

# FM 60-30

DEPARTMENT OF THE ARMY FIELD MANUAL

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**UNIT LOGISTICAL FI**  
**AMPHIBIOUS OPERATIONS**  
**EMBARKATION**  
**AND SHIP LOADING**  
**(UNIT LOADING OFFICER)**

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DEPARTMENT OF THE ARMY • SEPTEMBER 1952

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# CHAPTER 1

## GENERAL

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### 1. Purpose

The purpose of this manual is to present a description of the procedure for embarkation preparatory to an amphibious operation.

### 2. Scope

*a.* This manual contains instruction in planning and executing the embarkation of troops and the loading of ships with supplies and equipment at the division level and below. Further, such aspects of debarkation as relate to unloading technique are included.

*b.* The manual begins with a discussion of the factors involved in embarkation planning and a brief description of naval organization. This is followed by the duties of a unit loading officer by phases. Detailed instructions are then given as to loading and stowing, and the manual is concluded with general data for unloading procedures.

*c.* The appendixes present pertinent reference data to assist the unit loading officer in his duties and functions as outlined.

## **CHAPTER 2**

### **EMBARKATION PLANNING**

---

#### **3. General**

*a.* An amphibious operation may fail because of improper embarkation of troops or improper loading of supplies and equipment of the landing force. Moreover, the soundest tactical plan will miscarry if the assault transports of the landing force are not loaded so that troops, equipment, and supplies can be readily debarked in accordance with the tactical plan.

*b.* The problems attendant on the embarkation of an expeditionary force for oversea operation are many and varied and, if target dates are to be met, embarkation must be carefully planned and executed. Planning should begin immediately upon designation of the objective and of the forces assigned for the assault.

*c.* Basic planning considerations are usually contained in the directive of the theater commander. This will include the troop list of the force; the levels of supply to be lifted in assault shipping; and the number of assault transports, cargo ships, and landing ships available to lift the landing force. At all troop levels, the first step in planning is the establishment of liaison with the parallel naval echelon.

#### **4. Planning at Levels Above Transport Group (Navy) and Division (Army)**

When the naval commander and the troop commander at levels above the transport group and troop division have received their directives, they take the following joint steps:

*a.* Determine the shipping requirements of the assigned force (par. 5).

*b.* Balance shipping requirements against available shipping to determine whether the assigned force can be lifted.

*c.* If assigned shipping is deemed inadequate, report to higher authority, stating the probable effect of the insufficient shipping upon the accomplishment of the assigned mission.

*d.* The naval commander allocates shipping to his next subordinate commanders, and the troop commander issues an embarkation plan which includes the task organization of the next subordinate troop units.

## 5. Determination of Shipping Requirements:

a. In determining assault shipping required for the force, the following factors must be considered:

- (1) Total personnel to be embarked.
- (2) Total supplies and equipment to be loaded.
- (3) The tactical plan.
- (4) Requirements for special missions or special equipment.

b. The first step in determining shipping requirements is to prepare consolidated personnel and tonnage data which will show the total number of personnel and vehicles and amount of cargo. Cargo will be expressed in terms of cubic feet and short tons, and vehicles in terms of square feet and short tons.

c. The total shipping space requirements thus determined are incomplete since they must be modified by consideration of the tactical plan for landing and any load limitation prescribed for various types of vessels. The following factors of the tactical plan for landing will carry the greatest weight in determining space requirements:

- (1) Grouping tactical units into ships whose command parallels that of a landing force.
- (2) Assigning shipping to permit lifting troops and equipment in tactical units without regard to full use of space:

d. When space requirements, as modified by tactical requirements, have been translated into numbers of transports and cargo ships, special ships are still required to lift special units or equipment. Among these are:

- (1) Ships such as landing ships, tank (LST), and landing ships, dock (LSD), to carry landing vehicles, tracked (LVT), as may be required for the landing of assault infantry.
- (2) Ships such as LST's; landing ships, medium (LSM); landing ships, utility (LSU); and LSD's, to carry artillery, tanks, engineer, and other special equipment.
- (3) Special ships for the evacuation, such as hospital ships and evacuation LST's. (While evacuation by sea is a naval responsibility, the troop commander must furnish estimates of casualties and requirements.)

e. Shipping requirements should now be reexamined in terms of the following considerations and corrective action taken accordingly:

- (1) Organization of troops and shipping must provide for the accomplishment of the various tasks required under the preferred and alternate plans.
- (2) Troops and matériel must be distributed among embarkation groups so that the detachment of any group will not deprive

the remainder of the force of an unduly large percentage of any one arm or type of matériel.

- (3) The normal chains of command, both naval and landing force, should be interrupted as little as possible.

## **6. Allocation of Shipping**

*a.* Allocation of shipping to subordinate units of the landing force should be based upon considerations by which shipping requirements were determined (par. 5). Initial allocation may of necessity be by numbers and types of ships only, but this will be followed as soon as practicable by detailed assignments.

*b.* As planning proceeds at the attack force and higher levels, subordinate units should be kept constantly informed of the progress. Division and other subordinate commanders or their representatives should be consulted and recommendations obtained from them regarding embarkation planning affecting their units. Liaison with tactical planning sections must be continuous as embarkation planning must be based upon tactical planning and must proceed in conjunction with it. For example, a decision to land infantry in LVT's or artillery in amphibious trucks will require an increase in the number of landing ships needed and probably a corresponding decrease in the number of transports.

*c.* Information relative to transport squadrons or transport divisions assigned to lift subordinate units should include the exact composition of the squadrons or the divisions, date of arrival in the embarkation area, and time of availability for loading. This information should be communicated to lower echelons of the landing force at the earliest possible time so that these echelons may begin detailed planning. Latest loading characteristics data on all shipping assigned should also be procured by higher echelons and furnished to subordinate echelons of the landing force.

*d.* At the earliest practicable date following assignment of a vessel to lift an element of the landing force, the ship's combat cargo officer and the unit loading officer of the element arrange a meeting to formulate detailed loading plans. Normally, the ship's combat cargo officer arranges the meeting and contacts the unit loading officer at the latter's base.

## **7. Planning at Transport Group and Troop Division Levels**

When transport group and troop division commanders receive their respective directives from higher authority, they follow the same procedure as at higher levels, issuing directives for the composition of transport divisions and tractor divisions and assembling the troop

Table I. Shipping Allocation Annex

10TH INFANTRY DIVISION  
SHIPPING ALLOCATION ANNEX  
Maj Gen C. O. Bierman, Comd

Major M. G. Cokin, division transportation officer

Annex "G" to Embarkation Order No. 10

EMBARKATION GROUPS		10th Embarkation Group			28th Embarkation Group			29th Embarkation Group			30th Embarkation Group			Arty Embarkation Group			1st Amtrac Embarkation Group			2nd Amtrac Embarkation Group			1st Embarkation Group			
EMBARKATION GROUP COMMANDERS		LT COL J. C. MILLER			COL R. W. ADAMS			COL A. L. APPELGATE			COL G. E. JENKINS			COL H. H. HARVEY			MAJ P. M. LORTON			LT COL H. L. SILVERS			LT COL H. L. DAVIS			
EMBARKATION GROUP UNIT LOADING OFFICERS		MAJ GEO HOLLIS			CAPT F. F. ROBERTS			CAPT CHARLES PHILIPSON			CAPT E. W. NASH			MAJ A. L. JOHNSON			CAPT F. F. ROBESON			CAPT CHARLES PHILIPS			1st LT R. C. SMITH			
TOTAL SHIP'S CAPACITY		ACC 7 Mt McKinley	100 500	300 5,000	APA 33 Bayfield	85 12,000	1,450 120,000	APA 37 Cavalier	85 12,000	1,450 120,000	APA 45 Henrice	85 12,000	1,450 120,000	LST 1156 1157 1158 1159 1160 1161	96 96,000	1,800 840,000	LST 906 907 908 909 LST 1164	64 32,000	1,200 280,000	LST 912 913 914 915 LST 1165	64 32,000	1,200 280,000	LSD 5 Gunston Hall LSD 14 Rushmore LSD 20 Cleary LST 918 919 LST 1166	16 3,000	250 18,000	
OR, enl Sq ft; cu ft		1,507 582,000	26,290 5,423,000		APA 221 Oneida APA 99 Roller AKA 101 Ottawa AKA 81 Rollings LST 1153 1154 LSM 200	50 12,000	950 120,000	APA 222 Pickaway APA 236 Bronx AKA 108 Washburn LSD 22 Ft Marion LST 1155	85 12,000	1,450 120,000	APA 227 Ranville APA 233 Sevier AKA 105 Skagit LSD 27 Whitstone LST 1162	85 12,000	1,450 120,000	APA 223 Pitt APA 231 St Croix AKA 104 Seminole LSD 13 Cosa Grande LST 1163	85 12,000	1,450 120,000	85 16,000	300 140,000	85 16,000	300 140,000	85 16,000	300 140,000	85 16,000	300 140,000	85 16,000	300 140,000
DIVISIONAL UNITS		OR, enl sq ft; cu ft	258 109,000	2,960 1,875,000	299 80,000	4,960 778,000	299 80,000	4,960 778,000	299 80,000	4,960 778,000	299 80,000	4,960 778,000	96 48,000	1,800 840,000	96 48,000	1,800 840,000	80 40,000	1,500 420,000	80 40,000	1,500 420,000	96 41,000	1,800 334,000	96 41,000	1,800 334,000		
Hq, 10th Inf Div		62 141	62 141																							
Hq Co, 10th Inf Div		13 7,859	176 44,347	13 7,859	176 44,347																					
Band, 10th Inf Div		2 68	2 68																							
10th MP Co		7 3,640	180 18,124	7 3,640	180 18,124																					
10th Ord Maint Co		19 17,674	302 125,044	19 17,674	302 125,044																					
10th QM Co		12 17,948	248 106,922	12 17,948	248 106,922																					
10th Signal Co		15 12,057	354 72,219	15 11,583	354 69,863																					
10th Medical Det		1 6	13 164	1 6	13 164																					
10th Recon Co		5,167 7	32,207 34	5,167 7	32,207 34																					
10th Replacement Co		667 22	3,540 263	667 22	3,540 263																					
Hq & Hq Co, 28th Inf		4,803 11	23,462 175	4,803 11	23,462 175																					
Service Co, 28th Inf		11,459 6	68,190 184	11,459 6	68,190 184																					
Hv Mortar Co, 28th Inf		4,621 6	27,428 142	4,621 6	27,428 142																					
Tk Co, 28th Inf		6,919 13	59,119 201	6,919 13	59,119 201																					
Medical Co, 28th Inf		2,460 34	13,226 883	2,460 34	13,226 883																					
1st Bn, 28th Inf		5,516 34	27,179 883	5,516 34	27,179 883																					
2d Bn, 28th Inf		5,516 34	27,179 883	5,516 34	27,179 883																					
3rd Bn, 28th Inf		5,516 34	27,179 883	5,516 34	27,179 883																					
Hq and Hq Co, 29th Inf		4,803 11	23,462 175	4,803 11	23,462 175																					
Svc Co, 29th Inf		11,459 6	68,190 184	11,459 6	68,190 184																					
Hv Mortar Co, 29th Inf		4,621 6	27,428 142	4,621 6	27,428 142																					
Tk Co, 29th Inf		6,919 13	59,119 201	6,919 13	59,119 201																					
Medical Co, 29th Inf		2,460 34	13,226 883	2,460 34	13,226 883																					
1st Bn, 29th Inf		5,516 34	27,179 883	5,516 34	27,179 883																					
2d Bn, 29th Inf		5,516 34	27,179 883	5,516 34	27,179 883																					
3rd Bn, 29th Inf		5,516 34	27,179 883	5,516 34	27,179 883																					
Hq and Hq Co, 30th Inf		4,803 11	23,462 175	4,803 11	23,462 175																					
Svc Co, 30th Inf		11,459 6	68,190 184	11,459 6	68,190 184																					
Hv Mortar Co, 30th Inf		4,621 6	27,428 142	4,621 6	27,428 142																					
Tk Co, 30th Inf		6,919 13	59,119 201	6,919 13	59,119 201																					
Medical Co, 30th Inf		2,460 34	13,226 883	2,460 34	13,226 883																					
1st Bn, 30th Inf		5,516 34	27,179 883	5,516 34	27,179 883																					
2d Bn, 30th Inf		5,516 34	27,179 883	5,516 34	27,179 883																					
3rd Bn, 30th Inf		5,516 34	27,179 883	5,516 34	27,179 883																					
Hq and Hq Btry, 10th Div Arty		32 8,306	195 52,984	32 5,308	195 29,652																					
37th FA Bn (105 mm how)		48 23,190	621 139,222	36 18,822	371 110,050																					
38th FA Bn (105 mm how)		48 23,190	621 139,222	36 18,822	371 110,050																					
39th FA Bn (105 mm how)		48 23,190	621 139,222	36 18,822	371 110,050																					
40th FA Bn (155 mm how)		37 25,291	624 154,528	2 25,291	178 154,528																					
10th AAA AW Bn		38 27,292	735 203,501	2 27,292	217 203,501																					
10th Hv Tk Bn		39 32,732	638 253,751	1 253,751	2 253,751																					
10th Engr C Bn		45 41,477	927 262,501	30 25,025	438 162,748																					
10th Medical Bn		48 11,023	293 68,448	48 11,023	293 68,448																					
TOTAL DIVISIONAL UNITS		1,007 422,153	17,797 2,635,368	238 105,242	2,385 658,167																					
SUPPORTING UNITS		29 18,594	849 159,317	8 2,517	98 17,216																					
Shore Bn, 502nd Engr Bn and Shore Regt		37 28,191	711 278,389																							
315th Amtrac Bn (USMC) (armd)		22 31,603	480 359,706																							
316th Amtrac Bn (USMC) (cargo)		5 1,114	291 6,405	5 1,114	291 6,405																					
4407th Trans Port Co (Type A)		5 1,114	291 6,405																							
4408th Trans Port Co (Type A)		5 1,114	291 6,405																							
4409th Trans Port Co (Type A)		5 1,114	291 6,405																							
4410th Trans Port Co (Type A)		5 1,114	291 6,405																							
3465th Trans Amph Trk Co		6 12,594	183 105,254																							
3466th Trans Amph Trk Co		6 12,594	183 105,254																							
3467th Trans Amph Trk Co		6 12,594	183 105,254																							
TOTAL SUPPORTING UNITS		126 120,828	3,753 1,138,794	13 3,631	389 23,621																					
EXTRA SUPPLIES																										
Ammo (SA)		3,000		250		500		800		800		800		100		250		250		250		50				
Ammo HE		113,000		13,000		5,000		5,000		5,000		5,000		50,000		5,000		5,000		5,000		25,000				
Rations, 20 D (Assorted I, D, 2, C-2, 4, S-1; 13, R)		61,700		25,000		10,000		10,000		10,000		10,000		2,000		1,500		1,500		1,500		1,700				
Water, 5 D (1 gallon per man per day)		22,700		12,000		2,000		2,000		2,000		2,000		1,500		1,000		1,000		1,000		1,200				
Fuel and lubricants		100,000		25,000		5,000		5,000		5,000		5,000		4,000		8,000		8,000		8,000		40,000				
Engr		15,000		7,000		2,000		2,000		2,000		2,000		500		500		500		500		500				
QM		12,000		8,000		800		800		800		800														

SUBMITTED: 1 September 1950

APPROVED: 4 September 1950

**BY:**

BY

M. G. Cokin, Maj, TC, Transportation Officer

M. M. Day, Lt Col, GSC, G-4

Table II. Embarkation Plan Regimental Combat Team.

# EMBARKATION PLAN 28TH EMBARKATION GROUP, 10TH INFANTRY DIVISION

COL R. W. ADAMS, COMMANDING

MAJ F. P. ROBERTS, UNIT LOADING OFFICER

Organizations:	Commander of Troops		Lt Col Roe	Lt Col Rich	Lt Col Jones	Capt Robb	1st Lt Russ	Capt Sims	Maj Moore	Capt Smith	1st Lt James	Capt Dick	Capt Mix
	Unit Loading Officer		Maj Doll	Maj Lundy	Maj Berg	Capt Robb	1st Lt Pile	1st Lt Bush	1st Lt Marks	1st Lt Lucas	1st Lt Parks	1st Lt Dixon	1st Lt May
	Capacity	Ships	Keyfield, APA 33	Pickaway, APA 222	Bronx, APA 236	Washburn, AKA 106	Ft. Marion, LSD 22	LST - 1155	LST - 1164	LST - 906	LST - 907	LST - 908	LST - 909
	Off, Enl	379 6,460	85 1,430	85 1,430	85 1,450	12 60	15 250	15 300	15 300	15 300	15 300	15 300	15 300
	Sq Ft, Cu Ft	228,000 1198,000	12,000 120,000	12,000 120,000	12,000 120,000	25,000 260,000	3,000 18,000	16,000 140,000	16,000 140,000	8,000 70,000	8,000 70,000	8,000 70,000	8,000 70,000
Hq & Hq Co, 28th Inf	22	263	15 (2-2 1/2 T)	190	2 (3-2 1/2 T)	10	5	63	-	-	-	-	-
	4,803	23,452	2,292	11,025	711	4,284	1,799	8,127	-	-	-	-	-
Svc Co, 28th Inf	11	5	-	-	-	-	-	-	2 (26-2 1/2 T) 75	-	-	-	-
	11,459	68,190	152	928	-	-	-	-	8,007 47,442	-	-	-	-
Hv Mortar Co, 28th Inf	6	184	2 (2-2 1/2 T)	64	2 (1-2 1/2 T)	60	2 (1-2 1/2 T)	60	-	-	-	-	-
	4,621	27,428	1,873	11,040	1,374	8,194	1,374	8,194	-	-	-	-	-
Tr Co, 28th Inf	6	142	1	6	-	-	-	-	1 (1 Tr Rec)	19	2 (1-2 1/2 T)	50	2 (13 Trs)
	6,919	59,119	112	488	-	-	-	-	1270 (1-2 1/2 T) 928	2532 (9 Trs) 22,272	3005	27,076	-
Med Co, 28th Inf	13	201	2	98	2	30	2	50	-	-	-	-	-
	2,460	13,226	208	1,172	-	1,314	6,522	-	-	-	-	-	-
1st Bn, 28th Inf	34	883	4 (7-2 1/2 T)	83	-	-	-	-	-	-	-	-	-
	5,516	27,179	5,516	27,179	-	-	-	-	-	3	105	6	151
2nd Bn, 28th Inf	34	883	2	10	32 (7-2 1/2 T)	873	-	-	-	-	-	-	-
	5,516	27,179	-	-	5,516	27,179	-	-	-	-	-	-	-
3rd Bn, 28th Inf	34	883	2	10	-	-	32 (7-2 1/2 T)	873	-	-	-	-	-
	5,516	27,179	-	-	-	-	5,516	27,179	-	-	-	-	-
Det, 10th M.F. Co	1	32	1	12	-	10	-	10	-	-	-	-	-
	224	976	224	976	-	-	-	-	-	-	-	-	-
Det, 10th Sig Co	1	5	-	1	-	1 (1-2 1/2 T)	4	-	-	-	-	-	-
	237	1,428	-	-	-	237	1,428	-	-	-	-	-	-
Hq, 10th Div, Arty, Ln	2	-	2	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
37th FA Bn (105mm How)	36	371	16	221	7	10	7	10	1 (14-2 1/2 T) *34	1 (3-2 1/2 T) 6	-	(1-2 1/2 T) 2	1 (9-2 1/2 T) 18
	18,822	110,050	267	1,508	267	1,508	267	1,508	11,205 61,242	423 2,691	165	991	1,461 8,825
Det, 40th FA Bn (155mm How)	7	178	-	-	-	-	-	-	-	-	-	-	-
	7	217	-	-	-	-	-	-	-	-	-	-	-
Det, 10th AAA & W Bn	7	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
Co "B" 10th Engr C Bn	5	163	1	10	-	-	4	-	6	1 (5-2 1/2 T) 33	-	-	2 (8-2 1/2 T) 90
	5,484	33,251	224	631	168	387	168	387	845 5,290	-	-	-	3,403 22,324
502nd Engr Bn and Shore Regt	7	249	1	7	-	65	-	65	-	-	-	-	6 (6-2 1/2 T) 112
	5,187	45,928	56	244	-	-	-	-	-	-	-	-	5,131 45,684
(USMC) Amph Bn	18 (36 LVT(A))	4599	8	145	-	-	-	-	1 (8-2 1/2 T) *16	-	-	-	1 (3-LVT(A)) 15
315th Amph Bn (Armed)	14 (55 LVT(A))	194	112	488	-	-	-	-	2,309 14,300	-	-	-	4 (13-LVT(A)) 94
(USMC) Amph Bn (Cargo)	11 (60 LVT)	240	112	488	-	-	-	-	-	-	-	-	5,480 (2LVT) 57,916
316th Amph Bn (Cargo)	11 (60 LVT)	240	112	488	-	-	-	-	-	-	-	-	2,660 (3LVT) 28,874
	11,801 179,852	-	-	-	-	-	-	-	-	-	-	-	2,700 (2LVT) 28,916
4408th T Fort Co (A)	5	291	2	65	1	65	1 (2-2 1/2 T) 65	1 (1-2 1/2 T) *96	-	-	-	-	3 (12-LVT) 56
	1,114 6,405	99	387	376	2,171	474	2,856	165	-	-	-	-	1 (7-LVT) 34
3465th T Amph Trk Co	2 (12 LVT(A))	450	1	14	-	-	-	-	-	-	-	-	2 (17-LVT) 54
	3,132 16,832	-	-	-	-	-	-	-	-	-	-	-	2 (17-LVT) 54
3467th T Amph Trk Co	1 (6 LVT(A))	25	1	7	-	-	-	-	-	-	-	-	4,265 (6-2 1/2 T) 42,181
	1,566 10,430	-	-	-	-	-	-	-	-	-	-	-	1,666 20,006
TOTAL: Troops & Equip	263 5,790	84 1,404	46 1,127	50 1,206	7 273	3 56	12 300	13 296	12 266	11 262	13 300	12 300	
	112,472 873,425	11,248 56,580	8,412 43,723	11,149 56,201	23,801 138,648	2,955 24,963	13,885 114,202	12,553 118,349	7,245 69,824	7,264 69,555	7,016 69,501	6,944 68,749	
Extra Supplies:													
Ammo, SA		750		100		100		200		15		10	25
												50	50
Ammo, HE		10,000		1,500		1,500		4,200		450		450	225
												50	50
Rations		11,500		2,000		2,000		2,000		5,250		25	25
												50	50
Water		3,000		500		500		500		1,250		50	15
												5	10
Fuel & Lubricants		13,000		2,250		2,250		2,250		3,750		130	1,000
												70	100
Engineer		2,500		500		500		500		1,000		-	-
												-	-
Quartermaster		1,300		200		200		200		700		-	-
												-	-
Signal		1,000		100		100		100		700		-	-
												-	-
Pyrotechnics		80		10		10		10		30		-	-
												-	-
TOTAL: Extra Supplies		43,130		7,160		7,160		17,080		670		1,635	1,294
												176	265
												265	265
GRAND TOTALS:		263 5,790	84 1,404	46 1,127	50 1,206	7 273	3 56	12 300	13 296	12 266	11 262	13 300	12 300
		112,472 873,425	11,248 56,580	8,412 43,723	11,149 56,201	23,801 138,648	2,955 24,963	13,885 114,202	12,553 118,349	7,245 69,824	7,264 69,555	7,016 69,501	6,944 68,749

\*Drivers and/or Ships Platoon to go aboard prior to unloading

SUBMITTED: 1 Jan 1951  
BY: F. F. Roberts  
Maj. F. F. Roberts,  
Unit Loading Officer

APPROVED: 3 Jan 1951  
BY: R. W. Adams  
Col. R. W. Adams,  
Commanding

task organization into embarkation groups. The division commander issues his embarkation plan, which includes the shipping allocation and the composition of embarkation groups. The allocation of shipping and the composition of embarkation groups may be shown in the form of a chart (table I).

## **8. Embarkation Group Planning**

*a.* The embarkation group commander, after consultation with the transport division commander or other corresponding naval commander, organizes his embarkation teams and assigns each team to a single vessel. This is included in his embarkation plan, which may take the form of a chart (table II). The nucleus of the embarkation team is normally the battalion landing team (BLT). However, any element or combination of elements of the landing force which is assigned to one vessel is known as an embarkation team. Primary considerations in the designation of embarkation teams are the plan for landing, the capacities of assigned vessels, and the dispersal of forces throughout the group in such a manner that the loss of a ship will not destroy the tactical efficiency of the task unit.

*b.* The formation of corps and service troops into embarkation groups is determined by the location and size of the elements to be embarked. Embarkation planning considerations of separate embarkation groups closely parallel those of the division.

## **9. Preparation of Detailed Loading Plans for Each Ship**

The embarkation team should begin embarkation planning upon receipt of information from higher authority. Detailed planning begins as soon as team composition and vessel assignment are known. The priority for unloading must be determined before the loading plan can be prepared. The following should be included in embarkation plans of the team:

- a.* Designation of unit loading officer (par. 17).
- b.* Preparation and submission of basic loading forms by elements of the embarkation team (pars. 51-55).
- c.* Preparation of detailed loading plans (pars. 51-55).
- d.* Designation of billeting, mess, and guard officers.
- e.* Designation and movement of advance party to the embarkation point.
- f.* Establishment of embarkation control office in the embarkation area.
- g.* Movement of supplies and equipment to embarkation point.
- h.* Security of cargo in the dock area.
- i.* Movement of personnel to embarkation point for embarkation.

## 10. Planning the Loading of a Ship

(pars. 39 and 51-55)

In preparing the loading plan of a ship, the unit loading officer accomplishes the following steps in the order listed :

- a.* Consolidates the unit personnel and tonnage tables.
- b.* Consolidates the cargo and loading analysis forms.
- c.* Consolidates the vehicle summary and priority tables.
- d.* Obtains debarkation priorities from commanding officer of troops.
- e.* Cuts vehicle templates and marks with priority number, organization, and type of vehicles.
- f.* Lays out stowage diagrams in proper horizontal and vertical order.
- g.* Plans stowage in vehicles to be landed in the scheduled waves.
- h.* Plans stowage of cargo to be unloaded early for the floating dumps (if used) (critical items of supply, normally ammunition, fuels, medical supplies, etc., discharged into amphibious craft or vehicles to be available on call for immediate dispatch to the beach).
- i.* Plans stowage of ammunition and rations to be issued to troops before debarkation (D-1 (day before D-day) cargo) .
- j.* Plans stowage of remaining vehicles, taking into account priority and availability of landing craft, mechanized (LCM), where necessary.
- k.* Prepares and maintains a time study through the remaining steps (*l-n* below) in order to balance the unloading time of the hatches as nearly as possible.
- l.* Plans stowage of general cargo; completes and manifests the stowage diagrams.
- m.* Completes the "where stowed" columns of the cargo and loading analysis table and the vehicle summary and priority table.
- n.* Completes and checks the time study.
- o.* Prepares profile loading plan and balances it against the unit personnel and tonnage table.
- p.* Prepares the consolidated embarkation and tonnage table.
- q.* Prepares the consolidated vehicle table.
- r.* Assembles the loading plan in the following order:
  - (1) Consolidated embarkation and tonnage table.
  - (2) Consolidated unit personnel and tonnage table.
  - (3) Consolidated vehicle summary and priority table.
  - (4) Consolidated cargo and loading analysis table.
  - (5) Stowage diagrams.
  - (6) Profile loading diagram (omit for landing ships).
  - (7) Consolidated vehicle table.

