranged or scheduled fires, on-call fires, and firing on targets of opportunity. Initially, the fire concentrates on targets near the landing beaches (fig. 13). When the leading waves of amphibious tanks or assault craft reach a point approximately 500 yards from shore, the fire lifts to inland or flank targets. Naval gunfire continues

Figure 13. Amphibious vehicles move toward a beach under cover of naval gunfire.

as long as it is effective. The fire is controlled by direct observation on board the firing ships, artillery forward observers, or air observers.

b. Air support. Naval gunfire support and air support are coordinated so that naval gunfire support is lifted during low-level bombing and strafing attacks on beach installations. Air Force and/or Naval Air units come in for the final beach strafing runs as naval gunfire lifts. Under conditions of good visibility they continue this mission until leading assault waves are approximately 200 yards offshore. These final air strafing runs are preplanned carefully and are coordinated with the close supporting fires of the amphibious vehicles, landing ships, and craft. They support the attack inland by engaging predesignated targets or targets of opportunity such as enemy troops concentrating for counterattack.

44. FIRE SUPPORT COORDINATION. Naval gunfire, air support, and artillery (including amphibious tank units employed as artillery) are coordinated by the artillery commander at appropriate echelons through the agency of the fire support coordination center (FSCC) established in the artillery command post.

45. PREPARATION AND CONTROL FOR LANDING. Under cover of naval gunfire and air attack, the assault waves form (fig. 14) and move to the line of departure as in the rehearsal. The line of departure is from 1,000 to 5,000 yards offshore, depending on hydrographic conditions and types of fire from enemy shore defenses. The naval control officer in charge of the beach for each BLT is aboard the control craft stationed at the line of departure. He dispatches landing waves

from the line of departure according to schedule, by striking (hauling down) from the yardarm of his craft, the navy numeral flag for each wave. As the numeral flag for the next succeeding wave is raised to the yardarm, the wave moves slowly to the LD, so timing its movement as to cross the LD at full throttle when the flag is struck. The naval control officer for each beach is accompanied by S–3 and S–4 representatives from the BLT and a liaison officer from the attached amphibious tractor unit. The boat group commander, an assistant to the control officer, is responsible for guiding the first wave to the beach; the naval guide officers guide the succeeding waves. The boat group commander may be accompanied by liaison officers from the BLT and tractor company. After landing the first wave, he will assist the naval control officer stationed on the LD by controlling traffic to his assigned beach. Transfer lines (fig. 10) are designated in initial assault plans when hydrographic intelligence indicates offshore conditions, such as reefs, which will prevent landing craft from beaching. After the assault waves have landed, the boat group commander will, if necessary, establish a transfer line offshore and will regulate the shoreward and seaward traffic of landing vehicles and craft therefrom. He controls the assault waves and support serials by radio, power megaphone, flags, and arm and hand signals.

46. FIRE OF AMPHIBIOUS VEHICLES.

When naval gunfire lifts, amphibious tanks open fire with both howitzers and machine guns. The fires of the amphibious tanks and naval guns in this phase should be coordinated to insure a continuous large volume of fire on the beach. The tanks maintain a

Figure 14. Three waves of amphibious vehicles move to shore in a division-size landing.

large volume of fire on known and suspected enemy targets, and move aggressively while keeping a sharp lookout for underwater obstacles. Amphibious tractors (other than those constituting the first wave when amphibious tanks are not used) do not fire from the water during assault landings. Ashore they may engage targets of opportunity, in which case the infantry commanders of boat teams being transported must exercise extreme caution to insure that friendly troops are not endangered by the fire from their tractors.

47. THE ASSAULT LANDING. No amount of prior planning can determine, in detail, the actual conditions on the beach at the time of landing. Aggressive action and initiative are vital in insuring the success of the operation. When assault waves reach the shore they breach obstacles, reduce enemy fortifications, overrun and destroy enemy personnel and equipment, and occupy initial objectives.

a. Whenever possible, amphibious tanks cross beaches, move a short distance inland, and cover with direct fire the unloading of assault troops. Any employment of LVT(A)'s must consider their limited protective armor below the water line. Whenever possible, they will support the attack from hull defiladed positions. When beaches are backed by sea walls or high shoulders, the amphibious tanks halt offshore, allowing sufficient space between them for passage of amphibious tractors or landing craft and, if practicable, support the assault by fire on flank targets of opportunity, until routes inland (beach exits) are prepared. They will not maneuver in the landing lanes, as this will result in traffic congestion which will draw enemy fire.

b. Upon reaching the beach area designated for unloading, amphibious tractors discharge their troops and return to the water via flanks of the boat lanes, in order to keep clear of the incoming ship-to-shore movement. Such return routes are pre-determined. Their mission then becomes that of landing supplies and additional troops, under control of successively higher echelons of command as supply dumps ashore are established (par. 51).

48. MAINTENANCE AND REFUELING DURING THE LANDING. Each amphibious tank and tractor battalion will designate a maintenance ship, usually an LST, on which to repair amphibious vehicles damaged during the early stages of the operation. In addition, maintenance amphibious tractors will cruise between the ship and the shore. These tractors will carry maintenance personnel to make emergency repairs whenever practicable; if necessary, they can tow disabled vehicles to the maintenance ship. Other maintenance tractors will proceed ashore with assault waves and provide mobile maintenance for vehicles on land. Amphibious vehicles may refuel at the maintenance ship, from drums on rafts, from auxiliary naval fuel craft, or from transports and cargo ships that they are unloading.

49. EVACUATION OF CASUALTIES. Amphibious units must coordinate plans for treatment and evacuation of casualties with supported infantry units. The following procedures normally will be followed:

a. Amphibious tank units. The amphibious tank medical detachment usually furnishes two aid men to each company for the landing. In addition, a mobile aid station is mounted in an LVT attached from the

battalion supply section. This LVT carries ashore a ¼-ton truck to be used for collecting casualties, and it lands on order of the battalion commander. It may be commanded by one of the medical officers, who will screen casualties and establish priorities for their transportation to a hospital ship. The remainder of the detachment may remain aboard an LST(H) during the establishment of the beachhead. Casualties during the landing are given first aid in the company and then evacuated to the hospital ships or other ships designated to receive casualties (fig. 15). LVT's normally are not employed to evacuate casualties if LCVP's or other landing craft are available. Training beyond that which is given all personnel should be given to one man in each tank crew to qualify him as an aid man.

b. Amphibious tractor units. The amphibious tractor medical detachment usually furnishes three aid men to each company for the landing. The battalion surgeon with his aid team generally will be embarked aboard a designated LST(H), or a ship performing a similar role, and will move ashore as soon as assault troops secure a foothold on the beach. Casualties aboard tractors that are afloat will be given first aid aboard this ship. The aid station (including a ¼-ton truck) will be moved ashore in an LVT as soon as the tactical situation ashore permits. Tractors returning from the beach evacuate casualties to hospital ships or other craft designated to receive casualties.

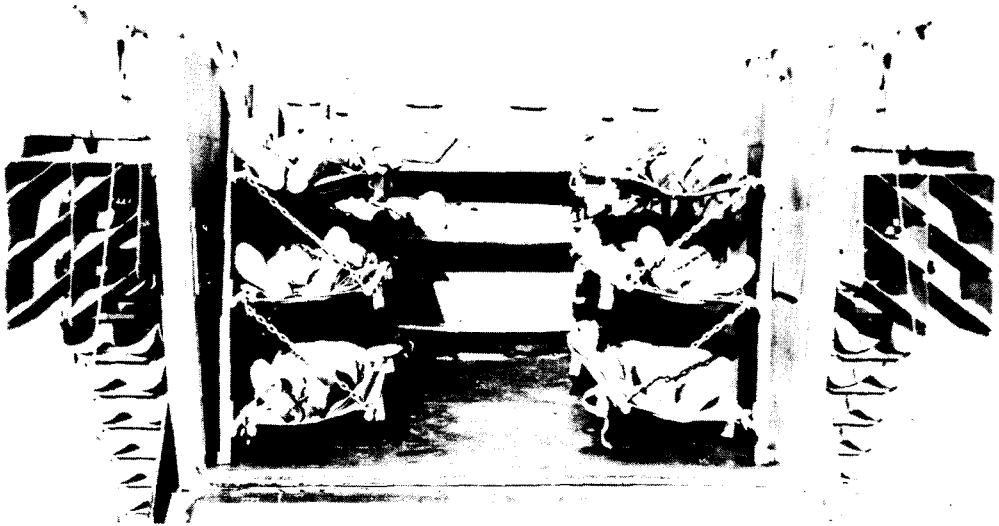


Figure 15. Amphibious tractor equipped with nine litters for evacuation of casualties.

Section V. ORGANIZATION OF THE BEACH AND MOVEMENT INLAND

50. INITIAL BEACH ORGANIZATION. The organization of the beach (figs. 11 and 16 and par. 38) is a continuous process. Its progress is determined, first, by the rate of advance inland and the neutralization of enemy resistance; and, second, by the rate of unloading. Elements of the shore party initially clear the beach by removing mines and other obstacles. They prepare the shore for landing of tanks, artillery, and supplies and equipment of all types. Logistical support is consolidated by centralizing shore company operations into shore battalion, shore regiment, and finally brigade operations. As the expansion and improvement of beach facilities are being made, progressive echelons of supply units take over and organize the dumps to facilitate the advance of the troops inland and the defeat of the enemy. Supply units set up ammunition, ration, fuel and lubricant, and other supply points, notifying unit commanders of their location. Field and depot maintenance shops set up service parks as soon as possible.

51. DIVISION BEACH CONTROL. The division shore party will set up central control of the beach organization as soon as possible after the assault waves land. All beach organization and control then will be under division direction.

52. SECURING OF BEACHHEAD. a. The first consideration of the assault troops after landing is the securing of a beachhead which must be large enough to insure the continuous landing of troops and matériel. It must include terrain features commanding the beach, not only as a defensive measure but also to further the

Figure 16. A beachhead during organization.

offensive. The operation to secure the beachhead usually is accomplished in three successive phases—first, the elimination of effective enemy small arms fire from the beaches; second, the elimination of ground observed artillery fire; and third, the protection of the central beaches from medium artillery fire and the expansion of the beachhead to provide room for the landing and maneuver of support units. These three phases generally are accomplished by the assault BLT's, RCT's, and divisions respectively. In the initial assault the LVT's may carry the assault boat teams inland 200 to 500 yards when conditions of terrain and enemy resistance permit. Some operational plans provide for the dismounting of the infantry at the water's edge. After discharging troops, the tractors return to the transport area at sea to bring in support troops, or are available for transporting initial beachhead supplies ashore. LVT's adapted to carry a bundle of hinged matting on each side pontoon may be attached to the shore team to land directly in rear of the assault waves. These bundles of matting provide a rapidly laid beach roadway (fig. 17).

b. Amphibious tanks employ their weapons against targets on the beach, and move 200 to 500 yards inland with the leading waves of infantry. As soon as the situation in the beachhead permits, they go into battery position and support the infantry by the delivery of observed artillery fire from hull defiladed positions, if the terrain permits. Amphibious tank howitzers are used only for indirect fire after the infantry has passed beyond them (except for close-in protection of their vehicles). Land tanks will be brought ashore as soon as possible to furnish normal tank support for the advance inland.

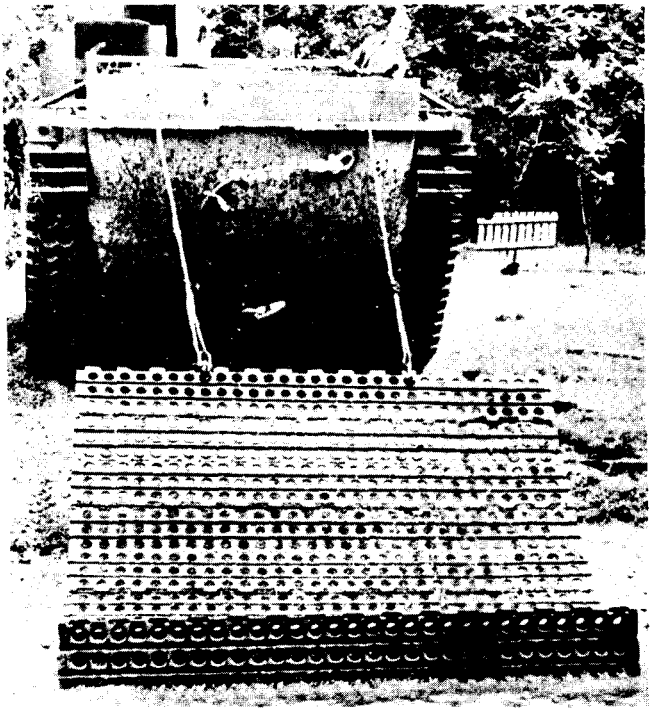


Figure 17. Amphibious tractor laying hinged mat.

53. CONCLUSION OF AMPHIBIOUS PHASE.

After the establishment of the beachhead, the beach activities stabilize into the landing of reinforcements and supplies. The combat operation then assumes, in general, the characteristics of a land operation, although the logistic phase continues to be amphibious until a port is captured and in operation.

PART TWO

AMPHIBIOUS TANK AND TRACTOR BATTALIONS

CHAPTER 3

THE AMPHIBIOUS TANK BATTALION

Section I. VEHICLES AND ORGANIZATION

54. GENERAL. See paragraphs 1 to 5 for references, characteristics, capabilities, and limitations.

55. DESCRIPTION OF LVT(A)(5) (figs. 18, 19, 20). The armament of the LVT(A)(5) consists of one 75-mm howitzer and three caliber .30 machine guns. The 75-mm cannon is vertically gyro-stabilized, and the turret is power operated. One machine gun is in the bow on a ball mount; two are in the turret on pedestal mounts. The hull contains a driving compartment at the front, an engine compartment in the rear, and a large fighting compartment in the center. The armor provides protection against small-arms fire and shell fragments. The hull is made of ¼-inch steel plate; the front facings of the driving compartment and the bow plate are of ½-inch armor, and the turret is of 1-inch armor. Plates of ¼-inch armor can be welded to the outer side of the pontoons to protect them from small-arms fire. The tank weighs 17½ tons empty, and 20 tons with complete combat load.

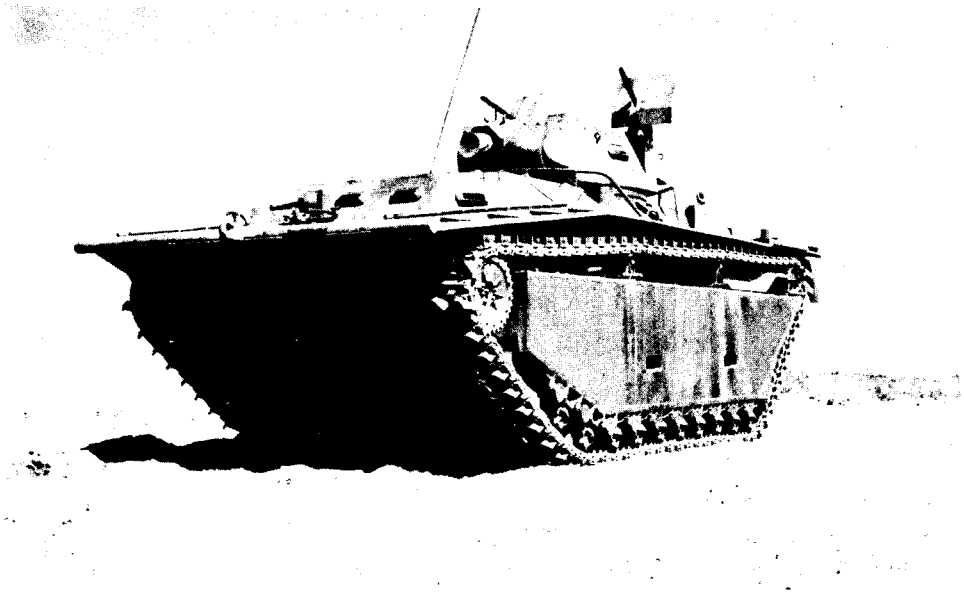


Figure 18. LVT(A)(5).

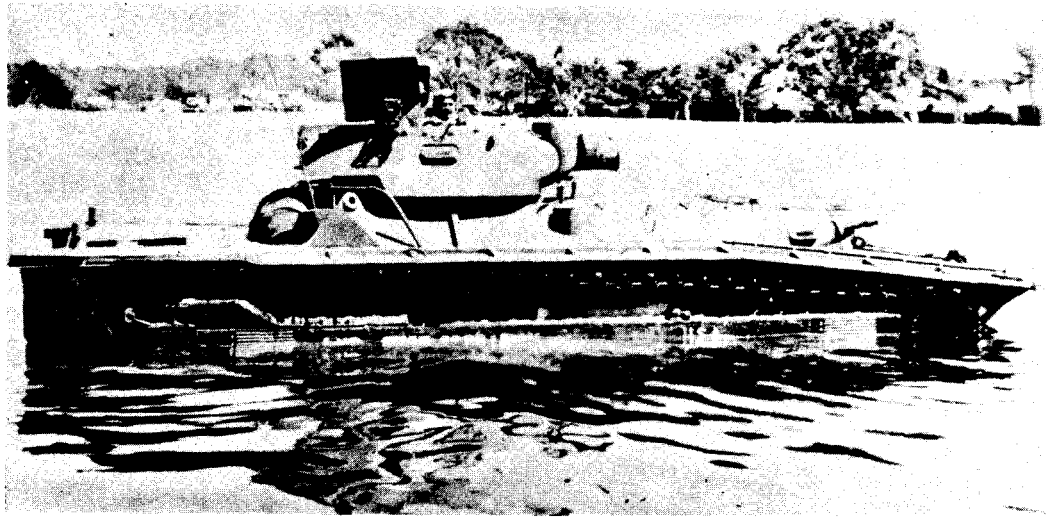


Figure 19. LVT(A)(5), water-borne.

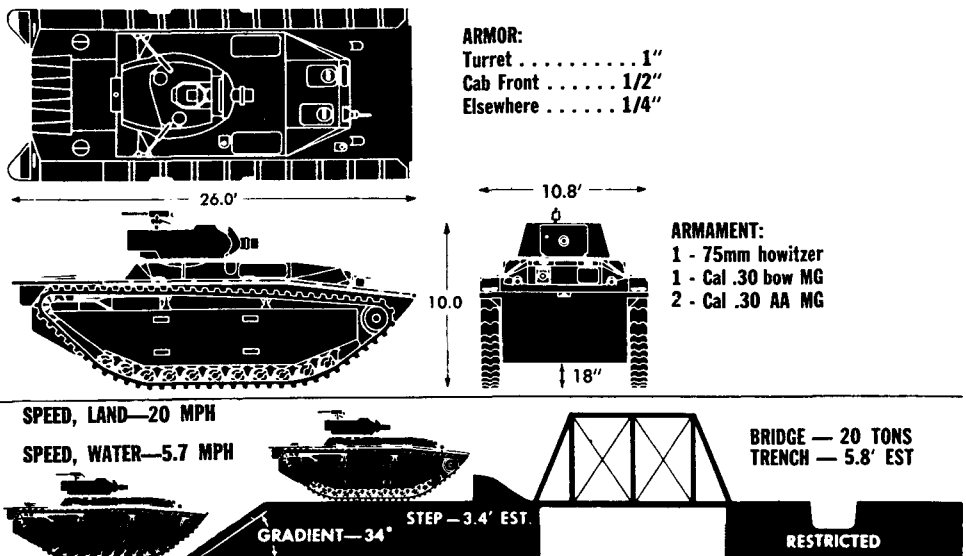


Figure 20. Data chart of LVT(A)(5).

56. AMPHIBIOUS TANK BATTALION ORGANIZATION. The amphibious tank battalion is administratively self-sufficient, having supply, medical, and maintenance facilities for a limited period of operation (figs. 21, 22, and 23). Tactically, it is employed in support of infantry for amphibious landings.

57. COMMUNICATION IN AMPHIBIOUS TANK UNITS. a. Radio. Radio is the primary means of communication in the amphibious tank battalion (fig. 24ⓐ). The battalion has SCR–508 and SCR–528 series F-M (frequency-modulated) radio sets for communication within the battalion, and naval TCS5 or TCS7 sets for communication with naval units. These TCS sets are A-M (amplitude-modulated) radios and will net with the SCR–506 used by larger armored units, and with the infantry SCR–694. The TCS radios may be substituted for SCR–508 and SCR–528 sets for use in interbattalion communication. The battalion also has SCR–510 sets mounted in ¼-ton trucks for reconnaissance and liaison on land. For land operations with the infantry, amphibious tank units have AN/VRC–3 sets for netting with infantry SCR–300 radios. During the afloat phase a battalion set should be with the battalion maintenance officer. for communication with forward observers and artillery battalions, the frequencies which are common to the 500 series radios of the amphibious tank battalion and the 600 series radios of the field artillery can be used. If these common channels are not available for fire control, it will be necessary to provide the appropriate liaison radios to the amphibious tank battalion or the field artillery. For channels of radio communication of amphibious tank battalions during artillery missions, see figure 24ⓑ.

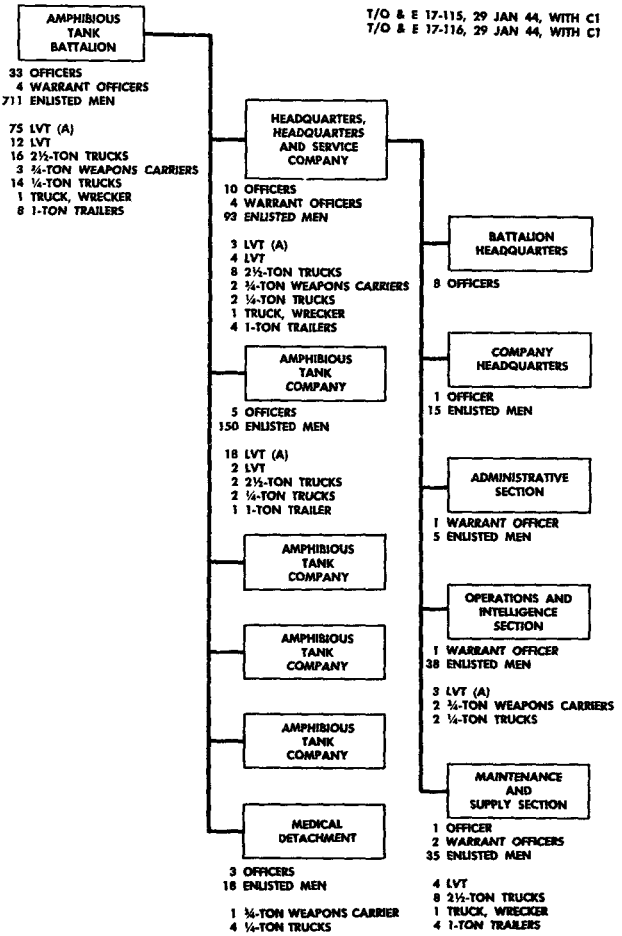


Figure 21. Composition of amphibious tank battalion and headquarters, headquarters and service company, amphibious tank battalion.

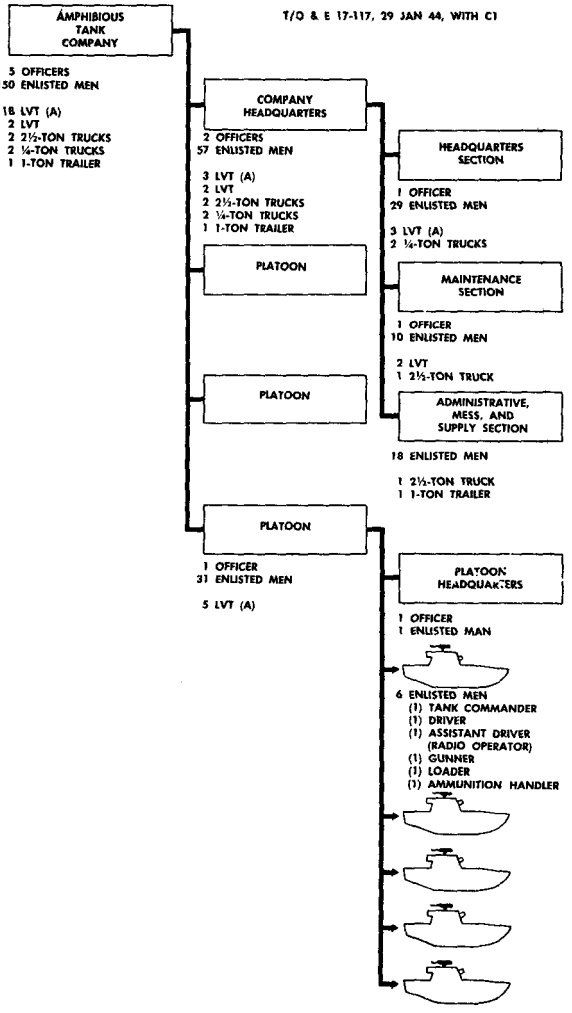


Figure 22. Composition of amphibious tank company.