## CHAPTER 3

### ORGANIZATION FOR EMBARKATION

---

#### 11. General

While planning and executing an embarkation, troop officers will be constantly working and associating with other members of the attack force. It is extremely important to smooth functioning of the movement that troop officers understand the organization of the various elements concerned.

#### 12. Landing Force

*a. Embarkation Team.* Any element or combination of elements of the landing force assigned to one vessel is known as an embarkation team.

*b. Embarkation Group.* The embarkation group is the basic organization for embarking landing force troops, equipment, and supplies. The group is composed of the troops and cargo to be embarked in a single transport division or similar naval task organization. An infantry regimental combat team (RCT) usually forms the nucleus of an embarkation group, but other types of embarkation groups may be formed around division artillery units, special battalions, division service and supply units, or a combination of these units.

*c. Division.* This is a standard infantry division.

*d. Division (Reinforced).* This organization is a standard infantry division reinforced by extra elements to perform a specific task.

#### 13. Naval Organizations

*a. Assault Transports and Cargo Ships (fig. 1).*

- (1) The organization of an attack transport, personnel (APA), or an attack transport, cargo (AKA), is similar to that of other major Navy vessels. The ship is divided into functional departments with an officer detailed as the department head responsible for each. Department heads operate directly under the commanding officer and the executive officer. Duties of department heads are set forth in Navy regulations, but their titles are usually self-descriptive.

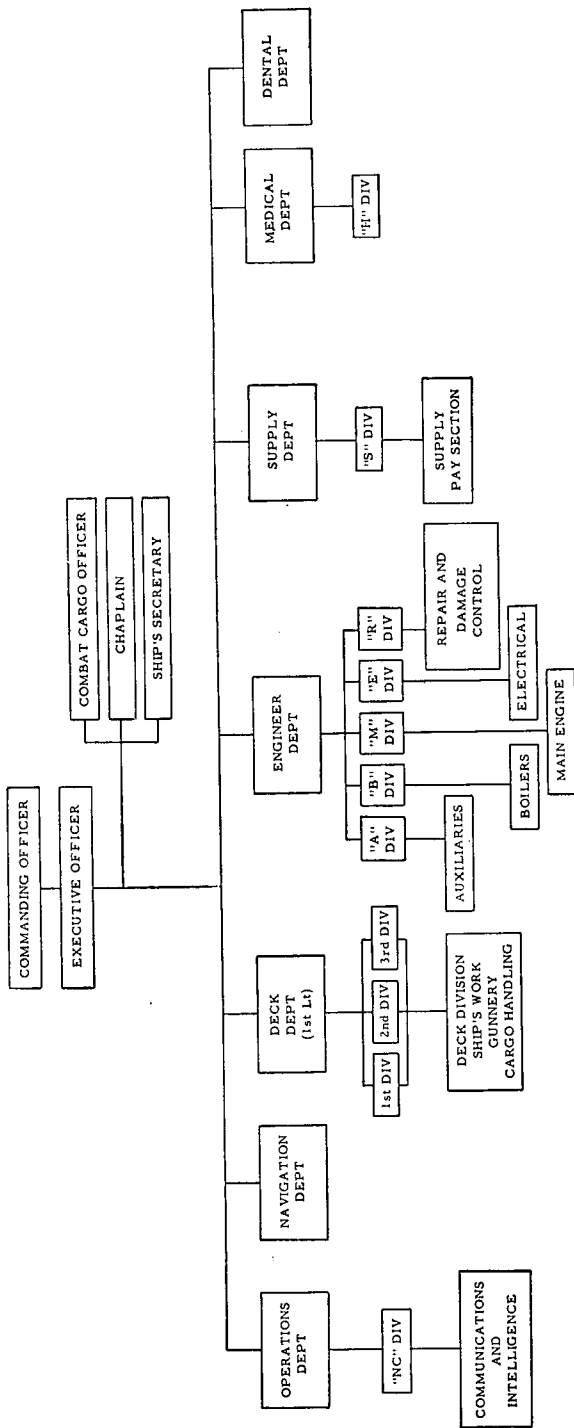


Figure 1. Typical ship organization, amphibious type vessels.

- (2) Departments are, in turn, divided into divisions, and each division is responsible for some particular phase of the ship's activity. The officer in charge of each division is called the division officer.
- (3) In addition, most ship's officers stand watches within their respective departments and are called watch officers.
- (4) The ship's combat cargo officer and the chaplain are not members of a department, but are responsible directly to the executive officer and the captain.

*b. Transport Division (TransDiv).*

- (1) A transport division is a naval organization intended to lift an embarkation group of about regimental combat team size. The transport division may vary considerably in size depending upon the task, but normally consists of four or five APA's and one or two AKA's. Landing ships, vehicle (LSV), or LSD may be assigned to any transport division for a particular operation.
- (2) In a landing force of corps size, corps troops may be assigned a separate transport division (fig. 2).
- (3) In the task organizations for amphibious operations, transport divisions become transport units.

*c. Transport Squadron (TransRon).*

- (1) A transport squadron consists of two or more transport divisions.
- (2) In the task organizations for amphibious operations, transport squadrons become transport elements.

*d. Transport Group (TransGp).* A transport group is the naval amphibious force necessary to lift and land a reinforced infantry division. The group consists of transport squadrons and tractor squadrons which contain the necessary vessels and landing craft to perform the mission. A separate transport division is included to lift corps troops (fig. 2).

*e. Tractor Squadron.*

- (1) The landing ships of a transport group are organized into a tractor squadron containing LST; LSM; landing ship, infantry (LSI); and landing ship, utility (LSU) divisions as necessary. In the task organization for amphibious operations, tractor squadrons become tractor groups.
- (2) Because of speed considerations, the tractor squadron may proceed to the objective as a separate convoy. However, upon arrival at the objective, it reverts to the command of the designated transport group commander.

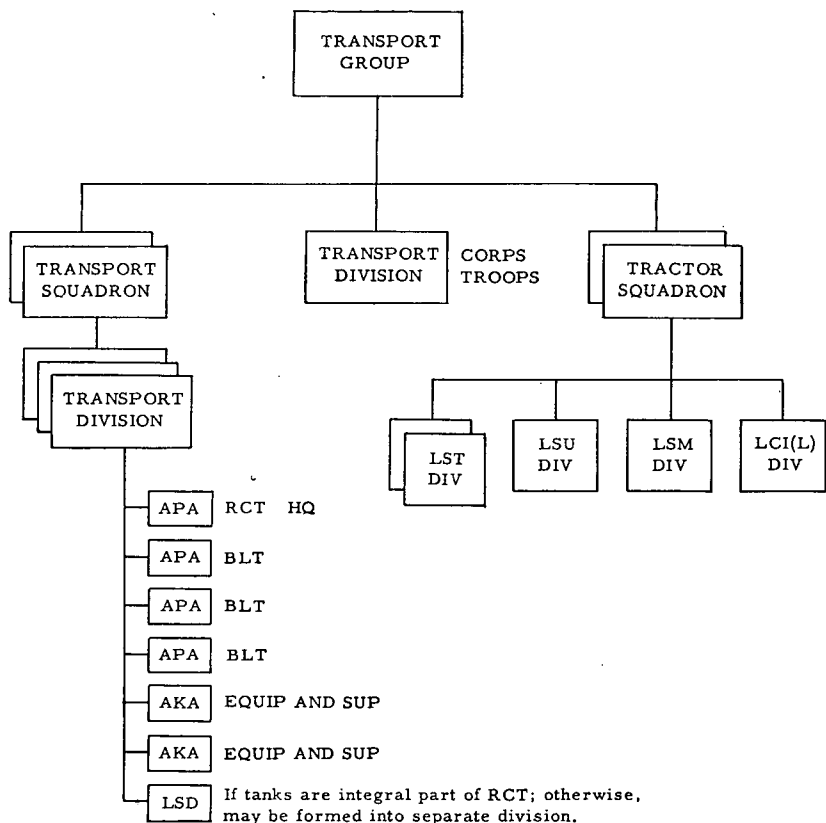


Figure 2. Typical transport group organization.

## 14. Other Organizations

The following types of organization may be employed in pertinent situations.

*a. Tractor Group.* When two or more transport groups are operating together, the tractor squadrons may be organized into a single landing ship command called a tractor group.

*b. Landing Ship Squadron or Flotilla.* Landing ships are organized into type commands for administrative purposes. Such commands have no function in an amphibious operation, although certain type commanders may be assigned to command the tractor squadrons or tractor group. An LST or LSM squadron usually contains 18 ships organized into 3 divisions of 6 ships each.

*c. Landing Ship Division.* A landing ship division is both an administrative and a tactical organization. As an administrative organization, it normally consists of a group of six ships made up of any one of the following types: LST, LSM, LSU, or landing ship, infan-

try (large) (LSIL). This number may be increased or decreased to meet the needs of a particular operation.

*d. Boat Team.* A boat team consists of landing force personnel, with their equipment, loaded in a single landing craft or amphibious vehicle for the assault landing.

*e. Boat Group.* A boat group is the basic naval task organization of landing craft for the ship-to-shore movement. The boat group is a flexible organization capable of landing a battalion landing team or similar organization (30 to 35 landing craft).

## CHAPTER 4

### LOADING OFFICERS

#### 15. General

Commanding officers of all units or organizations within an attack force have officers to advise them on matters pertaining to embarkation and debarkation, to coordinate the activities of the units, and to maintain liaison with their counterparts in the other services involved in the amphibious operation. These officers operate as special staff officers and are designated as follows:

*a. Army—Unit Loading Officer.*

- (1) See paragraph 17 for explanation of duties.
- (2) Training by army units is conducted at division level for unit loading officers of subordinate units.

*b. Navy—Combat Cargo Officer.*

- (1) See paragraph 18 for duties of the combat cargo officer.
- (2) These officers are designated as combat cargo officers of the unit to which they are assigned; for example, transport division combat cargo officer (par. 16). However, individual ship officers are designated merely combat cargo officers.
- (3) Combat cargo officers correspond to the unit loading officers (Army) except that they are employed in the naval chain of command.

#### 16. Corresponding Levels of Loading Officers

The following diagram shows the corresponding levels of loading officers and the units to which they are assigned.

Army (landing force)	Navy (amphibious force)
Unit loading officer—embarkation team (battalion landing team).	Combat cargo officer—ship.
Staff loading officer—embarkation group (regimental combat team).	Transport division combat cargo officer—transport division (transport unit).
Division transportation officer—infantry division.	Transport squadron combat cargo officer—transport squadron (transport element).
Division transportation officer—infantry division, reinforced.	Group combat cargo officer—transport group.

## 17. Unit Loading Officer

### *a. General.*

- (1) The unit loading officer will normally be an officer of the senior organization within the embarkation team. He must have been trained in a ship loading school. His assignment as unit loading officer will be temporary but, upon appointment, he will be relieved of all other duties. His principal duties as unit loading officer follow:
  - (a) Acts as direct representative of the commanding officer of troops of the embarkation team in all matters pertaining to loading.
  - (b) Effects liaison between the commanding officer of the ship and the commanding officer of troops.
  - (c) Prepares detailed loading plans for the ship to which the embarkation team is assigned (assisted by the ship's combat cargo officer).
  - (d) Coordinates and supervises the execution of the loading plan.
  - (e) Assists in the execution of the unloading plan.
- (2) In addition to being familiar with the course of instruction presented in transport loading schools (par. 15a), the unit loading officer should know the procedures for movement by rail, air, and other modes of transportation.
- (3) Early in the planning phase, an officer assistant and several enlisted assistants (all having attended a ship loading school) should be assigned to assist the unit loading officer. Necessary office space near that of the commanding officer of troops should also be assigned at this time.
- (4) The commanding officer of troops is responsible for the preparation of loading plans. As he deems desirable, he delegates portions of the detailed planning and supervision of loading to the unit loading officer.

### *b. Specific Duties.*

- (1) *The planning phase.* During the planning phase, the unit loading officer performs the following duties:
  - (a) Represents the commanding officer of troops in all matters pertaining to loading.
  - (b) Effects liaison, through the ship's combat cargo officer, between ship personnel and troop personnel.
  - (c) Obtains a ship's loading characteristics pamphlet from the division transportation officer. When the ship combat cargo officer arrives, this pamphlet is checked for accuracy.
  - (d) In the absence of the ship's combat cargo officer, prepares

the tentative loading plan. When the ship combat cargo officer is available, the two prepare the plan together.

- (e) Inspects the ship to be loaded when it arrives in the embarkation area.
- (f) Maintains contact, either personally or through a representative, with the embarkation team executive at the embarkation control office after the establishment of that office.
- (g) Coordinates the preparation (clearing and construction) of the embarkation point, cargo assembly areas, and vehicle staging areas with the agency doing the work.
- (h) Familiarizes himself with the troop administrative plan, the tactical plan, and all appropriate standing operating procedures.
- (i) Holds conferences with all units of the embarkation team regarding the preparation of loading forms.
- (j) Checks all loading forms submitted for accuracy; consolidates and completes the remaining forms (pars. 51-55); and then submits the loading plan to the embarkation team commander and the commanding officer of the ship for approval.
- (k) Supervises and coordinates the preparation of supplies and equipment for loading in accordance with standing operating procedures.
- (l) Coordinates and assists in scheduling the movement of equipment and supplies to the embarkation point.
- (m) Arranges for supplies and equipment to be placed in the embarkation area in accordance with the plans for stowing cargo on the beach or wharf.
- (n) Arranges with the combat cargo officer for the stowage of initial combat equipment and for the special stowage of equipment and supplies to be used in floating dumps.
- (o) Arranges for adequate mechanical loading devices at the beach and wharf area, as furnished by designated Army units.
- (p) Coordinates the protection of supplies and equipment at the embarkation point with the embarkation team executive officer.
- (q) Insures that the officer in charge of the ship's platoon and the officer in charge of the wharf or beach hatch details have stowage plans for the ship and are familiar with the loading plan.
- (r) Insures that the ship's platoon and wharf or beach hatch details are familiar with the plans for loading the hatches to which they are assigned (par. 33b(1)).

- (s) Arranges for embarkation of the advance detail which is, if possible, to be aboard ship at least 24 hours before loading.
  - (t) Makes periodic reports of his actions and progress during the planning phase to the embarkation team commander and the embarkation group unit loading officer.
  - (u) Advises appropriate signal officer of the communications requirements between staging and loading area for effective operations.
  - (v) Arranges for adequate lighting and equipment if there is to be night loading.
  - (w) Insures that all equipment and supplies are marked in accordance with standing operating procedures.
  - (x) Distributes copies of the approved loading plans to all interested troop personnel (hatch officers, noncommissioned officers, etc.).
  - (y) Ascertains that the labor needed for lashing, shoring, and chocking has been provided by the embarking troop unit, or has been arranged for.
  - (z) Arranges with the appropriate supply agency for delivery of lashing, shoring, and chocking materials to the embarkation area.
- (2) *The embarkation and rehearsal phase.* During the embarkation and rehearsal phase, the unit loading officer performs the following duties:
- (a) As direct representative of the commanding officer of troops, closely supervises loading to insure that it is proceeding in accordance with the approved loading plan.
  - (b) Continues liaison activities ((1) (b) above).
  - (c) Insures that mechanical loading devices are kept in operating condition.
  - (d) Insures that any changes he wishes to initiate in the approved loading plan have the approval of the commanding officer of the ship and the embarkation team commander.
  - (e) Closely supervises the activities of the beach or wharf detail.
  - (f) Insures that a hatch list and a time study are being maintained at each hatch section.
  - (g) Insures, by frequent inspection, that shoring, chocking, and lashing of supplies and equipment are in accordance with existing instructions. However, actual operation is accomplished under the supervision of the ship's first lieutenant.

- (h) Maintains a record of all approved changes in the tentative loading plan. If time is available after completion of loading, indicates changes in the plan and incorporates them in the final loading plan. Distributes copies of final loading plan and checks functioning of his unloading plan and communications during the rehearsal.
- (3) *Movement to objective phase.* During this phase, the unit loading officer performs the following duties:
- (a) Prepares the final loading plan if time was not available during the embarkation and rehearsal phases ((2) (h) above).
  - (b) If final loading plan was completed en route and not during the embarkation and rehearsal phases, distributes copies at the objective area.
  - (c) Inspects cargo daily to insure that lashing, shoring, and chocking remain intact. However, responsibility for safety and security of cargo in the holds rests with the ship's first lieutenant and the deck department.
  - (d) Continues liaison activities ((1) (b) above).
  - (e) Instructs all personnel concerned with unloading in their duties and in lessons learned during rehearsal. If necessary, changes the unloading plan in accordance with these lessons.
  - (f) Insures that all unloading equipment is in working order before arrival at the objective.
  - (g) On D-1 day, insures by inspection that all vehicles are in running condition, that the combat load is secure, and that the waterproofing is in good condition.
  - (h) Makes rations and ammunition available for distribution to troops on D-1 day.
  - (i) Insures that the ship's platoon is on station when needed to prepare the ship for unloading.
  - (j) Insures that hatch checkers are on station before unloading commences.
- (4) *Landing and assault phase.* During the landing and assault phase, the unit loading officer performs the following duties:
- (a) Insures that hatch checkers keep a list and a time study of all equipment and supplies unloaded.
  - (b) When required, advises the ship combat cargo officer of the unloading percentage reports.
  - (c) Before leaving the ship, insures that all troop cargo and living compartments are thoroughly policed.

- (d) At the completion of unloading, insures by personal inspection that cargo and troop compartments are clear of all troop equipment and supplies.
- (e) Insures that members of the ship's platoon know that they are to report to the shore party commander upon arriving ashore.
- (f) Reports from the ship to the embarkation team commander when the ship is completely unloaded. Reports ashore as directed by the embarkation team commander.

## **18. Combat Cargo Officer**

*a.* The member of the Navy staff corresponding to the unit loading officer is the combat cargo officer. Each APA and AKA of the amphibious forces has in its regular complement a Marine Corps officer assigned duty as ship combat cargo officer. Officers assigned this duty are trained in ship loading schools.

*b.* The ship combat cargo officer may be the commanding officer of the marine detachment, if such a detachment is regularly assigned to the ship.

*c.* The duties of the ship combat cargo officer, as promulgated in USF 66, are to advise and assist the commanding officer of the ship in the following:

- (1) All matters relating to loading and unloading troop cargo and to embarking, billeting, and messing troops.
- (2) The preparation, in conjunction with the ship's first lieutenant, of detailed plans for loading and stowing cargo, for unloading cargo, and for billeting and messing troops.
- (3) Acting as liaison officer with the commanding officer of troops during the planning and operational phases of an amphibious operation.
- (4) Advising the unit loading officer in the preparation of detailed loading, stowage, and unloading plans.
- (5) The preparation, correction, maintenance, and distribution of the transport characteristics pamphlet.

*d.* During the embarkation and rehearsal phase, the combat cargo officer performs the following duties:

- (1) Maintains continuous liaison with the commanding officer of troops through the unit loading officer.
- (2) Maintains a progress report on the assembly of cargo on shore in order that the loading of all hatches may progress efficiently and without delay.
- (3) Insures that loading and stowage plans are being followed.

- (4) Ascertains that all items of cargo are properly marked for stowage, location, and priority of discharge. The actual marking is the responsibility of the unit loading officer.
  - (5) Keeps the ship's commanding officer and heads of departments informed of the progress of loading and embarkation.
- e.* During unloading, his duties are as follows:
- (1) Makes frequent inspections to insure that unloading is proceeding according to the plan or any duly authorized changes in the plan.
  - (2) Insures that any items of cargo selected on priority request are expeditiously located and unloaded.
  - (3) Insures that unloading experience tables are kept.
  - (4) Maintains data from which the periodic unloading progress reports are made.
  - (5) Keeps a record of boat requirements by number and type necessary to complete the unloading.

## **19. Essential Knowledge Common to Unit Loading Officers and Combat Cargo Officers**

In addition to being able to perform their respective duties as listed in paragraphs 17 and 18, unit loading officers and ship combat cargo officers should have a sound knowledge of the following subjects:

- a.* Naval customs and terminology.
- b.* Standard ship organization.
- c.* Tables of organizations, tables of allowances, and tables of equipment for Army units.
- d.* The amphibious force organization.
- e.* The landing force organization.
- f.* Classification of supplies and equipment.
- g.* Standing operating procedures for the preparation of supplies and equipment for loading, including waterproofing, packing, marking, and crating.
- h.* Characteristics of amphibious force vessels.
- i.* Preparation of a ship's loading characteristics pamphlet.

## **20. Staff Loading Officers for the Landing Force**

Unit loading officer functions are supervised by the transportation officer of the next higher command. Transportation Corps personnel available through a port or Transportation Corps marine units assist in these functions. Duties for landing force loading officers as promulgated in USF 63 are as follows.

*a. Embarkation Group Staff Loading Officer.* The embarkation group staff loading officer performs the following duties:

- (1) Makes recommendations for allocation of assigned shipping within the embarkation group.
- (2) Coordinates all loading activities of the embarkation group.
- (3) Assists in preparing loading plans for all vessels assigned to lift the embarkation group.

*b. Division Transportation Officer.* Duties of the division transportation officer include the following:

- (1) Heads loading section on special staff of division commander.
- (2) Makes recommendations for employment of assigned shipping.
- (3) Coordinates and supervises all loading activities within the division.
- (4) Supervises training of staff and unit loading officers within the division.
- (5) Maintains current tonnage tables of division equipment and supplies.
- (6) Maintains complete and current file of transport characteristics pamphlets.
- (7) Advises staff and unit loading officers of subordinate units in preparation of loading plans for all vessels assigned to the division.

*c. Landing Force Transportation Officer.* Duties of the landing force transportation officer are listed below:

- (1) Heads loading section on staff of the landing force commander.
- (2) Makes recommendations for the employment of assigned shipping.
- (3) Coordinates all loading activities of the landing force.
- (4) Maintains complete and current file of ship's loading characteristics pamphlet.

## **21. Staff Combat Cargo Officer for the Naval Forces**

The following duties for amphibious force combat cargo officers have been promulgated in USF 66:

*a. Transport Division Combat Cargo Officer.*

- (1) A transport division combat cargo officer is assigned to the staff of each transport division commander. Principal duties of the combat cargo officer are as follows:
  - (a) Assists and advises the transport division commander in all matters concerning loading, embarkation, stowage, and unloading of ships of the division.

- (b) Assists in the preparation of loading and stowage plans of ships of the division.
  - (c) Coordinates the activities of the ship combat cargo officers.
  - (d) Acts as liaison officer between his division commander and the commanders of the landing force embarkation groups.
  - (e) Assembles loading and stowage plans of ships of the transport division.
- (2) In addition, the transport division combat cargo officer, maintains statistical records of the cargo handling characteristics and performance of the ships of his division so that he may intelligently advise in the allocation of troop units and cargo. In addition, he maintains a file of ship's loading characteristic pamphlets of all amphibious ships and transports, troop ships, and cargo ships, in order that he may advise on capabilities of these ships if assigned to his division.
  - (3) During loading, embarkation, and unloading, the transport division combat cargo officer compiles periodic progress reports for presentation to the division commander and for transmission to higher authority, as required. When selected items are requested by the landing force after the initial assault, the transport division combat cargo officer may be required to advise or to designate the source from which such items may be most quickly and easily obtained.
- b. *Transport Squadron Combat Cargo Officer.*
- (1) A transport squadron combat cargo officer is assigned to the staff of each transport squadron commander. Principal duties of the transport squadron combat cargo officer are as follows:
    - (a) To assist and advise the transport squadron commander in all matters concerning loading, embarkation, stowage, and unloading of ships of the transport squadron.
    - (b) To coordinate activities of the transport division combat cargo officers.
    - (c) To act as liaison officer between the transport squadron commander and the landing force division commander.
    - (d) To supervise, insofar as practicable, the loading of ships of the landing craft and landing ship squadron or squadrons assigned to unload over the beaches assigned to the transport squadron. If he cannot directly supervise loading of these ships, he should obtain their loading plans so that he may advise in their orderly discharge in accord-

ance with the approved plan or as requested upon arrival at the objective.

- (e) To assemble the loading plans of the ships of the transport squadron.
- (f) To keep up-to-date records of the progress of loading, embarkation, and unloading, and compile such reports as may be periodically required by higher authority.
- (2) In addition to keeping files of the ships of his own squadron, the transport squadron combat cargo officer will maintain the most complete file practicable of all amphibious ships, or types or classes of ships that may be assigned amphibious duties, concerning their cargo-handling and stowage characteristics and their performance records under all operating conditions.

*c. Amphibious Group Combat Cargo Officer.*

- (1) A group combat cargo officer is assigned to the staff of each amphibious group commander. In general, duties of the group combat cargo officer are similar to those of the transport squadron combat cargo officer. However, the group combat cargo officer is more concerned with supervising allocation and loading of assault shipping, especially those ships of the landing craft squadrons and others assigned to transport and unload corps and reserve troops and advance echelons of the garrison forces.
- (2) In addition, the group combat cargo officer should have complete knowledge of the composition and the schedules of resupply and follow-up echelons and the cargo loaded in each ship, as well as of each ship's capabilities for self-unloading.

## **CHAPTER 5**

### **LOADING AND STORAGE**

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#### **Section I. PREPARING SUPPLIES AND EQUIPMENT FOR LOADING**

#### **22. Responsibility**

Landing force and subordinate commanders are responsible for the preparation, marking, and protection of supplies and equipment so that they may withstand damage from handling and may be easily identified. However, actual marking and preparation of supplies and equipment are accomplished under the supervision of the troop leaders within each organization.

#### **23. Standing Operating Procedures**

*a.* Force, corps, and division issue standing operating procedures for subordinate units. In accordance with instructions in the pertinent standing operating procedure, each echelon prepares the equipment and supplies for which it is responsible.

*b.* Embarkation teams and groups base their plans for the preparation of supplies and equipment upon division standing operating procedures, which may include the following information:

- (1) Standing operating procedure for packing, crating, and marking supplies and equipment.
- (2) Standing operating procedure for preparing wheeled and track-laying equipment for loading.
- (3) Standing operating procedure for pallet loading.

#### **24. Principles of Packing and Crating**

The following are packing and crating principles to be followed for an amphibious operation. See TM 38-230 for additional data.

*a.* Standard uniformity, as far as practicable, in box and crate sizes to facilitate stowage and handling and the preparation of loading plans.

*b.* Separate packing and crating of various types of supplies, insofar as possible—that is, ordnance, signal, motor transport, engineer, general supply, and medical.

c. When applicable and insofar as possible, balanced proportions of items within containers.

d. Adequate blocking, bracing, and cushioning of material in containers to insure protection of fragile items and to prevent damage to containers or contents.

e. As far as practicable, use of waterproof or moisture-vaporproof containers and related materials for items subject to deterioration by moisture.

f. Application of corrosion-preventive materials or other appropriate preservatives when packaging methods are such that a preservative is necessary to insure adequate protection.

## 25. Tactical and Content Markings

(figs. 3 and 4)

a. Tactical markings indicate the owner of unit supplies and equipment.

b. Content markings indicate generally the contents of the container.

c. Vehicles and gas cylinders are marked in accordance with instructions contained in the appropriate standing operating procedure.

d. For detailed data, see SR 746-30-5 and SR 55-720-1.

## 26. Preparation of Vehicles for Loading

Instructions similar to the following for the preparation of vehicles for loading are usually contained in standing operating procedures.

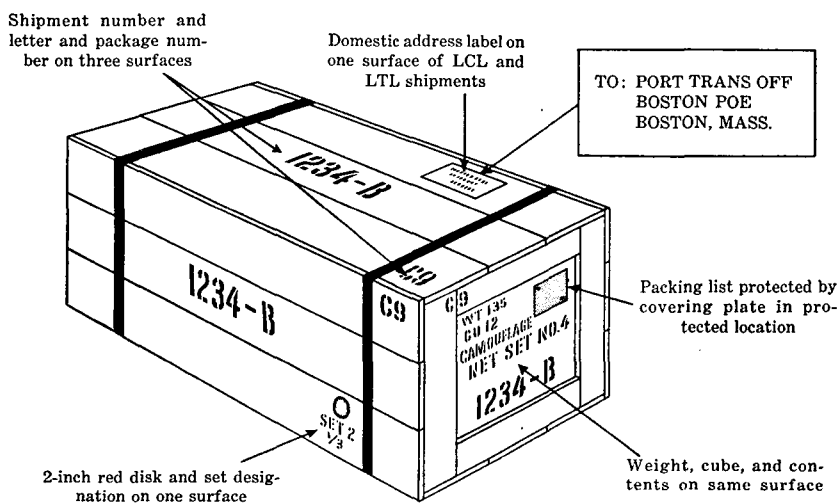


Figure 3. Marking of impedimenta—box.

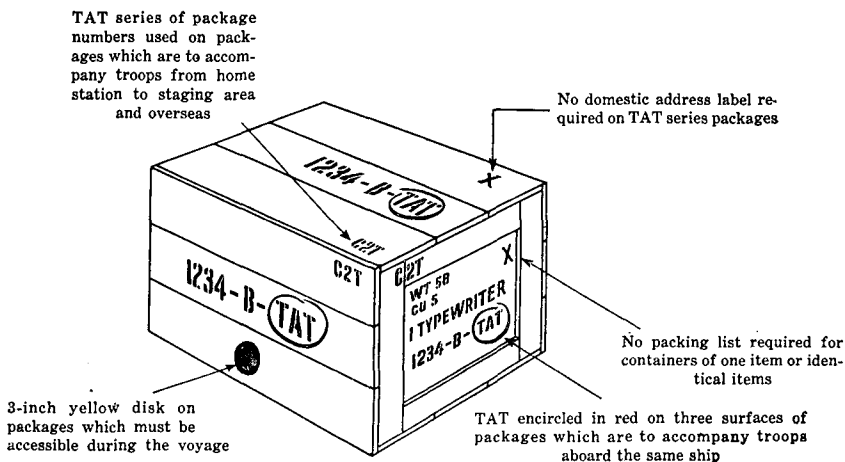


Figure 4. Marking of impedimenta—TAT series box.

a. Preparations prior to loading may include the following:

- (1) All fuel tanks will be filled to three-fourths capacity, and a reserve supply of fuel and lubricants in 5-gallon cans will be secured to the vehicle.
- (2) Fuel, lubrication, circulation, and ignition systems will be checked, and tires will be inflated to the specified loading pressure. Vehicles to be landed in the early part of the landing and assault phase will be waterproofed in accordance with the waterproofing instructions given in references listed in paragraph 27c.
- (3) Bows will be removed, secured together, and attached to the body of the vehicle. Canvas tops will be taken with the vehicle. Decision will be made as to whether tire chains will be used during the landing and necessary instructions issued.
- (4) Combat loads will not exceed the highest point of the vehicles in height, and will be securely cross-lashed.
- (5) Vehicles will be marked on each side and on top to indicate the vessel number, hatch section, platform, unloading priority number, and other information pertinent to the loading of the vehicle. Such marking will be with chalk or other easily removable substance.

b. Vehicles must be loaded in accordance with established vehicle priorities. They will be loaded fore and aft (athwartship stowage will be at an absolute minimum). Batteries will be disconnected, and vehicles will be blocked, chocked, and lashed to prevent shifting during transit. Drivers and assistants will be embarked on the ships with the vehicles.

c. During the voyage, drivers and assistants will be briefed for their participation in the amphibious assault. Vehicles should be inspected frequently to insure proper functioning when unloaded at the objective. Arrangements can be made with the ship combat cargo officer for access to hatches for inspections. These inspections include the following:

- (1) Inspection of vehicles' waterproofing.
- (2) Check for gas and oil leaks.
- (3) Inspection of chocking to see that vehicles are secure.
- (4) Inspection for deterioration due to dampness and sea water.
- (5) Tire inspection.
- (6) Testing of storage batteries for charge and water level.

## 27. Waterproofing

a. Under trained supervision, vehicles can be waterproofed by the driver. Waterproofing is effected by extending the air intake, the exhaust, and the gasoline vent well above the expected water level, and protecting the vulnerable engine parts by asbestos waterproofing compound.

b. For amphibious operations, waterproofing is usually accomplished in three separate steps. The first is effected at the camp area, the second at the embarkation area, and the third aboard the vessel just prior to debarkation.

c. Waterproofing procedure is described in detail in TM 9-2853.

## 28. Palletization

a. *Types of Pallets.* Palletization is the packing and securing of supplies and equipment on platforms (pallets) of varying sizes to facilitate handling during loading and unloading. Pallets may be divided into four general types.

- (1) *Sled pallet* (figs. 5-7). The sled pallet consists of a heavy timbered platform and runners, upon which supplies and equipment may be secured with steel bands. Cables are attached to the runners to permit towing. Sled pallets may be moved through any surf or over any beach which may be crossed by LVT's, amphibious trucks, or other similar landing craft. Pallets may be floated or dragged (if reef permits) over the beach to beach and inland dumps. Rations, water, fuel in 5-gallon containers, and ammunition are the most suitable supplies for pallet loading. Supplies subject to salt water deterioration should be waterproofed by wrapping with waterproofed paper.

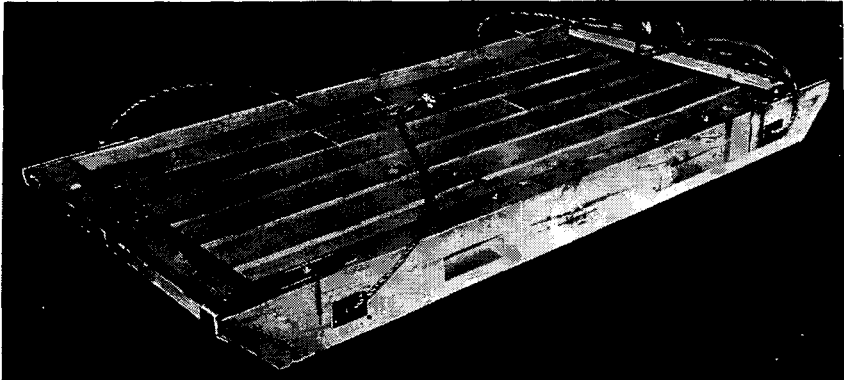


Figure 5. A sled pallet.

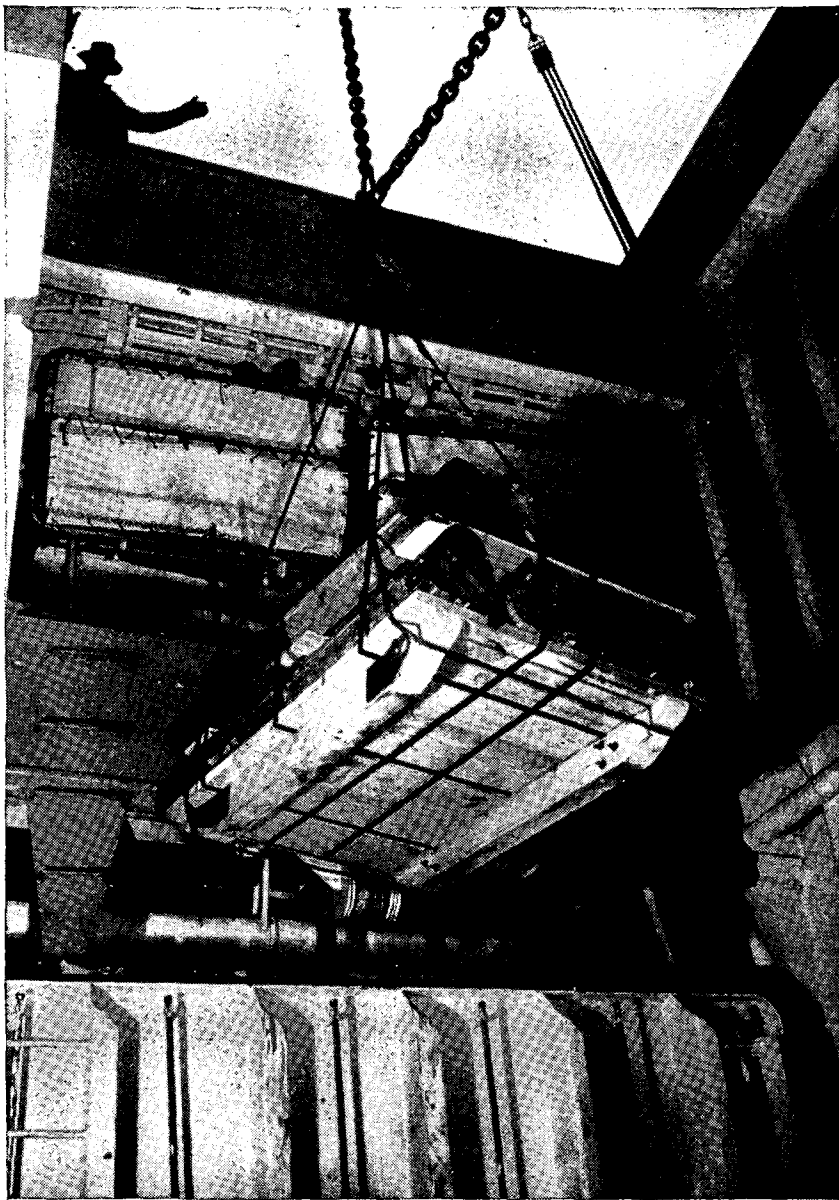
- (a) *Sled pallet specifications.* The standard size for the sled pallet is 6 by 4 feet, with height not to exceed 40 inches over-all. This gives the pallet a loading area of 6 by 4 feet by 32 inches, or approximately 64 cubic feet. Carrying capacity of the pallet is approximately 3,000 pounds; however, 2,000 pounds is considered ideal. Detailed specifications are outlined below:

Platform.....	4 by 6 ft (24 sq ft area by 2 in.)
Runners.....	4 by 6 in. by 6 ft
Weight without load.....	200 lb (approximately)
<b>Loaded height:</b>	
Maximum over-all.....	40 in. (80 cu ft)
Maximum load.....	32 in. (64 cu ft)
Maximum gross weight.....	3,000 lb
Recommended gross weight.....	2,000 lb
Slings or towing cable (2).....	½ in. by 16 ft
Strapping.....	¼ in. by .035 ft
5 lengths, each.....	14.5 ft
2 lengths, each.....	18.5 ft
<hr/>	
Total strapping.....	109.5 ft

- (b) *Material required.* The material required for one pallet is as follows:

**Lumber:**

9 pieces, 2 by 8 in. by 4 ft (decking)	
2 pieces, 4 by 6 in. by 6 ft (runners)	
2 pieces, 2 by 8 in. by 6 ft (reinforcing members)	
Strapping (1½ by .035 in.).....	109.5 ft
Cable, clamp.....	4
Cable, ½ in.....	32 ft
Nails, 20-penny.....	54
Nails, 8-penny.....	50



*Figure 6. Sled pallet being lowered into a hatch.*

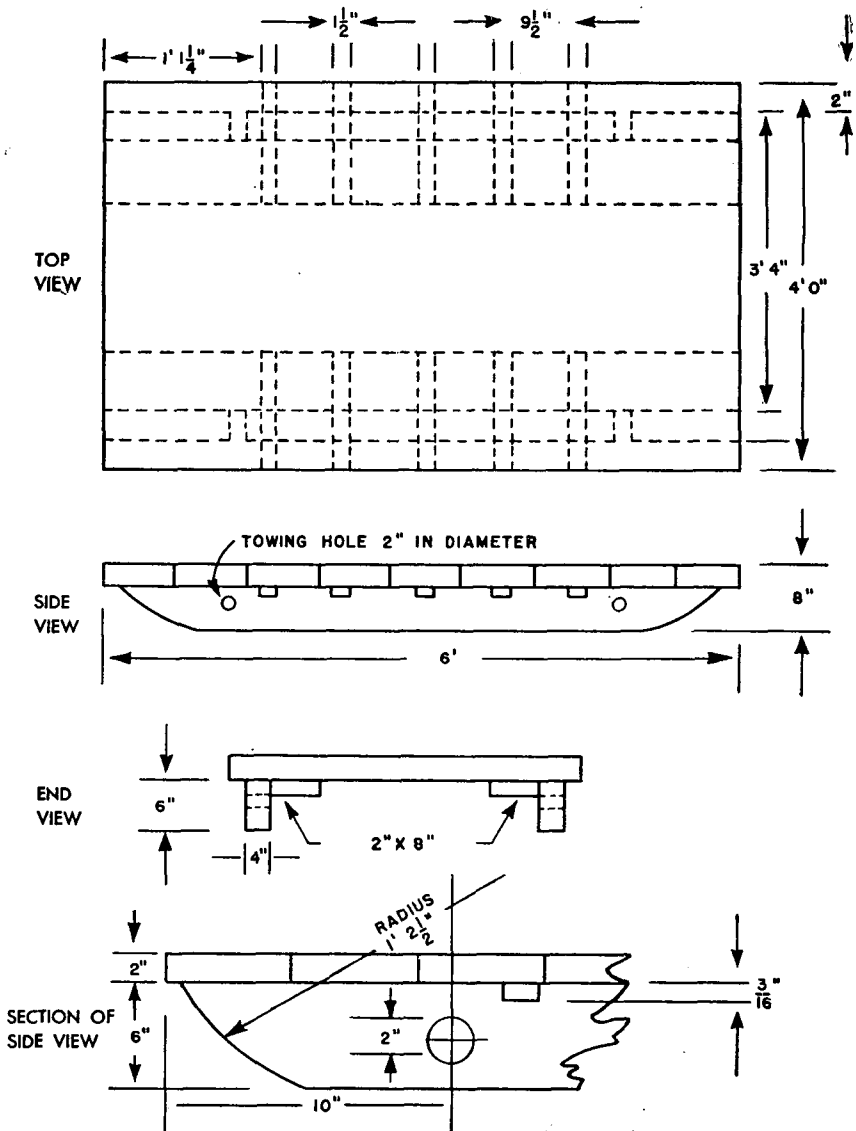


Figure 7. Sled pallet dimensions.

- (2) *Warehouse pallet* (fig. 8). The warehouse pallet is a double-deck 4- by 4-foot wooden platform without runners, used in handling cargo in warehouses and on wharves and for loading and unloading ships. Its use saves many man-hours of labor by reducing the number of handlings; and it permits piling uniform drafts four or five high on the wharf, thus saving considerable wharf space. This type of pallet protects items

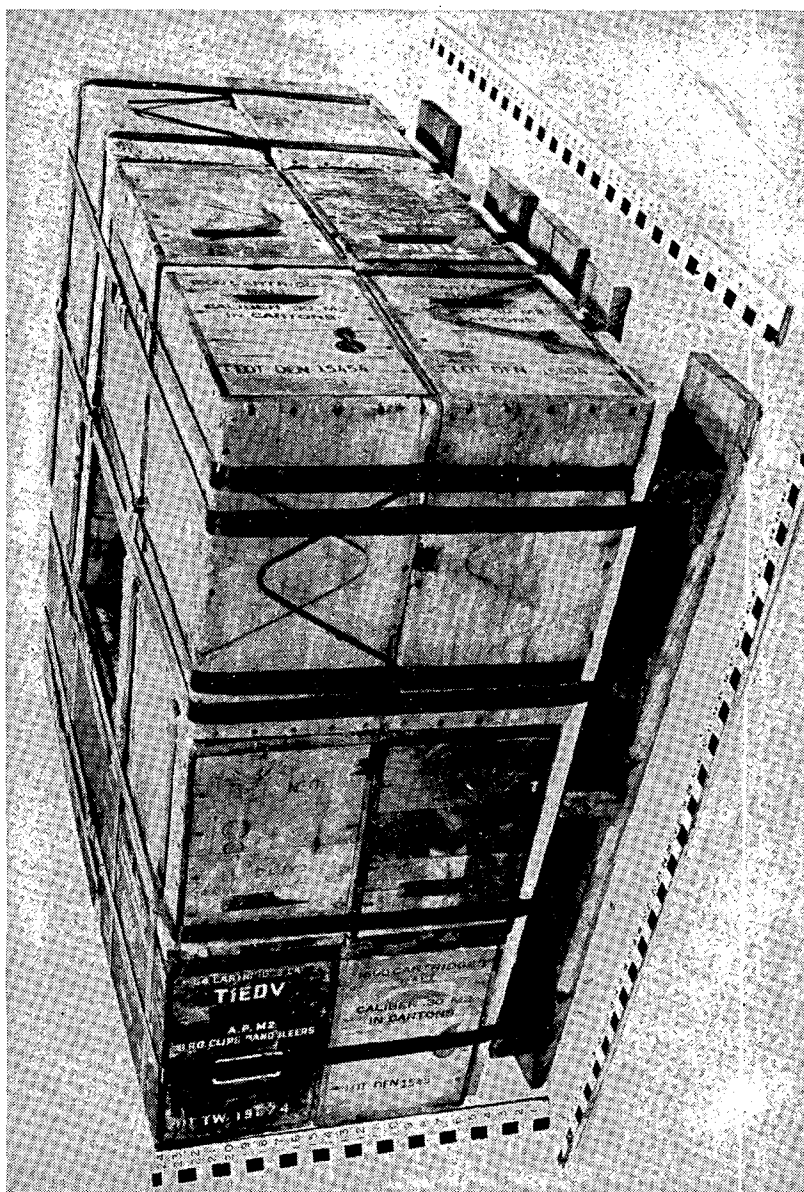


Figure 8. Warehouse pallets.

that may be easily crushed if a cargo net is used. The warehouse pallet may have cargo strapped to it and be used in the landing. Normal load for the pallet is 2,000 pounds.

(3) *Toboggan pallet.* The toboggan pallet shown in figure 9 has been tested and is considered more practical than previous toboggan pallets. An all-metal toboggan pallet has also been designed, and tests have proved it to be more efficient than previous toboggan pallets. Research is continuing on this type of pallet.

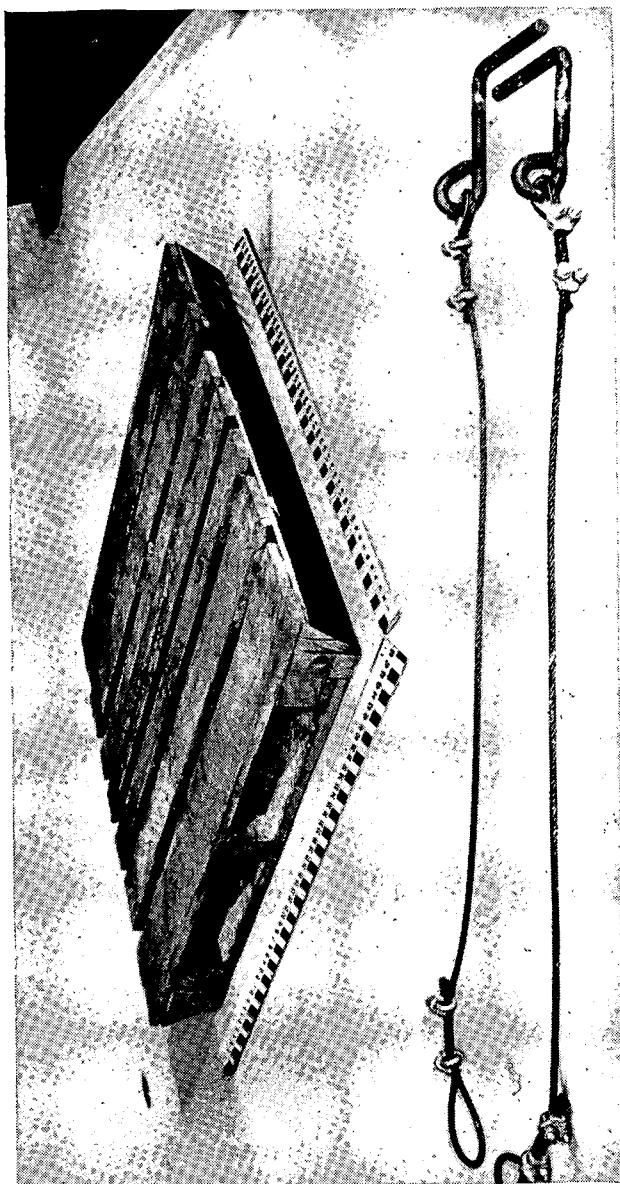
(4) *Floating pallet.* The floating pallet provides a means of moving limited quantities of cargo from ship to shore dumps when normal methods cannot be used. This type of pallet is waterproof and provides flotation for about 2,500 pounds, or 40 cubic feet. It can be towed at sea or on land, singly or in tandem, by any standard landing craft or landing vehicle. The floating pallet is especially useful for protecting items such as medical equipment that may be damaged by salt water.

b. *Pallet Stowage.* In combat loading, the number of pallets loaded on a transport should normally be limited to the number that may be loaded on the square of the hatch. This will usually limit the stowage of pallets to the lower decks of the hatch section. In special cases, however, and when fork lift trucks are available, the number of pallets carried may be increased accordingly. In the absence of fork lift trucks, pallets, two high, may be handled in the hold of a ship by the use of rollers consisting of lengths of iron pipe. Amphibious force instructions recommend that not more than 50 percent of the bulk cargo be palletized.

## **Section II. LOADING PROCEDURES**

### **29. Cargo Priority and Availability**

The ultimate aim of combat loading is to furnish equipment and supplies to the landing force in the order and quantity needed. This is accomplished by loading cargo so that it can be unloaded in the priority required by the tactical and logistical situation ashore. Since it is seldom possible to foresee all logistical requirements that will exist during the first few hours after landing, the ship must have available a stock of nearly all types of supplies required to meet the specific needs of the landing forces as unloading progresses. Further requirements must also be met, such as accessibility of ammunition and rations to be issued to the landing troops on D-1 day, immediate availability of vehicles to accompany the troops in the ship-to-shore movement,



*Figure 9. Tobongan pallet.*

early unloading of floating dump cargo, and other priorities established by administrative and embarkation plans. All these requirements must be taken into account and provided for during loading.

### **30. Considerations in Loading**

*a.* Distribution of loads among vessels is an important consideration during planning and loading. Each type of troop organization, arm, equipment, and supply should be divided among vessels in such a manner that the loss of one or several vessels will not jeopardize successful operation of the entire force. In addition, transport squadron and division commanders will want their ships to complete unloading at about the same time so that the ships of the unit may leave the area together.

*b.* Ships should not be loaded beyond their combat load capacity. Frequently, ships of the assault force will be overloaded in personnel, and when necessity dictates, this must be accepted in lieu of assigning more personnel carriers. However, the quantity of cargo loaded in ships must not be such as to make combat loading impossible. No arbitrary limit may be set for ship capacity, since this depends upon the type of vessel, number and size of vehicles to be embarked, and amount and types of supplies and equipment carried. In general, a combat load for an APA will not exceed 800 short tons; for an AKA, 2,500 short tons. The average load for each is about 700 and 2,000 short tons, respectively.

*c.* Ship stability and safety are naval responsibilities. However, in preparation of the loading plan and during actual loading, unit loading officers will consider items affecting the safety of the ship, such as trim, hazard of fire in the hold, lashing and securing of cargo, and the center of gravity.

*d.* As indicated in paragraph *a* above, each amphibious force commander will want all ships of his command to be unloaded as expeditiously and as nearly at the same time as possible. This keeps the convoy intact and permits it to leave the danger areas at the earliest practicable time. Accordingly, individual ship commanders will desire that each hatch complete unloading at the same time. This must be arranged for in the loading plan. Unit loading officers and ship's combat cargo officers will keep this in mind when assigning personnel to discharge each hatch. Experience tables are maintained by the combat cargo officers to provide information for allotting time in planning.

### 31. Cargo Handling Gear

Cargo handling gear is of the following types:

*a.* Fork lift truck—a wheeled or tracked vehicle with a two-prong lifting device fitted to the front. It is used to move pallets or heavy boxes on a pier and is occasionally used aboard ships.

*b.* Tractor and trailers—warehouse trailers are small, low four-wheel trailers for moving cargo from storage areas to ship's side. These trailers are pulled in tandem by small tractors (fig. 10).

*c.* Cargo nets and slings of various types.

*d.* Booms and winches.