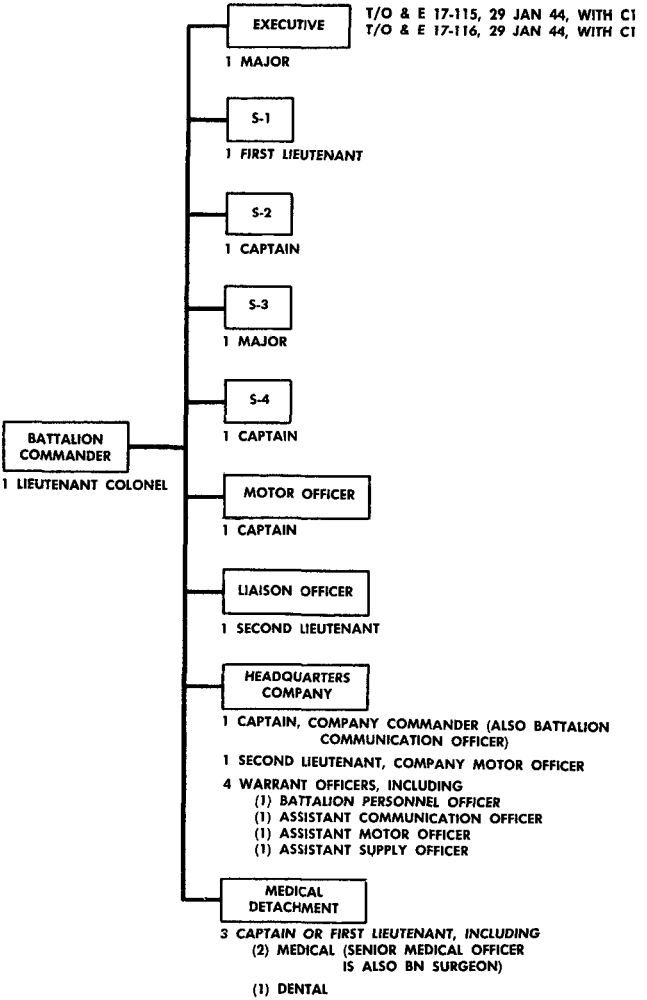
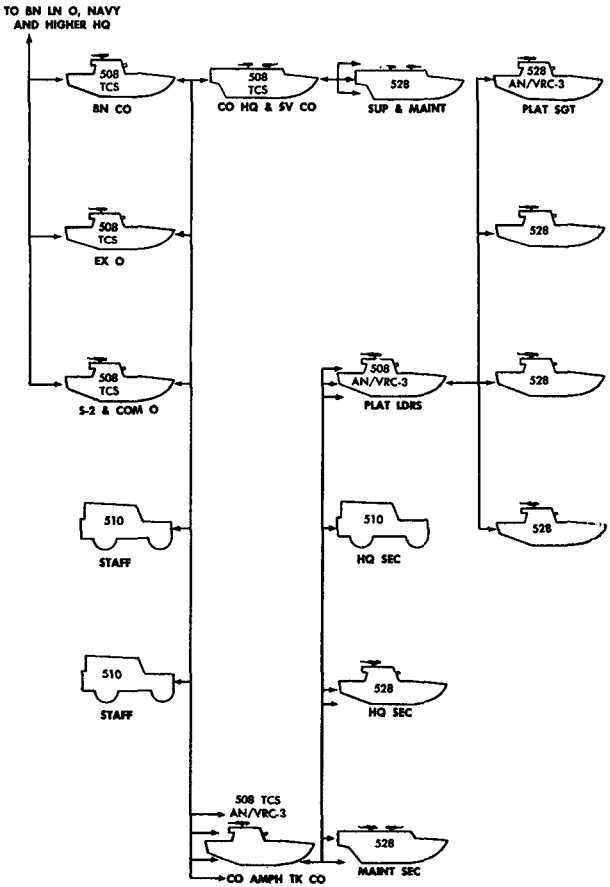


Figure 23. Staff organization, amphibious tank battalion.



ⓐ Amphibious tank battalion.

Figure 24. Channels of radio communication.

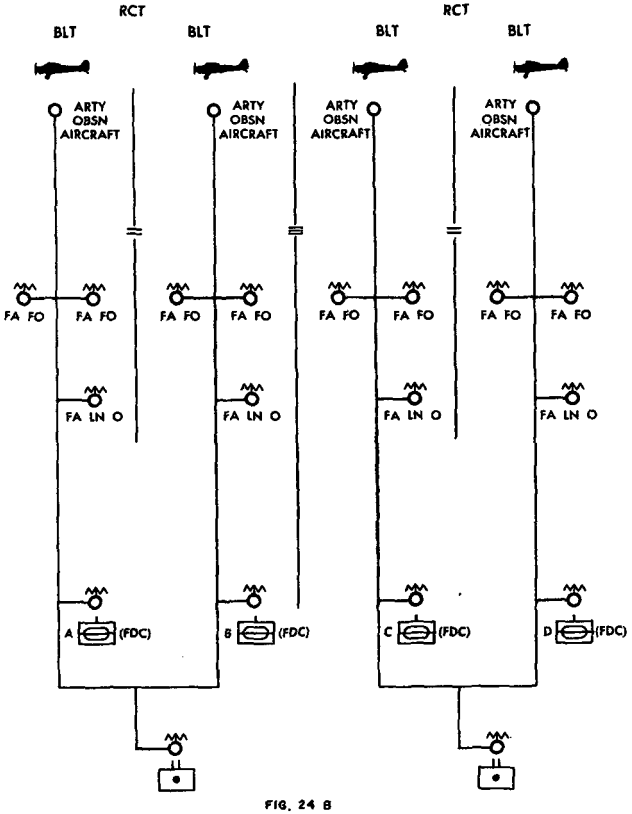


FIG. 24 B

(b) When the amphibious tank battalion is providing artillery support.

Figure 24 — Continued.

b. Wire. Wire communication is established as soon as practicable after assumption of artillery missions by elements of the amphibious tank battalion.

c. Visual. A secondary means of communication is the use of visual signals. This is the only means available during periods of radio silence. Commanders may use visual signals entirely to control small units, especially during the organization of landing waves. Visual signals used by amphibious tank units include arm and hand signals, flags, panels, blinkers, and pyrotechnics. Training in the use of semaphore and blinker, for at least one crew member of each vehicle, is an absolute necessity for proper coordination with the Navy in the ship-to-shore phase; this often will be the only satisfactory communication between vehicles of the unit during radio silence or when radios fail to function.

d. Megaphone. Voice megaphones, which may be electrically amplified, are an excellent means of communication within their range.

Section II. MISSIONS AND METHODS OF EMPLOYMENT

58. ATTACHMENT OF AMPHIBIOUS TANK UNITS. The operation order of a landing force normally attaches one amphibious tank battalion to each infantry division for the amphibious operation. The division, in turn, usually attaches the battalion to the division artillery. The division artillery commander exercises technical supervision over the battalion thus insuring the coordination of its supporting fires within the artillery plan after the battalion assumes its artillery role. Two amphibious tank companies

normally are attached to or placed in support of each assault RCT. Each assault RCT in turn places one company in support of or attaches it to each of its assault BLT's. The amphibious tanks support the infantry by direct fire until the situation is favorable for their disposition in battery positions, or until land tanks are available for commitment ashore. Normally, the amphibious tanks should be ready to deliver artillery fire as soon as it is called for by the artillery forward observers with the infantry. The decision as to when elements of the battalion commence their artillery role rests with the commander of the unit to which the element is attached. Thus, the BLT commander may direct the assumption of the artillery role when an element of the amphibious tank battalion is attached to the BLT. When these elements are *placed in support* of the RCT's and BLT's this decision rests with the division commander.

59. MISSIONS OF AMPHIBIOUS TANKS DURING THE ASSAULT. The first mission which the amphibious tanks will perform is to constitute the leading wave of, or furnish flank protection for, the assault landing force. They place howitzer and machine-gun fire upon the beach area while moving toward the beach, and they provide fire support during the period between the lifting of naval gunfire from the beach and the arrival and commitment of land tanks and artillery.

60. MISSIONS OF AMPHIBIOUS TANKS FOLLOWING THE ASSAULT. Subsequent missions of amphibious tanks are to—

a. Operate as land tanks in the expansion of the beachhead before land tanks come ashore and go into action.

b. Provide indirect fire support for the movement inland.

c. Defend beaches, from either dug-in or hull down positions.

d. Form a mobile counterattacking force.

e. Provide escort and fire support to task forces for supplemental landings and seaborne envelopment of enemy forces on beachhead flanks.

f. Substitute for land tanks in operations over flooded areas which amphibious tanks can negotiate and land tanks cannot.

g. Patrol harbors, and mop up small pockets of resistance on wharfs, piers, and partly sunken craft.

h. Support special operations such as river operations (including envelopments and patroling) and demonstration landings and withdrawals.

61. METHOD OF ACCOMPLISHING PRIMARY MISSION OF AMPHIBIOUS TANKS. **a.** Naval gunfire supporting an assault landing lifts inland from the beach when amphibious tanks are approximately 500 yards from shore. The amphibious tanks then open fire immediately on observed and suspected targets, maintaining a large volume of fire until they reach shore. If terrain permits, they move inland far enough to thoroughly cover the landing of assault troops by direct fire. If terrain prevents immediate movement inland, they provide direct fire support from near the water line until beach exits are prepared (par. 47).

b. As soon as infantry troops land, the amphibious tanks move forward together with the infantry to accomplish the initial expansion of the beachhead. This movement continues, employing normal infantry-tank

tactics (fig. 25) until the beach is clear of aimed small-arms fire and, if possible secure from direct observation. The vulnerability, size, and maintenance problems of amphibious tanks limit their effectiveness on land; plans for their employment in land operations must include consideration of their limitations, and should provide for their early relief by land tanks.

c. Each amphibious tank company has the fire power of a battalion of 75-mm artillery. Amphibious tank units therefore can furnish the indirect fire support that almost surely will be needed before organic artillery lands. Sometimes they will be the only artillery available. They may combine this mission with the land operation missions, one or more platoons operating as land tanks while the rest of the company operates as artillery; or the entire company may operate as artillery. When it is planned to employ amphibious tanks as artillery in the early phases of the operation, the supported unit should provide the ammunition and supply facilities.

62. AMPHIBIOUS TANKS AS ARTILLERY. Prior to arrival of artillery on the beach, amphibious tanks may be employed as direct support artillery. They may be further employed as reinforcing artillery after arrival of direct support artillery on the beach. Since amphibious tank battalions are not provided with all the personnel necessary to function as artillery, such personnel should be provided by the artillery to accomplish necessary survey and communication. Artillery observers and liaison personnel with the infantry provide the observation for amphibious tanks used as artillery. When not provided for by the T/O&E, fire direction centers must be organized within amphibious

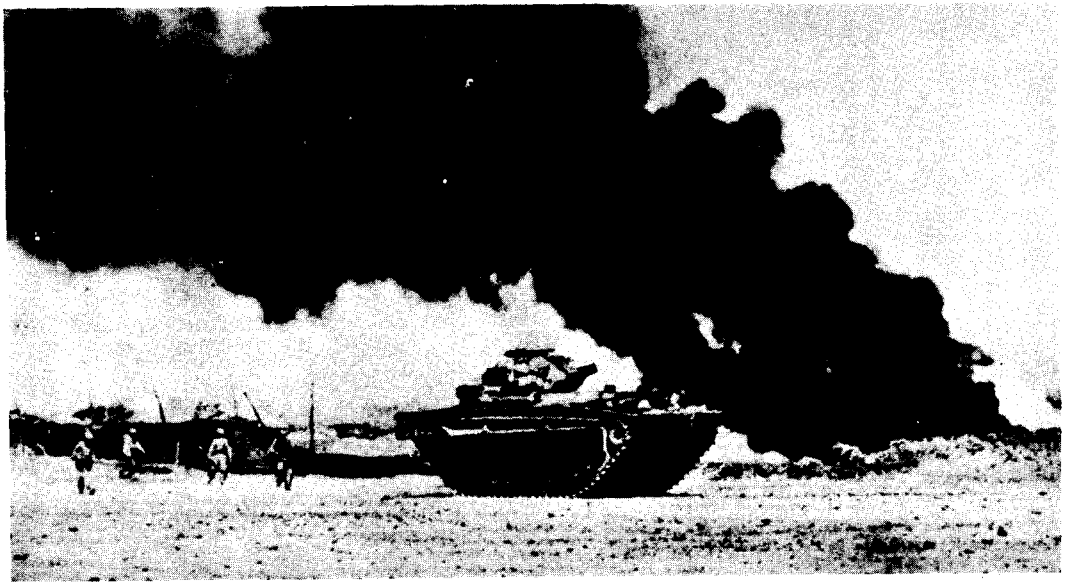


Figure 25. Amphibious tank in infantry–tank operation.

tank companies, and personnel trained to operate them. All platoon sergeants and officers of an amphibious tank company are trained to adjust fire. Maximum coordination is obtained by attaching amphibious tank companies to direct support artillery battalions. (See FM 6–20.)

63. AMPHIBIOUS TANKS IN RIVER OPERATIONS. Plans for all river operations must take into consideration the river current. A current of four or more miles per hour will greatly affect amphibious vehicles because of their limited speed in water. Other considerations are the condition of the approaches for entering the water, height and steepness of the banks, size of the trees, type of undergrowth, condition and type of soil, and whether exits from the river are natural or will have to be prepared. The tactics for a river crossing are outlined in FM 100–5. Crossings with amphibious tanks are similar to beach landings except that support is provided by artillery and tanks instead of by naval gunfire, and the line of departure is on the friendly bank instead of in the water. Employment of amphibious vehicles permits use of rivers as routes for forces making envelopment of enemy flanks or rear areas. Amphibious tanks are useful for river patroling.

64. AMPHIBIOUS TANKS IN DEMONSTRATIONS AND RAIDS. **a.** Amphibious demonstrations are made for the purpose of confusing the enemy as to the location of the main landing. Although an actual landing may not be made, amphibious tanks may be used in the landing feint to deliver a large volume of fire on the beach.

b. Amphibious raids usually have limited objectives,

call for a large volume of fire, and terminate with a withdrawal from the beachhead or bridgehead formed. Amphibious tanks operate as for any landing, then cover the withdrawal from successive positions. They are the last element of the task force to leave the beach or enemy river bank.

65. AMPHIBIOUS TANKS IN OTHER OPERATIONS. a. Defense of air fields and other coastal installations. Amphibious tank battalions may be used following the assault to provide security for air fields, supply dumps, bridges, and headquarters installations near the coast. They must be prepared to defend these by the establishment of security posts and the maintaining of a mobile counterattacking force to repel enemy seaborne or airborne counterlandings or attacks. For missions such as these, tanks will be placed along the sides of landing strips or installations, in concealed positions. Maximum use will be made of empty plane revetments and other covered positions to protect tanks from enemy artillery fire or air attacks. Crews will prepare positions for all-round defense and will dig in machine guns to achieve maximum fire effect. A fire chart will be prepared by the battalion to insure that each machine gun has a definite sector, that two or more guns cover every possible enemy approach, and that improvised traversing stops (stakes) are used to prevent guns from firing into friendly positions. Howitzers will be laid and shell fuses cut to provide air burst fire over any defiladed areas not covered by machine guns. Wire laid between tanks, platoons, companies, and battalions is very valuable in establishing security. Battalion, company, and platoon OP's will be located at vantage points. Plans will be pre-

pared by battalion to launch counterattacks into any part of the shore installations by companies not required in defensive positions. Arrangements for night illumination over the area will be made with higher headquarters.

b. Perimeter defense. Although amphibious tanks normally are occupying battery positions at night, they sometimes are employed for the reinforcement of front line positions, or for the protection of an exposed flank. Tank crews will be trained in the principles of establishing final protective lines, particular emphasis being placed on use of dismounted machine guns. When tanks are held on or near the front lines at night, the driver will remain with the vehicle, which will be placed in a concealed position.

c. Night security detachments off beaches. Employment on LVT(A)'s as post assault night security detachments off beaches, as a counter-landing measure, is practicable. Their low silhouette and armament adapt them to such employment when they are placed at near floating depth with their tracks grounded. Their communication equipment is adaptable to an outpost communication system. They are further useful in enfilading enemy sea flanks.

CHAPTER 4

THE AMPHIBIOUS TRACTOR BATTALION

Section I. VEHICLES AND ORGANIZATION

66. DESCRIPTION OF LVT(4) (figs. 26 and 27). The LVT(4) is a cargo vehicle which can carry 8,000 pounds of cargo, or 30 combat-equipped troops, or a 105-mm artillery piece. An enclosed driver's compartment is in the front; the engine compartment is immediately behind the driver's compartment. Dimensions of the cargo compartment are 12 feet 4 inches by 7 feet 4 inches. A hinged ramp at the rear of the cargo compartment facilitates loading and unloading (fig. 28). The hull is constructed of ⅛-inch steel, with some ½-inch and ¼-inch armor; armor kits are available for installation to provide additional protection. Armament consists of two caliber .50 machine guns mounted on the rear of the engine compartment, and two caliber .30 machine guns mounted on the sides of the cargo compartment. With normal load the total weight is 16 tons.

67. OTHER AMPHIBIOUS TRACTORS. a. LVT(3) (fig. 29). The characteristics of the LVT(3) are similar to those of the LVT(4). The most important difference is that the LVT(3) is propelled by two Cadillac V–8 water-cooled engines mounted in the side pontons.

b. LVT dozer (fig. 30). The LVT dozer is an amphibious tank or tractor with a dozer blade attached. The blade can be jettisoned from inside the vehicle. Attachment of the blade will reduce the

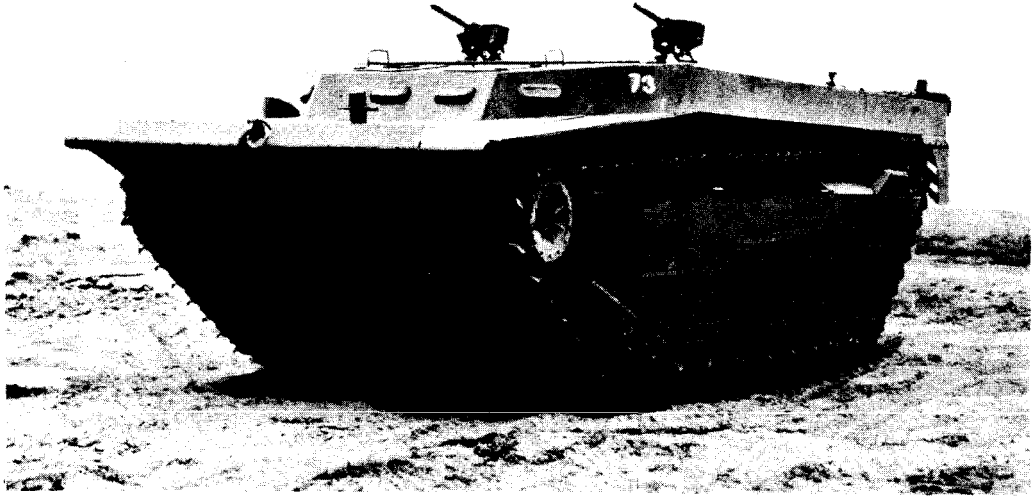


Figure 26. LVT(4).

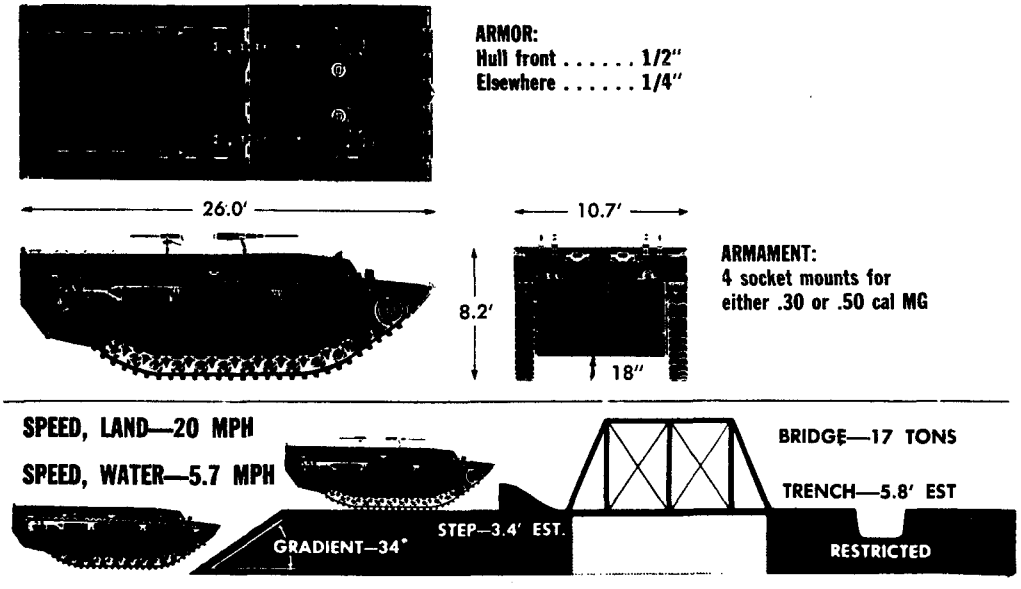


Figure 27. Data chart of LVT(4).

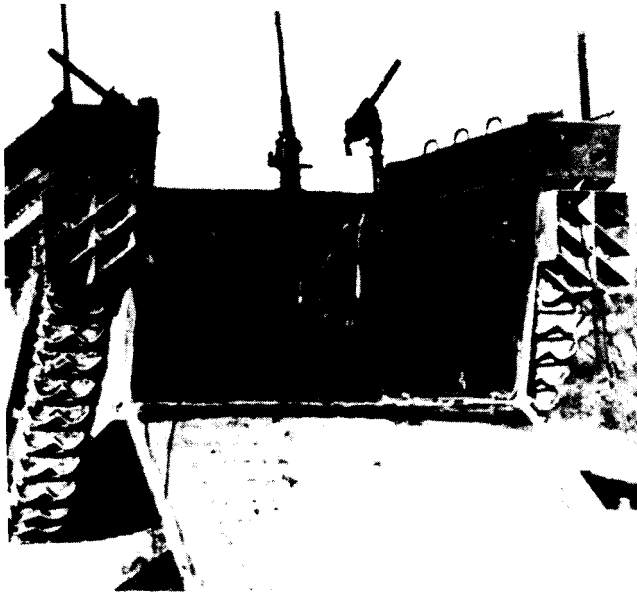


Figure 28. LVT(4)—showing hinged ramp at rear of cargo compartment.

maneuverability, seaworthiness, and speed.

c. **LVT flame thrower.** The LVT flame thrower, although tried in combat, still is in the experimental stage.

68. AMPHIBIOUS TRACTOR BATTALION ORGANIZATION. Like the amphibious tank battalion, the amphibious tractor battalion is both an administrative and a tactical unit, with supply, maintenance, and evacuation facilities for a limited period of independent action (figs. 31, 32, and 33).

Figure 29. LVT(3).

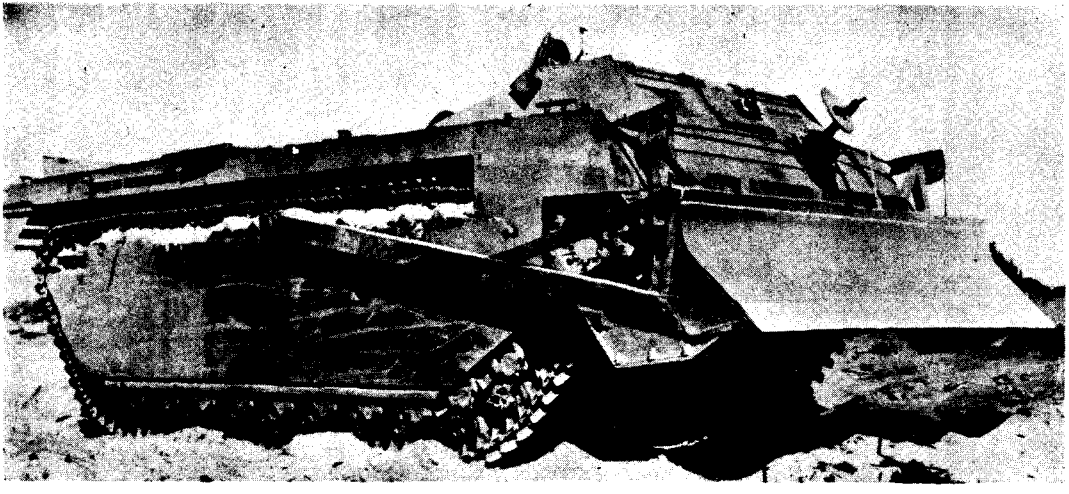


Figure 30. LVT dozer.