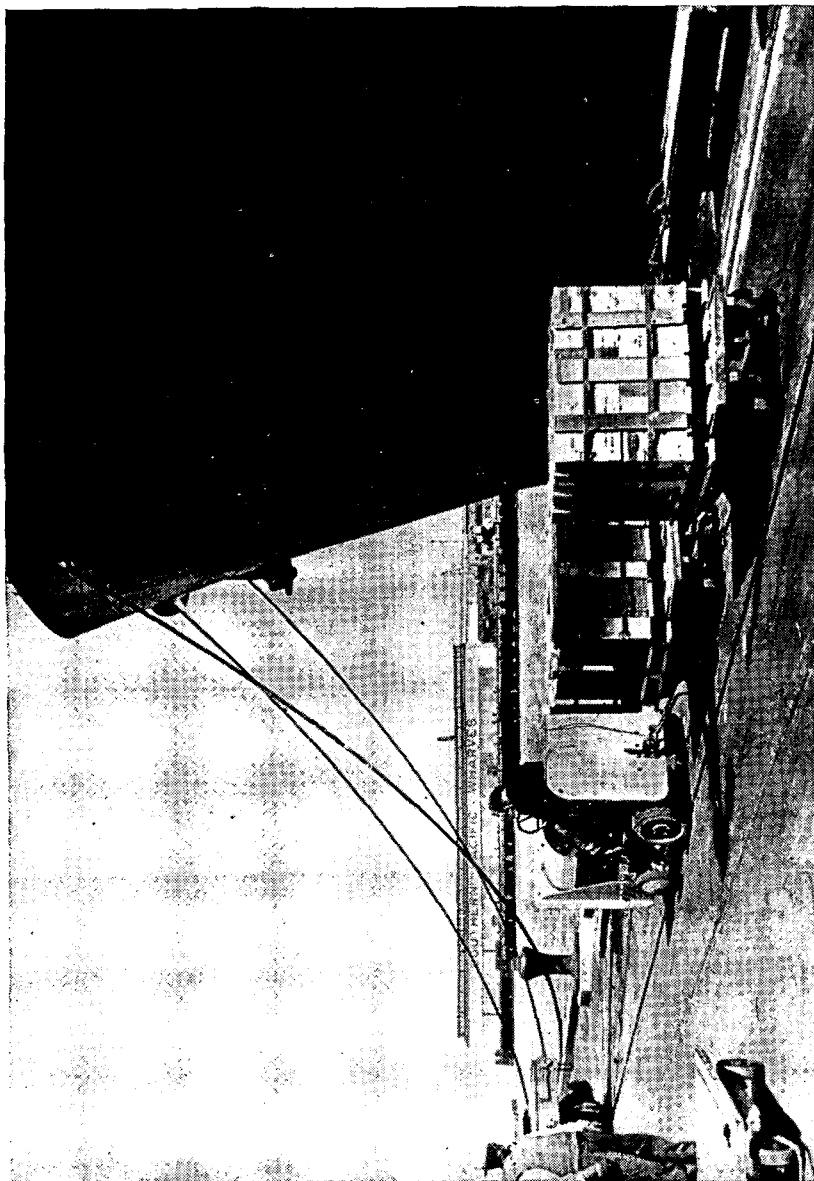
*e.* Gravity rollers—a series of metal rollers mounted between two rigid metal strips, usually in 10-foot sections. Such rollers are used for moving packaged cargo in locations where the rollers can be set up on a slight slope so that the packages will roll down by gravity. An example of such a location would be between the hatch square and wings of a hold in a ship.

*f.* Pipe rollers—pieces of ordinary pipe used in moving pallets or pieces of cargo in a ship by rolling.

### 32. Booms

*a.* Booms are movable steel or wooden spars for loading and unloading the vessel. They are pivoted at the lower end and carry necessary running rigging to move the boom and to lift the cargo. Classification of booms is according to the tested safety limit of the dynamic load each is capable of lifting, as 5-ton, 30-ton, etc. The size and number of booms vary with the ship. Each hatch in a ship must be served by at least one boom, but usually two or four are provided. Booms may be used in one of two ways—

- (1) *Swinging boom rig.* A single boom is used in the swinging boom rig. In unloading, the boom is swung in a position to plumb the hatch. The lift is attached to the hook and lifted clear of the ship. The boom with the attached lift is then swung in a position to plumb the boat receiving the lift, and the lift is lowered into the boat from this position.
- (2) *Midship-outboard rig (yard-and-stay).* Two booms are used in the midship-outboard rig. One (midship) is positioned over the hatch, with the other (outboard) over the side where the lift is to be delivered. The hook is located on a cargo runner connecting the upper ends of the booms, and the two ends of this cargo runner are attached to winches at the foot of each boom. In picking up a lift from the hold, the cargo runner leading to the outboard boom is slack and the cargo



*Figure 10. Warehouse trailers and tractors.*

runner from the inboard boom is taken up, bringing the lift up until it is clear of the ship. The cargo runner to the head of the outboard boom is then taken up as it tightens, moving the lift toward the ship's side. As this occurs, the inboard cargo runner is slackened and the lift swings out until it is held solely by the outboard cargo runner. The outboard cargo runner is then slackened, with the inboard cargo runner left fully slack, and the lift is lowered to the waiting boat. The midship-outboard rig is much faster for unloading than the swinging boom, but has a load limit of 3 to 5 tons. The midship-outboard rig should be used whenever possible, but it must be remembered that rerigging from one system to the other takes an appreciable amount of time, so that shifting to midship-outboard rig must not be undertaken if, after a few lifts, the swinging boom must again be used.

*b.* The boom of greatest capacity on a ship is called the jumbo boom. Where there are several large booms of the same capacity, they are all called jumbo booms. Most APA's have one or two large-capacity booms, usually 30-ton. The remainder of the booms are normally of 5- or 10-ton capacity. AKA's usually have a large-capacity boom, 30- or 40-ton, and several smaller booms, 5- or 10-ton, at each hatch.

### **33. Duties of Personnel During Loading**

*a. Unit Loading and Combat Cargo Officers.* For duties of unit loading and combat cargo officers during loading, see paragraphs 17*b*(2) and 18*d*.

*b. Advance Detail.* In order to carry out the loading plans prepared by the unit loading and combat cargo officers, an advance detail is formed composed of personnel of the embarking troops. Members of the advance detail are under the supervision and control of the unit loading officer. An advance detail is normally composed of the following:

- (1) *Ship's platoon.* The ship's platoon comprises the working detail to load and unload the ship and is under the commanding officer of troops. This platoon normally contains at least 2 officers and 60 enlisted men. Where loading is done by stevedores, the members of the ship's platoon should be stationed in the hatches to observe and check, since they will be required to unload the same cargo at the objective. The number of men necessary to handle the cargo in a hatch varies with the type of cargo and the hatch. The platoon leader and unit loading officer must shift men between hatches as the

work increases or decreases. In a hatch section receiving vehicles, no more than 4 men should be necessary to steady the vehicles and move them into position, but in a hatch receiving ammunition, as many as 2 details of 12 men each may be required. The ship's platoon includes the necessary non-commissioned officers to supervise the hatch details and the hatch section checkers.

- (2) *Billeting officer.* The billeting officer is appointed by the commanding officer of troops to billet the embarked troops. Billeting may either be by boat team or administrative troop unit.
- (3) *Mess officer.* The mess officer reports aboard with the advance detail to coordinate the messing of troops.
- (4) *Guides.* One noncommissioned officer from each unit or detachment to be embarked is assigned to assist the billeting officer. When the troops are embarked, these noncommissioned officers act as guides to conduct the embarking units to their compartments.
- (5) *Assistants to unit loading officer.* One noncommissioned officer, and other assistants as necessary, are assigned from each unit loading cargo in the vessel to assist the unit loading officer in identifying and locating cargo.
- (6) *Ship's guard.* Necessary personnel to establish the ship's guard accompany the advance detail.
- (7) *Cooks and messmen.* Necessary cooks and messmen, as arranged between the mess officer and the ship's supply officer, precede the troops in sufficient time to be ready to feed the troops the first meal after embarkation.

c. *Ship's Personnel.* Ship's personnel perform the following duties during loading:

- (1) *Winchmen and signalmen (hatch tenders).* Winchmen are provided by the ship to operate the ship's gear used in loading and discharging. The signalman at each hatch gives necessary signals to the winchmen.
- (2) *Hatch officer.* This is the commissioned, warrant, or petty officer assigned from ship's personnel to a hatch. The hatch officer supervises loading of his assigned hatch in conformity with the loading plans.
- (3) *Boat crews.* When loading is from a beach, the ship's boats will normally provide the transportation from beach to ship.

d. *Beach or Wharf Personnel.* The embarkation team will be required to move its cargo to the embarkation point and then to the ship. This will necessitate a working party of varying size up to about 100

enlisted men. This party will be obtained from the commanding officer of troops by the unit loading officer.

#### **34. Preparation of Embarkation Point**

As soon as the loading schedule has been published and cargo assembly areas have been assigned, the unit loading officer makes a preliminary survey of the assigned area to determine facilities available and improvements necessary. Such improvements may include the following: Construction of roads into the assigned area or improvement of existing routes, clearing and leveling of cargo assembly and vehicle staging areas, construction of earth finger ramps for landing craft, construction of embarkation control facilities, and establishment of communication facilities.

#### **35. Movement to Embarkation Point**

Division supplies assigned to the vessel are usually moved to the embarkation point and spotted for loading as early as practicable. The term "division supplies" includes all supplies and equipment, except organizational or class II equipment, of the units embarking aboard the vessel. These supplies are delivered to designated areas by division representatives 24 hours to several days in advance of loading as designated by the unit loading officer. The time depends upon whether the embarkation point is in use for the prior embarkation of another unit. Organizational supplies and equipment are usually moved to the embarkation point within 24 hours of the commencement of loading. The type of transportation used is contingent upon the means available and the distance supplies and equipment must be moved. In general, rail movement is the fastest and the most economical method for distances over 50 miles in the case of units with normal amounts of organic transportation. Truck movement is more economical for distance of less than 50 miles. This figure does not apply to highly motorized units, such as artillery.

#### **36. Stowage of Cargo in Embarkation Area**

a. Following completion and approval of loading plans, the unit loading officer should survey the wharf or beach area assigned his embarkation team and divide it into sections corresponding to the hatches and deck levels of the vessel to be loaded. Equipment and supplies to be loaded in the lower decks of the ship will be spotted nearest the shore line or at the most accessible place on the wharf because this cargo must be loaded first. Equipment and supplies will be placed in the section corresponding to the hatch and deck level for which they are destined on the ship.

b. If fork lift trucks or fork lift tractors are used, loose cargo may be stowed on warehouse pallets. Vehicles will be parked in assembly areas by hatch section in reverse order of unloading priority.

c. Movement of supplies and equipment to cargo assembly areas should be completed in sufficient time to permit a detailed inventory of all material assembled before loading.

d. Sufficient officers and enlisted personnel should be assigned to properly stack supplies and equipment in the embarkation area in accordance with the beach or wharf loading plan.

e. When motor transport is employed for moving equipment and supplies to the beach or wharf, each truck will be loaded with cargo destined for one hatch section and deck level on the ship. Drivers will be furnished pile tags showing type of cargo, hatch section, and deck level for each load. Embarkation control office personnel will insure that the cargo is unloaded in the embarkation area in accordance with the beach or wharf loading plan.

### **37. Embarkation Control Office**

An embarkation control office should be established at a location convenient to the embarkation point. It should be well marked, and key personnel necessary to furnish all information required for orderly embarkation of the units composing the embarkation team should be on duty in the embarkation control office at all times. The embarkation team executive officer will normally be the officer in charge of the embarkation control office. A representative of the unit loading officer should be on hand at the control office at all times to give information on loading as requested. The unit loading officer should keep the control office informed of his whereabouts and should remain in the vicinity of this office when he is not required elsewhere.

### **38. Security Posts**

The establishment of security posts in the embarkation area is dictated by a number of factors. Supplies and equipment stored at the embarkation point are extremely susceptible to sabotage or pilferage. Sufficient sentry posts must be established to keep an alert watch over all supplies and equipment to be loaded. Regulations against smoking or open fires near supplies, particularly class III and class V, should be published and rigidly enforced by sentries. To minimize the number of sentry posts required, supplies and equipment should be concentrated in the smallest practicable storage space while awaiting loading.

### 39. Points To Be Observed During Combat Loading

The following are pertinent points to observe during combat loading (par. 41) :

*a.* Rations, ammunition (both small arms and high explosives of all types), water cans, and gasoline should be stowed so as to be accessible for discharge at any time.

*b.* High explosives and petroleum products, particularly gasoline, must be stowed in spaces designated within the ship for that purpose. Pyrotechnics must be stowed in a special locker.

*c.* Petroleum products must not be stowed in the same hatch section with high explosives; a transverse bulkhead must separate these two types of cargo.

*d.* Rations and ammunition to be issued prior to debarkation (D-1 cargo, also called individual reserve) must be stowed so as to be accessible while under way.

*e.* In stowing a prime mover and towed piece of equipment, care should be taken to insure that the two pieces are in the same compartment as they must go ashore in the same boat. The towed piece is always discharged to the landing craft first and then the prime mover.

*f.* Whenever possible, general cargo should be left in nets for ease of unloading.

*g.* All loose and palletized cargo should be stowed vertically from the square of the hatch so that it is available for discharge upon request.

*h.* Time required for opening hatches, shifting rigging, and other incidental work must be considered in estimating unloading time.

*i.* The characteristics of jumbo boom rigs, midship-outboard rigs, and swinging boom rigs must be appreciated. Stowage of light lifts under a jumbo rig should be avoided; likewise, the stowage of a few lifts requiring a swinging boom rig should be avoided when otherwise the hold could be rigged with the faster midship-outboard rig.

*j.* Cargo should be considered in terms of boatloads and sling loads rather than merely in terms of cubic feet or weight. Cargo must be loaded in boats by related types to avoid the necessity of beaching a boat at two or more shore party unloading points. Landing craft, vehicle and personnel (LCVP), should, in general, be loaded with two net loads of cargo, although this may sometimes be increased to three. To insure that these factors are observed and that a boat will not have to move from one hatch to another to receive its load, cargo must be loaded in the ship by boatload, that is, with even numbers of net loads of cargo of one type loaded in each hatch.

## **Section III. METHODS OF LOADING**

### **40. General**

The manner in which cargo is loaded aboard a vessel determines the order in which equipment and supplies will be unloaded. Task forces are seldom alike; equipment and supplies differ; and the order in which matériel is required on the beach or pier will vary with the assigned mission. These factors make the loading task one which requires study to determine the type of loading to be used.

### **41. Combat Loading**

Combat loading is the loading of an assault troop unit, with its essential combat equipment and initial combat supplies, in a single ship in such a manner as to permit immediate and rapid debarkation in a desired priority for landing attack. This type of loading is used for any operation in which opposition from the enemy is anticipated; accordingly, vessels must be loaded to provide maximum flexibility to meet possible changes in the tactical plan. Combat loading differs from other methods in that only a portion of the total shipping space allotted can be utilized. This is due to the necessity for loading cargo so as to meet promptly emergency calls for equipment and supplies and to facilitate rapid discharge of cargo. It must be borne in mind at all times that combat loading is intended to insure maximum unloading efficiency of the individual landing teams and of the group as a whole. All other considerations, such as economy of space, must be subordinated to this. For this reason, combat loading is one of the best examples of the complete interdependence of tactics and logistics.

### **42. Unit Loading (Organizational Loading—Navy)**

Unit loading is the loading of a troop unit, with its equipment and supplies, in a single ship but without consideration of priority of debarkation for landing attack. It permits debarkation of complete units and equipment so that they are available for employment after assembly ashore. This method is more economical of ship space than is combat loading. Unit loading is used to best advantage in moving troops with their equipment and supplies when the troop units within the convoy may be debarked at separate ports. This type of loading may be used for transporting units arriving some time after D-day and when the destination is subject to change.

### 43. Convoy Loading

Convoy loading is the loading of troop units with their equipment and supplies in ships of the same convoy, but not necessarily in the same ship. Units so loaded are available for employment when landed at established beachheads or ports and after the lapse of time necessary to assemble them on land with their equipment and supplies. In convoy loading, vessels are loaded without consideration for tactical debarkation. This type of loading is used to best advantage for moving occupational or replacement troops to the objective area, or for moving units in the rear areas. Convoy loading is economical of ship's space but can only be used for troops who will debark at a common destination.

### 44. Commercial Loading

Commercial loading is that method of loading supplies and equipment on a cargo ship utilizing the maximum cargo space and carrying capacity without regard for priority of discharge for immediate tactical use. Economy of cargo space is the guiding factor. This type of loading is used only for resupply and shipment to a well-secured port, and is not readily adaptable to amphibious assault operations.

### 45. Special Military Loading

*a. Commodity Loading.\** Commodity loading is the loading of a ship with one class of supplies or with supplies of a single service. This method makes less efficient use of shipping space but permits discharge and clearance of supplies from a port area without delay for segregation.

*b. Balanced Loading.\** Balanced loading is utilized in loading a vessel in quantities proportional to expected or estimated rates of consumption or needs for a specific number of personnel.

*c. Selective Discharge.\** Selective discharge is a method of loading a ship with supplies to permit the immediate or ready discharge of any item.

## Section IV. METHODS OF STOWAGE

### 46. General

During the planning phase, it is difficult to determine exactly what supplies and equipment will be needed throughout the landing and assault phases and in follow-up shipping. Therefore, it is necessary

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\*Special loading methods may be used in combination to produce desired results; for example, balanced class V ship loaded for selective discharge.

to stow vital equipment and supplies (rations, water, and ammunition) aboard ship so that the flow of these supplies toward the beach may be regulated and controlled. Also, it is necessary to load ships so that any items may be discharged when desired. The following methods of stowage will be utilized to this end within the limits of the particular type of loading being used (pars. 40-45).

## **47. Hold Capacity**

*a.* The capacity of a hold may be stated in several ways. For instance, the cubic capacity is usually given as grain or bale capacity in cubic feet, but hold capacity is also measured in square feet of usable deck area, this figure being a factor in planning the loading of vehicles.

*b.* Part of the capacity of each hatch cannot be used in loading. This is because of space between boxes, between vehicles, around stanchions, and the like. This space is known as broken stowage. In stowing general cargo, broken stowage may account for 20 percent of the total available space; and in stowing vehicles, 25 percent of the square area of 50 percent of the cubic capacity. In planning, certain percentages will, of necessity, be deducted from hold capacities so that the planned load will fit the ship. During loading, ship's platoons must be instructed (and constantly observed) to insure that cargo is being stowed as tightly as possible to reduce broken stowage.

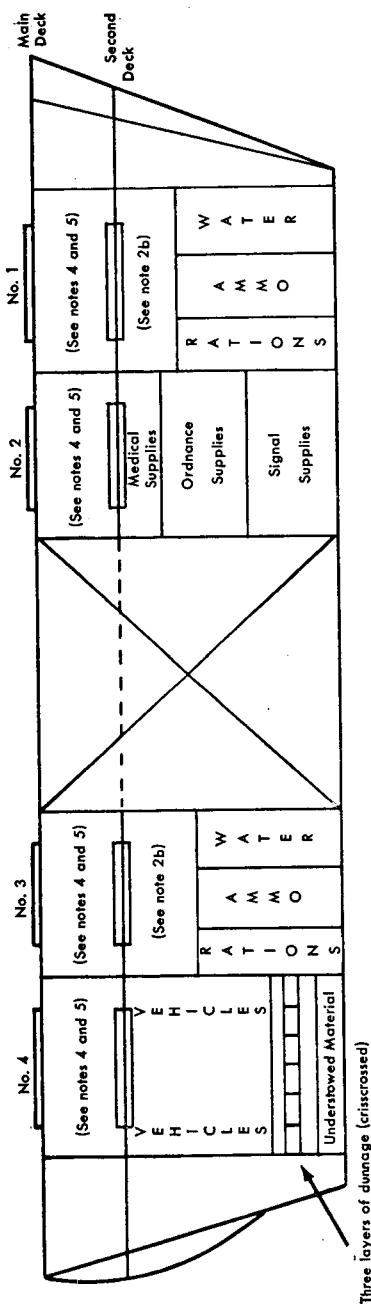
*c.* Broken stowage may be reduced by understowing (par. 50) or by filling in space between and around vehicles with package cargo. However, this practice violates the principles of combat loading and may not be used with that type loading due to the time lost in unloading.

## **48. Horizontal Stowage**

(fig. 11)

*a.* In combat loading, horizontal stowage means that the vital equipment and supplies are distributed in at least two hatch sections of the ship. The ship can thus deliver these supplies to the beach in proportionate amounts, and if one hatch section on the ship becomes inoperative, the vital equipment and supplies can be unloaded from another section of the ship.

*b.* In other than combat loading, the primary consideration is utilization of ship's space, and cargo may be horizontally stowed in individual cargo compartments. The cargo is divided into classes, and each class is stowed in horizontal layers over the entire square foot area of the compartment, each additional class being stowed in horizontal layers over the last.



# NOTES:

## 1. Horizontal stowage.

- a. The hold of No. 2 is horizontally stowed.
- b. The ship is horizontally stowed within the concept of combat loading because the vital items of equipment and supplies—rations, water, and ammunition—are distributed in more than one hatch section (Nos. 1 and 3).

## 2. Vertical stowage.

- a. The holds of Nos. 1 and 3 are vertically stowed.
  - b. In the cargo compartment, vertical stowage is less economical of ship's space than horizontal stowage because sufficient overhead clearance must be left to allow a working party to reach each item of cargo.
3. Understowing. The hold of No. 4 is understowed.

4. If combat-loaded, the second deck may be loaded with high priority vehicles.

5. In all types of loading other than combat loading, the second deck may be loaded with general cargo, or understowed if a large number of vehicles are to be transported.

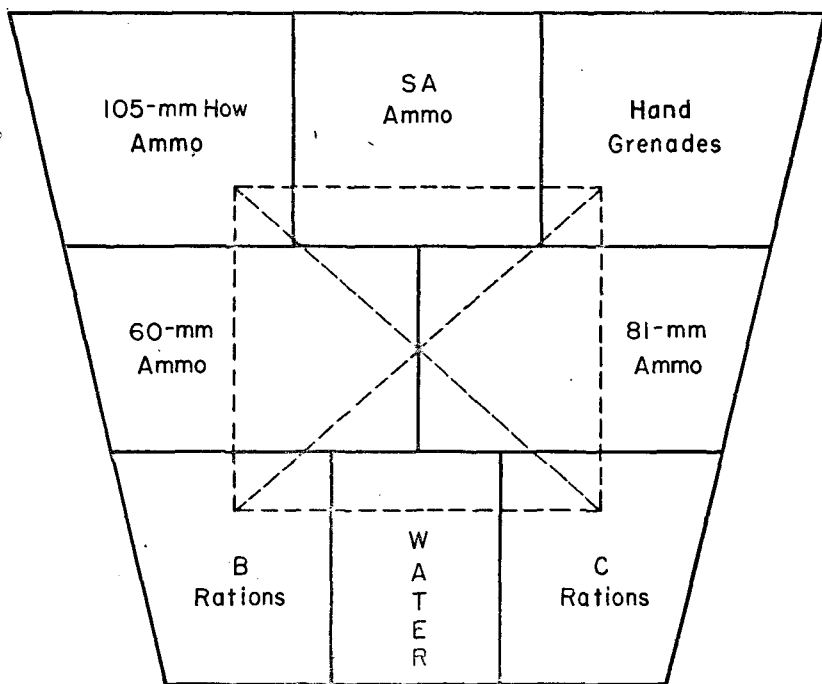
6. For ease in illustrating, the above profile plan has been simplified from an actual profile plan of an APA.

7. Figure is not to scale.

Figure 11. Methods of storage (profile view).

## 49. Vertical Stowage

After the vital equipment and supplies have been distributed into a number of hatch sections (par. 48), the remaining cargo should be accessible in each cargo compartment so that it may be unloaded in any priority desired at the beach. To this end, the cargo is vertically divided into classes, and each class is stowed in vertical blocks extending athwartships from the square of the hatch into the wings to the side of the ship, and from the square of the hatch to the fore and after bulkheads in such a manner as to allow accessibility to each class from the square of the hatch (fig. 12).



### NOTES:

1. Sufficient overhead clearance is left so that any item of cargo in the vertical sections may be moved to the square of the hatch and unloaded, regardless of priority.
2. The different types of cargo are further broken down and stowed into vertical sections. For example, all types of small arms ammunition are stowed in vertical sections so that any type of small arms ammunition may be unloaded when required.
3. Figure is not to scale.

*Figure 12. Vertical stowage (plan view).*

## 50. Understowing

(fig. 11)

*a.* Vehicles are sometimes stowed on top of bulk cargo for the more economical use of space. This is known as understowing. Selected items of bulk cargo are loaded in the cargo compartment to a predetermined height, leveled off leaving sufficient clearance for dunnage and vehicles, and floored over with enough dunnage to make a suitable stowage deck for vehicles.

*b.* For the most economical use of available stowage space in transport type ships, vehicles of approximately the same height are loaded in the same cargo compartment. Knowing the heights of the vehicles, the height of the cargo compartment, and the amount of dunnage to be used, the loading officer can determine the height to which the cargo within the compartment may be understowed. If vehicles are to be loaded in the wings of a compartment, the coaming clearance will be the critical dimension. Understowing may be used on any or all levels in all types of loading except combat loading. In combat loading, very low priority equipment may be understowed, but only in the lower hold of the hatch section.

*c.* To illustrate, during World War II there were not always enough LST's to supply the demand for each operation. Therefore, understowing was used to increase the carrying capacity of the LST's, at the same time allowing the vessel to carry an effective combat load. Understowing artillery ammunition on the tank deck of an LST is an example of this method. Generally, the understow was leveled off at 3 feet and floored over with dunnage. Amphibious trucks to be loaded in the ship were then moved up a prepared incline aft of the elevator or main deck ramp to position on top of the dunnage and ammunition. Most military vehicles, with the exception of tanks and LVT's, may be stowed above cargo that has been dunnaged over, but the weight limitations for beaching of landing ships concerned must be considered. However, when carrying LVT's, tanks, or similar vehicles, or when economy of shipping space is not a consideration, cargo should be stowed aft on the tank deck in vertical sections and shored up.

## Section V. PREPARATION OF DETAILED LOADING PLANS

### 51. General

Tentative detailed ship loading plans are prepared by the unit loading officer as directed by the commanding officer of troops. These plans are submitted to the commanding officer of the ship for approval. When thus approved, they constitute the final loading plans and

govern the loading of the ship. Changes in final loading plans will be made only with the approval of the commanding officer of the ship and the commanding officer of troops concerned. Disagreements between naval and landing force personnel regarding loading plans will be referred to the next higher level of command for decision.

## 52. Instructions for Preparing Loading Plans (Forms)

a. *The Consolidated Embarkation and Tonnage Table* (fig. 13). The consolidated embarkation and tonnage table is a list of all units embarked in a ship, together with the total personnel and total cubic

### CONSOLIDATED EMBARKATION AND TONNAGE TABLE

NAME OF SHIP **USS MUNCIE (APA 999)**

ORGANIZATION	PERSONNEL			CARGO		
	Off	Enl	Total	Sq Ft	Cu Ft	Short Tons
Hq, 2nd Bn, 184th ECT	34	782	816	1,025	12,014	98.08
Hq and Special Units	28	262	290	1,010	7,168	59.8
Special Troops	1	14	15		53	.6
Div Arty Det	2	10	12		42	.48
1st Plat, Btry A, 230th AAA Bn	1	24	25	949	5,716	23.68
7th MP Plat	1	4	5	232	1,022	5.11
7th QM Co Det	1	26	27	159	1,074	6.8
7th Medical Bn Det	3	30	33	224	1,444	5.92
13th Engr Bn Det	1	43	44	464	4,255	22.55
104th Engr Bn Det	8	183	191	284	3,013	22.84
1st Plat, 722nd Engr Co	1	16	17		60	.68
767th Tank Bn Det		11	11	216	1,821	32.78
75th Signal Co Det	3	17	20	404	1,690	6.8
707th Ord LM Det	1	10	11		39	.44
Standard Landing Craft Unit		23	23	253	6,441	80.42
3116 and 3117 Photo Unit	1	4	5	58	380	2.95
Initial Supplies					23,349	446.25
<b>TOTALS</b>	<b>86</b>	<b>1,459</b>	<b>1,545</b>	<b>5,278</b>	<b>69,581</b>	<b>816.18</b>

Figure 13. Consolidated embarkation and tonnage table.

feet, square feet, and short tons of cargo for the units concerned. Bulk general cargo is also shown. This table is prepared by the unit loading officer from data appearing on unit personnel and tonnage tables submitted by each subordinate unit (par. 68, FM 60-5).

*b. Unit Personnel and Tonnage Table.*

- (1) The unit personnel and tonnage table is prepared by each unit or detachment to be embarked and is submitted to the commanding officer of troops upon completion. Since this form must be accurate in every detail, the troop officer concerned must supervise its preparation and check carefully each item entered (par. 67, FM 60-5).
- (2) For clarity and simplicity, the unit personnel and tonnage table is divided into two sections:
  - (a) The upper portion (lines 1-11) is for information covering the table of allowances and special organic equipment of individual units of a battalion landing team. Data contained in these lines are assembled by the units concerned and submitted to the unit loading officer.
  - (b) The lower portion (lines 12-29) is for information pertaining to supplies common to the combat or landing team, the units of the division, or higher echelon. Data contained in these lines are assembled by the battalion, regimental, or higher echelon logistics officer.
- (3) The column to the extreme left of the unit personnel and tonnage table divides all cargo into stowage classifications. The two main columns to the right of the unit personnel and tonnage table list standard cargo and specially prepared cargo. Specially prepared cargo includes palletized cargo and heavy lifts other than vehicles. All cargo other than specially prepared cargo is known as standard cargo.
- (4) A line analysis of the unit personnel and tonnage table is contained in paragraph 67, FM 60-5.

*c. The Vehicle Summary and Priority Table.* This form is prepared by each unit or detachment to be embarked aboard the transport and is submitted to the commanding officer of troops. The unit or detachment commander lists each vehicle to be loaded in the order of desired unloading priority (par. 69, FM 60-5).

*d. The Cargo and Loading Analysis.* The cargo and loading analysis is prepared by each unit or detachment to be embarked aboard the transport and is submitted to the commanding officer of troops. This form provides a break-down of all cargo, except vehicles listed by cubic feet and weight on the unit personnel and tonnage table, and is comparable to a voucher or manifest in support of these figures (pars. 49g and 70, FM 60-5).

e. *Consolidated Unit Personnel and Tonnage Table* (fig. 14). After all individual unit personnel and tonnage tables are received, the unit loading officer prepares a consolidated unit personnel and tonnage table by grouping the figures on all individual unit personnel and tonnage tables.

f. *Consolidated Vehicle Summary and Priority Table* (fig. 15). This form is prepared by the commanding officer of troops. It lists all vehicles to be loaded according to unloading priority, vehicle type, serial number, and cargo to be loaded in vehicles (par. 71, FM 60-5).

g. *Consolidated Cargo and Loading Analysis* (fig. 16). After the unit loading officer completes the consolidated unit personnel and tonnage table, he prepares a consolidated cargo and loading analysis (par. 72, FM 60-5).

h. *The Stowage Diagram* (figs. 17-22). The stowage diagram is a scale drawing (scale,  $\frac{1}{8}$  inch equals 1 foot) plan of each hatch level, containing the over-all dimensions of the compartments, together with the cubic feet, square feet, boom capacity, and minimum clearance to coaming, girders, and boards (par. 73, FM 60-5).

i. *The Profile Loading Diagram* (fig. 23). This diagram presents an over-all picture of the completed load. It is a distorted profile view of the ship, showing the holds occupied by cargo and minimizing the spaces occupied by personnel and the ship's stores. All general cargo and vehicles are listed by types and weight. Total vehicles will be listed by type loaded in the same hatch level, showing the gross weight of total vehicles (par. 74, FM 60-5). The lower portion of the profile loading diagram should show the number of short tons, the number of lifts, and the estimated unloading time in minutes for each hatch section. In computing the unloading time, the following data may be used:

- (1) For midship-outboard rig, 5 minutes per lift.
- (2) For a swinging boom rig, 10 minutes per lift.
- (3) For a jumbo boom rig, 15 minutes per lift.
- (4) To open a hatch, 15 minutes.
- (5) To shift from one rig to another, 30 minutes.

j. *The Consolidated Vehicle Table* (fig. 24). This table provides a summary of all vehicles listed on the consolidated vehicle summary and priority table by types and units to which they belong.

### 53. Other Loading Forms

The following forms are not included in the loading plans for individual vessels:

a. *The Landing Force Embarkation and Tonnage Table* (fig. 25). This form will be prepared and submitted to the next higher echelon

CONSOLIDATED

UNIT PERSONNEL AND TONNAGE TABLE

Gen Col Lt Col				Total Officers	NCO's, 1st 3 Grades 93		Total Enlisted		Total Personnel
Maj 4 Capt 16 WO 65				86	Other Enl 1,366		1,459		1,545
	L I N E				STANDARD CARGO		SPECIALLY PRE-PARED CARGO (pallets, hv lifts, etc )		
					Cu Ft	Wt (lb)	No.	Cu Ft	Wt (lb)
TROOP SPACE CARGO	1	Baggage			5,413	123,600			
	2	Office Equipment							
	3	Initial Combat Equipment			920	21,660			
	4	Total Troop Space Cargo			6,333	145,260			
U N I T  G E N E R A L	5	Organizational Equipment			4,440	145,911			
	6	Mess Equipment			3,493	74,214			
	7	Camp Equipment			2,143	38,250			
	8	Special Equipment			938	20,695			
	9	Aviation Material							
	10	Vehicles (Towed Guns, etc)			28,518	303,931			
	11	Total Unit General Cargo			39,532	583,001			
	B U L K	A	12	Ammunition (Small Arms)		767	59,740	24	920
M		13	High Explosives		2,239	79,075	34	2,277	75,184
M		14	Pyrotechnics		13	600			
O		15	Total Ammunition		3,069	139,415		3,197	126,344
G E N E R A L  O T H E R  C A R G O	O T H E R	16	Gasoline		3,902	154,834	34	1,802	57,290
		17	Other Petr Products		727	25,200			
		18	Water		2,388	98,300	20	1,060	39,300
		19	Other Liquids						
		20	Rations		5,440	198,340	14	832	25,982
		21	PX Supplies						
		22	Signal		717	18,600			
		23	Engineer						
		24	Ordnance (Main)		70	2,200			
		25	Motor Parts		226	8,000			
		26	Medical		72	1,600			
		27	Chemical		214	8,600			
		28	QM Supplies (General)						
		29	Total Other Cargo		13,756	515,674		3,694	122,572
	30	TOTAL CARGO (Add lines 4, 11, 15, and 29)			62,690	1,383,350		6,891	248,916
	31	TOTAL SHORT TONS				591.68			124.46
		GRAND TOTAL	Sq Ft	Cu Ft	Wt (lb)	SHORT TONS	M/T		
			5,278	69,581	1,632,266	816.13	1,739.5		

Submitted By \_\_\_\_\_ ULO

Approved By \_\_\_\_\_ Comdg

UNIT 2nd Bn, 184th RCT

NAME OF SHIP USS MUNCIE (APA 999)

Date \_\_\_\_\_

Figure 14. Consolidated unit personnel and tonnage table.

CONSOLIDATED VEHICLE SUMMARY AND PRIORITY TABLE

VEHICLES				CARGO LOADED IN VEHICLES											
Pri No.	DESCRIPTION			Length	Width	Height	Sq Ft	Cu Ft	Net Weight	Type Cargo	No. of Contrs	Cu Ft	Weight of Cargo	Gross Wt of Vehicle	Where Stowed
	Type Vehicle	Org	Ser No.												
1	M-29C	Co E		15' 9"	5' 8"	4' 8"	89	416	5,640	Line 5		21	500	6,140	
2	M-29C	Co E		15' 9"	5' 8"	4' 8"	89	416	5,640	Line 5		21	500	6,140	
3	M-29C	Co F		15' 9"	5' 8"	4' 8"	89	416	5,640	Line 5		21	500	6,140	
4	M-29C	Co F		15' 9"	5' 8"	4' 8"	89	416	5,640	Line 5		21	500	6,140	
5	M-29C	Co G		15' 9"	5' 8"	4' 8"	89	416	5,640	Line 5		21	500	6,140	
6	Tk, L, M51A1	767 Tk Bn		14' 7"	7' 5"	8' 3"	108	891	32,340					32,340	
7	Tk, L, M51A1	767 Tk Bn		14' 7"	7' 5"	8' 3"	108	891	32,340					32,340	
65	Tlr, Sit Unit	230 AAA		16' 4"	8' 0"	4' 8"	131	612	5,140					5,140	
66	Trk, 1½-Ton	230 AAA		18' 10"	6' 11"	7' 2"	130	932	7,375					7,375	
67	Tlr, Sit Unit	230 AAA		16' 4"	8' 0"	4' 8"	131	612	5,140					5,140	
68	Trk, 1½-Ton	230 AAA		18' 10"	6' 11"	7' 2"	130	932	7,375					7,375	
69	Tlr, Sit Unit	230 AAA		16' 4"	8' 0"	4' 8"	131	612	5,140					5,140	
70	Trk, 1½-Ton	230 AAA		18' 10"	6' 11"	7' 2"	130	932	7,375					7,375	
71	Trk, 4-Ton	SLCU		11' 1"	5' 3"	4' 4"	58	251	2,453					2,453	
72	Trk, 2½-Ton	SLCU		19' 4"	7' 5"	9' 2"	143	1,311	10,100	Line 5		100	4,000	14,100	
73	LCPV Engine	STD LC		7' 8"	3' 4"	4' 7"	26	119	3,845					3,845	
74	LCPV Engine	STD LC		7' 8"	3' 4"	4' 7"	26	119	3,845					3,845	
TOTALS							5,278	28,518	303,931			692	21,000		

Figure 15. Consolidated vehicle summary and priority table.

CONSOLIDATED

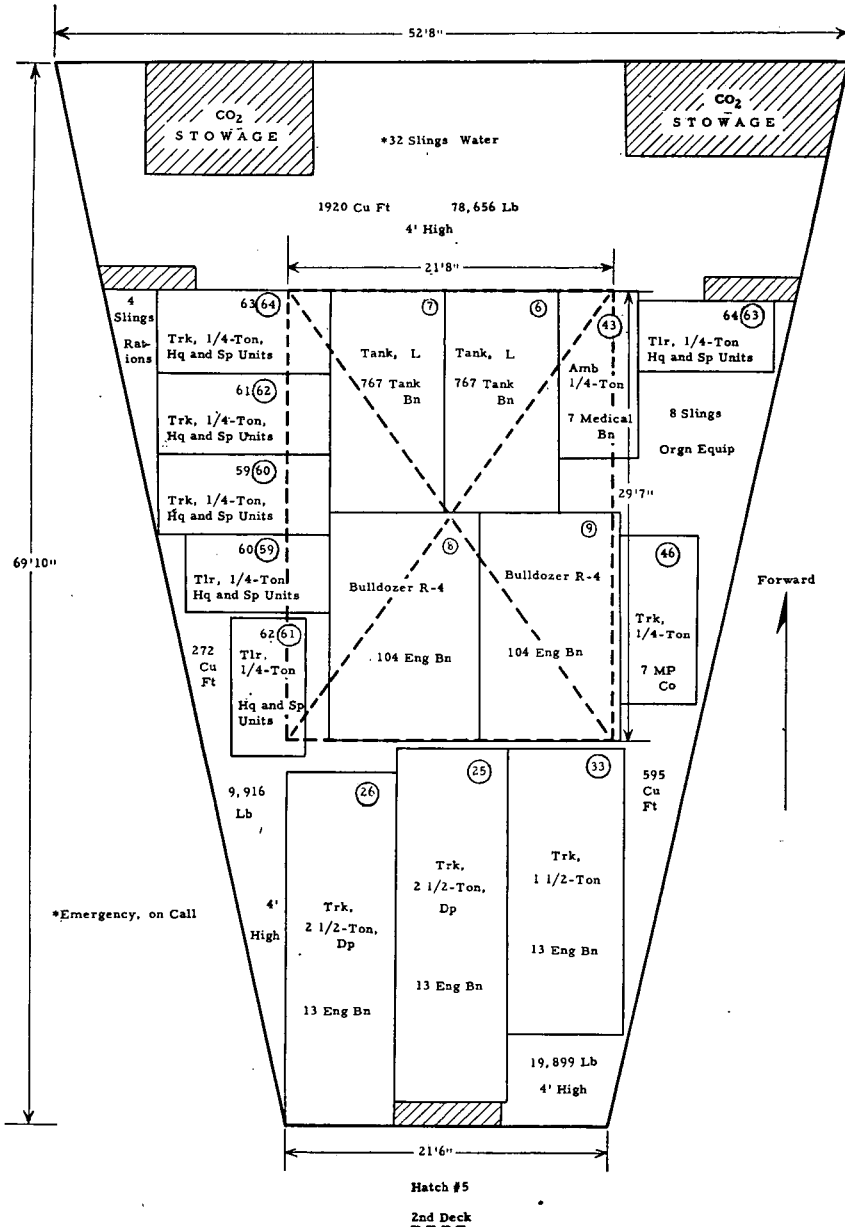
CARGO AND LOADING ANALYSIS

NAME OF SHIP USS Muncie (APA 999)			STANDARD CARGO					SPECIALLY PREPARED CARGO (PALLETES, HEAVY LIFTS, etc)			
UP&T LINE NO.	ORGANIZATION	DESCRIPTION	No. of Containers	Rounds or Gallons	Cu Ft	Wt (lb)	Number	Rounds or Gallons	Cu Ft	Wt (lb)	Where Stowed
1	All Units	Baggage	1,545		*5,413	*123,600					
3	All Units	Initial Comb Equip			*920	*21,660					
5	All Units	Orgn Equip			*4,440	*145,911					
6	All Units	Mess Equip			*3,193	*74,214					
7	All Units	Camp Equip			*2,143	*38,250					
8	All Units	Special Equip			*938	*20,695					
12	230th AAA (1st Plat) Bn	Ammo (SA)		10		1,000					
	Initial Supplies	Cal .30 Carbine		140		128	10 Pallets	540,000	360	20,700	
	Initial Supplies	Cal .30 M1 Tracer		100		134,400	10 Pallets	267,800	400	24,100	
	Initial Supplies	Cal .45 Cart Ball		50		60,000					
	Initial Supplies	Cal .30 AP MG		200		298					
12	Initial Supplies	Cal .50 AP	100		149	9,740	4 Pallets	61,440	160	6,360	
	Initial Supplies	Cal .30 AP M2				*767			*920	*51,160	
26	All Units	Medical Supplies			*72	*1,600					
27	All Units	Chemical Supplies			*214	*8,600					
			TOTALS		34,172	1,079,419			6,891	248,916	
			VEHICLES		28,518	303,931					
			PALLETS		6,891	248,916					
			GRAND TOTALS		69,581	1,632,266					

\*Totals

Figure 16. Consolidated cargo and loading analysis.

USS MUNCIE (APA 999)



Min Clr: 10'10"  
Scale: 1/8" to 1'

Sq Ft: 2,397 Cu Ft: 25,960

Booms: 1 30-Ton  
2 10-Ton

①

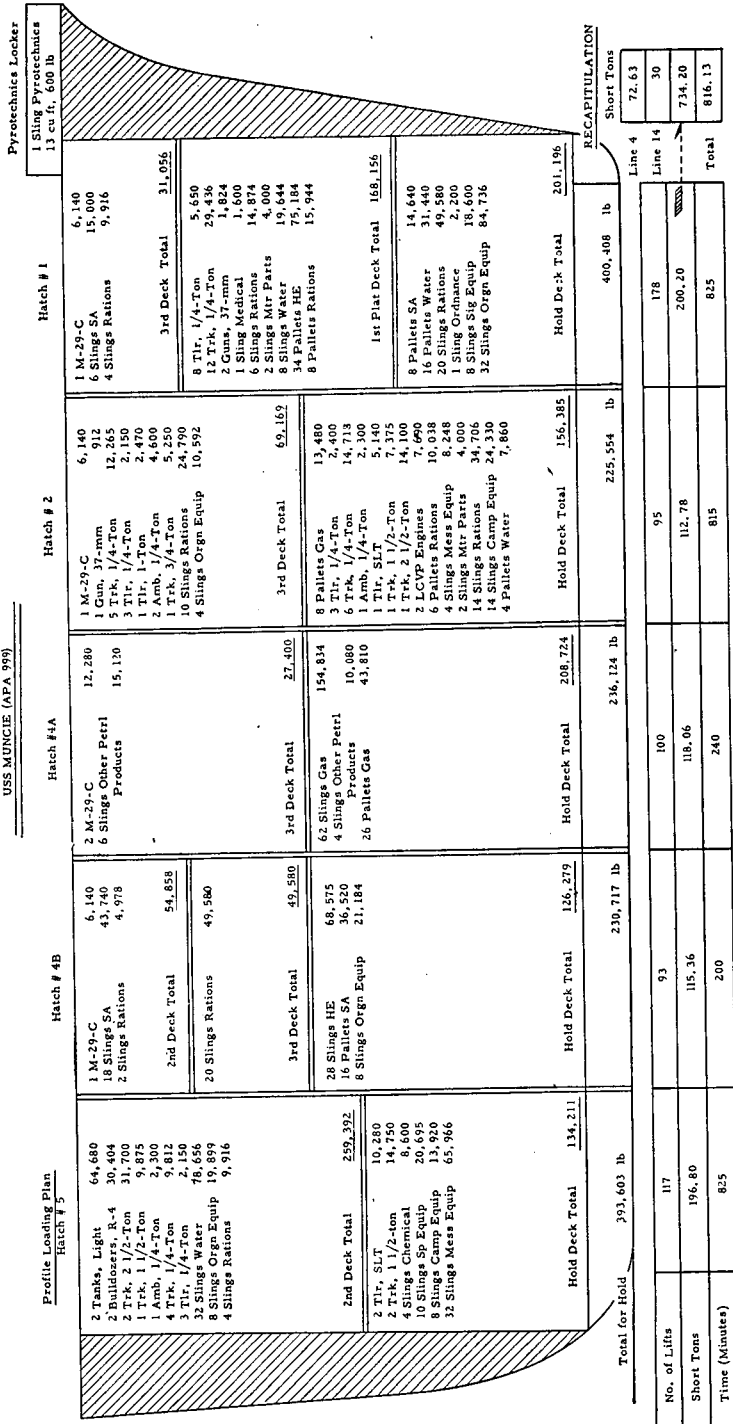
Figure 17. The stowage diagram—layout.

MANIFEST

Priority Number	No. Lifts	Cargo Description	Organization	Cu Ft	Wt (lb)	Remarks
6	1	Tank, light	767 Tank Bn	891	32,340	Assault
7	1	Tank, light	767 Tank Bn	891	32,340	Assault
8	1	Bulldozer, R-4	104 Eng Bn	1,172	15,202	Assault
9	1	Bulldozer, R-4	104 Eng Bn	1,172	15,202	Assault
9A	32 Sl	Water	All units	1,920	78,656	Emerg, on call
25	1	Truck, 2½-ton, dp	13th Eng Bn	1,406	15,850	HE, loaded
26	1	Truck, 2½-ton, dp	13th Eng Bn	1,406	15,850	HE, loaded
33	1	Truck, 1½-ton	13th Eng Bn	932	9,875	HE, loaded
43	1	Ambulance, ½-ton	7th Medical Bn	332	2,300	
43A	8 Sl	Orgn equip	All units	595	19,899	
46	1	Truck, ½-ton	7th MP Co	251	2,453	
(59)	1	Trailer, ½-ton	Hq and Sp units	154	800	
(60)	1	Truck, ½-ton	Hq and Sp units	251	2,453	
(61)	1	Trailer, ½-ton	Hq and Sp units	154	800	
(62)	1	Truck, ½-ton	Hq and Sp units	251	2,453	
(63)	1	Trailer, ½-ton	Hq and Sp units	154	550	
(64)	1	Truck, ½-ton	Hq and Sp units	251	2,453	
	4 Sl	Rations	All units	272	9,916	
<u>TOTALS</u> - - - - -				12,455	259,392	

C

Figure 17. The stowage diagram—cargo recapitulation.



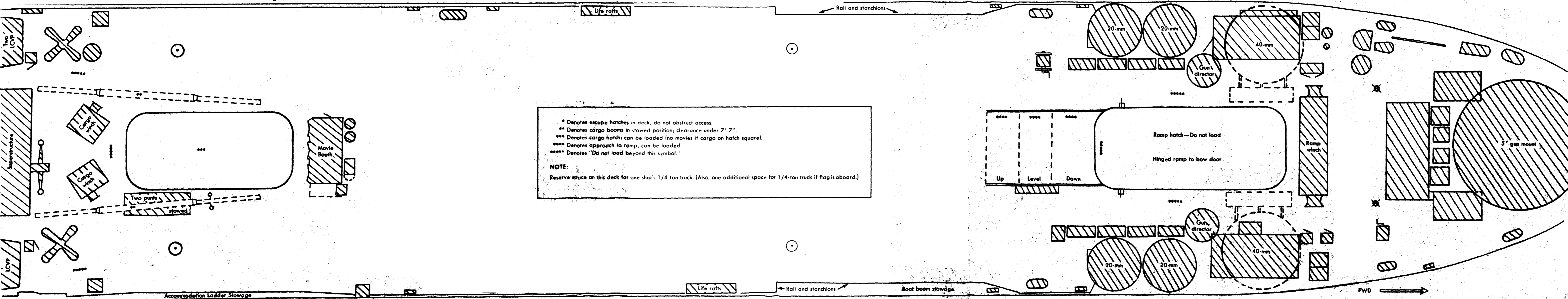


Figure 22. Diagram of main deck (weather deck) of 1153 class LST.

SCALE: 1/8" = 1' 0"

## LIST OF SYMBOLS

THERE CAN BE NO LOADING IN  
THE AREAS INDICATED BY THE  
FOLLOWING SYMBOLS:

Escape scuttle



20-mm gun working circle



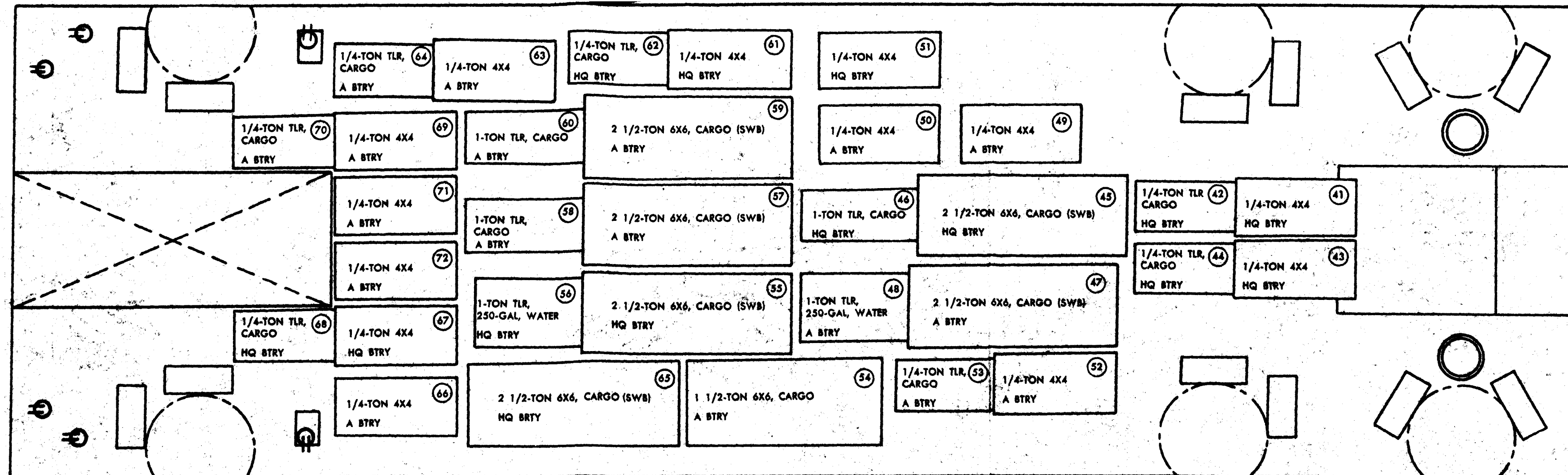
20-mm ready ammo box



Mushroom ventilator



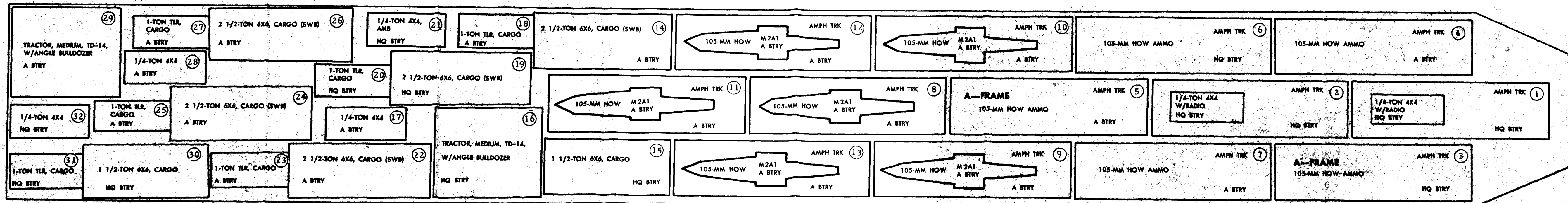
AFT



FWD

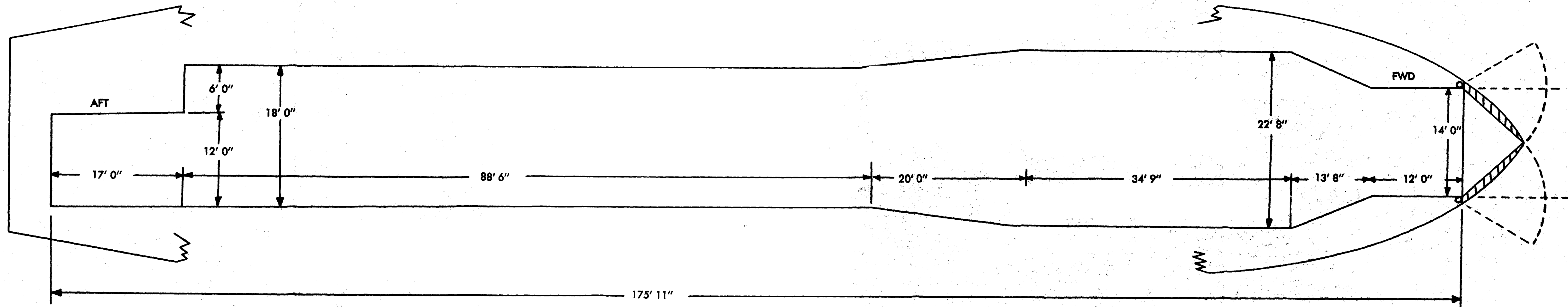
Scale: 1/8" to 1'

Figure 20. Sample diagram of main deck of 542 class LBT.