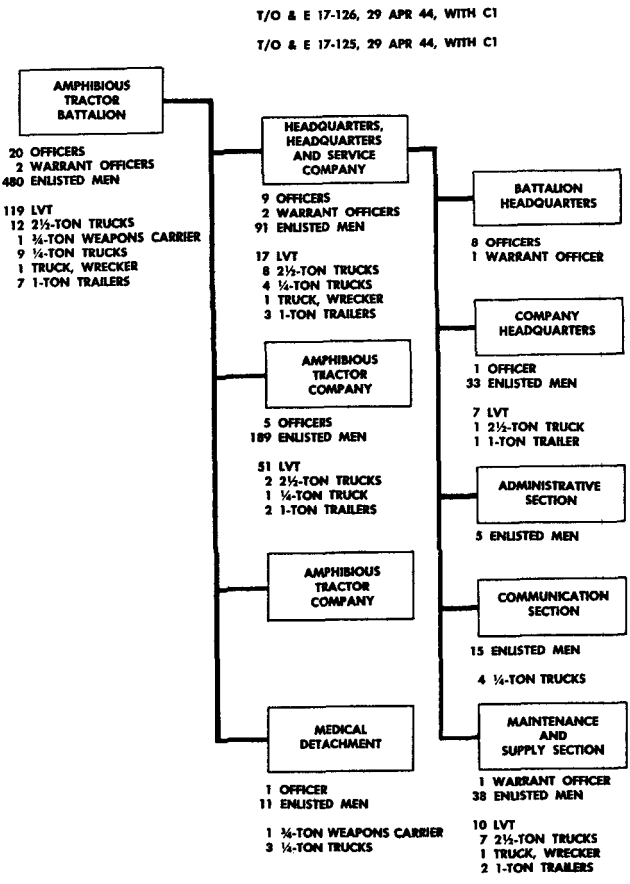


Figure 31. Composition of amphibious tractor battalion and headquarters, headquarters and service company, amphibious tractor battalion.

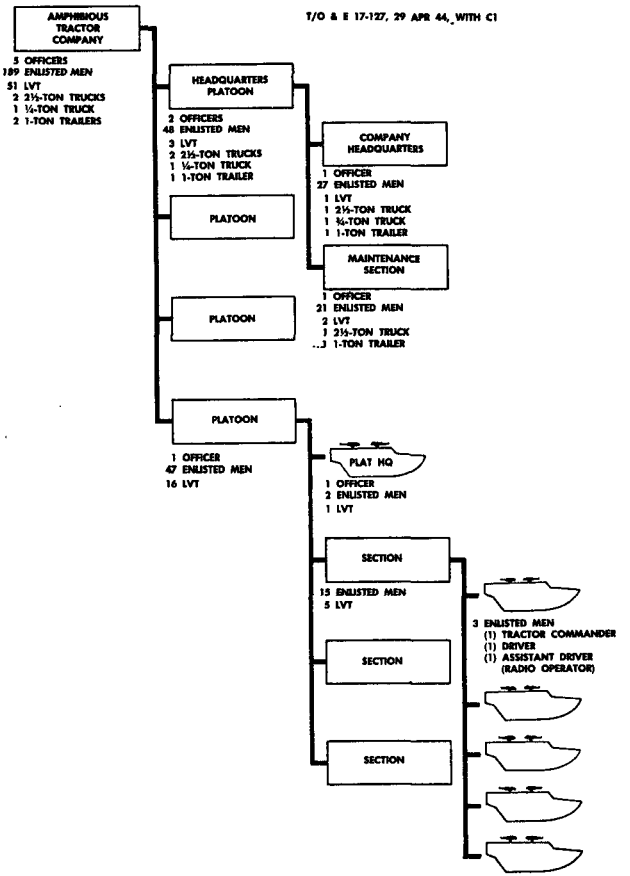


Figure 32. Composition of amphibious tractor company.

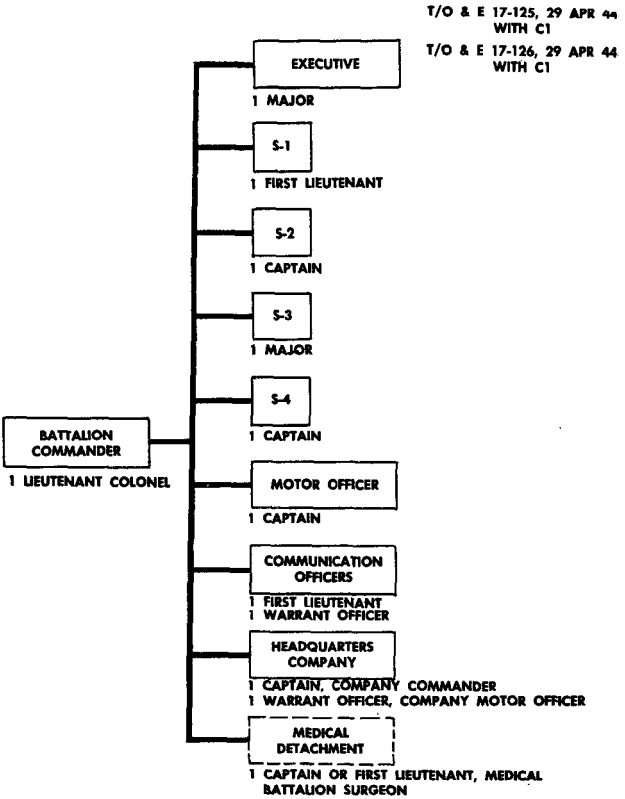


Figure 33. Staff organization, amphibious tractor battalion.

69. COMMUNICATION IN AMPHIBIOUS TRACTOR UNITS. Means of communication in the amphibious tractor battalion are the same as those in the

amphibious tank battalion (par. 57). Its radio net includes the same sets, except that it has no AN/VRC–3's (fig. 34).

Section II. MISSIONS AND METHODS OF EMPLOYMENT

70. MISSIONS OF AMPHIBIOUS TRACTORS DURING THE ASSAULT. The first missions which amphibious tractor units will be called on to perform are to—

a. Transport assault troops ashore.

b. Transport reinforcements, supplies, and equipment ashore, and to evacuate casualties from the beach to hospital ships.

c. Transport the direct support artillery of the assault troops when hydrographic conditions prevent the use of landing craft, and when DUKW's are not available.

71. OTHER MISSIONS OF AMPHIBIOUS TRACTORS. Other missions of amphibious tractor battalions are to—

a. Transport troops, supplies, and equipment during river operations.

b. Defend beaches, from either dug-in or hull down positions.

c. Form a mobile counterattacking force to repel counterlandings.

d. Substitute for wheeled vehicles in carrying troops and supplies inland, especially across flooded areas.

e. Defend installations such as supply points and air fields near the coast line.

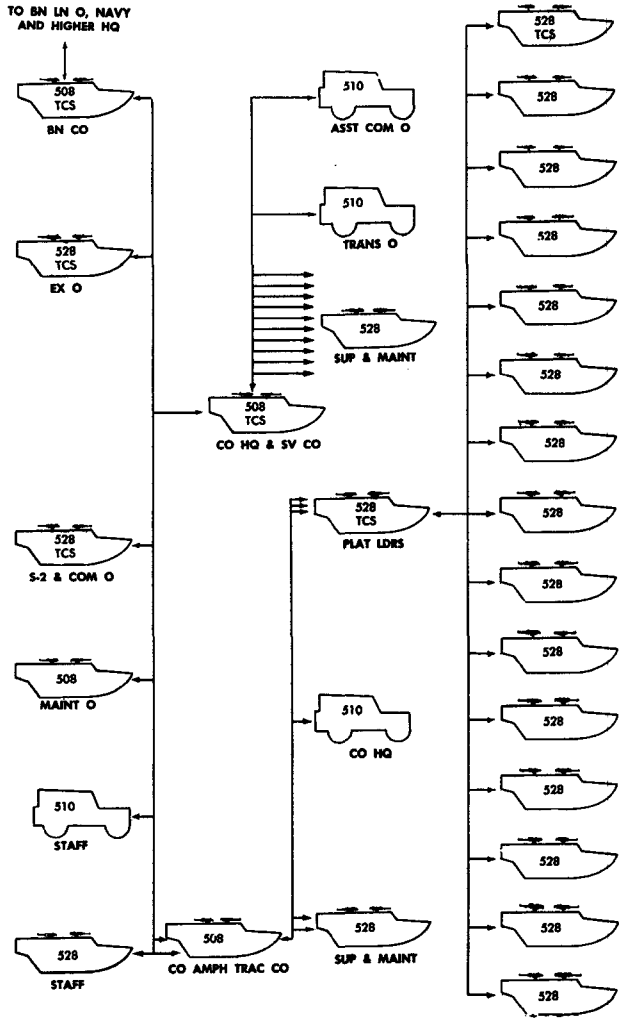


Figure 34. Channels of radio communication, amphibious tractor battalion.

f. Patrol harbors in conjunction with amphibious tanks or infantry.

g. Under exceptional circumstances, carry extra fuel, ammunition, and other supplies for amphibious tank and tractor units on long water movements.

h. Carry in and lay hinged beach roadway matting for the shore party (fig. 17).

72. ATTACHMENTS OF AMPHIBIOUS TRACTOR UNITS. When amphibious tractors are to be used, the assault division normally will attach an amphibious tractor battalion to each assault RCT for the landing operation. Organization of the tractor battalion allows for attachment of a company of tractors to each assault BLT when the BLT's are employed tactically with two in the assault and one in reserve. Each tractor company has sufficient vehicles to land the assault and support units of a BLT. After landing the two assault BLT's, one tractor company will return to the landing ship area to carry in initial beachhead supplies while the other will be used to land other units of the RCT, including the reserve BLT. Upon completion of the assault phase of the operation, the amphibious tractor units will be attached to the shore party for the build-up (support) phase of the operation.

73. METHOD OF ACCOMPLISHING ASSAULT MISSIONS OF AMPHIBIOUS TRACTORS. a. Assault landings. Amphibious tractors normally form the second and succeeding waves of assault landings in which this equipment is employed. Assault troops load on the tractors while still aboard landing ships; the tractors then enter the water and proceed to the rendezvous area, seaward of the line of departure, where they are organized into waves in accordance with the

BLT landing diagram. The vehicle waves are guided to the line of departure, where they are dispatched to the assault beach at a predetermined time so as to land on a planned schedule. Machine guns are not fired during the movement to the shore except by the first wave and, then, only when amphibious tanks are not ahead (fig. 35). The tractor commander will make all decisions regarding operation of the vehicle while afloat; the boat team commander assumes full control upon reaching shore. After reaching the beach and unloading, the tractors re-enter the water, giving priority to incoming vehicles. They return to the LST area, line of transfer, or transport area, as directed, and pick up support and reserve troops and supplies for movement to shore. The boat group commander, a naval officer, controls the movement of LVT's while afloat.

b. Landing support artillery. When amphibious tractors are used to land direct support artillery, the 105-mm howitzer section, complete except for prime mover, is loaded in the tractor. Upon landing, the personnel of the section unload the howitzer over the ramp and couple it to the LVT. The LVT then serves as a prime mover until the artillery vehicles can be brought ashore. If the battery positions are on or close to the beach, the pieces may be unloaded at the firing position.

c. Landing reserves. Each RCT may assign one tractor company to bring the reserve BLT ashore after the assault BLT's land; the other tractor company brings in equipment and supplies. Normally, amphibious tractors are used to land the reserve units only when hydrographic conditions prevent the use of landing craft. If landing craft cannot reach the beach because of reef or shallow water, they will come alongside

Figure 35. Infantrymen manning machine guns on an amphibious tractor; shields are for test purposes only.

tractors at the line of transfer; troops then transfer into tractors for landing.

74. AMPHIBIOUS TRACTORS IN RIVER OPERATIONS. Amphibious tractors may operate in conjunction with amphibious tanks in river crossings, envelopments, or patroling (par. 63). Tractors are useful for ferrying troops, ¼-ton trucks, artillery pieces, and supplies over rivers and other inland waterways. They may serve as an expedient in bridging streams (fig. 36).

75. AMPHIBIOUS TRACTORS IN OTHER OPERATIONS. **a. Amphibious raids.** Amphibious tractors may be used to transport the assault troops for the landing phase of an amphibious raid (par. 64).

b. Defense of air fields. Amphibious tractors may be used instead of amphibious tanks in defense of air fields (par. 65).

c. Inland defense. Amphibious tractors, with their two caliber .50 and two caliber .30 machine guns, may defend shore installations or form secondary lines between the front lines and rear installations to prevent infiltration. If ground troops are available for holding the perimeter of these defenses, the tractors may occupy areas well within the perimeter and move wherever needed to bring into action the fire power of their machine guns. When ground troops are not available, a majority of the tractors will be placed within the perimeter, using the men to set up defensive positions with dismounted machine guns. Other tractors will be manned and held as a mobile counterattacking force. Plans for employing amphibious tractors inland should take into consideration the damage that will result to roads and to the vehicles.

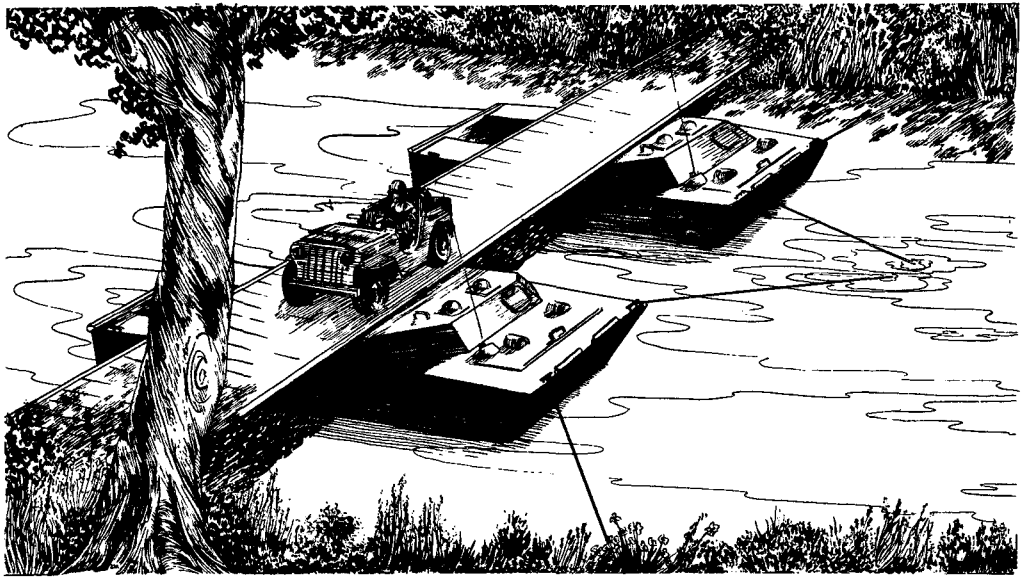


Figure 36. Amphibious tractors used as bridge pontons.

PART THREE

AMPHIBIOUS TANK AND TRACTOR TRAINING

CHAPTER 5

TRAINING COMMON TO AMPHIBIOUS TANK AND TRACTOR UNITS

Section I. INDIVIDUAL TRAINING

76. PRETRAINING QUALIFICATIONS. Personnel selected for assignment to amphibious tank and tractor units previously should complete a basic course in armored training. Training then can give emphasis to the water phases of amphibious operations.

77. GENERAL TRAINING. All personnel will receive training in driving, maintenance, gunnery, and radio operation. Personnel assigned to these duties, in addition, will receive specialized training for their particular jobs. In addition, amphibious training should include the following subjects:

a. Swimming, special survival methods, artificial respiration, and use of life belts and rafts.

b. Use of debarkation nets and lowering lines.

c. Semaphore signaling, blinker lights, signal flags and panels, and arm and hand signals, as used by both Army and Navy.

d. Nomenclature of amphibious vehicles and weapons.

e. Naval terminology, customs, and insignia.

f. Recognition of landing craft, ships, and planes.

g. Familiarization with shipboard routine.

h. Small boat operation, knot tying, and use of boat hooks.

i. Camouflage for beach defensive positions.

j. Use of compass, elementary navigation, and reading of maps and hydrographic charts.

k. Methods of beach marking and shore party functions.

l. Control of disease anticipated in the operation area.

m. Waterproofing and care of individual and unit equipment.

n. Loading and unloading of cargo, to include the proper handling and field storage of loose supplies.

o. Stowage of vehicular equipment.

p. Identification of supplies by class and type.

q. Identification and neutralization of antiboat and land mines.

Section II. DRIVER TRAINING

78. GENERAL. a. References. Driver selection and training conform to the principles outlined in TM 21–301. TM 9–775 and TM 9–776 give details on controls and their operation.

b. Selection and initial training. It is desirable that personnel selected for drivers have previous training in driving land tanks. Initial training should be conducted in soft soil or sand to save undue wear on vehicles. Overland movements or long uphill pulls should be held to a minimum, because they will result in an excessive amount of vehicle losses for maintenance

without materially increasing the skill or ability of the drivers.

c. Difficult conditions. Driver training should proceed progressively from easy to difficult driving conditions.

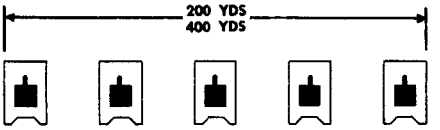
d. Proper gear selection. Training must combat the usual tendency to drive in a gear so high that the engine will labor. Drivers should never use fourth or fifth gear in either land or water driving, because use of these gears causes undue strain on the power unit on land, and does not perceptibly increase speed on water.

e. Life belts. During water driving all personnel in vehicles will wear life belts.

79. LAND DRIVING. Training in land driving will precede training in water driving, stressing operation over rough terrain and flooded areas. In operating over rough terrain, drivers must learn to avoid objects that will damage the vehicle. They must learn how to make maximum use of the vehicle's capabilities in negotiating swamps, and flats, and flooded areas.

80. FORMATIONS. Driver training stresses operating in formation. Formations used by amphibious tanks on both land and water are similar to those used by land tanks (figs. 37, 38, and 39).

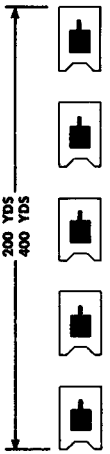
81. LAUNCHING. Driver visibility often will be obscured by spray and waves, which makes him dependent on the vehicle commander for directions. The vehicle commander must check to insure that the vehicular load is distributed equally, because a vehicle with a list is difficult to maneuver. Drivers will prepare for launching and enter the water by following this sequence of actions—



CONTROL. **Difficult.**

FIRE DELIVERED. **Maximum to front; minimum to flanks.**

LINE

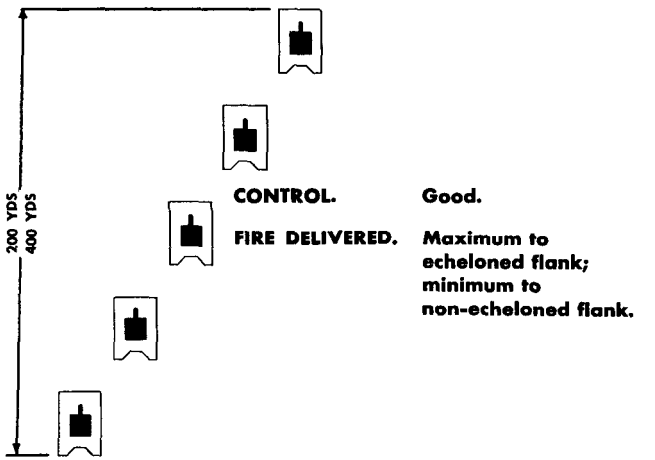


CONTROL. **Excellent.**

FIRE DELIVERED. **Minimum to front; maximum to flanks.**

COLUMN

Figure 37. Types of formations—(line and column).



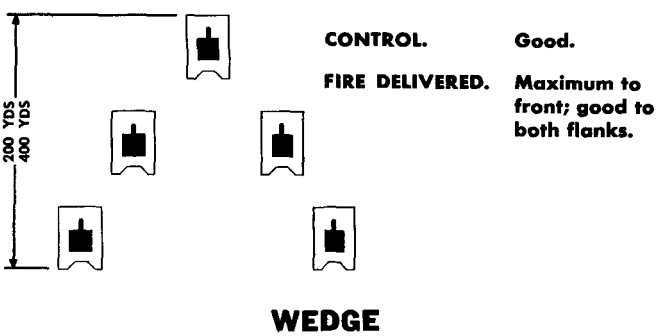


Figure 38. Types of formations—(echelon and wedge).

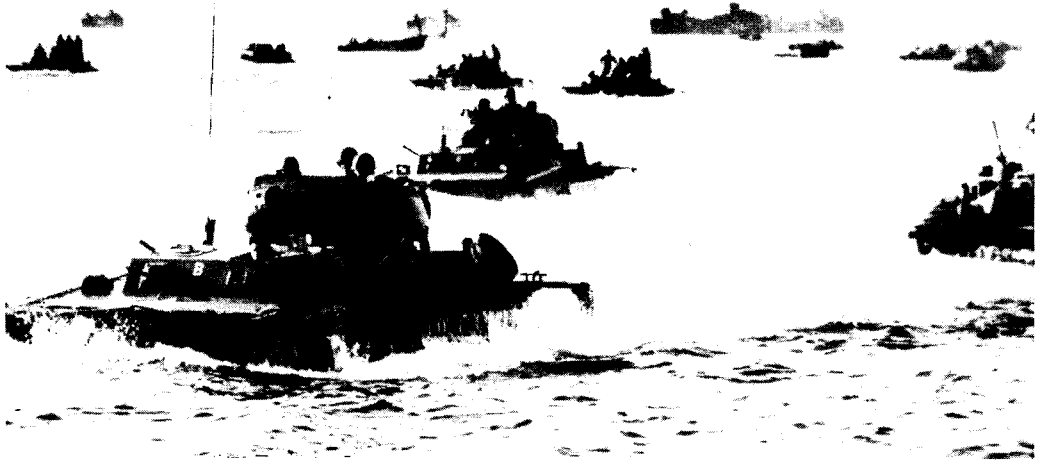


Figure 39. LVT(A)'s in formation for beach assault.

a. Place vehicle on beach at right angle to surf line.

b. Turn on engine compartment blower.

c. Close hatches, and check vision device.

d. Put vehicle in second gear; leave clutch disengaged.

e. Set hand throttle at 1,800 revolutions per minute.

f. Open throttle fully, engage clutch, and enter water at right angle to the waves. When heavy surf is striking the beach, vehicle commanders should observe to seaward for several minutes and select a time for entering the water immediately after the largest incoming wave has struck the beach. Once afloat the vehicle should maintain a direction perpendicular to the incoming waves until beyond the line of breakers, in order to reduce the possibility of being capsized by waves striking the vehicle broadside.

g. Change to third gear when fully afloat and past the surf line, and turn off engine compartment blower.

h. Make turns with continuous pulls on steering levers.

82. LANDING ON SANDY OR GRAVEL BEACHES. In landing, drivers will follow this sequence of actions:

a. Set hand throttle at 1,800 revolutions per minute (be sure engine is in third gear).

b. Close all hatches.

c. Turn on engine compartment blower.

d. Open foot throttle fully and keep it open.

e. Steer at right angle to the beach, using steady pulls to maintain direction.

f. If the vehicle becomes fully broached (turned parallel to beach), turn out to sea and come in again.

g. When the tracks strike ground, immediately re-

lease steering levers until both tracks are fully aground. Keep throttle fully open until engine labors. Shift to lower gear only when necessary, not when tracks first strike ground.

h. When fully ashore, adjust throttle to idling speed of 800 revolutions per minute.

i. Amphibious tanks which have engines in the rear must have a motor cowling tarpaulin lashed taut over the cowling when landing or operating in heavy seas, in order to reduce chances of the motor being drowned out.

83. OPERATION AT SEA. Training in driving at sea will stress the fact that the limited speed and large turning radius of amphibious vehicles make them difficult to maneuver. Drivers learn to maintain formations, remembering that vehicles in water formations must maintain proper intervals in order to make turns without colliding. They learn how to circle, but are taught to avoid circling whenever possible because of the extreme wear on the steering bands. In training, it is not advisable to operate any farther from shore than is necessary for the training mission. When extended cross-water maneuvers are attempted, an escort craft must accompany the vehicles as a salvage and emergency rescue craft. All vehicles must be checked to see that tow cables are attached before putting to sea.

84. LANDING THROUGH SURF. In landing through heavy surf, drivers follow the same procedure as for normal landing, with these additions—

a. When a following wave causes the bow to nose under water, disengage the clutch but keep the throttle open.

b. When the crest of the wave has passed, engage the clutch; then, if necessary, pull the steering levers sufficiently to straighten the course. Release steering levers as soon as the vehicle is again headed straight to the beach.

c. After tracks are fully aground, shift to lower gear, if necessary, to maintain maximum speed. It is important to clear the surf quickly to avoid large waves which might refloat the vehicle and then drop it hard on the beach.

d. The driver will be dependent upon the vehicle commander for directions, since his vision is limited because of spray and waves.

85. LANDING OVER REEFS OR ROCKY SHORES. In landing over coral reefs, drivers should choose a landing spot between the coral fingers (ridges of coral extending from the reef). On approaching the reef, disengage the clutch and let the vehicle coast until it strikes the reef. Then engage the clutch and use first or second gear in driving over the reef. This procedure will prevent tipping the vehicle over if one track strikes a coral finger, tearing off grousers, or knocking holes in hull or pontons. Drivers follow the same procedure in landing over rocky shores.