SCALE: 1/8" = 1' 0"

Figure 19. Sample stowage diagram of tank deck of 542 class LST.



SCALE: 1/8" = 1' 0"

Figure 18. Sample diagram of tank deck of LSM.

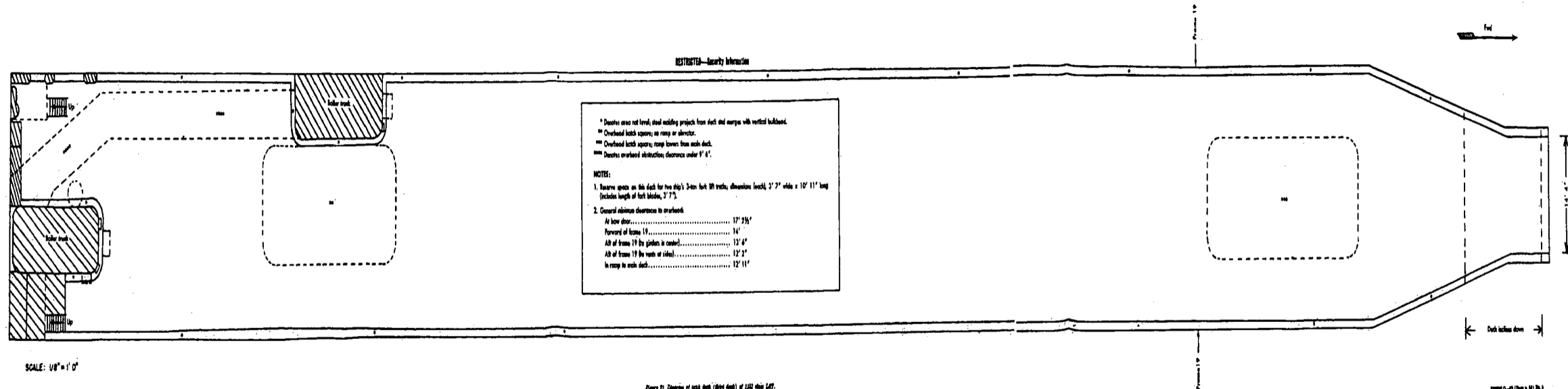


Figure 21. Diagram of deck deck (third deck) of LST-1162.

RESTRICTED

UNIT	CONSOLIDATED VEHICLE TABLE													
	Vehicle Type													Total
	D-8 bulldozer	Trk, $\frac{1}{2}$ -ton, 4x4, amb	Trk, $\frac{1}{2}$ -ton, 4x4 (R)	Tlr, $\frac{1}{2}$ -ton										
104 Engr Bn	2													2
7th Medical Bn		4												4
75th Sig Co			4	4										8
Totals	2	4	4	4										14

Figure 24. Consolidated vehicle table.

by each division or embarkation group. It is a general summary and analysis of embarkation data for the division or embarkation group.

*b. Break-down of Equipment and Supplies* (fig. 26). This form will be prepared and submitted to higher echelons by divisions or separate organizations embarking for combat. It presents a detailed summary in convenient form of total supplies and equipment in short tons, together with a break-down of vehicles by type and number loaded in each ship. This form is of special value to logistical control personnel during the unloading phase of amphibious operations. However, it is primarily a work form and not a required one.

*c. The Cargo Manifest.* This form should be prepared by all units and detachments as a record of the supplies and equipment to be loaded and as an aid in the preparation of other forms. Information entered thereon will consist of the unit personnel and tonnage table line number, serial number of box or container, a brief description of the contents, the cubic feet, and the weight of each individual container of organizational equipment to be loaded. The manifest will not be submitted to higher echelon.

LANDING FORCE EMBARKATION AND TONNAGE TABLE													
Trans Div Number	Ship	Unit Embarked	TROOP CAPACITY			TROOPS EMBARKED			CARGO CAPACITY		CARGO LOADED		CO of Troops
			Off	Enl	Total	Off	Enl	Total	Cu Ft	Short Tons	Cu Ft	Short Tons	
9	APA 94	1st Inf Regt	70	1,000	1,070	70	802	872	80,000	66,000	490	Moore	
	APA 23	11th Emb Team	76	1,310	1,486	70	1,280	1,350	80,000	72,000	610	Adams	
	APA 60	16th Emb Team	82	1,280	1,362	80	1,270	1,350	82,000	71,500	565	Smith	
	AKA 10	1st Inf Regt (Sup)	12	60	72	12	60	72	240,000	239,500	3,600	Hunt	
10	APA 4	2nd Inf Regt	74	1,290	1,364	70	1,120	1,190	81,000	70,000	650	Jones	

Figure 25. Landing force embarkation and tonnage table.

#### Division (or code name)

## Name of Ship and Number

## 61.8

61.8

2 units  $\frac{1}{2}$  ton 4x4 Camd and Recm (1 on each)

Trucks: 1/4-ton, 4x4 Comd and Recon (1.2 tons each)

220396 0—52 (Face p. 56)

## 54. Completed Plans (Forms)

The completed loading plan will consist of seven standard forms for transport ships and six for landing ships. The completed plan is assembled in the following order :

- a.* Consolidated embarkation and tonnage table.
- b.* Consolidated unit personnel and tonnage table.
- c.* The consolidated vehicle summary and priority table.
- d.* Consolidated cargo and loading analysis.
- e.* The stowage diagrams.
- f.* The profile loading diagram (not included for landing ships).
- g.* Consolidated vehicle table.

## 55. Forms To Be Completed by Division and Separate Embarkation Groups

Divisions and separate embarkation groups will prepare the following forms and submit them to higher echelons:

*a. Landing Force Embarkation and Tonnage Table* (fig. 25). The landing force embarkation and tonnage table presents a summary and analysis of embarkation data for the division or separate embarkation group. When completed, this form will be classified as confidential.

*b. Break-down of Equipment and Supplies* (fig. 26). This form presents a detailed analysis of total supplies and equipment in short tons, together with a break-down of vehicles by type and number loaded in each vessel of the convoy lifting the division or embarkation group. When completed, this form will be classified as confidential.

## CHAPTER 6

### UNLOADING

---

#### 56. Responsibility

*a.* The commanding officer of the ship and the higher naval echelons in the chain of command are responsible for unloading in the established priority all cargo loaded in ships of the attack force, and for the safe and expeditious delivery of the cargo to the proper beaches. The transport group commander is in direct control and coordinates the unloading of the transport group.

*b.* The unit loading officer, under the direction of the commanding officer of troops and with the assistance of the ship's combat cargo officer, will draw up detailed plans for unloading. At the objective area, the ship's combat cargo officer will insure by frequent inspection that unloading is proceeding according to plan and in the most expeditious manner. In addition, he will insure that unloading experience tables are being filled out and will keep interested parties informed of the unloading status. The unit loading officer will direct activities of troop unloading details and will insure that unloading is proceeding in accordance with unloading priorities established by the commanding officer of troops. He will also have a hatch checker to maintain a running record of matériel unloaded and the beaches to which it is sent. In the absence of the troop officer in command, the unit loading officer may make such decisions as are necessary in regard to unloading. Staff combat cargo officers keep up-to-date records of the progress of unloading and compile such reports as may be periodically required by higher authority.

#### 57. Ship's Debarkation Officer

The ship's debarkation officer is the representative of the ship's commanding officer and may or may not be the ship's combat cargo officer. He is responsible for the debarkation of troops in accordance with the debarkation schedule and for unloading cargo in accordance with the unloading plan or order. His primary function is to have the proper type boat at the debarkation stations when needed. His station is on the bridge, where he has telephone communications to each debarkation station and to each hatch. He keeps a check-off list

of all boats loaded, their destination, what is loaded in each, and the time each departs from the ship.

## **58. Hatch Unloading Personnel**

The following personnel will normally be assigned to unload one hatch:

*a.* A hatch officer (officer or petty officer) is assigned from ship's personnel. He is responsible for loading the boats with equipment and supplies, and he supervises the general activities of the hatch detail. He insures that the coxswain knows the route and distance to his destination, and he keeps the ship's debarkation officer informed of the following:

- (1) When ready for a boat.
- (2) When boat is nearly loaded.
- (3) When the boat clears the station.
- (4) Any causes for delay in unloading.

*b.* A hatch talker is assigned from ship's personnel. He mans the telephone and relays all messages between the hatch officer and the ship's debarkation officer.

*c.* A boatswain's mate, winchmen, hatch tenders, and a cargo checker are furnished by the Navy. Two complete groups of these personnel should be trained and available in order that cargo handling may continue without interruption. The commanding officer of troops may also require that a checker be stationed at each hatch to keep a record of the supplies and equipment unloaded.

*d.* A hatch unloading detail, part of the ship's platoon, is assigned for unloading the hatch. The leader of the ship's platoon supervises the activities of all hatch details, assigning them to shifts, arranging for meals, and ascertaining that the unloading schedule is being carried out. A noncommissioned officer is assigned to supervise the hatch detail. He insures that the unloading priority is being followed, that the detail is ready for work when required, and that the checker is keeping an accurate record of supplies and equipment unloaded.

- (1) The hatch detail loads cargo nets, attaches vehicle slings, fastens steadying lines to vehicles, and signals a hatch tender when the draft is ready for hoisting.
- (2) To economically utilize the services of the ship's platoon, the size of the hatch detail will vary, depending on the type of hatch and the type of cargo to be unloaded. The detail will be smallest when unloading vehicles and largest when unloading bulk supplies such as ammunition. The leader of the ship's platoon and the unit loading officer are responsible

for determining when the size of the hatch detail should be increased or decreased.

## **59. Unloading Plan**

As the priority for unloading must be determined before the loading plan can be prepared, the basis for the detailed unloading plan is prepared during the planning phase.

a. Usually, the highest priority supplies and equipment consist of cargo that is to land with the scheduled waves or cargo that is to be at the line of departure at a designated time. The commanding officer of troops is responsible for establishing the priority for loading and unloading the remainder of the supplies and equipment for his embarkation team.

b. The unit loading officer prepares the detailed unloading plan in sufficient time to indoctrinate all unloading personnel before reaching the objective. The plan includes—

- (1) The necessary information to insure that priorities established by the commanding officer of troops will be followed.
- (2) A list of names, ranks, and duties of all ship and troop personnel assigned by hatch section.
- (3) Special instructions for unloading when other than ship's boats are used.
- (4) Special instructions governing any peculiarities to be encountered during discharge operations.
- (5) Types of cargo at each hatch section and the types of boats in the order required for unloading.

c. There is no standard form for an unloading plan.

## **60. Use of Various Types of Vessels for Unloading**

a. The following ship's boats unload the majority of the equipment and supplies from transport type vessels:

- (1) Under ideal conditions, the LCVP has a capacity of 36 troops or 8,100 pounds of cargo. It normally unloads two or three cargo nets of bulk cargo, or a ¼-ton truck and trailer.
- (2) The LCM(3) and LCM(6) have capacities of 60,000 and 68,000 pounds respectively under ideal conditions. In unloading transport ships, the LCM is used primarily to unload vehicles which are over the carrying capacity of the LCVP. Loaded LCM's may be transported to the objective area in LSD's (fig. 27).



*Figure 27. LCM loaded with 155-mm howitzer and prime mover.*

b. In addition to ship's boats, the following types of landing craft may be used to assist in unloading transport ships:

- (1) The LST may be used to unload APA's and AKA's by mooring so that two hatch sections may be unloaded simultaneously. As the LST has no cargo loading gear, the APA or AKA booms are used. Though bulk cargo may be loaded into the LST, this craft is best adapted to transfer vehicles and drums. Personnel may also be transferred to LST's. The main deck ramp may be used to transfer cargo from the main deck to the tank deck. However, when possible cargo should be loaded directly into the tank deck through the after cargo hatch on the LST.
  - (2) Because of its speed, the LSM is particularly useful for unloading vehicles for long hauls to the beach. Its open well deck and ramp also make possible the unloading of bulk cargo.
  - (3) The LSU is especially useful in unloading vehicles because of its open well deck and bow ramp.
  - (4) Pontoon barges may be used as floating fuel dumps, for unloading dunnage, or for other purposes. Because of their open decks, pontoon barges should only carry cargo that cannot be damaged by salt water or spray.
  - (5) The amphibious truck is most useful when bulk cargo is taken to inland dumps instead of being unloaded at the beach. When loaded aboard LST's, amphibious trucks may be used to carry supplies to units ashore in answer to emergency calls.
  - (6) The LVT may be used in the same manner as the amphibious truck; however, it is not recommended for long trips on land. The LVT may be used to advantage in crossing reefs after cargo has been transferred from landing craft.
- c. See Appendix IV for characteristics of amphibious force vessels.

## APPENDIX I

### REFERENCES

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- FM 60-5      Amphibious Operations, Battalion in Assault Landings.  
TM 9-2853    Preparation of Ordnance Matériel for Deep Water Fording.  
TM 38-230    Preservation, Packaging, and Packing of Military Supplies and Equipment.  
SR 55-720-1   Preparation for Oversea Movements of Units (POM).  
SR 746-30-5   Marking of Oversea Supply.

#### NAVY DEPARTMENT PUBLICATIONS

- USF 63      Amphibious Instructions, Landing Forces. 1947.  
USF 66      Tactical and Operational Instructions, Amphibious Forces. 7 July 1947.

## APPENDIX II

### SHIP'S LOADING CHARACTERISTICS PAMPHLET

---

#### 1. Contents

The ship's loading characteristics pamphlet contains, in a concise and convenient form, all data of interest to units to be embarked. It is essential that the data be complete and accurate, as the detailed plans for embarkation and loading may frequently be prepared well in advance of the arrival of the ship or of the ship's combat cargo officer at the embarkation area.

#### 2. Miscellaneous Instructions

If no characteristics pamphlet exists, the unit loading officer must prepare one. The following miscellaneous instructions will guide him in preparing this pamphlet, and also in understanding those already prepared:

- a.* Tie in all obstructions and hatches from two directions.
- b.* Make all measurements parallel or at right angles to the bulkheads.
- c.* Label all drawings with hatch number and deck level.
- d.* Compute square foot and cubic foot capacities.
- e.* Measure clearance to coaming, girders, boards, and overhead obstructions.
- f.* Note any fire fighting installations in troop cargo spaces.
- g.* When a deck is used for troop berthing but has removable bunks on the square of the hatch, prepare a separate scale drawing of the hatch square.
- h.* All troop cargo spaces, including all obstructions, etc., must be to a scale of  $\frac{1}{8}$  inch to 1 foot.
- i.* The stowage diagram should include all measurements necessary to give a complete picture for template loading of each deck level.

#### 3. Sample

The following pages of this section constitute a sample ship's loading characteristics pamphlet.

---

# **Ship's Loading Characteristics Pamphlet**

**U.S.S. ROCKWALL APA-230**

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SHIP'S LOADING  
CHARACTERISTICS PAMPHLET

APPROVED 30 JANUARY 1952

H. P. THOMSON  
CAPTAIN U.S. NAVY  
COMMANDING U.S.S. ROCKWALL ( APA 230 )

BY



R. PERKINS  
LT. COMDR. U.S.N.R.  
EXECUTIVE OFFICER

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SECTION ONE

TRANSPORT CHARACTERISTICS U.S.S. ROCKWALL (APA-230)

1. PRINCIPAL CHARACTERISTICS:

Type hull. . . . . VC-2  
Length overall. . . . . 455'3"  
Beam. . . . . 62'2"  
Maximum draft. . . . . 24'0"  
Maximum Speed (knots). . . . . 18  
Cruising speed (knots). . . . . 17  
Steaming radius (miles). . . . . 9,755  
Displacement, normal load, tons. . . . . 12,020  
Fuel Oil capacity (gallons). . . . . 367,910  
Potable fresh water capacity (gallons). . . . . 137,790  
Daily distiller capacity (gallons). . . . . 40,000

2. TROOP ACCOMMODATIONS:

	<u>Standing Bunks</u>	<u>Emergency Bunks</u>	<u>Space</u>	<u>Location</u>
(a) <u>OFFICER BERTHING:</u>				
CO of troops	1	0		Cabin Deck
Exec. Officer	1	0	SR-0106	Boat Deck
Other Troop Officers	83	0	A-105-AEL	Main Deck
<u>TOTAL</u>	85	0		
(b) <u>ENLISTED BERTHING:</u>				
Compartment ABLE	182	0	A-102-L	Main Deck
Compartment BAKER	295	0	A-203-L	Second Deck
Compartment CHARLIE	173	0	A-301-L	Third Deck
Compartment DOG	318	30	A-302-LT	Third Deck
Compartment EASY	276	45	C-202-AL	Second Deck
Compartment FOX	267	40	C-303-L	Third Deck
Compartment (MCO's)	25	0	A-204-L	Second Deck
<u>TOTAL</u>	1536	115		
(c) <u>TOTAL BERTHING:</u>				
Troop Officers				85
Troop Enlisted				1536
Troop Enlisted ( Emergency Bunks )				115
TOTAL BERTHING WITH EMERGENCY BUNKS IN PLACE				1736
TOTAL BERTHING WITHOUT EMERGENCY BUNKS				1621
(d) <u>TROOP OFFICE SPACE:</u>				
		<u>Location</u>		<u>Capacity</u>
Adjutant & Message Center		A-105-AEL		Two Desk
Conference Room		A-105-AEL		Equiped

(f) TROOP TOILET ACCOMMODATIONS:

		<u>ENLISTED</u>			
<u>Space</u>	<u>Location</u>	<u>Showers</u>	<u>Toilet Seats</u>	<u>Urinals</u>	<u>Wash Basins</u>
A-102-L	Main Deck, Stbd	4	15	4	22
A-102*L	Main Deck, Port	4	15	4	22
A-105-L	Main Deck, Stbd	4	8	2	12
A-105*L	Main Deck, Port	4	8	2	12
C-101-10L	Main Deck, Port	4	11	2	15
C-101-7L	Main Deck, Stbd	4	11	2	15
<u>OFFICERS:</u>					
A-105-AEL	Main Deck, Amidships	5	6	4	10
<u>TOTAL</u>		29	64	20	108

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U.S.S. ROCKWALL ( APA 230 )

2. TROOP ACCOMODATIONS: ( CONT'D )

(g) Radio equipment available for troop use: ---- NONE

3. TROOP CARGO ACCOMODATIONS:

Cargo deadweight tonnage. . . . .	3,030
Bale cubic capacity (total) . . . . .	102,236
Reefer cargo capacity (total) . . . . .	*
Troop Ammunition capacity (Cu.Ft.) . . . . .	9,207
Troop Gasoline capacity (Cu.Ft.) . . . . .	8,202
Troop Pyrotechnic locker capacity (Cu.Ft.) . . . . .	*

\*NOTE: Limited space available by special arrangement.

Sling, 15-ton Cap. Spreader, Vehicle handling, 1" wood. . . . .	3
Sling, 5-ton Cap. Spreader, Vehicle Handling, 1" Wood.. . . .	3
Nets, Cargo . . . . .	125
Pallets, wood . . . . .	None
Vehicle Wheel Nets, Manila. . . . .	None
Salmon boards . . . . .	6
Fork lifts . . . . .	None
Chains. . . . . 84 : Turn Buckles. . . . .	42

\*NOTE: Swinging booms on number 1, 2, and 4 hatches can only be used on one side at a time.

TROOP CARGO SPACE:

HOLD	DECK	HATCH OPENING	MIN. CLEARANCE	BOOMS TONS	Sq. Ft.	CU. FT.
1*	3rd	17'11" x 11'3"	23'	2-10; 2-5	209	4,807
1	1st Plat.	17'11" x 11'3"	5'2"	2-10; 2-5	2,164	11,185
1**	Lower Hold	16'11" x 10'11"	5'3"	2-10; 2-5	1,424	7,957
2	3rd	14'2" x 22'3"	7'1"	2-10	1,164	8,247
2	Lower Hold	14'2" x 21'10"	9'0"	2-10	19 62	17,775
4A	3rd Reefer	22'4" x 11'1"	11'0"	2-10; 2-5	250	2,759
4A***	Lower Hold	each				
	Port & Stbd	11'2" x 7'8"	7'10"	2-10; 2-5	1,032	8,202
4B*	2nd	21'8" x 9'11"	18'0"	2-10; 2-5	224	4,032
4B*	3rd	21'8" x 9'3"	12'0"	2-10; 2-5	192	2,304
4B	Lower Hold (ea)	7'5" x 7'5"	8'0"	2-10; 2-5	624	5,176
**	Troop Ammunition Magazine has	147 Sqft, and	1250 Cu. Ft.			
5	2nd	22'0" x 33'0"	10'9"	1-35; 2-10	2,454	26, 487
5	3rd	22'0" x 33'0"	9'2"	1-35; 2-10	1,576	14,448
TOTALS ( With removeable bunks removed ) . . . . .					13,175	113,379
TOTALS ( With removeable bunks in place ) . . . . .					12,550	102,236

NOTE:

\* Hatch available only when not used by troops for berthing  
\*\* Ammunition Stowage  
\*\*\* Gasoline Stowage

4. LANDING CRAFT:

LCM (6) . . . . .	2
LCVP . . . . .	22
LCVPL . . . . .	1
LCPR . . . . .	1

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U.S.S. ROCKWALL ( APA 230 )

5. ARMAMENT AND FIRE CONTROL EQUIPMENT:

<u>TYPE</u>	<u>GUNS</u>
40 mm Quad. . . . .	1
40 mm Twin. . . . .	4
20 mm Twin. . . . .	8
5"/38 Cal. . . . .	1

<u>FIRE CONTROL:</u>	<u>TYPE</u>	<u>DIRECTORS</u>	<u>RANGE FINDER</u>
	Mark 51	5	
	Mark 65		1

6. RADAR INSTALLATIONS:

<u>MODEL</u>	<u>LOCATION</u>	<u>DECK</u>
SG-1	CIC	Bridge Deck
SA-2	CIC	Bridge Deck
VD-2	Wheel House	Bridge Deck

7. PRINCIPAL RADIO EQUIPMENT OTHER THAN FOR TROOP USE:

<u>MODEL</u>	<u>LOCATION</u>	<u>DECK</u>
1 TDE	Radio Central	Cabin Deck
1 TAJ-15	Emergency	Main Deck
1 TEK	Radio Central	Cabin Deck
1 TBS-5	Radio Central	Cabin Deck
1 TCP-1	Radio Central	Cabin Deck
2 TCS	Radio Central	Cabin Deck
1 TDC	Radio Central	Cabin Deck
1 SCR-524	CIC	Bridge Deck
2 SCR-608	Flag Plot	Flying Bridge
1 RAK	Radio Central	Cabin Deck
1 RAK	Emergency	Main Deck
1RAL	Emergency	Main Deck
1 RAL	Radio Central	Cabin Deck
1 RAO	Radio Central	Cabin Deck
2 REB	Radio Central	Cabin Deck
2 REC	Radio Central	Cabin Deck
1 RBL	Radio Central	Cabin Deck
2 RBS	CIC	Bridge Deck
2 REG	Radio Central	Cabin Deck

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PROFILE PLAN  
U.S.S. ROCKWALL (APA 230)



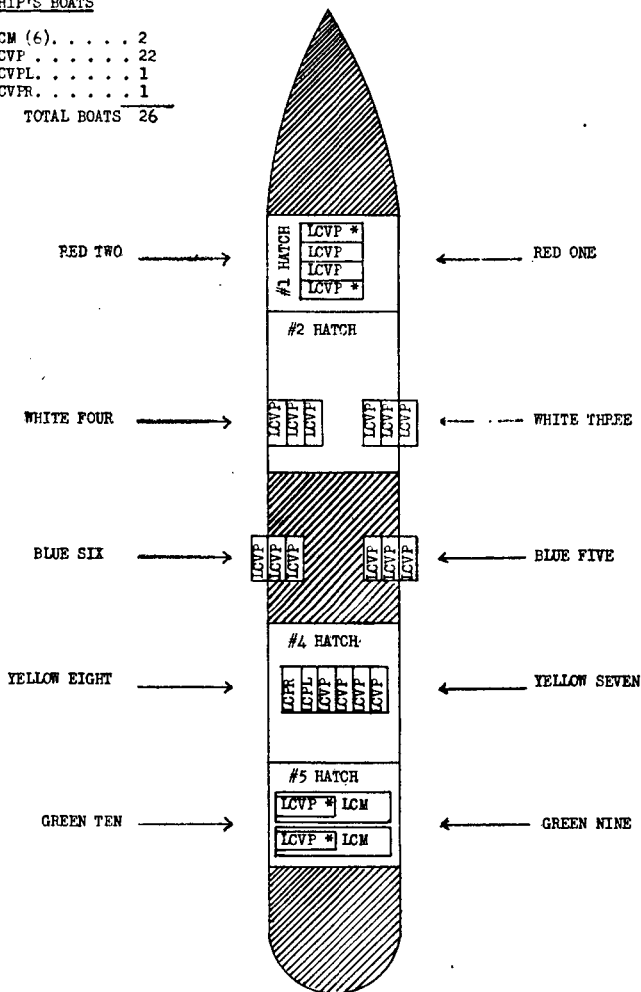
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LOCATION OF BOATS AND DEBARKATION STATIONS

SHIP'S BOATS

LCM (6) . . . . . 2  
LCVP . . . . . 22  
LCVPL . . . . . 1  
LCVPR . . . . . 1  
TOTAL BOATS 26



\* Denotes boats Nested

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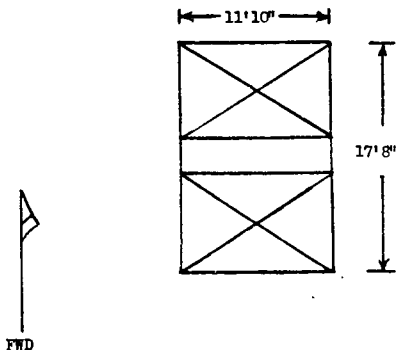
SECTION TWO

CARGO HOLD DIAGRAMS

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U.S.S. ROCKWALL ( APA 230 )

Third Deck, # 1 HOLD

Hatch opening overhead: 17'11" x 11'3"  
Cubic Feet: 4807  
Square Feet: 209

Clearance to girders: 23'0"  
Clearance to Coaming: \*  
Clearance to Boards : \*  
Minimum Clearance : 23'0"

Booms: Two 10-ton; Two 5-ton

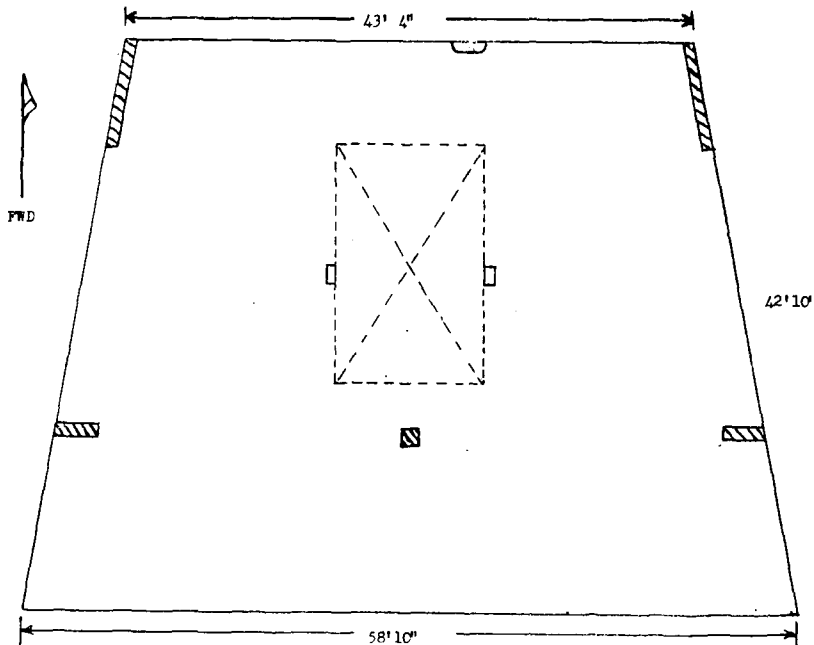
Scale: 1/8 inch = 1 foot

\* NOTE: This hatch square available, by special arrangement, for high priority cargo, when not used for troop berthing.