86. BRINGING VEHICLES ALONGSIDE. To bring two amphibious vehicles alongside, follow this procedure—

a. Bring vehicles together headed in the same direction.

b. Post men with boat hooks on bow and stern of both vehicles on the side at which contact is to be made.

c. Keep one vehicle as nearly stationary as possible, making the approach with the other vehicle, decreasing its speed as it nears the stationary vehicle.

d. As the vehicles come alongside, direct men with boat hooks to engage cleats of other vehicle, pulling the vehicles together to within safe jumping distance.

e. Keep vehicles slightly apart to prevent damage; if bumpers are available, hang them over the side.

f. When moving away, push the vehicles well apart with boat hooks before engaging clutches.

87. MOORING ALONGSIDE SHIPS. In coming alongside large ships, an amphibious vehicle approaches the ship at an oblique angle, with the vehicle's bow facing the ship's anchor, and eases to the ship's side at the point desired. A member of the vehicle crew fastens a line from the ship to the bow cleat of the vehicle on the side nearer the ship. The driver then moves the vehicle slowly forward until the line is taut, and holds it in position by constant application of power. When leaving the ship the driver must move the vehicle cautiously to avoid bumping the ship's side.

88. LOADING VEHICLES ABOARD LST FROM WATER. **a.** Amphibious vehicles, preparing to load on an LST from the water, approach the ship's bow at a 45-degree angle, from the lee (sheltered) side of the ship. On nearing the bow, the driver slows the vehicle and moves it very slowly to a position in front of the ramp. As the vehicle passes the ramp, personnel on the ship throw a light line (*heaving line*) to a member of the vehicle crew stationed on the stern of the vehicle. To the heaving line are attached two *steadying lines*, which are heavier ropes with eyes on one end. The

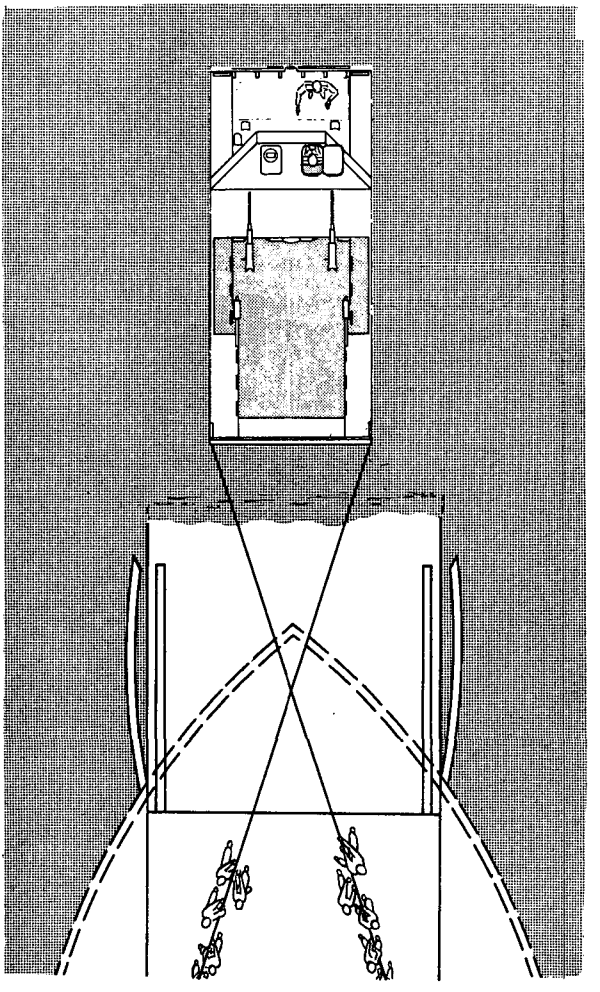


Figure 40. Loading an amphibious tractor aboard an LST, from the water.

vehicle crew member places the eyes of the steadying lines over the stern cleats of the vehicle. Personnel aboard the ship cross the steadying lines (fig. 40) and pull the vehicle up to the ramp. Each steadying line should be manned by five or more men aboard ship; the number of men required will depend upon the roughness of the sea. The driver then backs the vehicle carefully aboard; the vehicle commander takes a position at the bow of the vehicle to direct him.

b. In loading a number of vehicles, control of approach to the bow must be maintained either by radio or by signal from the top deck. Arrangements must be made in advance with the ship to insure its being ready for the loading.

c. Initial training in this type loading may be given by using a Rhino ferry equipped with an LST type ramp.

Section III. GUNNERY

89. TRAINING WITH INDIVIDUAL WEAPONS.

Personnel of the amphibious tank and tractor battalions are armed with submachine guns, carbines, and pistols as prescribed in tables of organization and equipment. Personnel will receive detailed training and fire a qualification course annually with the weapons they carry, and will receive familiarization training with other individual weapons, including rocket launchers. Extensive training will be conducted in the use of grenades and the firing of submachine guns from stationary and moving vehicles.

90. TRAINING WITH VEHICULAR WEAPONS.

All personnel will receive detailed training with vehicular

weapons of their battalion. Training in firing from the water will stress the general principle applicable to all vehicular weapons: snapshooting from the crest of a wave. The gunner must catch sight of his target as the vehicle rises on the swell, adjust his aim quickly, and fire before the vehicle drops into a trough.

91. COMBAT FIRING. a. Amphibious tanks. Assault landing beaches normally will be partly or entirely obscured from view by dust and smoke resulting from naval gunfire and air bombardment. Gunners will be trained in saturation or area firing; that is, delivering a large volume of tank and machine gun fire on areas known or believed to contain enemy troops and defenses. Howitzer crews also will be trained to prepare fuses and fire air bursts set to explode over the beach or its immediate vicinity. This method is very effective against entrenched troops, and will keep down troops that have sought cover from naval bombardment and air attacks. The use of time fire against the enemy positions on reverse slopes of steep, high ridges backing landing beaches should be perfected. The above methods of fire may not seem an economical use of ammunition; however, when naval gunfire lifts as assault waves approach the beach, it is imperative that a heavy volume of fire be delivered by the amphibious tanks to keep the enemy from manning beach defenses. If tank crewmen are trained to fire only on located targets, they will probably deliver little or no fire on many assault landings, due to enemy positions being obscured by dust and smoke. The practice of using the time fire not only reaches enemy troops in fox holes but insures that "overs" will burst in the vicinity of the beach rather than being lost inland. The morale effect

on boat teams as a result of close support by amphibious tanks for the landing of the assault waves is a valuable factor.

b. Amphibious tractors. The machine guns of the amphibious tractor are manned by troops being transported, and fire of these weapons is controlled by the boat team commander (pars. 46 and 73).

92. COMBAT LOADS OF AMMUNITION. During all training which includes firing, vehicles will carry a combat load of ammunition, as prescribed in FM 101–10 or other current Department of the Army directives. All personnel will become familiar with the amounts of ammunition prescribed for a combat load. Crews also must be trained in the identification, handling, care, and stowage of ammunition for their vehicles. Care must be taken in stowing and securing to prevent damage to ammunition or vehicle in a rough sea.

Section IV. MAINTENANCE

93. GENERAL. Training will stress the fact that maintenance is particularly important to amphibious vehicles because of their design, characteristics, and limitations (pars. 3 and 5). All amphibious tank and tractor personnel should become familiar with applicable maintenance procedures outlined in TM 9–775 and TM 9–776.

94. VEHICULAR MAINTENANCE. Organizational maintenance consists of the maintenance performed by organizations on their own equipment.

a. Crew maintenance. Drivers and crew members of

vehicles perform crew maintenance. Crew maintenance is largely preventive, stressing lubrication, cleaning, tightening, and painting. It includes prescribed inspections by drivers and other crew members, who must be continually on the alert for wear and tear that may become the cause of a breakdown. Defects must be repaired, or promptly reported to the company maintenance section for repair. Frequent and thorough lubrication is essential, an important consideration being that lubrication equipment and containers must be kept covered and free from dirt. An especially thorough cleaning is necessary after surf operation in order to remove sand and salt water (fig. 41). A properly applied coat of paint should cover all exposed surfaces. Crew members frequently should touch up small spots needing paint, to prevent rust. A rust-preventative paint must be applied to the outer skin surfaces to which additional armor plate is being attached, to prevent corrosive action of salt water. Surfaces that cannot be painted must always be covered with oil or grease. In addition to preventive maintenance, crews must be taught to make minor repairs and replacements of such things as track grousers, splash guards, and support rollers.

b. Unit maintenance. Personnel of the company maintenance sections and the battalion maintenance platoon perform the more detailed scheduled checks, adjustments, and repairs, including the replacement of parts and assemblies. The principal check of vehicles is made after each 100 hours of operation. At this check battalion maintenance personnel inspect, adjust, and repair the engine, while company maintenance personnel check the remainder of the vehicle, The driver stays with the vehicle during this check.

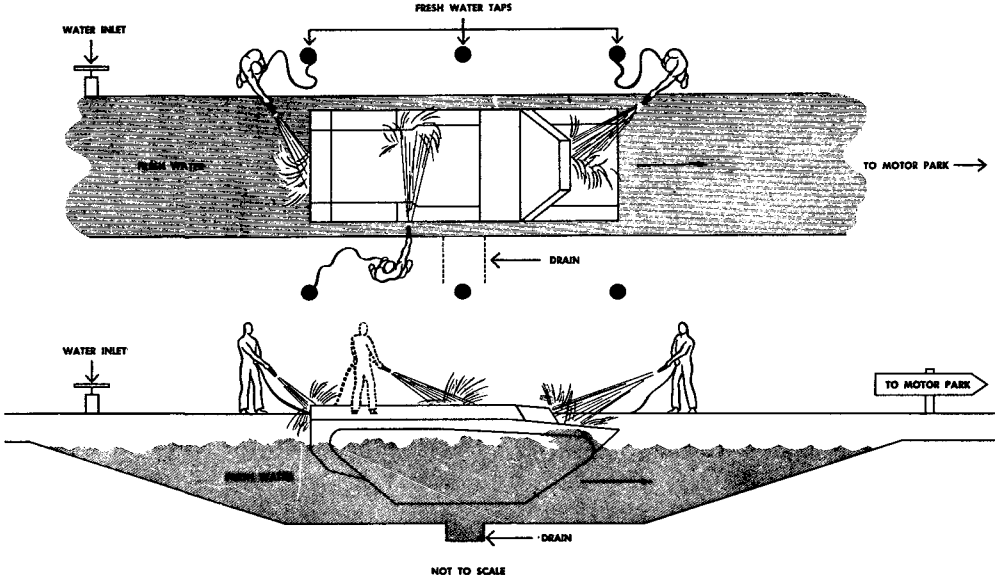


Figure 41. A suggester "bathtub" for washing amphibious vehicles.

and assists as needed. Maintenance personnel will use DA AGO Form 462 to insure covering all items of the check list in TM 37–2810. The extent of these repairs is dependent on the skill of the maintenance personnel and the time, tools, and materials available to do the job.

95. SALVAGE OPERATIONS. The battalion maintenance platoon should designate one of its amphibious tractors as a retriever and equip it with winch, block and tackle, pumps, and hoses. With this retriever the platoon can salvage vehicles in shallow water. When an LVT is sunk near the shore during training, the field maintenance shop unit should be contacted and requested to receive the vehicle as soon as it is removed from the water. If the vehicle is allowed to stand for several days before it is disassembled in detail, and all parts put through a steaming and drying process to prevent corrosive effect of salt water, irreparable damage will be done to the motor and power train gears because of rust. During all salvage operations near the shore, and officer or NCO should be designated to watch for the approach of large waves and warn the working party; otherwise they may be crushed by the capsized vehicle or drawn into the sea and drowned in the backwash or undertow. If battalion personnel cannot salvage a vehicle because of deep water or distance from shore, they report the situation to naval personnel for action.

96. TOWING. All amphibious vehicles should carry the issued towing cables, attached to the vehicle and ready for use, should towing become necessary. Amphibious tanks are towed bow first; amphibious

tractors are towed stern first. Landing craft towing amphibious vehicles must not exceed a speed of 5 miles per hour, to prevent swamping and sinking the vehicle in the wash.

97. MAINTENANCE OF WEAPONS. Weapons on amphibious vehicles require special maintenance to resist corrosion. TM 9–850 lists corrosion preventive measures. These points are especially important—

a. Keep weapons well coated with the heaviest oil or grease that will still permit the guns to function properly.

b. Keep weapons in waterproof covers whenever possible.

c. Clean and oil weapons daily, as they may sweat and rust while covered.

d. Seal muzzles of howitzers and machine guns with thin sealing tape or rubber before launching. These seals must be thin enough to break readily when the weapon is fired.

98. RADIO MAINTENANCE. All radios used in amphibious vehicles if not already so treated, should be waterproofed and fungiproofed by signal corps personnel. Training of radio operators emphasizes preventive maintenance as prescribed in training manuals for the various sets, and in TB SIG 123. Preventive measures to combat the action of salt water include—

a. Application of light coat of oil to all exposed metal surfaces.

b. Sealing all connections with waterproof tape, and then painting with a waterproof compound.

c. Encasing sets in issued or improvised canvas covers.

d. Repeated drying of headsets, microphones, cordage, and other parts during water operation. In addition to wiping, drying may be effected by placing wet microphones and other parts on the warm transmission.

99. SHIPBOARD MAINTENANCE. a. Crews of amphibious vehicles must carry out definite maintenance schedules. Such schedules should be drawn up in coordination with the appropriate ship's officers so that ship regulations and safety precautions as laid down by the ship's captain will not be violated. The captain of a ship alone is responsible for the safety of his ship in its entirety. To carry out certain tests will require advance permission from the ship's captain; such permission will be obtained through the officer-of-the-deck. Maintenance tests requiring such advance permission are those which hazard the safety of the ship and personnel, and will be those involving—

(1) Handling and stowage of fuel and explosive gases.
(2) Handling and stowage of ammunition and explosives.
(3) Charging batteries.
(4) Operation of any machinery which may endanger the lives or health of personnel.
(5) Shift of heavy weights which may endanger the stability or structural integrity of the ship.
(6) Test-firing of any weapon.

b. During an ocean voyage particular care must be taken to prevent corrosion, the formation of mold, and the collection of moisture in supplies and equipment. The maintenance schedule should provide detailed inspections to avoid damage and deterioration due to

moisture and salt always present throughout a sea voyage. Loose equipment, not otherwise subject to damage, may be seriously impaired by rubbing and friction resulting from the motion of the ship, even though the voyage is unusually calm. In heavy weather the security of vehicles and equipment lashings must be checked frequently, and the hazard of fire is greatly increased. Extra precautions and security measures must be established under such conditions.

c. The maintenance schedule will include daily and periodic tests necessary to maintain all equipment in a state of maximum efficiency and preservation. This schedule should include—

(1) Hand cranking engines 50 turns of crank.
(2) Running engines for 20 minutes every four days (arrange for tank deck blower system to be operating while running LVT engines).
(3) Checking the clutches, weapons, and radios (uncover radios during the voyage to prevent sweating).
(4) Drying wet or damp equipment.
(5) Posting of fire guards with extinguishers during all maintenance.
(6) Refueling of only one vehicle at a time (always notify ship's captain before refueling).
(7) Checking batteries, recharging them when necessary.
(8) Checking tautness of turnbuckles or chains securing vehicles to deck.

Section V. ABANDON VEHICLE TRAINING

100. GENERAL. Crews will stay with damaged vehicles as long as possible, attempting to keep them

afloat by bailing or by plugging holes; the bilge pump will not operate unless the engine is running. However, all personnel will receive training in abandoning vehicles in the event of sinking or capsizing. Training will emphasize abandonment of vehicles in a prearranged and orderly manner. Whenever practicable, abandonment will be at the command of the vehicle commander. At the command PREPARE TO ABANDON, personnel secure equipment and get ready to abandon; at the command ABANDON, personnel immediately leave the vehicle.

101. CAPSIZED VEHICLES. A vehicle turned upside down (after removal of batteries, fuel, and oil), with holes dug under hatches or turret, permits practice in abandoning capsized vehicles. Personnel must learn that vehicles capsize only in shallow water, and that capsized vehicles will have enough air trapped between the water and the floor (the top when capsized) to permit personnel to breathe for several minutes. This allows time for analysis of the situation and determination of the best method of escape. Personnel in amphibious tanks can leave through the turret or escape hatches. Personnel in cargo compartments of amphibious tractors escape under compartment sides; personnel in the driver's compartment leave through the hatches, or go through companionways to cargo compartments. Capsized vehicles resting on the bottom in shallow water will often be raised briefly by the action of the waves, enough to allow men underneath to escape.

102. DESTROYING ABANDONED VEHICLES. Crews of amphibious vehicles which must be abandoned

on land will destroy the vehicle and its armament according to methods outlined in FM 17–75.

Section VI. UNIT TRAINING

103. PLATOON TRAINING. **a.** Training of platoons as units will begin as soon as crew members have learned to perform their duties. This training must stress flexibility of organization, as platoons may be split up on more than one ship to conform to the infantry landing plan. Platoon landing exercises will be conducted, using various landing diagrams which require the platoon leader to adjust or reorganize his unit to accomplish the mission assigned. This training will include realistic exercises covering all phases of operation. Exercises for amphibious tank platoons should conform to principles set forth in FM 17–32, FM 17–69, and FM 17–76 (where applicable). These exercises will stress—

(1) Functioning of elements of the platoon as a tactical unit.
(2) Control, command, and initiative by platoon and section leader.
(3) Operation in formation, and changing of formations (on land and water).
(4) Use of visual signals and radio in communication and control.
(5) Practice landings and movement inland to an objective.

b. Amphibious tank platoons will conduct firing problems from sea to shore and direct-fire mission problems ashore. These platoons will be trained in the selection and occupation of battery positions, and in firing as artillery batteries.

c. Beach assault training for amphibious tank units will be conducted with and without accompanying infantry. The platoon or wave will land and overrun defended beaches and destroy or by-pass enemy resistance while moving inland to designated phase lines. The delivery of accurate machine gun fire from moving tanks is an important phase of this training.

104. COMPANY TRAINING. **a.** Company training exercises will begin as soon as the platoons are trained sufficiently to function as units. Company exercises will include problems in which the company functions as a unit. These problems not only will give training in operation and control on the company level, but also will permit a check on the progress of the platoon, crew, and individual training. In addition to tactical training, the company commander must conduct weekly inspections to check on care and condition of vehicular and company equipment (fig. 42).

b. In training, companies will practice moving to a rendezvous area at sea which may be marked by an amphibious vehicle or craft. Platoons should practice assembling at such areas, each platoon moving in from a different direction to simulate assembly from various LST's. The assembled unit then will practice moving from the rendezvous area to a line of departure marked by LVT's or small craft, changing direction en route so as to cross the LD in a line formation. Extensive training will be conducted in crossing an LD and then forming a staggered line, wedge, or echelon formation en route to the beach. For purposes of control the Navy requires amphibious vehicles to cross the LD in line and retain that formation until wave guide

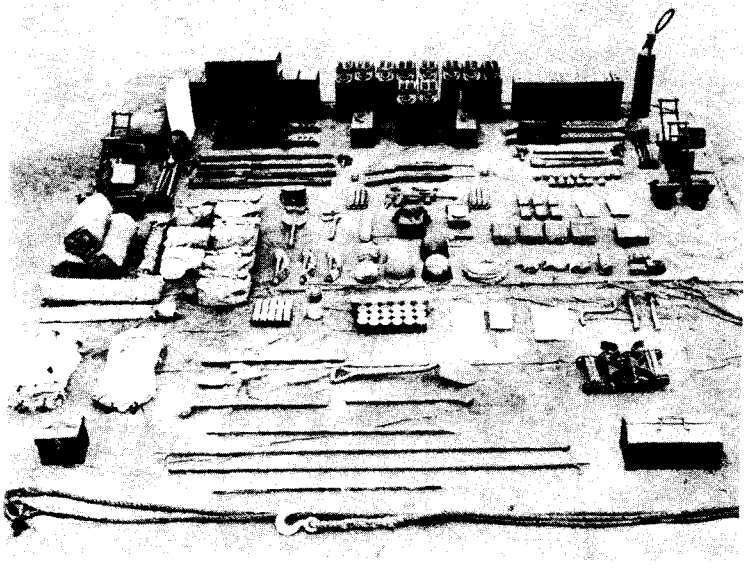


Figure 42. LVT(4) inspection lay-out.

craft leave them just off the shore. In combat landings these guide craft may be driven off by enemy artillery and machine gun fire; in this event the leading assault waves of amphibious vehicles will adopt a staggered line, wedge, or echelon formation which will best meet enemy defenses and beach and shore conditions. Platoon or wave commanders must learn to control and maintain formations while regulating speed on the slowest vehicle in their unit. When any wave slows up en route to the beach, all succeeding waves must regulate on it and keep their *time distance* rather than close up, which would result in congestion on the beach. Practice in mass assault and indirect firing also will be conducted. Amphibious tank companies will conduct exercises conforming to principles set forth in FM 17–32. See unit training programs, appendices V and VI.

105. BATTALION TRAINING. Battalion training should include command post exercises, in which command posts are established and simulated situations presented for action by staff members and headquarters and service company personnel. Emphasis will be on communication and control. Battalion commanders will supervise closely all training, and be responsible for training schedules. Training schedules must be flexible enough to permit changes necessary because of weather, surf, or tide conditions. Small-unit tests prescribed by Army Field Forces may serve as a basis for testing of platoons and companies. Battalion training for amphibious tanks should include exercises based on FM 17–33. See unit training programs, appendices V and VI.

106. BATTALION STAFF OPERATIONAL CON-

TROL. **a. Amphibious tank battalion.** The organization of the battalion staff for a landing operation is variable and must be adjusted for each operation, depending on the tactical considerations and desires of the supported infantry. Members of the staff may be used as follows:

(1) *Battalion commander.* The battalion commander lands immediately in rear of the first amphibious tank wave, usually near one of the flanks. He insures that his units land on the proper beaches and follows the situation of each company. He is available to consult with infantry commanders regarding the employment and actions of his companies and other matters of mutual concern.

(2) *Battalion executive officer.* The executive officer assists the battalion commander, and lands immediately behind the first amphibious tank wave on the flank opposite the battalion commander.

(3) *S–3.* The S–3, with communication facilities, normally will be at the infantry division CP.

(4) *S–4.* The S–4 will establish a rear CP aboard the LST which carries the battalion supply, administrative, and maintenance echelons. He will be in radio communication with the battalion commander, and will dispatch the elements under his control to the shore, as required.

(5) *Liaison officers.* The S–2, with communication facilities, normally will be at the division artillery CP. If amphibious tank companies are attached to RCT's, staff members are sent to the RCT's for liaison during the period of attachment.

b. Amphibious tractor battalion. As with the amphibious tank battalion, operational flexibility to achieve maximum communication, control, and coordination under changing conditions is essential. The staff must be organized to coordinate RCT plans for LVT's with naval plans for the ship-to-shore movement. Members of the staff may be used as follows:

(1) *Battalion commander.* The battalion commander will establish his CP, initially afloat, with that of the assault RCT commander.

(2) *Battalion executive officer.* The executive officer will establish a rear command post on the ship of the naval officer in command of the LST's that transported the battalion.

(3) *S–3.* The S–3 will be at the LD on the control boat of the naval officer who is responsible for the conduct of the landing (Transdiv control officer).

(4) *S–4 and maintenance officer.* The supply and maintenance officers are aboard the maintenance LST and must be ready to move ashore on order.

(5) *Liaison officers.* Staff members are sent to the control officer (naval) in charge of water traffic for each BLT. A logistical officer for each BLT normally is there to complete the team for coordination of requests from the shore to land supplies and equipment.

107. TRAINING WITH OTHER UNITS. Amphibious tank units should participate in training with field artillery. Both amphibious tank and tractor units should participate in training with infantry, with naval units, with each other, and, if possible, with air units.

The ideal situation would permit exercises similar to rehearsal landings, including all elements normally involved in an assault landing (pars. 19 and 21).

108. PREPARATION FOR UNIT EXERCISES. An exercise or maneuver involving either amphibious tanks or amphibious tractors will require detailed planning and preparation. Since the exercises must, to be of maximum value, include all phases and personnel used in amphibious operation, coordination with other units is essential. If an amphibious tank unit is to conduct a training exercise it should request amphibious tractors; similarly, an amphibious tractor unit should request amphibious tanks. Amphibious units should obtain sufficient infantry personnel to add realism to the landing phase, and enough engineer personnel to represent a shore party. Personnel of amphibious units not involved in the exercise may represent infantry and engineers. When untrained personnel participate, every effort must be made to avoid hazardous conditions and to arrange for some preliminary training prior to the exercise. If ships and craft can be obtained for the exercise, the request for them should be submitted at the earliest opportunity, so that plans can include their employment. If ships and craft cannot be obtained, arrangements must be made to simulate them by buoys flying colored flags, or by amphibious tractors.

109. SELECTION OF AREA FOR EXERCISE. In most cases, the selection of an area for conducting an exercise or maneuver will be relatively simple, since amphibious tank and tractor units usually are stationed on a coast. Where there are a variety of areas available, a section of the coast should be used which, in general, would be a logical site for landing on

a hostile shore. The shore line selected should have no hazardous underwater formations nor strong offshore currents. The terrain inland should be suitable for the operation of tracked vehicles and should offer initial objectives for a BLT.

110. PLANNING A TRAINING EXERCISE. An operation order must be written containing all details for the exercise, which usually will be a landing operation. Figures 43 and 44 show a simple operation order form, including an assault landing diagram for the area selected. The intelligence annex should show detailed enemy dispositions to fit terrain selected for the exercise. In many instances the operation order will include units which actually will not participate in the exercise; and if shipping is not available it will be necessary to simulate ships, control craft, and guide boats. These variations from the operation order can be shown by a diagram such as that in figure 45. This diagram shows that the exercise covered by the operation order in figures 43 and 44 is set up for the amphibious tank company referred to in paragraph 3b of the operation order, and that all ships and craft will be simulated. It also shows that amphibious tractors and infantrymen have been obtained for the exercise.

111. PRELIMINARY PHASES OF THE EXERCISE. The preliminary phases of the exercise, including ship assignment, loading of ships, and disembarking at the rendezvous area, may be conducted diagrammatically in the form of a map exercise. Junior officers should study aerial photos, maps, and charts of the area and prepare sand table models of the beach. Loading plans and diagrams must be prepared for the ships assumed to be transporting troops to the assault area. The

CLASSIFICATION*

714th Amph Tk Bn
WATERTOWN, CALIF
010800 Sep 19—

Opn O 1

Map: USA, California, 1:50,000, COASTTOWN sheet.

Task Orgn: No change.

1. a. Annex 1, Int.
   b. (1) 2d Inf Regt (-), 1st Inf Div, assaults COASTTOWN PENINSULA to secure beachhead Obj. 2d Bn (BLT 2) assaults beach RED ONE, 3d Bn (BLT 3) assaults beach RED TWO. Regtl Hv Tk Co, 2d Inf Regt, lands at H + 50 Min.
   (2) Annex 2, Assault Landing Diagram.

2. a. 714th Amph Tk Bn, Atchd to 1st Inf Div, Spts assault of 2d Inf Regt on COASTTOWN BEACH and secures Regtl Obj in conjunction with assault BLTs.
   b. (1) Annex 3, Consolidated UP&T Tables, 2d Inf Regt.
   (2) D day and H-hour to be announced.

3. a. Co A: Forms first assault wave for BLT 2; lands on RED ONE at H-hour; assaults Obj in conjunction with Cos E and F. Takes up Posns on O to furnish Arty Spt as called for by assault BLTs.
   b. Co B: Forms first assault wave for BLT 3; lands on RED TWO at H-hour; assaults Obj in conjunction with Cos K and L. Takes up Posns on O to furnish Arty Spt as called for by assault BLTs.
   c. Hq & Sv Co, Cos C and D: Remain in Div Res for possible subsequent landings.
   x. (1) Cos A and B authorized direct contact with Loading Officers, BLTs 2 and 3.
   (2) First assault wave will open fire when 400 yds off beach or as Naval gunfire on the beach ceases, whichever is sooner.
   (3) Units will report by flash message to this Hq all information of high intelligence value as listed in Annex 1, Int.

4. Adm O 3.

5. a. Item 5, SOI. Radio silence during voyage.
   b. Bn Comdrs Ech and CPs.
   (1) Afloat: Bn CO, LST 56; Co A, LST 17; Co B, LST 12.
   (2) Ashore: Bn CP, 300 yds inland, left flank, RED ONE.

WEBB
Lt Col

Annexes: 1-Int**
2-Assault Landing Diagram***
3-Consolidated UP&T Tables **

Distr: A
2d Inf Regt

OFFICIAL:

/s/ Jones
S-3

CLASSIFICATION*

* Would be SECRET in the field.
** Omitted from LEX Opn O.
*** For example diagram, see figure 44.

Figure 43. Operation order.

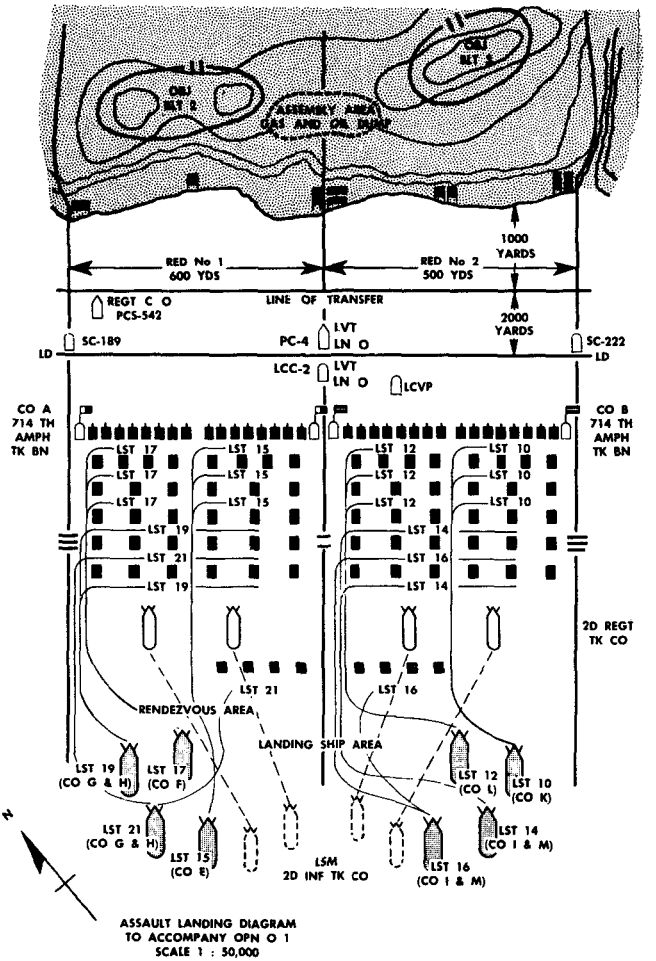


Figure 44. Assault landing diagram to accompany operation order.

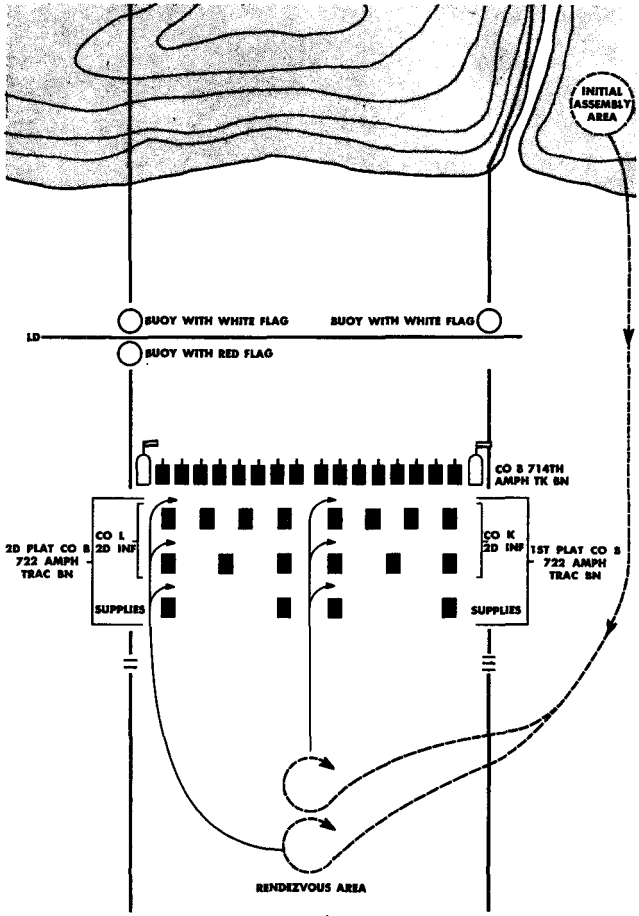


Figure 45. Diagram showing craft to be used in the exercise.

map exercise should include briefing of troops for the entire operation, including detailed plans of the infantry for attacking initial objectives.

112. CONDUCT OF THE EXERCISE. After conclusion of the map exercise the landing exercise will follow as closely as possible the procedure outlined for a rehearsal (pars. 35-37), and will terminate with an instructional critique.

Section VII. ELEMENTARY NAVIGATION

113. GENERAL. a. While the Navy ordinarily guides Army amphibious units during the assault phases of large-scale joint operations, there will be many situations where the ability of amphibious unit commanders to solve problems in elementary navigation will be vital to their successful employment. For example, an amphibious unit may find itself out of contact with its control vessel or base unit as the result of defective coordination, or under circumstances of reduced visibility. Also, amphibious battalions or smaller units may be required to navigate in small-scale shore-to-shore operations, in arctic operations, or in amphibious envelopments. The battalion S–2 acts as the battalion navigation officer.

b. For methods and procedures in using maps and compasses, see FM's 21–25 and 21–26. For conventional signs and symbols, including those used on marine (hydrographic) charts, see FM 21–30.

114. CHART READING. a. Description. A chart of a seacoast is used for water operations as a map is used on land. It indicates the depth of water, character of the bottom, channels, shoals, currents, buoys, prominent landmarks, and other factors affecting

movement on the water.

b. Interpreting a chart.

(1) *Depth.* Figures at various points on the portions of the chart representing water indicate the depth of the water at those points. This depth is measured in either feet or fathoms, a fathom being 6 feet. The unit used on a particular chart is printed below the title. In making charts, soundings are taken at the time of low water; therefore, at high tide, the depth of the water will be somewhat greater than is indicated. Spaces on the chart where no depth is shown, and where nearby soundings are indicated as deep, may be assumed to be deep. However, unmarked areas near marked reefs, shoals, or sand bars should be avoided. This is true particularly in coral regions or off rocky coasts.

(2) *Nautical miles and knots.* A nautical mile is a unit used for the measuring of distance on marine charts and is equal to approximately 6,080 feet. A knot (abbreviated as kn) is a unit of speed equal to 1 nautical mile per hour. Nautical miles and knots can be converted into land miles and land miles per hour by multiplying by 1-1/7. Land miles and land miles per hour are converted to nautical miles and knots by multiplying by seven-eighths. Thus, if a current was represented on a chart as having a speed of 3 knots, it would also be moving at the rate of 1-1/7 x 3, or approximately 3.4 miles per hour.

c. The compass rose. Compass roses (fig. 49) are printed in several places on nautical charts. The

outer circle of the rose is oriented to true north and the inner circle to magnetic north. The azimuth of a line may be measured without a protractor by prolonging the line until it crosses a north-south grid line and making a tracing somewhat larger than the compass rose of the angle where they intersect. This tracing then is placed over the compass rose so that the line traced from the north grid line is over the north line of the compass rose, and the vertex of the angle at the center of the rose. If a magnetic azimuth is desired, the magnetic north line and the inner circle of the rose are used. If true azimuth is desired, the true north line and the outer circle are used.

115. VEHICLE COMPASSES. **a.** Each amphibious tank and tractor is equipped with a vehicle compass mounted in the driver's compartment. The compass is magnetic, and includes compensators to offset the magnetism in the vehicle, such as its permanent magnetism, that induced by the earth's field, and the electrical equipment on the vehicle. They also are designed to offset the effect of the vehicle's pitch and roll. Detailed instructions and work sheets for compensating the compass to reduce deviation (compass error) are contained in a pamphlet which accompanies each compass.

b. When deviation has been reduced as far as possible, a card is prepared showing the course to be steered for each heading (fig. 46). The deviation card is posted within plain view, immediately above the compass. Taking an example from figure 46, if the driver were directed to steer a course of 270°, he would use a compass reading of 267°. For courses between the readings on the card, he would interpolate; that is,

make a proportional correction. Since the deviation decreases from −3° for a reading of 270° to 0° for 315°, and the difference between these two readings is 45°, the deviation for 271° would be 44/45 of −3°; for 272°, 43/45 of −3°, and so on, until, for example, for 290° it would be 25/45 of −3° or 1-2/5°. This is considered as −1°, and the course to be steered for 290° would be 290° −1° or 289°.

116. STEERING BY COMPASS. In steering by compass during water operations, the driver, by changing direction slowly, places the vehicle on the correct course. He then looks directly ahead and picks out a mark on which to steer, such as a point of land, a star, or a stationary cloud formation. He checks his course occasionally and, if the vehicle is drifting, compensates by setting a new course a few degrees into the current

HEADING		COMPASS READING
N	0°	2°
NE	45°	45°
E	90°	89°
SE	135°	136°
S	180°	180°
SW	225°	225°
W	270°	267°
NW	315°	315°

Figure 46. Compass deviation card.

or wind. This procedure is continued until the vehicle is ready to make a landing.

117. LOG KEEPING. A log should be kept by all unit commanders, vehicle commanders, and other personnel concerned with navigating during a water operation. A log is a series of informal notations in a notebook showing the compass courses steered, estimated distances covered, estimated speeds, estimated compensations for the effect of currents or winds, record of landmarks sighted, and any other pertinent data. An entry always should indicate the time when it is recorded.

118. SPEED AND TIME DISTANCE. a. The water speed of an amphibious tank or tractor in third gear may be computed with reasonable accuracy by using the following formula:

$$\frac{\text{Engine speed in RPM (revolutions per minute)}}{10} = \text{Movement in yards per minute}$$

Increasing or decreasing the load in the vehicle results mainly in a corresponding change in gasoline consumption, and affects the ratio between forward speed and the tachometer reading to only a slight degree.

b. For example, an amphibious vehicle traveling in third gear, with the tachometer showing an engine speed of 1,800 revolutions per minute, will travel $\frac{1800}{10}$ or 180, yards per minute. Hourly rate is determined by multiplying by 60 and dividing by 1,760. In this case it is $180 \times 60 = 10{,}800$ yards per hour. Dividing by 1,760 (the number of yards in a mile), we get approximately 6-1/7 miles per hour.

119. NAVIGATION BY ELEMENTARY DEAD RECKONING.

a. General. Dead reckoning is a method of navigation which may be used out of sight of land, or when known reference points are not visible. It is particularly suitable for use with amphibious vehicles, since it requires only instruments already in the vehicle.

b. Basic problems. Dead reckoning navigation, as applied to small craft, involves four problems—

(1) The selection, on the chart, of the route to be followed.

(2) The computation of the azimuth of each course to be steered.

(3) The computation of the time required to travel each course, with particular attention to the time when a change of direction is to be made.

(4) The determination of the vehicle's position during the movement so that the navigator can make necessary adjustments in its heading (direction of movement).

c. Selection of route. The shortest route is along a straight line drawn between the starting place and the destination. However, it is not always possible to follow such a route, because of the tactical situation or the necessity for avoiding obstacles. When it is necessary to travel on more than one course, the route should, if possible, be plotted so that direction is changed within sight of a conspicuous landmark.

d. Computation of azimuth to be steered. The azimuth to be steered by the driver for each compass course is computed as follows:

(1) The intended route is plotted (drawn) on the chart as the course line. (Line AX, fig. 47).

(2) The necessary correction for drift due to the effect of current is graphically computed on the chart in the following manner:

(a) An hour's run by the vehicle (5 nautical miles in fig. 47) is graphically plotted on the course line from the starting point A (line AB).

(b) An hour's current flow (2 knots in fig. 47) is graphically plotted from point A in the direction of flow (line AC). Care must be taken to use the same unit of measurement (knots or miles per hour) as was used in *(a)* above.

(c) A line is drawn connecting points C and B. This line CB is parallel to, and therefore has the same azimuth as, the course to be steered.

(d) The magnetic azimuth from C to B is measured with a protractor (303° in fig. 47) and reported to the driver as the course to be steered.

(3) The driver then steers the course indicated for 303° by the deviation card for his particular compass. With the deviation card shown in figure 46, this would be approximately 302°.

e. Computation of time. The distance from A to B is placed on a drawing compass (or pair of dividers). The compass then is pivoted from point C, and the arc formed where it intersects line AB (extended in length, if necessary) is marked D. The distance AD then represents graphically the distance which actually will be made in 1 hour's run (5.8 nautical miles in fig. 47). Using this distance as a standard, the time required while on that course may be measured. In figure 47, the total distance is 13.5 nautical miles.

Dividing this by 5.8 knots gives 2.3 hours or 2 hours and 18 minutes.

f. Compensation for wind. A strong wind will require additional compensation. No fixed rule can be stated for determining the amount required, since it depends

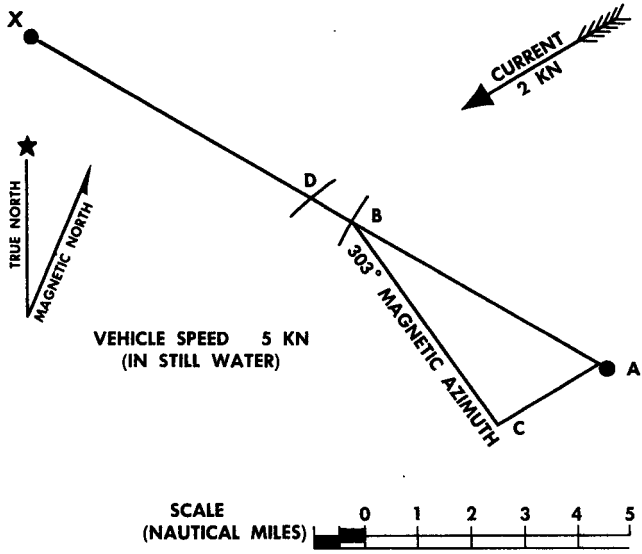


Figure 47. Determining compensation required to offset an estimated drift from current.

on many variables, such as the velocity of the wind, the weight of the vehicle and cargo, the amount of the vehicle above the surface of the water and therefore exposed to the effect of the wind, the action of waves induced by the wind, and the direction of the vehicle in relation to the wind. However, as a basis for forming

an estimate, a 25-mile-per-hour wind, blowing at an angle of 90° to the vehicle's course, will move an empty amphibious tractor off its course at the rate of about 3 land miles per hour.

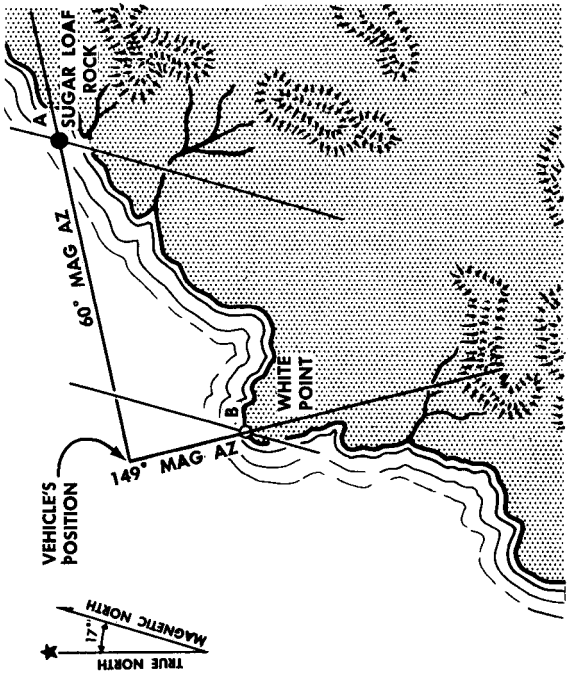


Figure 48. Graphic determination of position. (Magnetic azimuths are drawn on the map through the selected landmarks to facilitate drawing back azimuths.)

g. Determination of position.

(1) Position while on the water may be obtained as follows (fig. 48):

(a) Two visible objects on the shore which also are indicated on the chart are selected (points A and B).

(b) Magnetic azimuths to each of these objects are measured with a hand compass.

(c) These magnetic azimuths are laid off through the objects on the chart, and prolonged until they intersect. This is the approximate position of the vehicle.

(d) Results are more nearly accurate when the objects selected are not closer together than 30° nor farther apart than 150°, as seen by the observer.

(2) Since conditions aboard amphibious vehicles make plotting difficult during the voyage, azimuth to landmarks should be plotted and indicated on the chart at the same time the courses are computed (fig. 49). If there are enough of those, the vehicle commander can keep the vehicle on the course without having to plot his position.

120. ILLUSTRATIVE EXAMPLE IN NAVIGATION.

The navigation problem in figure 49 was solved as follows:

a. The route to be followed was drawn on the chart. In order to avoid the mine field, it was necessary to divide the route into two legs, the course being changed at a point where azimuths could be measured to both the oil storage tank and the offshore rock. The embarkation point was marked A, the point where the course should be changed, A', and the destination, X.

b. The vehicle was to be driven at an engine speed of 1,650 revolutions per minute, which equals 165 yards per minute, or 9,900 yards per hour. This is divided by 1,760 to get land miles per hour, and then multiplied by seven-eighths to get knots; 4.92 knots (nautical miles per hour) in this case.

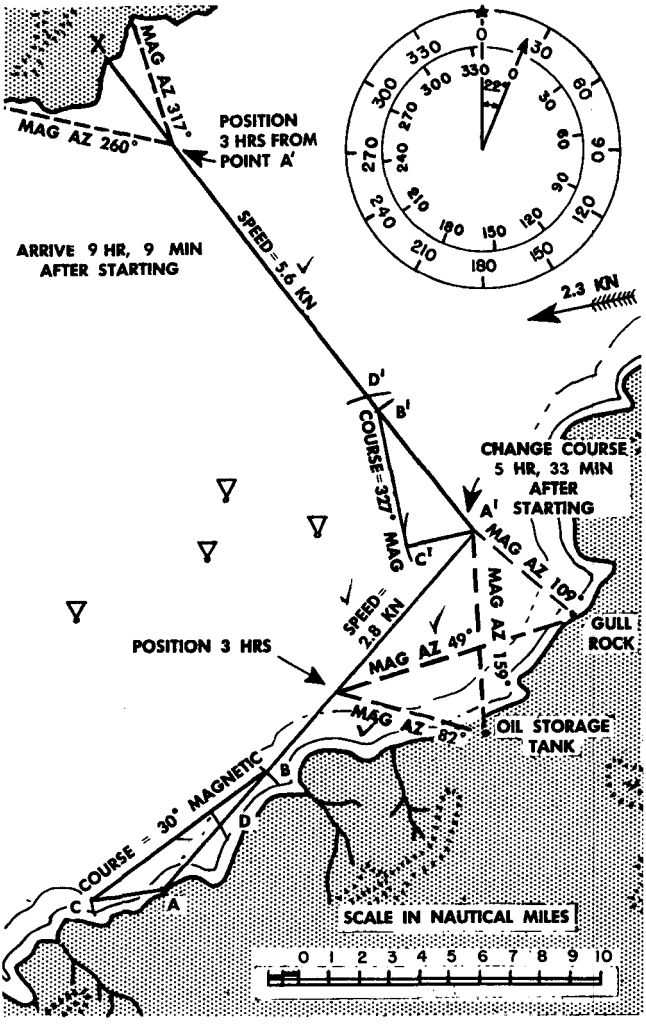


Figure 49. Solution to a problem in navigation.

c. A distance of 4.92 nautical miles was set on a drawing compass, using the graphic scale at the bottom of the chart, and this distance laid off on each leg of the route from A and A', as AB and A'B'.

d. Short lines were drawn from A and A' in the direction of the current's flow, and the current's speed of 2.3 knots laid off on these lines from A and A', as AC and A'C'.

e. Lines were drawn connecting C with B, and C' with B'. The magnetic azimuths of these lines were measured, using the magnetic circle in the compass rose, and entered on the chart as the courses to be given to the driver.

f. The distance from A to B was placed on the drawing compass. Using C as a pivot point, this distance was laid off on line AB and marked D. The same procedure was repeated from C' on the second leg and marked D'. The distance from A to D was set on the compass and compared with the graphic scale at the bottom of the chart to determine the speed of the vehicle in knots, as affected by the current indicated in **d**. This was found to be 2.8 knots. The distance from A to A' was measured as 15.5 nautical miles. When divided by the speed ($15.5 \div 2.8$), this gave the time to be spent on the first leg, and therefore the time to change the course, as 5.55 hours or 5 hours, 33 minutes after starting. The same procedure was repeated for the second leg to determine the time of landing.

g. Magnetic azimuths to landmarks along the route (oil storage tank, Gull Rock, and shoreline irregularities near the destination) were measured and entered on the map so that the vehicle's position could be determined easily during the journey.

CHAPTER 6

AMPHIBIOUS TANK CREW DRILL

Section I. DUTIES OF CREW MEMBERS

121. TANK COMMANDER. a. Before operation.

(1) Inspect uniforms and equipment of crew.
(2) Supervise maintenance; take reports from crew members.
(3) Check exterior of vehicle, including suspension system and tracks, for looseness, wear, or damage.
(4) Check communication with crew.
(5) Check load distribution.
(6) Check condition of weapons.
(7) Check presence of drain plugs in bottom of hull.
(8) Report "Tank ready." or report deficiencies.

b. During operation.

(1) Assist driver, when launching, by appropriate instructions.
(2) Observe trim of vehicle.
(3) Prevent accumulation of trash in compartment.
(4) Man turret machine gun (depress during launching).
(5) Observe operation of bilge pump.
(6) Observe for signals from platoon leader.
(7) Direct driver by interphone.
(8) Select targets and direct fire, including direction for setting time fuses.
(9) Observe and report floating debris, obstacles,

and vehicles or craft that may endanger his vehicle.