16 Bunks overlap the square of the hatch

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U.S.S. ROCKWALL ( APA 230 )

First Platform, # 1 HOLD

Hatch Opening overhead: 17'11" x 11'5"  
Cubic Feet: 11,185  
Square Feet: 2,164

Clearance to Girders: 6'5"  
Clearance to Coaming: 5'9"  
Minimum Clearance : 5'2"

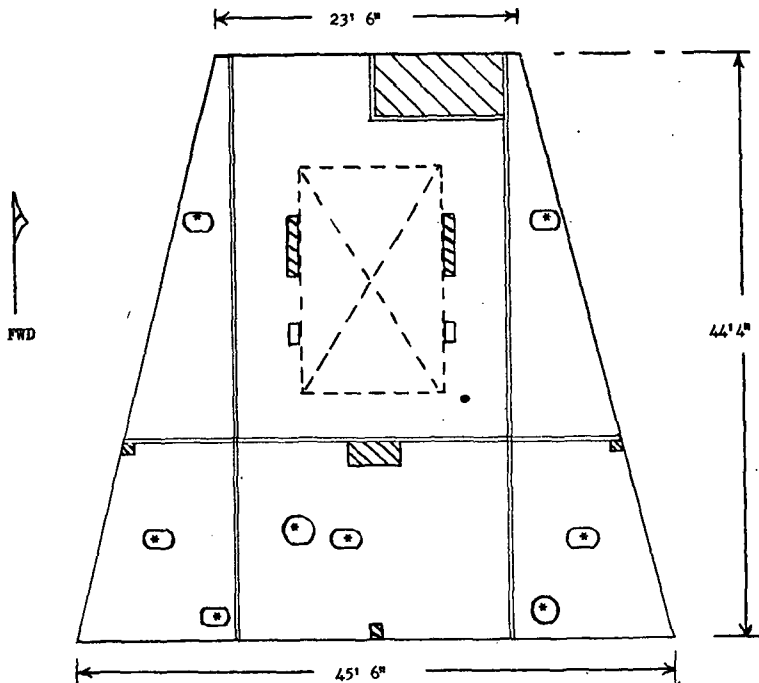
Booms: Two 10-ton; Two 5-ton

Scale: 1/8 inch = 1 foot

\* NOTE: Raised 8" off deck

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U.S.S. ROCKWALL ( APA 230 )

Lower Hold, # 1 HOLD ( Troop Ammunition )

Hatch Opening overhead: 16'11" x 10'11"

Cubic Feet: 7,957

Square Feet: 1,424

Clearance to Girders: 6'0"

Clearance to Coaming: 5'10"

Clearance to Boards: 6'8"

Minimum Clearance : 5'3"

Booms: Two 10-ton; Two 5-ton

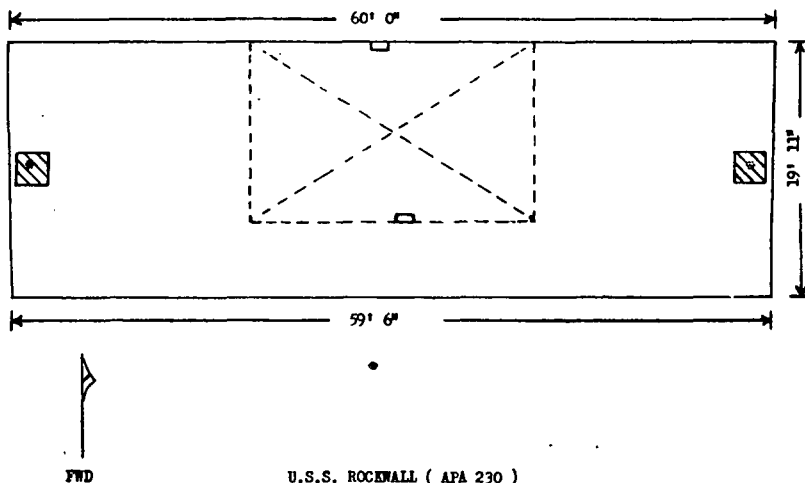
Scale: 1/8 inch = 1 foot

\* NOTE: Raised 8" off deck  
 == Removeable stanchions

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U.S.S. ROCKWALL ( APA 230 )

Third Deck, # 2 HOLD

Hatch Opening overhead: 14'2" x 22'3"

Cubic Feet: 8,247

Square Feet: 1,164

Clearance to Girders: 8'5"

Clearance to Coaming: 7'8"

Clearance to Boards : 9'10"

Minimum Clearance : 7'1"

Booms: Two 10- Ton

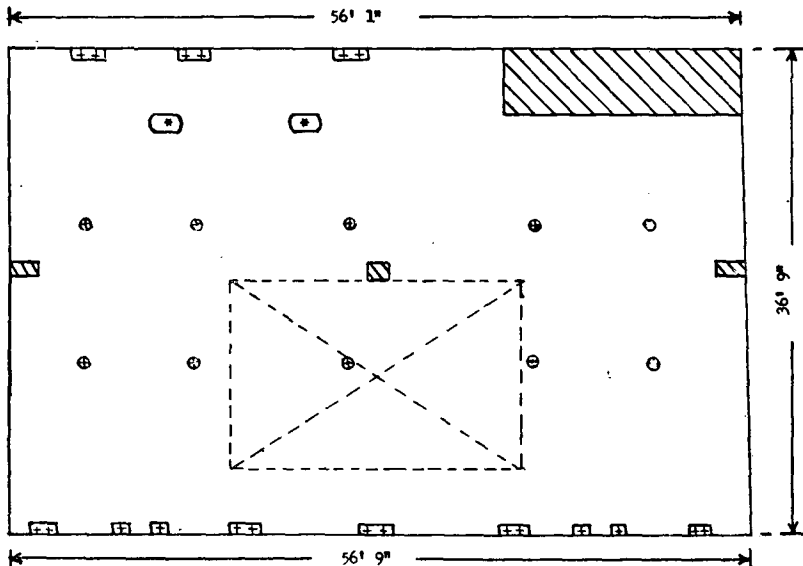
Scale: 1/8 inch = 1 Foot

\* NOTE: Raised 8" off deck

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U.S.S. ROCKWALL ( APA 230 )

Lower Hold, # 2 HOLD

Hatch Opening overhead: 14'2" x 21'10"

Cubic Feet: 17,775

Square Feet: 1,962

Clearance to Girders: 10'2"

Clearance to Coaming: 9'5"

Clearance to Boards : 11'5"

Minimum Clearance : 9'0"

Booms: Two 10-Ton

Scale: 1/8 inch = 1 Foot

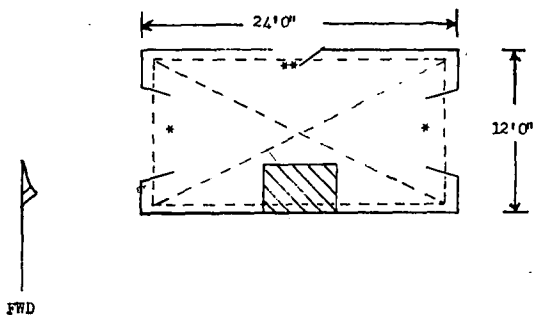
\* NOTE: Raised 8" off deck

⊗ Cloverleaves

⊞ Hold down pads, located against skin of ship

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U.S.S. ROCKWALL ( APA 230 )

Third Deck (Reefer Hatch) #4A HOLD

Hatch Opening overhead: 22'4" x 11'1"  
Cubic Feet: 2,759  
Square Feet: 250

Clearance to Girders: 32'0"  
Clearance to Coaming: 11'0"  
Clearance to Boards : 11'0"  
Minimum Clearance : 11'0"

Booms: Two 10-ton; Two 5-ton

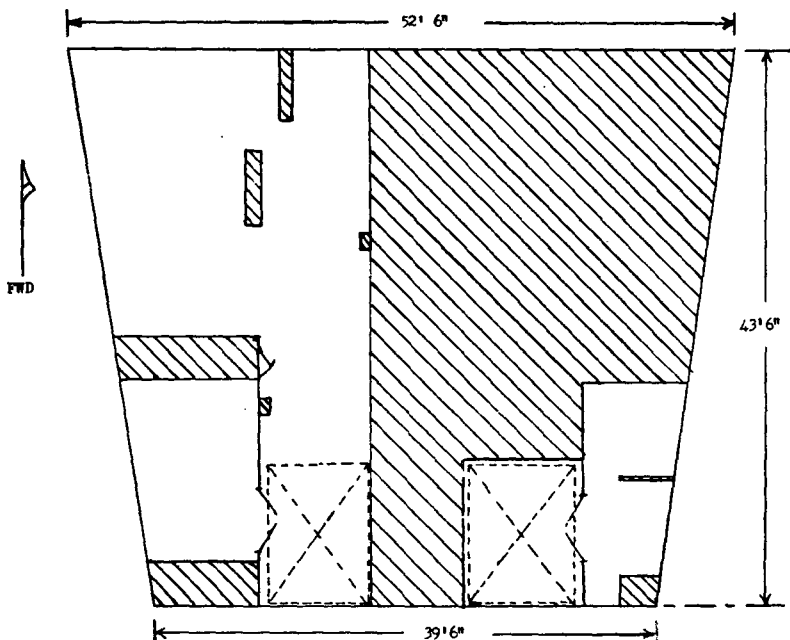
Scale: 1/8 inch = 1 Foot

\* NOTE: Doors to Reefer (Open Inboard)  
\*\* Access door

STOWAGE FOR HIGH PRIORITY VEHICLES  
AND D-1 CARGO ONLY

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U.S.S. ROCKWALL ( APA 230 )

Lower Hold, # 4A HOLD ( Gasoline Storage, Trp )

Hatch Opening overhead: (ea.) 11'2" x 7'8"

Cubic Feet: 8,202

Square Feet: 1,032

Clearance to Girders: 9'4"

Clearance To Coaming: 8'10"

Clearance to Boards : 10'0"

Minimum Clearance : 8'0"

Gas Lockers : 7'10"

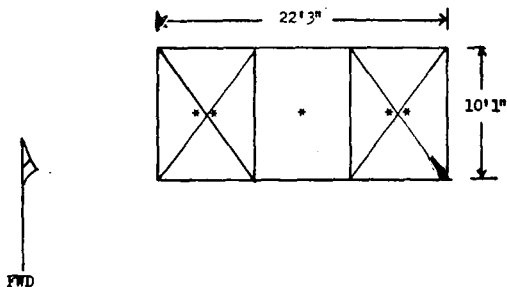
Booms: Two 10-ton; Two 5-ton

Scale: 1/8 inch = 1 Foot

NOTE: Stbd Gas Locker-- 82 Drum capacity  
Port Gas Locker--104 Drum capacity

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U.S.S. ROCKWALL ( APA 230 )

Second Deck, # 4B HOLD

Hatch Opening overhead: 21' 8" x 9' 11"  
Cubic Feet: 4,032  
Square Feet: 224

Clearance to Girders: 21' 0"  
Clearance to Coaming: 18' 0"  
Clearance to Boards : 21' 10"  
Minimum Clearance : 18' 0"

Booms: Two 10-Ton; Two 5-ton

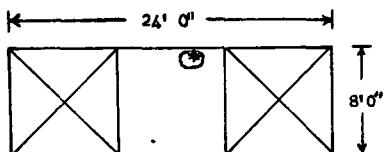
Scale: 1/8 inch = 1 Foot

\* NOTE: Wooden Hatch covers  
\*\* Hinged Pontoon Hatch

This Hatch square is in troop berthing compartment C-202-AL. Is available for high priority cargo by special arrangement-- No bunks installed on this hatch square.

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U.S.S. ROCKWALL (APA 230)

Third Deck. # 4B HOLD

Hatch Opening overhead: 21'8" x 9'3"  
Cubic Feet: 2,304  
Square Feet: 192

Clearance to Girders: 12'6"  
Clearance to Coaming: 12'0"  
Clearance to Boards: 13'0"  
Minimum Clearance: 12'0"

Booms: Two 10-ton; Two 5-ton

Scale: 1/8 inch = 1 Foot

\*NOTE: Access trunk to shaft alley

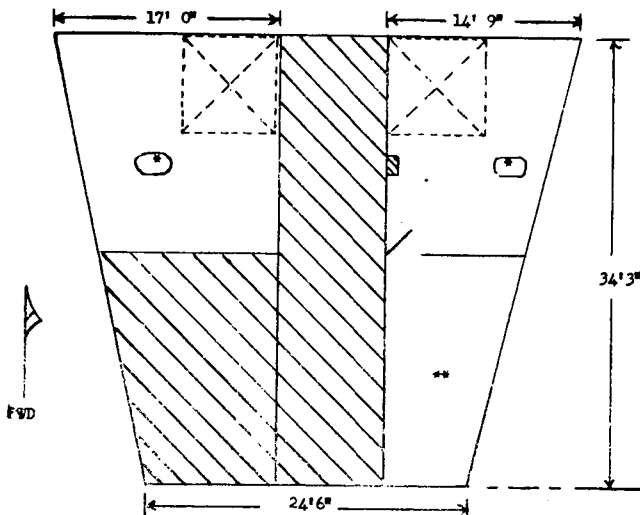
This Hatch square available, by  
special arrangement, for high  
priority cargo.

Overhead Hatch off set 2'6" to Port.

10 Bunks overlap stbd side of Hatch-  
Square.

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U.S.S. ROCKWALL (APA 230)

Lower Hold, # 4 B HOLD (Ammunition Stowage stbd aft)

Hatch Opening overhead: (each) 7' 5" x 7' 5"

Cubic Feet: 5,176

Square Feet: 624

Clearance to Girders: 8' 8"

Clearance to Coaming: 9' 0"

Clearance to Boards: 9' 0"

Minimum Clearance : 8' 0" Port side  
8' 6" Stbd side

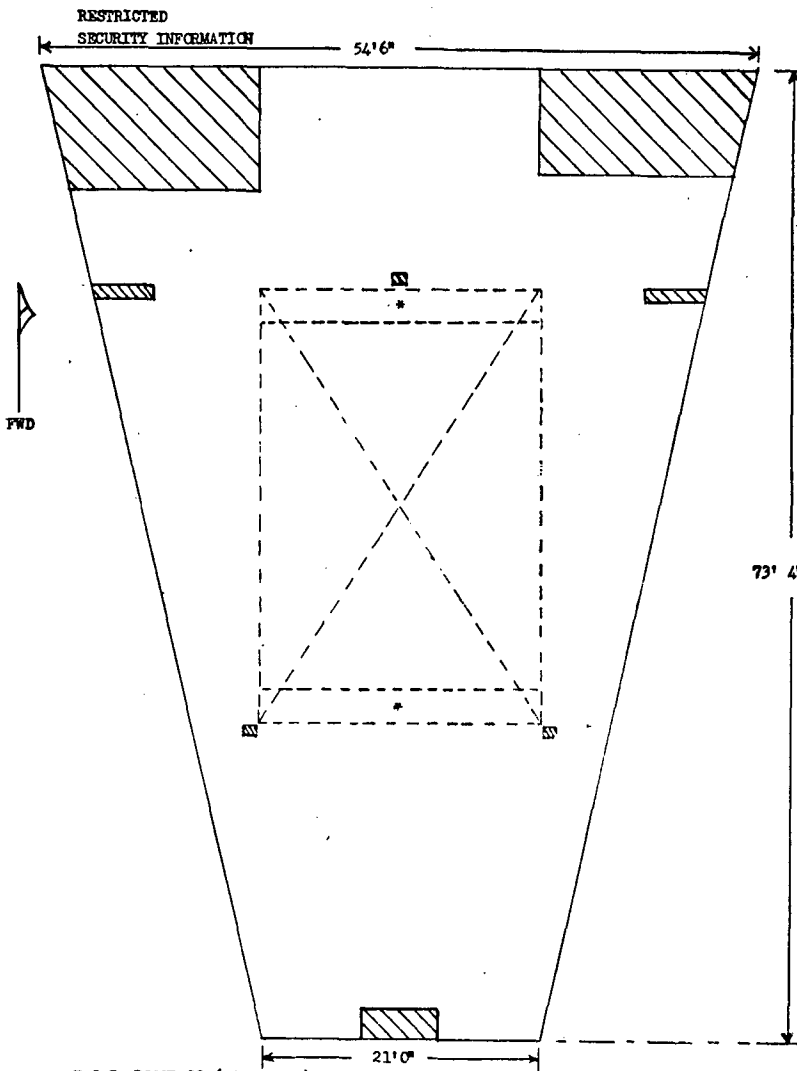
Booms: Two 10-ton; Two 5-ton

Scale: 1/8 inch = 1 foot

\*NOTE: Raised 8" off deck

\*\* Troop Ammo Magazine has 147 sq. ft. and  
1250 cu. ft.

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U.S.S. ROCKWALL ( APA 230 )

Second Deck, # 5 HOLD

Hatch Opening overhead: 22' x 33'  
 With Roller Beams : 22' x 28'6"  
 Cubic Feet: 26,487  
 Square Feet: 2,454

Clearance to Girders: 15'9"  
 Clearance to Coaming: 11'10"  
 Clearance to Boards : 17'1"  
 Minimum Clearance : 10'9"

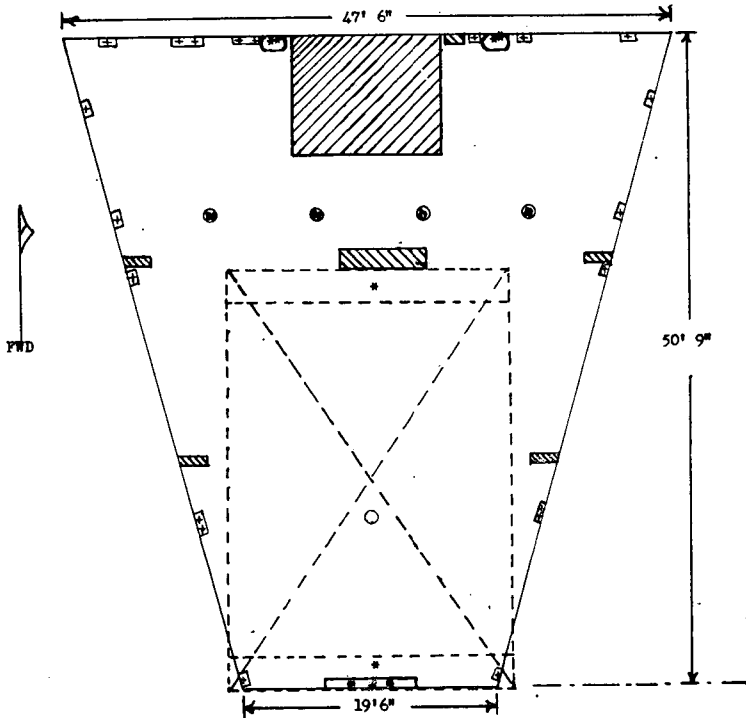
Booms: One 35-ton; Two 10-ton  
 Scale: 1/8 inch = 1 Foot

\* NOTE: Removeable Girders

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U.S.S. ROCKWALL ( APA 230 )

Third Deck, # 5 HOLD

Hatch Opening overhead: 22' x 33'

Cubic Feet: 14,448

Square Feet: 1,576

Clearance to Girders: 10'2"

Clearance to Coaming: 10'0"

Clearance to Boards: 12'2"

Minimum Clearance: 9'2"

Booms: One 35-ton; Two 10-ton

Scale: 1/8 inch = 1 Foot

\* NOTE: Removeable Girders

\*\* Raised 6" off deck

● Cloverleaves

⊕ Hold down pads, located against skin of ship

# Holding down pad on after bulkhead 1' off deck

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U.S.S. ROCKWALL ( APA 230 )

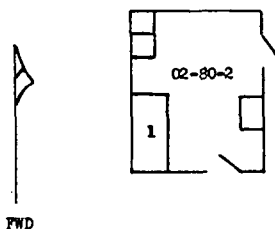
SECTION THREE

TROOP BERTHING DIAGRAMS

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U.S.S. ROCKWALL ( APA 230 )

Cabin Deck

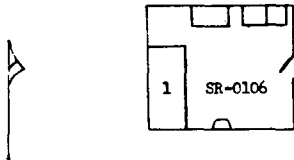
02-80-2

1 Bunk ( Commanding Officer of Troops )

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U.S.S. ROCKWALL ( AFA 230 )

Boat Deck

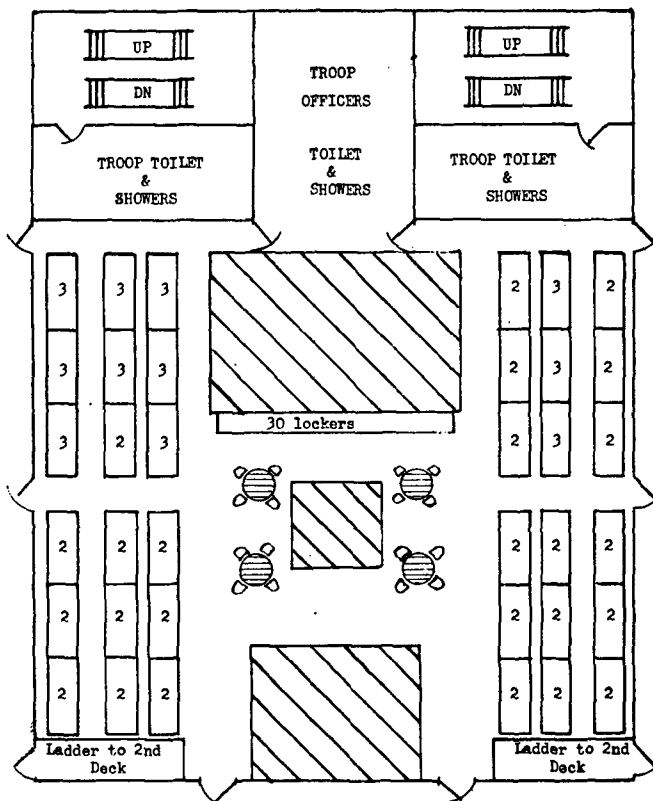
Stateroom 0106

1 Bunk ( Executive Officer of Troops )

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U.S.S. ROCKWALL ( APA 230 )

Main Deck

Troop Officers Berthing Compartment

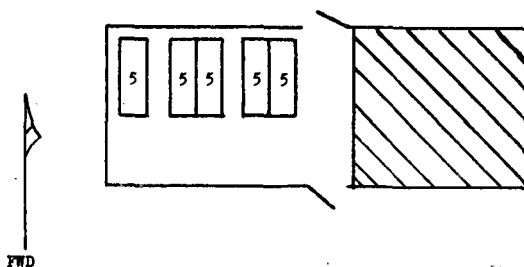
A-105-AEL

83 Bunks

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U.S.S. ROCKWALL ( APA 230 )

Second Deck

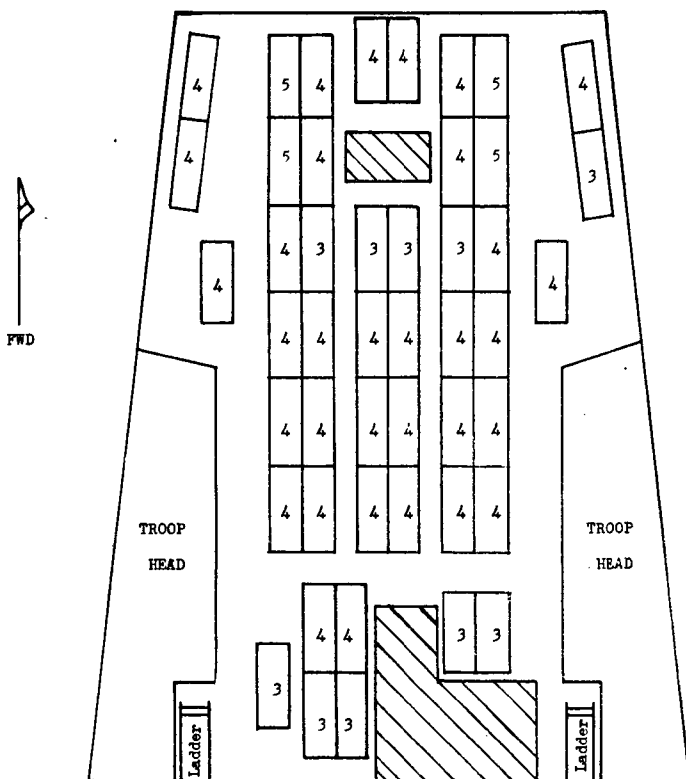
NCO Berthing Compartment (A-204-L)

25 Bunks

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U.S.S. ROCKWALL ( APA 230 )

Main Deck, Fore'sle

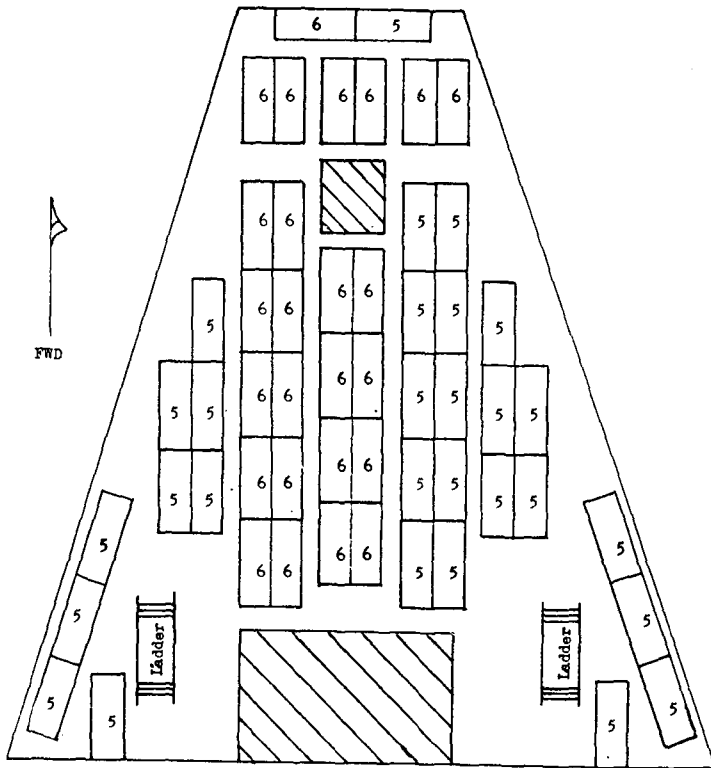
Troop Berthing Compartment A-102-L

182 Bunks

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U.S.S. ROCKWALL ( APA 230 )