(10) Report vehicle deficiencies to platoon leader.

c. At halt.

(1) Supervise maintenance by crew.

(2) Check general condition of vehicle.

(3) Check tracks and suspension system.

d. After operation.

(1) Supervise maintenance by crew.

(2) Perform same sequence of duties as before operation.

(3) Report fuel, oil, and ammunition consumption and condition of crew, vehicle, and guns to platoon leader.

122. DRIVER. a. Before operation.

(1) Stand inspection.

(2) Check stowage of equipment in cab.

(3) Close battery switch and turn on blowers.

(4) Check power train oil levels and security of fastenings.

(5) Check operating controls.

(6) Start engine; set hand throttle for warm-up.

(7) Check instruments and operation of accessories.

(8) Observe engine performance after warm-up.

(9) Report "Driver ready." or report deficiencies.

b. During operation.

(1) Observe proper driving procedure.

(2) Observe and report floating debris, obstacles, etc.

(3) Turn Cuno fuel filter as required.

(4) Report any malfunctions to tank commander.

c. At halt.

(1) Observe proper engine idling procedure.
(2) Inspect power train for oil leaks and security of fastenings.
(3) Check operating controls.
(4) Clean vision device.

d. After operation.

(1) Set engine speed for cool-down.
(2) Check instruments, operating controls and stowage of equipment in cab; observe engine performance during cool-down.
(3) Stop engine.
(4) Check escape hatch; clean vision device.
(5) Check power train oil levels and security of fastenings.
(6) Report oil consumption.
(7) Lubricate points in cab.
(8) Assist in refueling tank.
(9) Report any need for additional maintenance.

123. ASSISTANT DRIVER. a. Before operation.

(1) Stand inspection.
(2) Check in engine compartment for:
(a) Fuel or oil leaks.
(b) Secure fastening of accessories.
(c) Condition and functioning of batteries and electrical parts.
(3) Hand-crank engine (50 turns of crank).
(4) Check fuel and oil filters.
(5) Open fuel valves.
(6) Check escape hatches; clean vision devices.
(7) Make required maintenance check on radio and interphone.
(8) Check operation of bow machine gun.

(9) Report "Assistant driver ready," or report deficiencies.

b. During operation.

(1) Protect radio from water.
(2) Keep alert for malfunctions of radio or interphone.
(3) Observe and report any floating debris, obstacles, etc.
(4) Report any malfunctions to tank commander.

c. At halt.

(1) Clean vision device.
(2) Check waterproofing of mast base and antenna.
(3) Stay at radio to receive and pass on messages.

d. After operation.

(1) Service radio and interphone.
(2) Check escape hatch; clean vision device.
(3) Check in engine compartment for fuel and oil leaks and secure fastenings of accessories.
(4) Check batteries, electrical connections, and fire extinguishers.
(5) Assist in refueling tank.
(6) Report any need for additional maintenance.

124. GUNNER. a. Before operation.

(1) Stand inspection.
(2) Check howitzer bore, breech mechanism, and recoil mechanism.
(3) Check turret traverse, elevating mechanism, firing switches, stabilizer, and sights.
(4) Check howitzer muzzle cover.
(5) Check stowage of equipment and ammunition in turret.
(6) Check auxiliary communication devices.

(7) Put howitzer in traveling position; lock turret.
(8) Report "Gunner ready," or report deficiencies.

b. During operation.

(1) Observe precautions as to minimum elevation of howitzer.
(2) Observe and report any floating debris, obstacles, etc.
(3) Report any malfunctions of the gun.

c. At halt.

(1) Check sights.
(2) Check elevating mechanism and turret traverse.
(3) Put gun in traveling position (depending on situation).
(4) Replenish turret ammunition supply.

d. After operation.

(1) Perform same sequence of duties as before operation.
(2) Clean howitzer.
(3) Put howitzer in traveling position.
(4) Lubricate points in turret.
(5) Report any need for additional maintenance.

125. LOADER. a. Before operation.

(1) Stand inspection.
(2) Check fuel supply.
(3) Check fixed fire extinguishers.
(4) Check presence of towing cable.
(5) Mount turret machine guns; check their operation.
(6) Report "Loader ready," or report deficiencies.

b. During operation.

(1) Replenish ammunition supply in turret.

(2) Assist gunner, if necessary.
(3) Observe and report any floating debris, obstacles, etc.

c. At halt.

(1) Replenish ammunition supply in turret.
(2) Dispose of empty cases.

d. After operation.

(1) Clean and stow turret machine guns.
(2) Clean turret; dispose of empty cases.
(3) Check fuel supply, close valves, and report fuel consumption.
(4) Assist in greasing suspension system and tow cable.
(5) Assist in cleaning howitzer.

126. ASSISTANT LOADER. a. Before operation.

(1) Stand inspection.
(2) Make required maintenance check on auxiliary generator.
(3) Start auxiliary generator.
(4) Check engine oil level.
(5) Check engine air cleaner.
(6) Check security of fastenings and oil levels of power train in hold.
(7) Check ammunition supply and stowage in hold.
(8) Check and lock port and starboard hatches.
(9) Report "Assistant loader ready," or report deficiencies.

b. During operation.

(1) Check ammunition supply in hold.
(2) Assist in replenishing turret ammunition supply.
(3) Set time fuses as directed by tank commander.

(4) Check oil and fuel supply; replenish, if necessary.

c. At halt.

(1) Assist in replenishing turret ammunition supply.
(2) Check stowage of equipment.
(3) Report any deficiencies.

d. After operation

(1) Check stowage of equipment and ammunition; report ammunition expenditures.
(2) Service engine air cleaner.
(3) Check engine oil level.
(4) Service power train in engine compartment.
(5) Report oil consumption.
(6) Lubricate points in cargo compartment.
(7) Assist in refueling tank.
(8) Report any need for additional maintenance.

Section II. CREW DRILL PROCEDURE

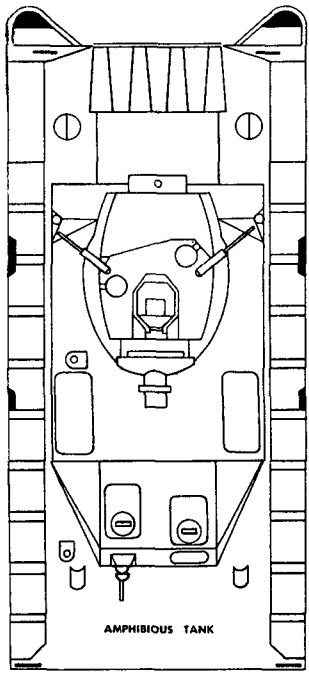
127. MOUNTING. a. At the command FALL IN, all crew members fall in at close interval, two paces in front of the vehicle bow, facing away from the vehicle, in this order (right to left)—tank commander, gunner, assistant driver, assistant loader, driver, loader (fig. 50).

b. At the command PREPARE TO MOUNT, all crew members execute an about face.

c. At the command MOUNT, crew members run to steps indicated below (fig. 51), mount, and take mounted posts.

(1) Tank commander: rear starboard step.
(2) Loader: rear port step.
(3) Gunner: rear starboard step, following tank commander.

(4) Driver: front port step.
(5) Assistant driver: front starboard step.
(6) Assistant loader: front port step, following driver.



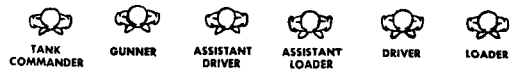


Figure 50. Dismounted posts of amphibious tank crew.

128. PREPARE FOR ACTION. In combat, crew members will prepare for action before leaving landing ships for movement ashore, or in bivouac if already

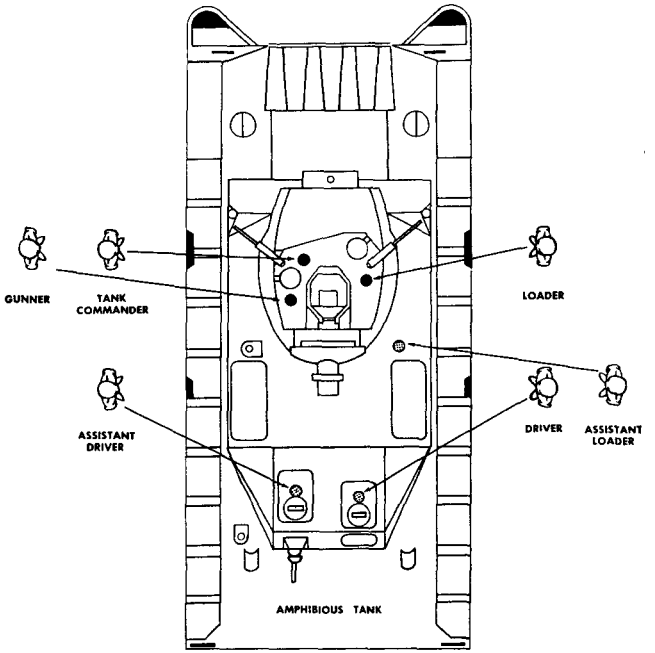


Figure 51. Mounting positions of amphibious tank crew.

ashore. In addition to their regular before-operation duties, crew members perform the following at the command PREPARE FOR ACTION.

a. Tank commander. Supervises preparation for action by all members of crew. Receives crew reports. Reports "Tank ready."

b. Gunner. Checks operation of howitzer. Reports "Gunner ready."

c. Loader. Half loads turret machine guns. Assists gunner in checking operation of howitzer. Reports "Loader ready."

d. Assistant loader. Checks ammunition supply. Reports "Passer ready."

e. Driver. Checks operation of vehicle. Closes hatch. Reports "Driver ready."

f. Assistant driver. Half loads bow machine gun. Reports "Bog ready."

129. MOUNTED ACTION. With the crew at mounted posts and hatches open, the command is PREPARE TO FIRE.

a. Tank commander. Fully loads turret machine guns.

b. Gunner. Checks solenoids and manual firing controls. Unlocks turret friction clamp. Removes panoramic telescope from case and seats it in telescope mount. Wipes off sights; makes field check of sights. Checks manual traverse and elevation. Sets safety switch on solenoid box to *ON* position. Reports "Gunner ready."

c. Assistant driver. Closes hatch. Fully loads bow machine gun. Reports "Bog ready."

d. Driver. Closes hatch. Reports "Driver ready."

e. Loader. Opens breech; inspects bore and chamber of howitzer. Unlocks howitzer traveling lock. Connects power cable to electrical firing mechanism. Pulls safety lever to firing position. Reports "Loader ready."

f. Assistant loader. Opens ammunition cases and

inspects ammunition. Fills ready rack. Assembles sponge and rammer. Reports "Passer ready."

130. FIRING THE HOWITZER. Methods and principles of firing the 75-mm howitzer mounted on the amphibious tank, both for direct and indirect fire, conform to those outlined in FM 17–69. For indirect fire, additional references are FM 6–40, FM 6–140, TM 9–318, and TM 9–732B.

131. DISMOUNTING. The command PREPARE TO DISMOUNT alerts crew members. At the command DISMOUNT they dismount in reverse order of mounting, over the same route; then form at dismounted posts for further orders.

132. DISMOUNTED ACTION. **a.** With the crew at mounted posts and hatches open, the initial command is PREPARE TO FIGHT ON FOOT. All crew members disconnect breakaway interphone plugs. The assistant loader distributes grenades to other crew members as directed by the vehicle commander. The assistant driver dismounts the bow machine gun and passes it to the loader, who places it near the starboard side hatch. The tank commander secures the machine gun tripod and places it near the port side hatch.

b. At the command DISMOUNT, the tank commander dismounts and prepares to act as machine gun squad leader. The assistant driver dismounts, receives the machine gun from the gunner, and prepares to act as number 2 man of the machine gun squad (see FM 23–55). The loader dismounts, receives the tripod from the assistant loader, and prepares to

act as number 1 man. The assistant loader dismounts with his individual weapon and extra machine gun ammunition. The driver moves the tank to a defilade position and mans the radio while the gunner mans a turret machine gun to protect the vehicle.

CHAPTER 7

AMPHIBIOUS TRACTOR CREW DRILL

Section I. DUTIES OF CREW MEMBERS

133. TRACTOR COMMANDER. a. Before operation.

(1) Inspect uniforms and equipment of crew.
(2) Supervise maintenance; take reports from crew members.
(3) Check exterior of tractor, including suspension system and tracks, for looseness, wear, or damage.
(4) Mount and adjust weapons.
(5) Check for presence of drain plugs in bottom of hull.
(6) Check communication with crew.
(7) Report "Tractor ready," or report deficiencies.

b. During operation.

(1) Assist driver, when launching, by appropriate instructions.
(2) Observe trim of tractor.
(3) Keep cargo compartment and companionway policed.
(4) Man a machine gun when troops are not being carried.
(5) Observe operation of bilge pump.
(6) Observe for signals from the section or platoon leader.
(7) Direct driver by interphone.
(8) Observe for and report floating debris,

obstacles, and vehicles or craft that may endanger his tractor.

(9) Check fuel and oil supply; replenish, if necessary.

(10) Report tractor deficiencies to platoon leader.

c. At halt.

(1) Supervise maintenance by crew.

(2) Check general condition of vehicle.

(3) Check tracks and suspension system (on land).

d. After operation.

(1) Supervise maintenance by crew.

(2) Lubricate suspension system.

(3) Perform same sequence of duties as before operation.

(4) Dismount, clean, and stow machine guns.

(5) Report fuel, oil, and ammunition consumption and condition of crew, tractor, and guns to platoon leader.

134. DRIVER. a. Before operation.

(1) Stand inspection.

(2) Check engine air cleaners.

(3) Turn on fuel valves, battery switch, and blowers.

(4) Check power train oil levels and security of fastenings.

(5) Check stowage of equipment in cab.

(6) Prime and start engine; set hand throttle for warm-up.

(7) Check instruments and accessories.

(8) Check operating controls.

(9) Check hatches; clean vision device.

(10) Check performance of engine.

(11) Report "Driver ready," or report deficiencies.

b. During operation.

(1) Observe proper driving procedure.
(2) Turn Cuno fuel filter as required.
(3) Observe and report any floating debris, obstacles, etc.
(4) Report any malfunctions to tractor commander.

c. At halt.

(1) Observe proper engine-idling procedure.
(2) Inspect power train for oil leaks and security of fastenings.
(3) Check operating controls.

d. After operation.

(1) Set engine speed for cool-down.
(2) Check instruments, operating controls, and stowage of equipment in cab; observe engine performance during cool-down.
(3) Stop engine.
(4) Check power train oil levels and security of fastenings.
(5) Report oil consumption.
(6) Lubricate points in cab.
(7) Clean engine air cleaner.
(8) Close fuel valves.
(9) Assist in refueling vehicle.
(10) Report any need for additional maintenance.

135. ASSISTANT DRIVER. a. Before operation.

(1) Stand inspection.
(2) Check for fuel and oil leaks, and loose accessories or fastenings.
(3) Check batteries and electrical connections.
(4) Hand-crank engine (50 turns of crank).

(5) Perform necessary maintenance on fuel and oil filters.
(6) Check reserve fuel and oil supply.
(7) Check ammunition and stowage in cargo compartment.
(8) Assist tractor commander to mount and check weapons.
(9) Report "Assistant driver ready," or report deficiencies.

b. During operation.

(1) Protect radio from water.
(2) Keep alert for malfunctions of radio or interphone.
(3) Observe and report any floating debris, obstacles, etc.
(4) Report any malfunctions to tractor commander.

c. At halt.

(1) Check and service hatches and vision devices.
(2) Check mast base and antenna.
(3) Report any malfunctions to tractor commander.

d. After operation.

(1) Make required maintenance check of radio and interphone.
(2) Check and service hatches and vision devices.
(3) Check fuel supply and report consumption; refuel if necessary.
(4) Lubricate points in cargo and engine compartments.
(5) Check engine oil level.
(6) Assist tractor commander to lubricate suspension system and to clean and stow weapons.

Section II. CREW DRILL PROCEDURE

136. MOUNTING. **a.** At the command FALL IN, crew members take positions two paces in front of the vehicle bow, facing away from the vehicle; tractor commander in front of right sprocket, driver in front of left sprocket, and assistant driver midway between tractor commander and driver (fig. 52).

b. At the command PREPARE TO MOUNT, all crew members execute an about face.

c. At the command MOUNT, crew members run to steps indicated below (fig. 53), mount, and take mounted posts.

(1) Tractor commander: starboard step.
(2) Driver: port step.
(3) Assistant driver: starboard step, following tractor commander.

Note. The general way for mounting a tractor, when additional armor has been added, is to climb aboard opposite the front sprockets, using grousers for the steps.

137. ACTION. With the crew at mounted posts and hatches open, the command is ACTION.

a. Tractor commander. Checks ammunition supply. Receives reports from crew. Checks weapons and mans one machine gun. (If transported troops are aboard, they man all machine guns.)

b. Driver. Lowers seat. Closes hatch. Reports "Driver ready."

c. Assistant driver. Lowers seat. Closes hatch. Reports "Radio operator ready." (May man a machine gun, if necessary.)

138. DISMOUNTING. The command PREPARE

TO DISMOUNT alerts crew members. At the command DISMOUNT they dismount in reverse order of mounting, over the same route; then form at dismounted posts for further orders (fig. 52).

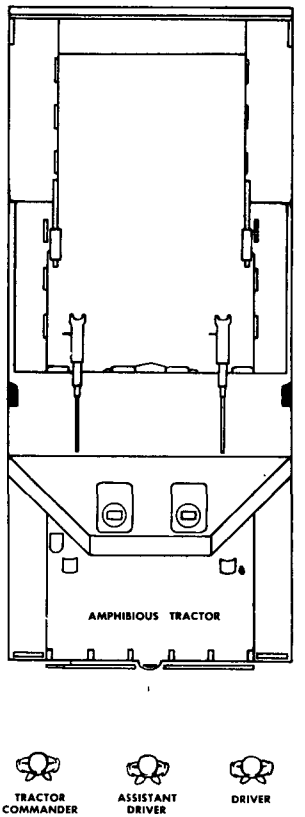


Figure 52. Dismounted posts of amphibious tractor crew.

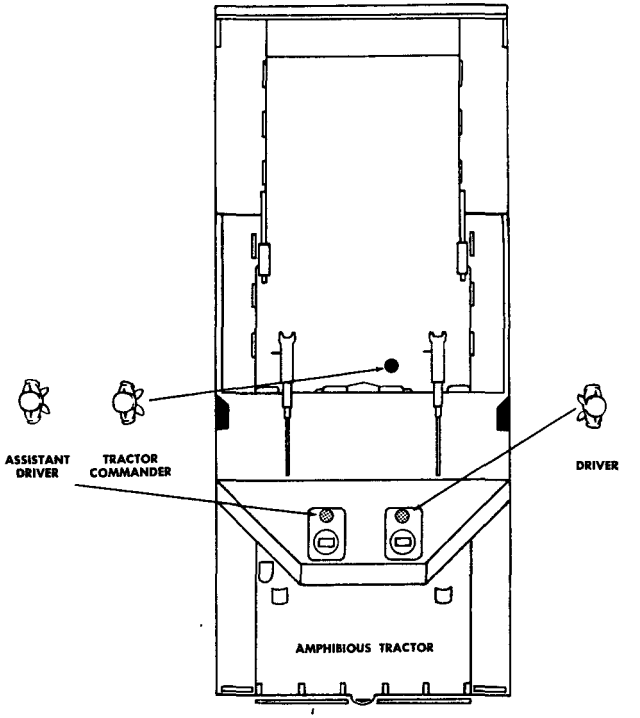


Figure 53. Mounting positions of amphibious tractor crew.

139. DISMOUNTED ACTION. **a.** At the command PREPARE TO FIGHT ON FOOT, the assistant driver dismounts one of the caliber .30 machine guns. The tractor commander secures the tripod. The driver distributes grenades. The driver and assistant driver lower ramp.

b. At the command FIGHT ON FOOT, the tractor commander runs out of the vehicle with the tripod and

prepares to act as number 1 man of the machine gun squad (FM 23–55). The assistant driver follows with the machine gun and one box of ammunition; the driver follows him, carrying two boxes of ammunition. All carry individual weapons.

APPENDIX I

REFERENCES

SR 110–1–1	Index of Army Motion Pictures and Film Strips.
SR 310–20 series	List of Training Publications.
FM 6–40	Field Artillery Gunnery.
FM 6–140	The Firing Battery
FM 17–32	Tank Company.
FM 17–33	Tank Battalion.
FM 17–69	Crew Drill, Service of the Piece, and Gunnery (75-mm Assault Howitzer on Motor Carriage M8).
FM 17–76	Crew Drill and Service of the Piece, Medium Tank, M4 Series (105-mm Howitzer).
FM 21–8	Military Training Aids.
FM 21–25	Elementary Map and Aerial Photograph Reading.
FM 21–26	Advanced Map and Aerial Photograph Reading.
FM 21–30	Military Symbols and Abbreviations.
FM 21–31	Conventional Signs, Military Symbols, and Abbreviations.
FM 23–55	Browning Machine Guns, Caliber .30, M1917A1, M1919A4, M1919A6.
FM 23–100	Tank and Destroyer Gunnery.
FM 31–5	Landing Operations on Hostile Shores.

TM 9–318	75-mm Howitzer M2 and M3 (Mounted in Combat Vehicles).
TM 9–732B	75-mm Howitzer Motor Carriage M8.
TM 9–775	Landing Vehicles, Tracked MK I and MK II.
TM 9–776	Landing Vehicles Tracked, MK IV, LVT(4).
TM 20–205	Dictionary of United States Army Terms.
TM 21–301	Driver Selection Training and Supervision, Half-Track and Full-Track Vehicles.
TM 21–306	Manual for the Full-Track Vehicle Driver.
	Dictionary of U. S. Military Terms for Joint Usage.

APPENDIX II

CHARACTERISTICS OF LANDING CRAFT AND SHIPS

1. LCC: LANDING CRAFT, CONTROL (Fig. 54). Operational use—as a lead-in navigational craft for landing vehicles (boats); to mark line of departure; for traffic control; for preliminary hydrographic surveys. Length, 56 feet; width, 13 feet 7 inches; draft, 4 feet; not intended to beach; maximum speed, 13½ knots; displacement, 30 tons; range, 500 miles at 10 knots; armanent, three twin caliber .50 machine guns on ring mounts; ¼-inch armor on bridge and gun cockpits; powered by two 250-horsepower Diesel engines; steel hull; distinguished by its collapsible antenna and radar; usually carried on the decks of an APA or AKA and lowered by booms.

2. LCVP: LANDING CRAFT, VEHICLE, PERSONNEL (fig. 55). Length, 36 feet; width, 11 feet; draft, 3 feet (light); displacement, 18,700 pounds; speed, 9 knots; range, 105 miles; armament, two caliber .30 machine guns; capacity, 36 fully equipped troops, three tons of vehicles, or four tons of cargo; crew, three. It is not wide enough to carry a vehicle larger than a ¼-ton truck. These craft are taken to the target area on transports and other ships of the landing force.

3. LCM(6): LANDING CRAFT, MECHANIZED (MARK 6) (figs. 56 and 57). Length, 56 feet; width,

Figure 54. LCC.

Figure 55. LCVP.

14 feet 1 inch; draft, 3 feet forward, 4 feet aft (light); speed, 9 knots; displacement, 26 tons; range, 150 miles; armor, ¼-inch; armament, two caliber .50 machine guns; capacity, one M4 medium tank, 120 troops, or 68,000 pounds of cargo. The LCM has a bow ramp. When used with the LSD it is loaded with tanks or heavy artillery and floated into the docking space of the LSD for transportation to the anchorage off the assault beaches. The LCM lands tanks, vehicles, troops, and supplies. These craft are taken to the forward area aboard assault cargo ships (AKA's), attack transports (APA's), cargo ships (AK's), transports (AP's), and LSD's.

4. LSU: LANDING SHIP, UTILITY (fig. 58). Length, 119 feet; width, 32 feet; draft, 3 feet 6 inches forward, 4 feet aft (loaded); displacement loaded, 309 tons; speed, 8 knots; range, 1,200 miles; armament, two 20-mm guns; capacity, three M26 tanks, five M24 tanks, four or five M4 medium tanks, nine trucks, or 150 tons of cargo; no troop accommodations; crew, 13. The LSU is seaworthy but not suited for long ocean voyages. When the target area is a considerable distance from the advance base, LSU's are transported either by placing one on a launching cradle on the weather deck of an LSU or by carrying three in the tank deck of an LSD. They can land tanks, vehicles, and supplies on the beaches (fig. 59). LSU's have been converted into rocket craft for close shore bombardment.

5. LSM: LANDING SHIP, MEDIUM (figs. 60 and 61). Length, 203 feet; width, 34 feet; draft, 3 feet 5 inches forward, 7 feet 11 inches aft (landing with load

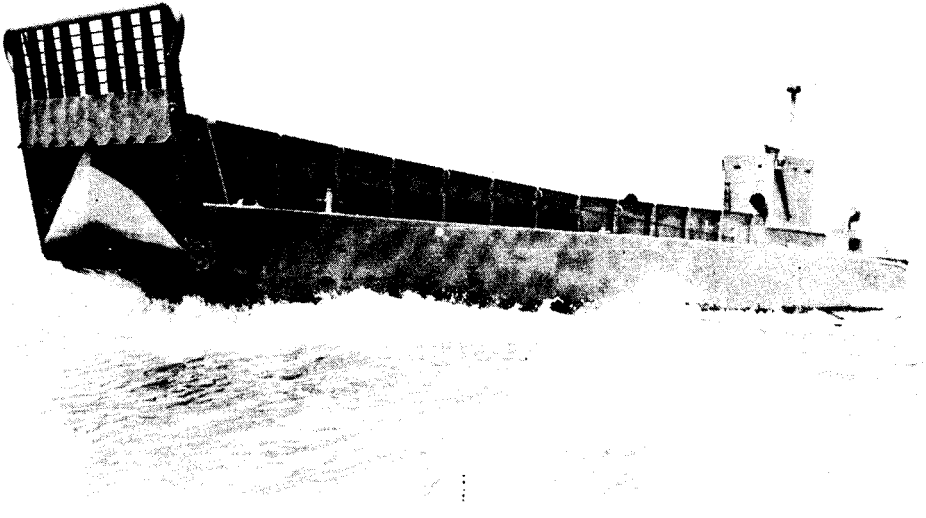


Figure 56. LCM.

Figure 57. LCM's unloading vehicles.

not exceeding 165 tons); displacement, 1,095 tons; speed, 13 knots; range, 4,900 miles; crew, 52; armament, 40-mm and 20-mm guns and caliber .50 machine guns; capacity, five M26 tanks, six LVT's, or nine DUKW's; accommodations for 54 troops. The LSM is

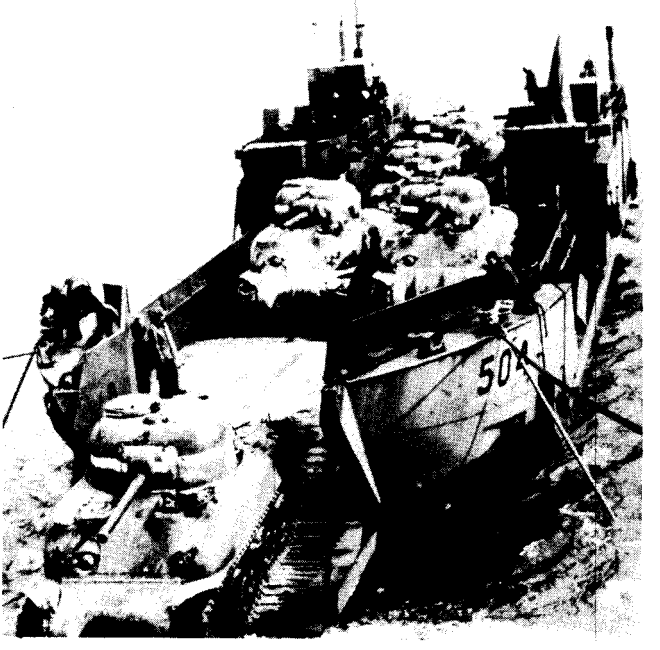


Figure 58. LSU

an oceangoing tank landing ship similar to the LST. It has bow doors and a ramp, and an open tank deck. Under favorable beach conditions it can unload tanks directly on the beach. LSM's can land tank platoons to support the assault companies of infantry on the beach. Ships of this type have been modified to fire

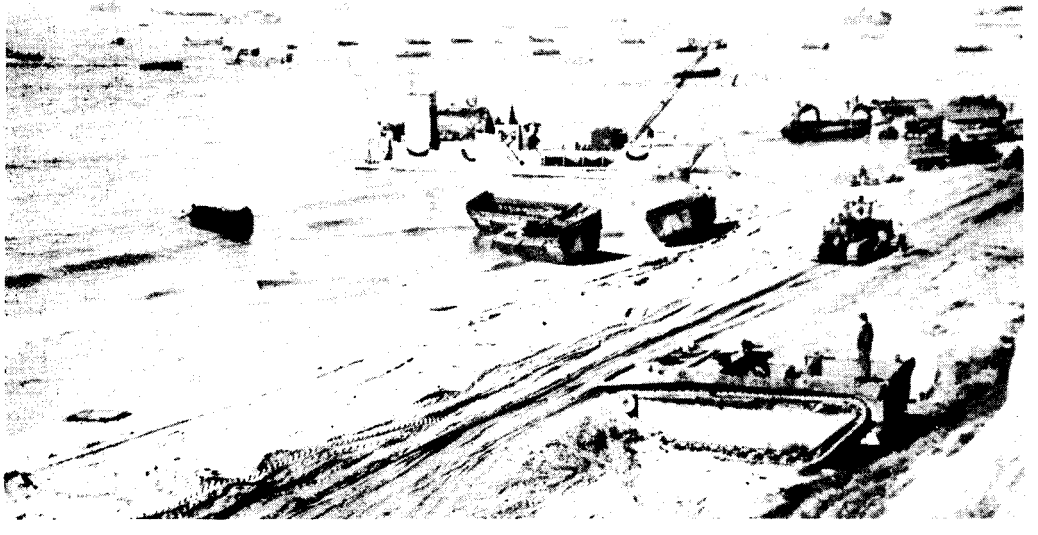


Figure 59. LSU unloading on a busy beach.

rockets from offshore. The LSM(R) is a rocket ship built on the hull of an LSM. The LSM(R) is used to deliver a large volume of preparatory rocket fire on a landing beach.

6. LST: LANDING SHIP, TANK (figs. 62 and 63). The LST is actually an oceangoing tank landing craft.

Figure 60. LSM.

It is designed to beach on a slope of 1:50, and to land tanks and vehicles over a bow ramp.

a. The LST is 328 feet long and has a beam of 50 feet. It has a maximum total oceangoing displacement of approximately 4,000 tons with a pay load of between 1,600 and 1,900 tons. Four gasoline motors furnish electric power and run pumps which can re-

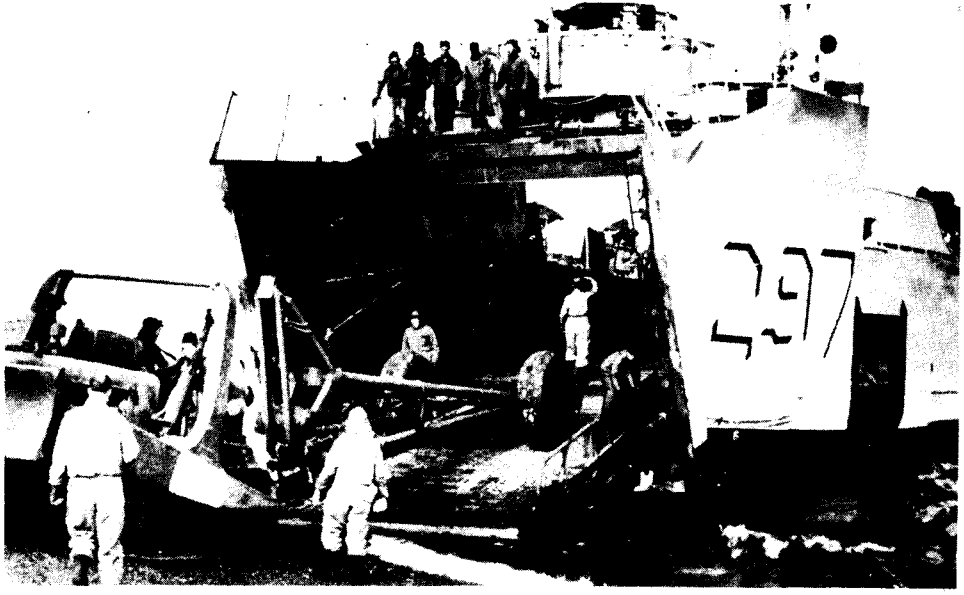


Figure 61. LSM unloading engineer equipment.

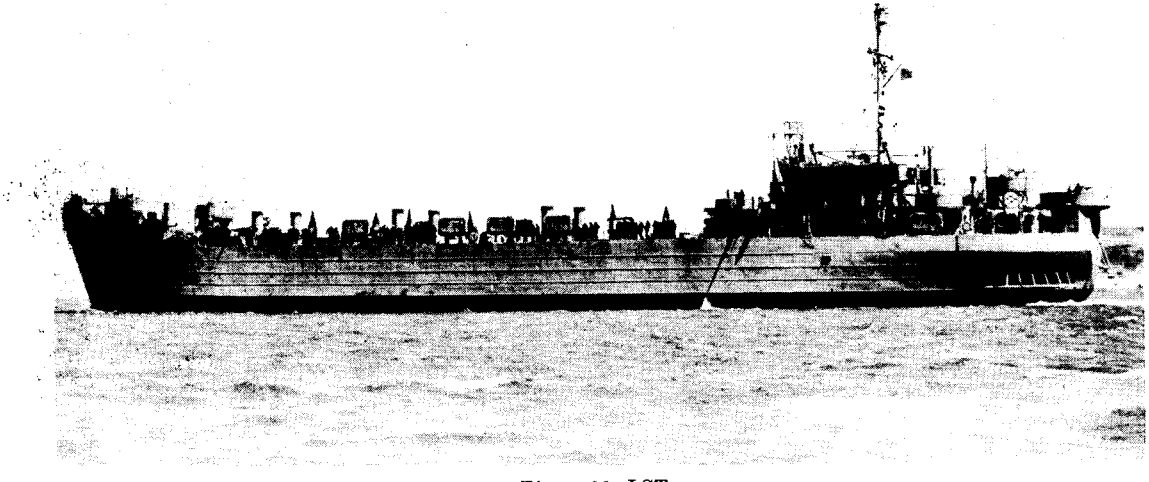


Figure 62. LST.

move 500 tons of liquid ballast from the ballast tanks; this allows the bow of the ship to beach in 3 to 4 feet of water. In addition, these pumps are used to trim the ship. Because of the shallow draft, the danger of being torpedoed by a torpedo exploding by a contact is remote. The ship has a cruising radius of 6,000 miles

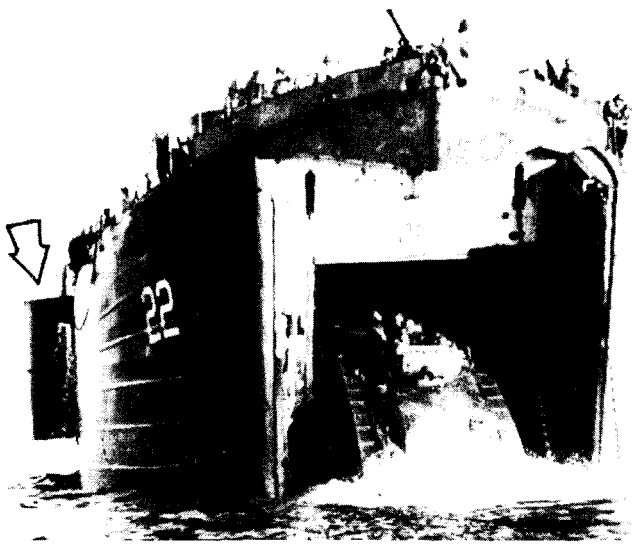


Figure 63. LVT(A) being launched from the ramp of an LST at sea. Note pontoon causeway lashed to side of LST.

at a cruising speed of 9 knots when fully loaded. It is capable of a speed of 12 knots for a limited time. The ship is powered by two 900-horsepower Diesel engines which operate twin screws. In planning an operation involving this type ship, a speed of advance of not more than 7½ to 8 knots can be counted on. Armament includes 40-mm and 20-mm guns.

b. The six-davit (mounting LCVP's) LST carries a Navy crew of 9 officers and 220 enlisted men. It has troop accommodations for 14 officers and 131 enlisted men of the Army.

c. The ship has two decks on which vehicles may be carried—the top or weather deck and the tank deck. It is not possible to load tanks or 10-ton wreckers on the top deck. All vehicles placed on the top deck must be loaded through the bow ramp onto the tank deck, thence to the top deck by the ramp (in older models there is an elevator instead of a ramp). A cargo hatch aft also services the top deck. For inaccessible landings, sectional pontoons, to make up floating causeways, can be carried on each side amidship. See figure 63.

d. The tank deck is 228 feet long and 30 feet wide; it is designed for a concentrated load of heavy tanks. The authorized tank deck load is ten M26 tanks. Additional space is available on the deck for loading tanks or other vehicles; however, they cannot be loaded unless an accurate study of the beaching conditions reveals that the maximum beaching capacity of 500 tons can be exceeded. The authorized tank deck load of LVT's is 17 amphibious tanks or tractors. The limiting height from the deck to the underside of the lights is 11 feet 3 inches. The Diesel oil or ballast tanks and the engine rooms are directly under and to the rear of the tank deck. Battery-charging equipment, with outlets for charging vehicular batteries, is supplied on the tank deck.

e. The capacity of the top deck is a distributed load of 350 tons. This may include an LCT loaded to 176 tons. Because of the limited capacity of the ramp,

loads must not exceed 17 tons gross weight. Because of the LST's construction, the top deck cannot carry loads concentrated in a small space. For example, an LVT carried on the top deck must be secured on planking spanning the hull frames. Thus secured, nine LVT's can be carried.

f. On LST's equipped with ramps from the tank deck to the top deck, it is possible to load a few vehicles on the top deck, then raise the ramp and load vehicles on the tank deck while those on the top deck are maneuvering into position. This process can be repeated until the tank deck is about three-fourths filled, after which it is impossible to lower the ramp. Vehicles are backed onto the ship in inverse order of landing priority. It is advisable when loading from land to close the doors to within a short distance of the ramp. This will prevent a vehicle from turning over in case it runs off the ramp. When loading from water, open the doors to the fullest extent. It is advisable, when loading the tank deck, to place a number of heavy vehicles on the sides of the deck, and to put half-tracks and lighter vehicles in the middle lane. The tank deck has an efficient ventilating system, which must be running during loading or unloading and at other times when vehicle motors are in operation.

g. LSU's often are carried to the target area mounted on side-launching cradles on the weather deck of the LST. Miscellaneous conversions of the LST include flight decks and Brodie devices for launching light aircraft, ambulance or hospital ships, aircraft repair ships, salvage craft tenders, and general stores-issue ships.

7. LSD: LANDING SHIP, DOCK (fig. 64). Length,

457 feet 9 inches; width, 72 feet; draft, 10 feet forward, 15 feet aft (light); displacement, 8,000 tons; speed, 15 knots; range, 8,000 miles; crew, 326 officers and men; armament, one 5-inch and one 3-inch gun, in addition to 40-mm and 20-mm guns and caliber .50 machine guns. The LSD is an adaptation of the floating drydock and is designed to carry LCM's or LSU's loaded with tanks or vehicles in its hold. The hold is an open well deck and also is referred to as the tank deck. During loading or unloading, the hold is flooded to a depth of about 8 feet; the gate in the rear is opened and the LCM's or LSU's are floated in or out (fig. 65). The ship is not designed to unload tanks or vehicles directly on the beach. The tank deck or hold will carry three LSU's, each loaded with three M26 tanks; or 18 LCM's, each loaded with one M4 medium tank; or 41 LVT's. (Because of stability requirements, the number of LCM(6)'s carried is reduced to 15. In assault landings LSD's usually carry 14 LCM(3)'s or 12 LCM(6)'s.) Temporary decks can be constructed, which will enable the LSD to carry up to 92 LVT's or 108 DUKW's. Land tanks cannot be loaded on these temporary decks. The LSD is used by the Navy in the area offshore from the assault beaches as a floating drydock to repair ships and craft such as LSM's, LCI's, or LSU's. It has accommodations for 22 troop officers and 310 men.

8. LSV: LANDING SHIP, VEHICLE (fig. 66). The LSV is a converted transport for carrying landing vehicles and troops. It has a stern ramp over which LVT's and DUKW's are launched into the water; the ship cannot land vehicles directly on the beach. The LSV is 451 feet long and 60 feet wide, with a loaded displacement of 8,000 tons, and has a speed of 19.5

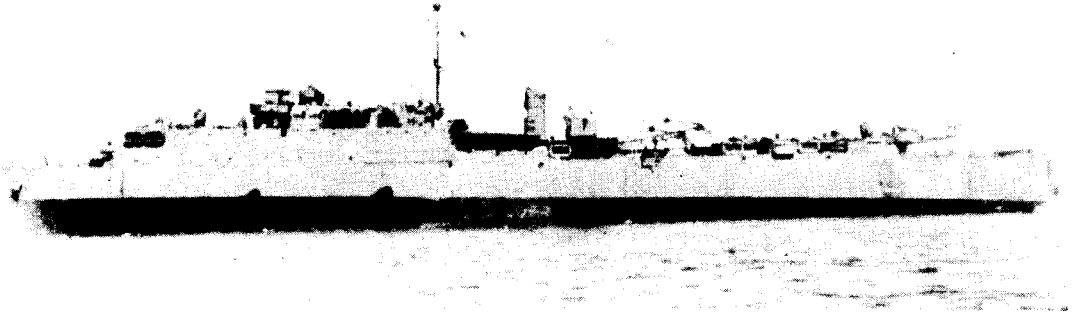


Figure 64. LSD.

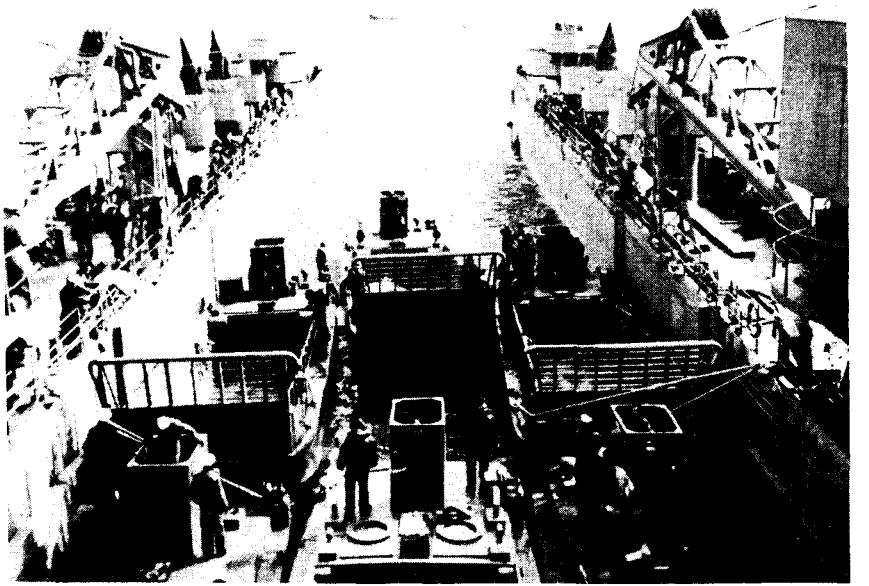


Figure 65. LCM's floating aboard an LSD.

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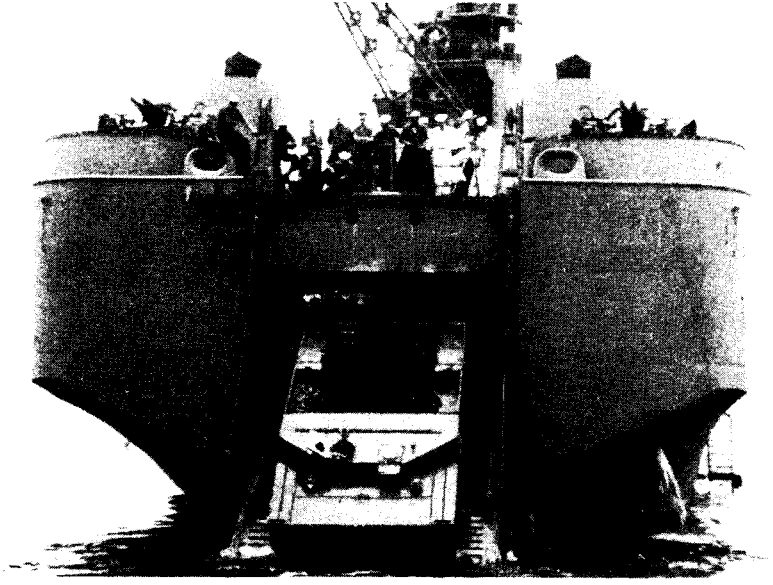

Figure 66. LSV.

knots. It can carry 21 LVT's and 800 troops, or 31 DUKW's and 800 troops, or 1,800 troops without vehicles; it has 14 LCVP's on deck and davits. Armament includes 5-inch, 40-mm, and 20-mm guns. It has a crew of 481 officers and men.

9. RHINO FERRY (fig. 67). The Rhino ferry consists of U. S. NL pontoons joined to form a ferry six pontoons wide and 30 pontoons long (approximately 30 ft. by 174 ft.). It is in effect an oversize pontoon barge. Two large outboard motors furnish power. The ferry has a bow ramp. Tanks and other vehicles can load on Rhino ferries from LST's; the ferries then proceed to shore and unload the vehicles directly on the beach.

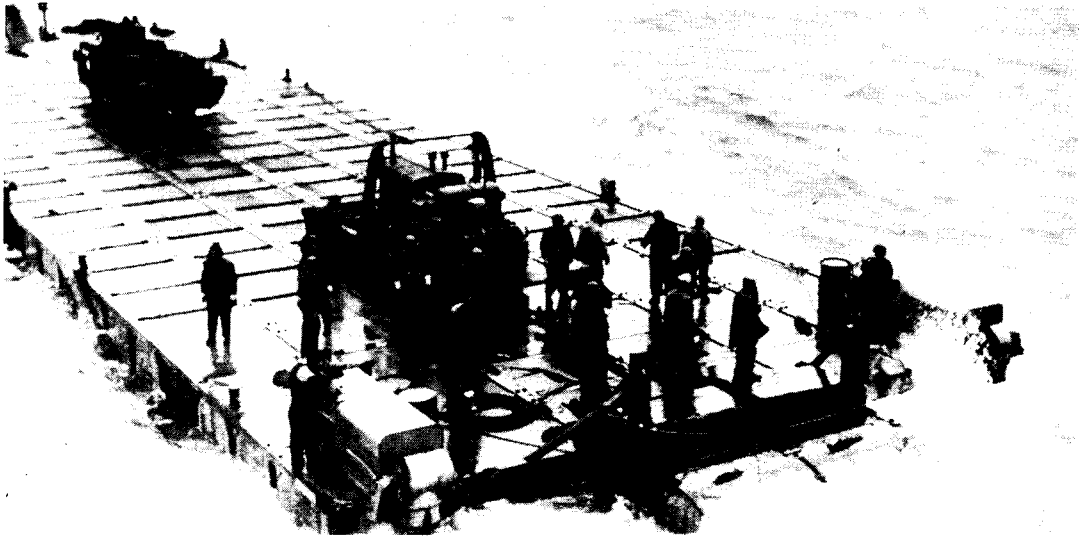

Figure 67. Rhino ferry.

APPENDIX III

GLOSSARY OF NAUTICAL TERMS MOST FREQUENTLY USED BY PERSONNEL OF AMPHIBIOUS UNITS

Note. Where the word "vehicle" appears in a definition, "ship," "craft," or "vessel" is equally applicable.

Abeam—At right angles to the fore and aft line of vehicles.

Aboard—On or in the vehicle.

Aft—Near rear of vehicle.

Astern—Aft or behind the rear of the vehicle.

Awash—Even with surface of water.

Ballast—Any weight carried to make vehicle more stable.

Beam—Extreme width of vehicle.

Below—Underneath floor (deck) of vehicle.

Bilge—Rounded portion of the vehicle that curves upward from the bottom plate; lowest portion of the vehicle inside the hull.

Boat hook—A dull hook on a 10-foot pole used to steady or control LVT's or craft when coming alongside or shoving off.

Bow—Forward end of the vehicle.

Bulkhead—Any partition used for subdividing the interior of the vehicle.

Calk—Operation of jamming material into the contact area of a joint to make it watertight or oiltight.

Cleat—The handles or devices on a craft or LVT for use in securing lines or cables.

Derelict—A vehicle abandoned and drifting aimlessly at sea.

Draft—The depth of vehicle below the water line measured vertically to the lowest part of the vehicle.

Drain well—The chamber into which seepage water is collected and then pumped into the sea by bilge pumps.

Even keel—Flotation of vehicle parallel to water line.

Fathom—Six feet; a nautical unit of length.

Foul—A term applied to the underwater portion of outside of vehicle, when it is more or less covered with sea growth or foreign matter.

Freeboard—The vertical distance from the top edge (gunwale) of the vehicle to the water, at the side.

Gangway—The term applied to a place of exit on the vehicle.

Gear—A comprehensive term used in speaking of all equipment which is used in any given operation.

Grating—Any open iron latticework used for covering openings or platforms.

Hawser—A large rope or cable used in towing or mooring.

Heaving line—A line about the diameter of a clothesline and 100 or more feet long having a weighted knot on one end to facilitate throwing. It is used for throwing from ship to LVT so that a heavier line or cable may be pulled to the LVT.

Hulk—The body of an old, wrecked, or dismantled vehicle unfit for sea service.

Hull—The framework of a vehicle together with all inside and outside plating but exclusive of equipment.

Knot—A measure of speed: one nautical mile per hour. (A nautical mile is approximately 6,080 feet.)

Launching—A term applied to the operation of sliding or driving a vehicle into the water.

Let go—Release.

List—The deviation of the vehicle from the upright position because of the shifting of cargo or for other reasons.

Make fast—To tie or secure.

Mooring—A term applied to the operation of securing a vehicle to wharf or dock by means of chains or rope.

Overboard—Outside; over side of vehicle into the water.

Painter—A small rope or line used in tying or securing a small craft or LVT.

Paying—Slackening away on a rope or cable.

Pitching—The alternate rising and falling of the front and rear of a vehicle when the vehicle alternately rises and plunges in the water.

Port—The left-hand side of the vehicle as viewed from rear to front; also, an opening.

Pump dale—A pipe to convey water from the bilge pump discharge channel through the side of the vehicle.

Retract—To refloat landing craft by backing off of beach.

Roll—The motion of the vehicle from side to side.

Running lights—Small lights used to identify size and the direction of travel of ships and craft at night. For small craft or LVT's, a white light, six feet above deck, is sufficient. Larger craft and ships have a white light on the foremast, a red light on the port side, and a green light on the starboard side.

Shove off—To push away from.

Skin—The outside plating; also refers to the inner bottom plating, then called the inner skin.

Slack away—To let out or pay out a rope, line, or hawser.

Sounding—Measuring the depth of water.

Starboard—Right side of the vehicle when looking forward.

Stern—The rear end of the vehicle.

Topside—That portion of the side of the hull which is above the designed waterline.

Trim—The position of a vessel in the water with reference to the horizontal plane. To adjust the cargo or personnel on each side of the center and at each end so that the vessel (vehicle) will sit on an even keel.

Veer—To change direction.

Wake—The disturbed water left behind a moving vehicle; also called the wash.

Waterlogged—A vehicle full of water but still afloat.

APPENDIX IV

TERMS PECULIAR TO AMPHIBIOUS OPERATIONS

Advance force—In a joint oversea expedition, a force preceding the main part of a joint task force to the objective. The advance force normally dissolves on D-day and is redistributed to other parts of the joint task force. (The advance force prepares the objective by reconnaissance, minesweeping, preliminary naval and air bombardment, and underwater demolition operations.)

AGC—The navy symbol for amphibious force flagship (headquarters ship). See *headquarters ship.* (This special ship of the amphibious command is fitted out with all means of communication and detection devices, as the headquarters for the attack force commander and commander of the landing force, to insure protection and control of the forces under their commands. It actually is a shipborne headquarters and floating joint information and control center.)

AK—The navy symbol for a cargo ship.

AKA—The navy symbol for a cargo ship, attack.

Amtank—Amphibious tank, LVT(A); Buffalo.

Amtrac—Amphibious tractor, LVT; Alligator.

AP—The navy symbol for a transport. (Troop carrier.)

APA—The navy symbol for a transport, attack. (It is capable of combat unit loading and normally transports a battalion landing team).

APD—The navy symbol for a destroyer-type high-speed transport.

Assault craft—A landing craft employed for landing troops and equipment in an assault on an enemy beach.

Attack force—A subdivision of an expeditionary force, consisting of assault shipping with embarked troops and supporting naval and tactical units, operating to establish a landing force on shore and support its operation thereafter.

Battalion landing team—An infantry battalion specially reinforced by necessary combat and service elements; the basic unit for planning an assault landing. A battalion landing team (BLT) normally is embarked aboard one APA or an appropriate number of smaller ships. Also referred to as a landing team.

BB—Battleship.

Beach—Shore line of landing area assigned to one combat team. Each beach is given a color designation, and subdivisions of the beach are numbered from left to right as you face the beach.

Beach dump—Area adjacent to a beach, utilized by the shore group for temporary storage of supplies and equipment.

Beachhead—A designated area on a hostile shore which, when seized and held, insures the continuous landing of troops and matériel, and provides maneuver space requisite for the projected operations ashore. It is the physical objective of the amphibious part of an operation. It corresponds to a bridgehead in land operations. (Its depth should be sufficient to protect the beach from ground observed artillery fire.)

Beachhead line—An objective for fixing the limits of the beachhead; a tentative main line of resistance based, if practicable, on terrain features which can be defended against enemy counterattack prior to advance

out of the beachhead; occupied and organized as demanded by the situation.

Beach marker—A sign or device used to identify a beach or certain activities thereon, for incoming waterborne traffic. Markers may be panels, lights, buoys, or electronic devices.

Beachmaster—The officer in command of the beach party. (Responsible for the beaching and unloading of boats; under the command of the shore party commander except for purely naval functions.)

Beach party—That element of a shore party which provides control for landing of craft and larger landing ships. It also regulates water traffic near the beach.

Boat—Any small craft capable of being stowed aboard a ship.

Boat assembly area—The area astern, to the quarter, or abeam of a transport where empty landing craft circle, awaiting a call to the ship to take on personnel or cargo.

Boat assignment table—A table showing the organization of a boat group and the assignment of personnel and matériel to each boat (or landing vehicle).

Boat group—Usually the landing craft organization for landing a battalion landing team. It also denotes the landing craft carried by an attack transport.

Boat rendezvous area—The area in which the boats rendezvous after being loaded and prior to movement to line of departure.

Boat space—The space and weight factor used to determine the capacity of boats and landing craft. With respect to landing craft, it is based on the requirements of one man with his individual equipment.

He is assumed to weigh 224 pounds and to occupy 13.5 cubic feet of space.

Boat team—A subordinate unit of the landing team, constituted to function from the pre-debarkation phase of the landing until normal unit organization has been reestablished ashore. It is the personnel, with their equipment, loaded in one landing boat charged with the performance of a task after debarking from the landing boat. (The senior officer or enlisted man in the boat is the boat team commander.)

Boat wave—The landing craft or LVT's within a boat group which carry those troops scheduled to land simultaneously or at approximately the same time.

Build-up—The process of attaining prescribed strengths of units and levels of supply. Also may be applied to the means of accomplishing this process. (Troops, equipment, and supplies of the build-up are landed over beaches or in ports already captured to further the operation and for protection, operation, and expansion of the base.)

CA—Heavy cruiser.

CL—Light cruiser.

Close support fire—Fire furnished in support of units ashore. It is fire placed on enemy troops, weapons, or positions which, because of their proximity, present the most immediate and serious threat to the supported units. Close support ships are usually gunboats, rocket and mortar-carrying LSM(R)'s, destroyers, and light cruisers.

Combat loading—The loading of assault troops with their essential combat equipment and initial combat supplies in the same ship or craft, and in a manner permitting immediate and rapid debarkation in

desired priority to conform to the anticipated tactical operation of the unit for the landing attack.

Combat team—See regimental combat team (RCT).

Comlanfor—Commander, landing force; commander of the task organization troops, especially equipped and trained to carry out amphibious operations.

Comnavfor—Commander, naval force; commander of the naval units of the joint force. This officer also may be the task force commander.

Comtransdiv—Commander, transport division.

Comtransron—Commander, transport squadron.

Comtractors—Commander, tractor group.

Control group—Vessels designated to control the movement from ship to shore, provide communication facilities with the boats and troops while en route to the beach, and assist in controlling the supporting naval gunfire.

Control officer—A naval officer, designated by the attack force, charged with the over-all supervision of the ship-to-shore movement.

Control vessels, boats, and craft—In an amphibious operation, a vessel to guide, and to act as a headquarters for the control of waterborne traffic to and from the beach.

(a) Primary control vessels—Vessels used by central control, transport squadron control, and transport division control officers.

(b) Secondary control vessels—Vessels used by boat group and boat wave commanders, and by wave guide officers.

(c) Special control vessels—Vessels used by corps and division (army) commanders, boat flotilla commanders, senior beachmasters, and shore group commanders.

CV—Large aircraft carrier.

CVE—Escort aircraft carrier.

CVL—Light aircraft carrier, built on the hull of a CL.

DD—The naval symbol for destroyer.

D-day—A term used to designate the unnamed day on which the initial assault landing is to be made.

DE—The naval symbol for an escort (small) destroyer.

Debarkation—The unloading of troops, equipment, or supplies from a ship or an aircraft.

Debarkation schedule—A schedule showing the type of boat, the station and time it is to report alongside a transport for loading, and the boat team it is to embark. This schedule is prepared by the landing force.

Debarkation station—A location definitely established at the rail of a transport where troops and matériel load into boats for the ship-to-shore movement. There are usually four or more such stations located on each side of an APA.

Deep support—The naval gunfire on inland targets to support the operation as a whole, as distinguished from close support, which is for the immediate benefit of front line troops. Usually fired by BB's and CA's.

Demonstration—1. An attack or a show of force on a front where a decision is not sought, made with the object of deceiving the enemy. 2. In an amphibious operation, an exhibition of force which may be a feint or a minor attack.

Demonstration group—The vessels assigned the task of transporting and supporting the troops that are to participate in an amphibious demonstration.

Distance—1. The space between adjacent individual ships or boats measured in any direction between

foremasts. 2. The space between adjacent men, animals, vehicles, or units in a formation measured from front to rear. 3. In air operations the term has no specialized meaning.

Dunnage—Any material, such as boards, mats, planks, blocks, bamboo, etc., which is used in transportation and storage to support and secure supplies, to protect them from damage, or for convenience in handling.

Embarkation—The loading of troops, with their supplies and equipment, aboard vessels or aircraft.

Embarkation area—In an amphibious operation, an area, including a group of embarkation points, in which final preparations are completed and through which craft and ships load are called forward to embark. A marshalling area.

Fire support area—The sea area assigned to the fire support group to permit it to maneuver so as to carry out the naval gunfire support.

Fire support coordination center—A single location in which all communications incident to the control of the artillery, air, and naval gunfire are centralized to provide for coordination of fire support. (The artillery commander of the appropriate echelon acts as fire support coordinator.)

Fire support group—(FSG) The basic naval unit for the delivery of support fire.

Floating dump—Critical supplies and equipment held afloat on barges, boats, vehicles, or ships; established early in a landing operation, and located near a control vessel for quick dispatch to any required beach.

Follow-up—Generally refers to shipments of personnel and matériel scheduled to arrive in the objective

area at some time after the assault and prior to the build-up.

Garrison force—All units assigned to a base or area for defense, development, operation, and maintenance of facilities. Units operating from the base normally are included for logistical purposes.

H-hour—1. The term used to designate the hour for an attack to be launched or for a movement to begin. 2. In an amphibious operation, the clock time designated for the first wave to land on the designated beach. Other letters of the alphabet may be used; e.g., F-hour, G-hour.

Headquarters ship—A naval vessel from which naval, landing force, and air commanders exercise control in landing operations. (See AGC)

Interval—1. The space between adjacent groups of ships or boats measured in any direction between the corresponding ships or boats in each group. 2. The space between adjacent individuals, vehicles, or units in a formation that are placed side by side, measured abreast. 3. In air operations the term has no specialized meaning.

Joint—Connotes activities, operations, organizations, etc., in which elements of more than one service of the Department of Defense participate.

Joint expeditionary force—A joint force organized to undertake a joint oversea expedition.

Landing area—Includes the beach, the approaches to the beach, the transport area(s), the fire support area(s), the air occupied by close supporting aircraft, and the land included in the advance inland to the initial objective.

Landing craft—A craft which is especially designed for beaching, unloading, or loading on a beach, and re-

tracting. (This term generally is applied to non-ocean-going vessels of less than 160 feet length, designed for use in landing operations; the designation LC (landing craft) is used therefor, with appropriate modifications to designate particular types.)

Landing craft availability table—A tabulation of all landing craft available to embark and transport troops and matériel ashore. It is prepared by the transport group commander and submitted to the commander of troop units for planning purposes.

LCM—Landing craft, mechanized.

LCVP—Landing craft, vehicle, personnel.

Landing diagram—A graphic diagram of the organization of the boat group into waves, showing the distance between waves, expressed in minutes, after H-hour, and the interval between boats and formations, shown in yards.

Landing forces—A task organization of troops especially trained and equipped, assigned to carry out amphibious operations against a position or group of positions so located as to permit their seizure by troops operating under a single tactical command. Some of its elements may be transported by air.

Landing schedule—A schedule showing the place, hour, and priorities of landing of all units embarked on a transport. It further shows necessary coordination for the ship-to-shore movement to execute the desired scheme of maneuver, and planned supporting naval and air bombardment missions.

Landing ship—A large type assault ship generally over 200 feet long which is designed for long sea voyages and for rapid unloading over or onto a beach. (LS is used as a prefix in naval symbols to designate these ships.)

Loading officer—An Army officer of the embarked unit who is especially trained to plan and supervise the loading and unloading of the personnel and equipment of his unit aboard the ships assigned.

LSD—Landing ship, dock.

LSM—Landing ship, medium.

LST—Landing ship, tank.

LSU—Landing ship, utility.

LSV—Landing ship, vehicle.

Landing vehicles—Amphibious vehicles used in landing operations which are capable of operating on land and water are known as landing vehicles; they include LVT's and DUKW's.

LEX—Naval term for a practice landing, a landing exercise.

Line of departure—A line designated to coordinate the departure of attack elements—a jump-off line. In amphibious operations, a suitably marked off-shore coordinating line to assist assault craft to land on designated beaches at scheduled times.

Line of transfer (transfer area)—A line designated between the line of departure and the beach for the purpose of coordinating the transfer of troops or supplies between naval craft and LVT's and DUKW's; generally marked by control vessels which control traffic to the beach.

Main landing—The landing, over beaches in the objective area, upon which the ultimate success of the operation order for securing a beachhead depends, and from which assault forces can assume the offense and continue operations on land against an active enemy.

Mine group—Task unit of the attack force assigned the mission of laying and sweeping mines in the objective

area. Also may be attached to the advance force.

Naval gunfire liaison officer (NGLO)—A naval officer attached to an RCT or a BLT, to advise that organization on all matters pertaining to naval gunfire support. He assists the FSCC in the planning and coordination of naval gunfire support with artillery and air.

Naval gunfire support (NGS)—Fire support of troops in amphibious assault or engaged in other operations on shore by naval ordnance on supporting vessels. Types of support—

(a) Close support fire—Naval gunfire delivered in close support of friendly troops, either ashore or in landing craft. It is fired on enemy troops, weapons, or positions which, because of their proximity, present the most immediate and serious threat to the supported unit. It is provided by support landing craft, destroyers, and antiaircraft batteries of cruisers and battleships.

(b) Deep support fire—Naval gunfire delivered on objectives not in the immediate vicinity of friendly forces, but farther inland, on enemy reserves, supply dumps, fire direction centers, artillery concentrations, etc. It is provided by battleships, cruisers, and destroyers.

Naval platoon—Unit assigned to a shore party and generally called the beach party.

Naval task force—A subdivision of the naval attack force composed of ships appropriate for one specific mission.

Objective area—A definite geographical area within which is located the objective to be seized or reached by the expeditionary troops or landing force.

Organizational unit loading—The loading of troop units

with their equipment and supplies in the same vessel, but without regard for any planned priority of debarkation.

Pallet—A portable platform upon which materials are placed for convenient handling and stowage. (A low platform constructed of wood or steel and mounted on runners or rounded baseboards upon which are stacked and secured ammunition, rations, or other supplies to facilitate handling from ship holds to beach dumps. Usually approximately 4 x 6 feet and having attached towing slings, they haul approximately one ton bulk cargo.)

Pontoon, N. L.—A navy lightered pontoon; cube shaped, sheet steel, airtight cell from which pontoon barges and causeways are assembled when required.

Preparatory fires—Intensive naval fires delivered on landing beaches and adjacent areas immediately prior to and during the approach to the beach of the assault landing craft of the leading waves.

Rail loading—Loading personnel and materiel into landing craft suspended from ship davits (Wellin type) prior to launching the craft.

Reconnaissance group—Task unit of the joint attack force designated to reconnoiter landing areas prior to D-day. They may locate enemy naval forces, locate suitable beaches, locate underwater obstacles and mines, plot suitable targets for naval gunfire, etc.

Regimental combat team (RCT)—Reinforced infantry operating as a balanced fighting unit of essential arms. The normal ground force ratio is one regiment of infantry, one battalion of artillery, and one company of engineers; but may be changed to meet the demands of the tactical situation.

Salvage group—In an amphibious operation, a naval

task organization designated and equipped to rescue personnel and to salvage equipment and matériel.

Screening group—A defensive unit of naval vessels employed to protect the naval attack force, such as a unit of antisubmarine vessels, picket boats, etc., seaward from the transport and fire support areas.

Secondary landing—Landing made outside the immediate area of the main landing, which directly supports the main landing; may under certain circumstances become the main landing.

SFCP—Shore fire control party; a specially trained unit of naval gunnery, artillery, and communication personnel for control of naval gunfire in support of troops ashore. A shore fire control party is made up of a naval gunfire spotter team including naval gunfire spotter, assistant spotter, radio and wire teams; and a naval gunfire liaison team in charge of a naval gunfire liaison officer, who is supported by a radio team and a wire team

Shore group—The appropriate number of shore party units to provide the logistical support for an RCT.

Shore party—A task organization formed for the purpose of providing logistic support within the beach area to landing force units during the early phases of an amphibious operation. Its basic mission is to unload supplies and equipment; provide services and facilities ashore; to receive, segregate and safeguard this material; maintain security of the beach area; evacuate casualties and prisoners of war and reembark other personnel as directed.

Shore party team—The shore party organization basically organized to support a battalion landing team in an amphibious operation. The shore party team is the basic unit of a shore party. In army usage,

the organization performing this mission takes the name of the major T/O&E unit involved, usually a shore company.

S-day—Sailing day. The day that the attack force sets sail for the objective or landing area.

SS—Naval symbol for submarine.

Stevedore—One who works at or is responsible for the loading of a vessel in port.

TACP—Tactical air control party. A subordinate operational component of the land-based tactical air control group designed for the control of aircraft from forward observation posts. The tactical air control party operates at division, regimental, or battalion level. (Usually consists of one air officer and three enlisted men attached to each landing team and combat team for the purpose of directing and controlling air support.)

Tonnage—A term used variously to indicate a ship's size, weight, or carrying capacity.

(a) Deadweight tons—Cargo- and personnel-carrying capacity of a ship, measured in 2,240-pound tons.

(b) Gross tons—Entire internal cubic capacity of a ship expressed in tons of 100 cubic feet capacity.

(c) Long tons—2,240-pound tons.

(d) Measurement tons (ship tons)—40 cubic feet.

(e) Short tons—2,000-pound tons.

Transport quartermaster TQM—Each APA and AKA of the amphibious forces normally has in its regular complement a Marine officer, usually of the rank of captain, assigned duty as transport quartermaster. He maintains ship's data as it affects loading, unloading, billeting and messing; performs liaison between the commanding officer of the ship and the

commanding officer of the troops, prior to embarkation; assists the loading officer in the preparation of detailed loading plans; supervises cargo stowage in accordance with approved loading plans.

Tractor group—A term sometimes used to designate a group of landing ships in an amphibious operation which carries the amphibious vehicles of the landing force.

Transport division—transdiv—The attack transports and attack cargo ships required to carry personnel, supplies, and equipment of one regimental combat team. (Usually consists of five APA's and two AKA's).

Transport group—transgroup—A subdivision of an attack force consisting of assault shipping and, when attached, its protective and service units, organized for the purpose of embarking, transporting, and landing troops, equipment and supplies of the landing force.

Transport area—The sea area designated as a station area for transports debarking troops during the assault phase of a landing operation.

Transport Squadron—transron—Two or more transport divisions organized to carry a reinforced infantry division.

Underwater demolition team (UDT)—A naval unit organized and equipped to perform beach reconnaissance and underwater demolition missions in an amphibious operation.

UP&T (unit personnel and tonnage) table—A table showing total personnel and cubic measurements and weights of each class of material, and number, size, and weight of each type of vehicle to be embarked by a combat unit.

APPENDIX V

UNIT TRAINING PROGRAM — AMPHIBIOUS TRACTOR BATTALION

SUBJECT	Hours per week [19 weeks]																			Total hours
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Orientation (TIP)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
Physical training, swimming, and athletics	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	..	36
Commander's time	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	..	38
Inspections	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	29
Maintenance of clothing, equipment, and quarters	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	38
Basic communication	4	2	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
Driving, land, individual	4	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
Driving, land, formation	..	6	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12
Combat firing, land, platoon	..	..	..	8	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12
Firing, vehicular weapons and individual arms	8	7	4	4	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	27
Antiaircraft firing	..	..	6	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12
Driving, water, individual	..	..	..	..	10	8	6	..	..	..	..	..	..	..	..	..	..	..	..	24
Driving, water, formation	..	..	..	..	..	5	7	7	7	4	8	..	..	..	..	..	..	..	..	38
Driving, night	..	..	..	..	..	..	..	..	..	..	4	..	4	..	4	..	4	..	..	16
Combat firing, water	..	..	..	..	..	..	..	4	4	7	..	..	..	..	..	..	..	..	..	15

Security measures (individual-crew)														4	4	4	4		4	4		24
Loading, transporting personnel and cargo							2	2	4	4	4	6	4	4								30
Marches, camps, bivouacs, field exercises, and LEX's, to include loading aboard ship																								
Platoon						6	4	6														16
Company									6	6	6					4	4					26
Battalion												12	10	12	8	8						50
Combined																8	12	16				36
Maintenance, vehicles and weapons	8	7	8	8	8	8	8	6	6	6	6	6	6	8	8	8	8	8				131
Army Field Forces Tests																			36	36		36
Total hours	35	37	37	35	35	36	36	34	36	36	36	36	36	36	36	36	36	36	36	40		685
SPECIALIST TRAINING—TECHNICAL SUBJECTS																						
Communication personnel *	5	3	3	5	5	4	4	6	4	4	4	4	4	4	4	4	4	4				75
Amphibious intelligence, to include elementary navigation **	5	3	3	5	5	4	4	6	4	4	4	4	4	4	4	4	4	4				75
Tractor commanders	5	3	3	5	5	4	4	6	4	4	4	4	4	4	4	4	4	4				75
Driver and crew, vehicular care and maintenance, to include wheeled vehicles ***	5	3	3	5	5	4	4	6	4	4	4	4	4	4	4	4	4	4				75
Total hours	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40		760

* Communication training under direction of battalion communication officer.
** Intelligence and navigation training under direction of the battalion S–2.
*** Wheeled vehicle drivers instruction under direction of the battalion motor officer.

APPENDIX VI

UNIT TRAINING PROGRAM — AMPHIBIOUS TANK BATTALION

SUBJECT	Hours per week [19 weeks] 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total hours
Orientation (TIP)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
Physical training, swimming, and athletics	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5	..	39
Commander's time	5	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	..	41
Inspections	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	32
Maintenance of clothing, equipment, and quarters	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	38
Basic communication	2	4	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
Driving, land, individual	8	4	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14
Driving, land, formation	4	2	4	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14
Combat firing, land, platoon	..	..	..	..	..	4	8	..	..	..	..	..	..	..	..	..	..	..	..	12
Driving, water individual	..	8	4	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16
Driving, water, formation, to include LEX's	..	..	..	4	6	4	4	..	4	4	4	4	..	4	..	4	4	4	..	50
Driving, night	..	..	..	..	..	..	..	4	..	4	..	..	4	..	4	..	..	..	..	16
Combat firing, water, platoon	..	..	..	..	..	..	..	..	..	..	..	4	8	4	..	..	..	..	..	16
Firing, vehicular weapons and individual arms	8	6	8	6	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	32
AA and AT defense	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	4	2	2	..	12

Security measures (individual-crew)					5	6	4	5	3		4								4							31
Marches, camps, bivouacs, field exercises, and LEX's, to include loading aboard ship and selection and occupation of positions.																										
Platoon					4	4	4	4	4			4	4													28
Company										4	4	4	4	8	8	4	4		4							44
Battalion																4	4	8	4							20
Service practice					4			4		4		4		4	4	4	4	4	4							36
Maintenance, vehicles and weapons	6	6	5	5	5	5	5	5	5	5	5	5	6	6	6	6	6	6								98
Army Field Forces Tests																									36	36
Total hours	40	40	36	36	37	32	34	31	25	30	30	34	36	36	32	34	36	35	40	654						
SPECIALIST TRAINING—TECHNICAL SUBJECTS																										
Cannoneers					4	4	3	8	6	9	15	10	10	6	4	4	8	6	4	5						106
Instrument, FD, and command personnel **					4	4	3	8	6	9	15	10	10	6	4	4	8	6	4	5						106
Communication personnel *					4	4	3	8	6	9	15	10	10	6	4	4	8	4	6	3						106
Wheeled vehicle drivers and ammunition section					4	4	3	8	6	9	15	10	10	6	4	4	8	6	4	5						106
Driver and crew, vehicular care and maintenance ***					4	4	3	8	6	9	15	10	10	6	4	4	8	6	4	5						106
Total hours	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	760						

* Communication training under direction of battalion communication officer.
** Intelligence and navigation training under direction of the battalion S–2.
*** Wheeled vehicle drivers instruction under direction of the battalion motor officer.

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