Second Deck, Poc'sle

Troop Berthing Compartment A-203-L

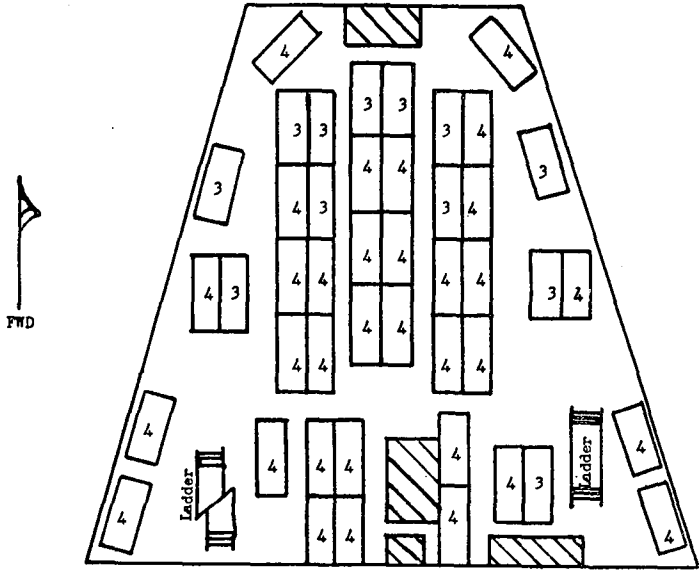
Head, Main deck, Foc'sle Compartment A-102-L

295 Bunks

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U.S.S. ROCKWALL ( APA 230 )

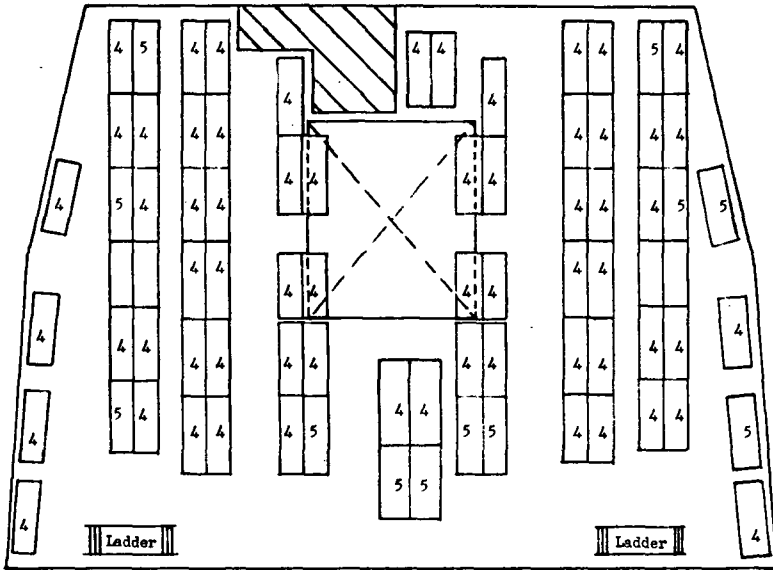
Third Deck, Fore'sle

Troop Berthing Compartment A-301 \_L  
Head, Main Deck, Fore'sle Comp. A-102-L

173 BUNKS

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U.S.S. ROCKWALL ( APA 230 )

Third Deck, # 1 HOLD

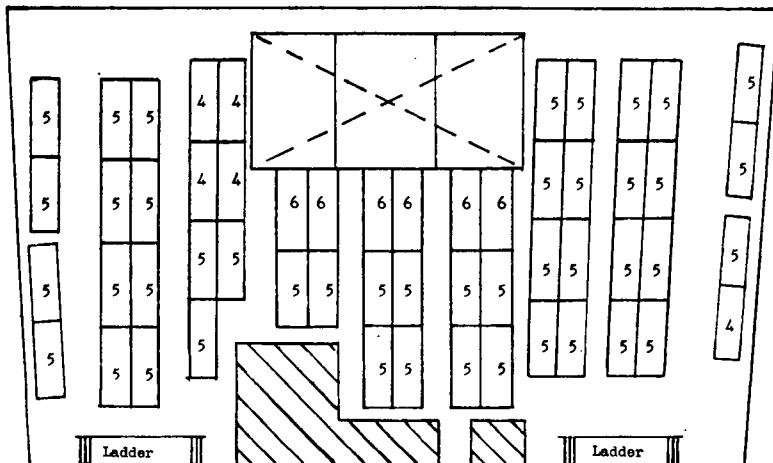
Troop Berthing Compartment A-302-LT  
Troop Head Facilities are located  
in Compartments, Port and Stbd,  
A-105-AEL Main Deck.

318 BUNKS  
Including 16 bunks overlapping  
the Square of the Hatch.

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U.S.S. ROCKWALL ( APA 230 )

Second Deck, #4 HOLD

Troop Berthing Compartment C-202-AL

Troop head facilities are located in  
compartments on Main Deck, C-101-10L (Port),  
and C-101-7L (Stbd)

276 BUNKS

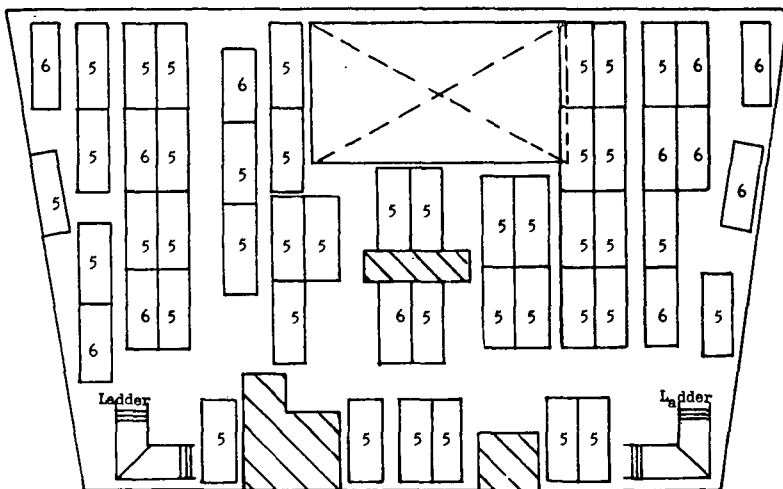


FWD

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U.S.S. ROCKWALL ( APA 230 )

Third Deck, # 4 HOLD

Troop Berthing Compartment C-303-L

Head facilities located in compartments  
C-101-10L (Port) and C-101-7L ( Stbd )  
on Main Deck.

267 Bunks--- Including 10 partially  
overlapping sq. of the  
hatch

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CHANGE NO.	DATE OF CHANGE	AUTHORITY	CHANGED BY

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## **APPENDIX III**

### **TIME FACTORS FOR EMBARKATION AND DEBARKATION**

#### **1. Factors To Be Considered**

The time required for stowing a combat load on APA's and AKA's depends on many factors, such as the ship's characteristics, dock facilities, speed of working parties, weather, slings and cargo nets available, number and type of boats (when wharf facilities are not available), experience of ship's crew, morale of troops, amount of cargo to be embarked, etc. Time required for unloading depends upon the amount of cargo to be unloaded, characteristics of the ship, handling gear available, enemy action, landing craft and barges available, experience of ship's crew and unloading details, size of shore party, weather, whether working in daylight or darkness, etc.

#### **2. Method of Determining Time Elements**

Although many factors are to be considered in determining the time required for loading and unloading APA's and AKA's, it is essential that an average figure be determined for planning. The best method of arriving at an average time element is to consolidate and digest experience figures. An average figure may be used for any operation by adding or subtracting estimated time in accordance with advantages or disadvantages encountered in the particular operation.

#### **3. Average Time Requirements**

a. As an example, it may be assumed that under ideal conditions an APA may be loaded with 600 tons of cargo and normal complement of personnel in 24 hours, and an AKA in 72 hours. To allow for breakdowns or other delaying factors, two or more additional days should be allowed for loading a transport division consisting of approximately four APA's and one AKA.

b. Where feasible, it is well to load APA's of each transport division simultaneously and AKA's of all transport divisions at the same time and after all APA's are loaded. This method has the advantage of holding most of the unit's transportation until the AKA's are loaded. Under these conditions, using the same berths and cargo assembly areas

successively, a transport squadron may be loaded in about 9 days, allowing 1 day between loadings to spot cargo and move ships.

*c.* Under ideal conditions, an APA loaded with 600 tons of cargo may be unloaded within 10 hours, and an AKA loaded with 1,500 tons of cargo may be unloaded within 20 hours. However, in the average operation 2 to 3 days will be required for unloading an APA and 3 to 5 days for an AKA.

## APPENDIX IV

### AMPHIBIOUS FORCE VESSELS AND CRAFT

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#### 1. Groups

Amphibious force vessels and craft are divided into groups as follows:

- a.* Transport types (ships): APA, AKA, high speed transports (APD), LSV, LSD.
- b.* Landing ships: LST, LSM, LSU.
- c.* Landing craft: LSI, LCS (L), LSFF.
- d.* Small landing craft: LCR (S), LCR (L), LCP (R), LCVP, LCM, LCC.
- e.* Lighters, pontoon barges, causeways.\*
- f.* Amphibious vehicles: LVT, amphibious trucks.
- g.* Gunfire support craft: LSM (R), LCS (L).\*

#### 2. Break-Down

Table III gives a detailed break-down of amphibious force vessels and craft.

---

\*Characteristics of groups *e* and *g* will not be included in this appendix.

Table III. *Characteristics of Amphibious Force Vessels and Craft*

CHARACTERISTICS OF RUBBER BOATS

Name	Symbol	Length	Beam	Capacity		Draft (loaded)		Speed (knots)	Range (miles)	Crew	Weight, empty (tons)	Example of material carried
				Troop	Cargo (tons)	For-ward	Aft					
Landing craft, rubber (small).	LCR(S)	12'5"-----	5'11"-----	7	0	Very shallow-----		3½-4½ w/8-hp. motor.	-----	0	278 lb. w/ motor.	Personnel only.
Landing craft, rubber (large).	LCR(L)	14'8"-----	7'9"-----	10	0	Very shallow-----		3½-4½ w/8-hp. motor.	-----	0	474 lb. w/ motor.	Personnel only.

CHARACTERISTICS OF SMALL LANDING CRAFT

Landing craft, personnel (ramped).	LCP(R)	35'10"-----	10'9"-----	36 or 4.05-----	-----	-----	3'6"-----	11-----	69 (loaded)-----	3	6.75-----	Bulk cargo only.
Landing craft, vehicle and personnel.	LCVP	35'9"-----	10'11½"-----	36 or 4.05-----	-----	-----	3'0"-----	9-----	102-----	3	9.35-----	1¼-ton truck and 1¼-ton trailer.
Landing craft, mechanized (mark 3).	LCM(3)	50'0"-----	14'1"-----	100 or 30-----	3'6"-----	-----	4'6"-----	11-----	850 at 6¼ knots-----	4	26-----	1 30-ton tank, or 1 2½-ton truck and 1 1-ton trailer.
Landing craft, mechanized (mark 6).	LCM(6)	56'0"-----	14'1"-----	120 or 34-----	3'6"-----	-----	4'6"-----	11-----	850 at 6¼ knots-----	4	29.5-----	1 35-ton tank, or 1 2½-ton truck and 1 1-ton trailer.
Landing craft, control (mark 2).	LCC(2)	56'0"-----	14'6"-----	8-----	0-----	-----	3'11"-----	13.5-----	500 at 10 knots-----	9	25-----	None.

# CHARACTERISTICS OF LANDING CRAFT

Landing ship, infantry (large), 1 class.	LSI(L)	160'0"	23'0"	188 or 75	5'4"	5'11"	15.5	4,000 at 12 knots (loaded).	24	24	75 tons, bulk cargo.
Landing ship, infantry (large), 351 class.	LSI(L)	160'3 3/4"	23'3"	209 or 75	5'7 3/4"	5'7 3/4"	15.5	8,000 at 12 knots.	29	209.2	75 tons, bulk cargo.
Landing craft, support (large), mark 3.	LCS(L)3	158' 1/2"	23'3"	0	4'9"	6'6"	15.5	5,500 at 12 knots.	70	250	None.
Landing ship, flotilla flagship.	LSFF	160'0"	23'0"	0	5'4"	5'11"	15.5	8,000 at 12 knots.	24	194	None.

# CHARACTERISTICS OF AMPHIBIOUS VEHICLES

Landing vehicle, tracked (mark 3).	LVT(3)	24'2"	10'10"	25 <sup>a</sup> or 4.	No consideration need be made for the draft of amphibious vehicles.	18L <sup>b</sup> , 4.5W <sup>c</sup>	175L <sup>b</sup> , 75W <sup>c</sup>	3-4	14	4 tons, bulk cargo.
Landing vehicle, tracked (mark 4).	LVT(4)	26'1"	10'8"	24 or 4		20L <sup>b</sup> , 5.0W <sup>c</sup>	150L <sup>b</sup> , 50W <sup>c</sup>	3-4	13.7	1 1/4-ton truck.
Landing vehicle, tracked (armored) (mark 4).	LVT(A)(4)	26'1"	10'8"	0	0	15L <sup>b</sup> , 5.2W <sup>c</sup>	150L <sup>b</sup> , 75W <sup>c</sup>	3-4	17.5	None.
Landing vehicle, tracked (armored) (mark 5).	LVT(A)(5)	26'1"	10'8"	0	0	15L <sup>b</sup> , 5.2W <sup>c</sup>	150L <sup>b</sup> , 75W <sup>c</sup>	5	17.5	None.
Truck, 2 1/2-ton, 6 x 6, amphibious.	AMPH TRK	31'0"	9'9"	25 or 2.5		50L <sup>b</sup> , 5.5W <sup>c</sup>	240L <sup>b</sup> , 35W <sup>c</sup>	2	7.5	1 105-mm howitzer.
Trailer, 3-ton, 2-wheel, amphibious, cargo.	TRAILER	17'0"	7'6"	0	3			0	2.0	Bulk cargo only.

<sup>a</sup> Possible maximum, 30-36.

<sup>b</sup> L=land.

<sup>c</sup> W=water.

Table III. Characteristics of Amphibious Force Vessels and Craft—Continued

CHARACTERISTICS OF LANDING SHIPS

No.	No. ships in class	Class	Type	Troop capacity	Combat load (short tons)	Troop cargo (cu. ft.)	Troop cargo (sq. ft.)	LCM carried	LCVP carried	Length (overall)	Draft (ft.)
LST: 1,513, 531		1	Elevator, 10-ton capacity.		500 tons.	92,765	6,328, tk deck—4,500, main deck.	0	2-6	328'	Landing—500 tons, 3' 0" fwd, 9' 6" aft. Ocean-going—1,431 tons, 8' 0" fwd, 14' 4" aft.
514-530, 532 up		542	Ramp, 17-ton capacity.	• 167	Tank deck—17 LVT or 21 amph trk or 12 medium tk or 10 tk w/T6. Main deck—24 2½-ton trk or 44 ¼-ton trk.	92,765	6,328, tk deck—4,500, main deck.	0	2-6	328'	Landing—500 tons, 3' 0" fwd, 9' 6" aft. Ocean-going—1,431 tons, 8' 0" fwd, 14' 4" aft.
1153-1154	2	1153	Ramp, 25-ton capacity (apprx).	• 197	Tank deck—21 LVT. Main deck—35 2½-ton trk.	100,900	8,072, tk deck—6,238, main deck.	0	4	382'	Landing—560 tons, 3' 8" fwd, 10' 4" aft. Ocean-going—2,565 tons, 9' 9" fwd, 16' 1" aft.
LSM		1	Open well	• 54	5 medium or 3 hv tk or 6 LVT or 9 amph trk or 165 tons cargo.	21,027 (open well).	3,186	0	0	203'6"	Landing (full load)—165 tons, 3' 5" fwd, 7' aft. Ocean-going (full load)—387 tons, 4' 5" fwd, 8' aft. Landing—140 tons, 3'4" fwd, 4'0" aft.
LSU			Open well	8	3 medium tk or 165 tons cargo.	10,974	1,829	0	0	120'4"	

\* Troop capacity may be increased by berthing troops on coits.

Notes:

1. A boat space is the space and weight allowed one soldier with his individual combat equipment. It is 224 pounds or 13.5 cubic feet. When computing boat spaces required for cargo, use either the weight or the space occupied, whichever is greater. Hand carts, loaded or empty, require two boat spaces.

2. Running time may be computed from the formula  $t = \frac{3d}{s}$ , where

d=distance run in hundreds of yards

s=speed in knots (1½ mph)

t=running time in minutes.

Table III. Characteristics of Amphibious Force Vessels and Craft—Continued

CHARACTERISTICS OF TRANSPORT TYPE VESSELS

No.	No. ships in class	Class	Type	Troop capacity	Combat load (short tons)	Troop cargo (cu. ft.)	Troop cargo (sq. ft.)	LCM carried	LCVP carried	Length (overall)	Draft (ft.)
LSV:											
1, 2	2	Catskill	EX-CM	800	44 amph trk	126,765	15,700	0	14	454'	18.
3-6	4	Osage	EX-AN	800	19 LVT and 29 amph trk	157,325	17,136	0	14	451'	18.
LSD: 1-22, 25, 26, 27											
	332				3 LSU a or 18 LCM (6) or 41 LVT b or 47 amph trk b, or 25 tk w/T6 c	Open well deck.	16,691	0	2	458'	17.
APD:											
1-36		Manley	EX-DD	275	6 1/4-ton trk, 2 1-ton trk, 4 carts.	9,000		0	4	314'	12.
APA:											
37-139		Bates	EX-DE	170	6-10 tons.	9,000		0	4	306'	13
1, 11	2	Doyen		850	400	49,870	6,320	0	16	415'	19.
2, 3, 14-17	6	Harris	535	1,675	800	160,216	23,440	2-4	21	535'	31.
5	1	Barnett		1,530	600-800	133,000	11,140	2	21	487'	24.
6-9	4	Heywood	Conv USSB	1,300	600-800	129,388	12,400	3-4	20	507'	25.
10	1	H. Lee	Exchorda	1,000	600-700	142,305	13,856	2	15	475'	26.
12, 13	2	Dickman	535	2,400	600-800	171,788	12,000	6	31	535'	32.
18-20, 30	4	President	C-3 P&C	1,350	600-800	175,000	14,000	2	30	492'	27.
21, 28, 31, 32	4	Crescent City	X Daltia C-3 P&C.	1,210	600-800	120,000	14,000	3	31	491'	26.
25-27	3	Middleton	C-3 P&C	1,300	600-800	155,500	13,990	2	23	498'	27.
33-48, 92, 93, 95, 96, 99-102, 104, 100-116	36	Bayfield	C-3 SA2	1,650	600-800	170,000	11,321	2-4	23-276	492'	27.
49-51, 94, 98	5	Ormsby	C-2F	1,500	500-700	135,000	8,030	1-2	25-26	459'	26.
52-256, 91, 97, 103, 106	9	Sumter	C-3 SA3	1,300	600-800	175,000	10,699	1-4	18-24	492'	26.
57-88	32	Gilliam	S4BD1	800	300-400	85,000	6,500	0	15	426'	16.
89-90	2	O'Hara	C-381-A3	1,800	600-800	95,000	11,586	2	27	492'	25.
117-180, 187, 235	113	Victory	VC-2SAP5	1,550	500-700	50,000	10,013	2	22	455'	24.
Average troop load for planning purposes						80,000	7,000	2	22		

See footnotes at end of table.

Table III. Characteristics of Amphibious Force Vessels and Craft—Continued

CHARACTERISTICS OF TRANSPORT TYPE VESSELS

No.	No. ships in class	Class	Type	Troop capacity	Combat load (short tons)	Troop cargo (cu. ft.)	Troop cargo (sq. ft.)	LCM carried	LCVP carried	Length (over-all)	Draft (ft.)
AKA:											
1, 6-8, 11	5	Areturas	C-2	300	1,500-2,500	333,000	22,065	7-8	11-14	459'	26.
2-4, 12-14	6	Procyon	C-SF	200	1,500-2,500	350,000	25,575	7-9	11-15	459'	26.
9	1	Alhena	SC-2	150	1,500-2,500	415,745	33,494	8	10	480'	27.
10	1	Almaack	C-3E	200	1,500-2,500	373,140	32,343	7	11	473'	28.
15-20, 53-63	17	Andromeda	C-2-SB1	250	1,500-2,500	290,000	26,370	8	16	459'	26.
21-52	32	Artemis	S4-SE2BD1	250	500-700	117,000	8,533	2	12	428'	16.
64-87	24	Tolland	C-2S-AJ1	175	1,500-2,500	316,683	31,470	8	16	459'	26.
88-108	21	Uvalde	C-2	175	1,500-2,500	409,000	31,027	8	16	459'	26.
Average troop load for planning purposes.					2,000	290,000	20,000	8	16	-----	-----

Ships on active list 1 Jul 47: APA 18-21, 27, 30, 33, 36-38, 44-45, 217-220, 222, 224, 227, 236, 237.

Ships on active list 1 Jul 47: AKA 12-15, 19, 20, 22, 40, 53-61, 88, 95, 98, 100, 104-108.

<sup>a</sup> Additional vehicles may be carried when temporary decks are installed on the LSD.

<sup>b</sup> With the addition of one temporary deck, a total of 64 LVT's or 74 amphibious trucks may be carried.

<sup>c</sup> Tanks should not be loaded for an assault landing in an LSD having a spar deck.

# GLOSSARY

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## Section I. TONNAGE TERMS

### 1. General

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

### 2. Definitions

The following definitions include specific types of tonnage and related factors:

*a. Cargo Dead Weight Tonnage.* The number of long tons which remain after deducting fuel, water, stores, dunnage, and other items necessary for use on a voyage from the dead weight tonnage of the vessel. This is the total long ton cargo and passenger capacity of the vessel.

*b. Cubic Capacity.* Each vessel has two types of cubic capacity: bale and grain. For example, from figures taken from an actual cargo vessel, the bale cubic amounted to 392,000 cubic feet and the grain cubic to 428,000 cubic feet.

(1) *Bale cubic capacity.* The space available for cargo measured in cubic feet, to the inside of the cargo battens on the frames and to the underside of the beams. In a general cargo of mixed commodities, the bale cubic applies. The cargo comes in contact with the cargo battens and usually does not extend to the skin of the ship.

(2) *Grain cubic capacity.* The maximum space available for cargo, measured in cubic feet, the measurements being taken to the inside of the shell plating of the ship or to the outside of the frames and to the top of the beams or the underside of deck plating. In other words, when bulk cargo such as grain is loaded, it flows between the frames and beams and occupies the maximum space available, or the vessel's grain cubic capacity.

*c. Dead Weight Tonnage.* The carrying capacity of a ship in long tons. It is the difference between the displacement tonnage, light, and the displacement tonnage, loaded.

*d. Displacement.* The volume of water displaced by a freely floating and unrestrained vessel, the weight of the water being equal to the weight of the vessel and everything on board at the time the

displacement is recorded. Displacement is expressed either in cubic feet or in tons of water.

(1) *Displacement tonnage, light.* The weight of the ship in long tons, excluding cargo, passengers, fuel, water, stores, dunnage, and such other items as are necessary for use on a voyage.

(2) *Displacement tonnage, loaded.* The weight of the ship in long tons, including cargo, passengers, fuel, water, stores, dunnage, and other items necessary for use on a voyage, which brings the vessel down to its maximum draft. It may also be defined as the total quantity of water displaced by the vessel when in the above condition.

*e. Gross Tonnage (Gross Register Tonnage).* The entire internal cubic capacity of a ship expressed in register tons (*h* below).

*f. Net Tonnage (Net Register Tonnage).* The pay load (cargo passenger earning) spaces remaining after deduction from the gross tonnage of space for the crew, power plant, fuel, and operational facilities of the vessel. Net tonnage is expressed in register tons.

*g. Stowage Factor.* As applied to cargo, the stowage factor is the ratio of the cubic feet of space occupied by cargo to the weight of the cargo in long tons. The unit in which a stowage factor is expressed is "cubic feet per ton." A stowage factor is computed by dividing 2,240 pounds (long ton) by the weight, in pounds, of a cubic foot of cargo represented. For example: A container measures 4 cubic feet and weighs 100 pounds. To determine the stowage factor, first find the weight of 1 cubic foot by dividing 4 into 100, which gives 25 pounds. Then divide 25 into 2,240, which gives the stowage factor or number of cubic feet occupied by 1 long ton—in this case 90 cubic feet.

*h. Units of Volume.*

(1) *Measurement ton (M/T) (ship's ton).* Volumetric or space measurement, 40 cubic feet. For example, a vessel having a capacity of 10,000 measurement tons has a bale cubic of 400,000 cubic feet. For planning purposes, a shipload (Liberty ship), including deck-load, is 10,000 measurement tons.

(2) *Register ton.* 100 cubic feet. (This tonnage is used as a basis for collecting entry fees for the vessel and has no direct bearing on the cargo-carrying capacity of the vessel.)

*i. Units of Weight.*

(1) *Long ton.* 2,240 pounds (weight ton).

(2) *Metric ton.* 2,205 pounds (1,000 kilograms).

(3) *Short ton.* 2,000 pounds.

## Section II. ABBREVIATIONS USED ON BLUEPRINTS (NAVY)

### 3. Explanation of Abbreviations

<i>Aft. B.</i> After body.	<i>H. P.</i> Hawse pipe.
<i>A. L.</i> Accommodation ladder.	<i>H. R.</i> Half round.
<i>A. P.</i> After perpendicular.	<i>I.</i> I-beam.
<i>A. S.</i> Angle stiffener.	<i>I. D.</i> Inside diameter.
<i>Asst.</i> Assistant.	<i>Inbd.</i> Inboard.
<i>Bat.</i> Batten.	<i>In. Bot.</i> Inner bottom.
<i>B. E.</i> Beveled edge.	<i>Jog.</i> Joggle.
<i>Bev. Bd.</i> Bevel board.	<i>K.</i> Keel.
<i>Bhd.</i> Bulkhead.	<i>K. P.</i> King post.
<i>B. K.</i> Bilge keel; same as <i>Rol. K.</i>	<i>L.</i> Line.
<i>Bkt.</i> Bracket.	<i>L. B. P.</i> Length between perpendiculars.
<i>B. L.</i> Base line.	<i>Ldg.</i> Landing.
<i>Boss. Fr. Aft.</i> Bossed frames aft.	<i>L. Dk.</i> Lower deck.
<i>Boss Plt.</i> Boss plate.	<i>Lkr.</i> Locker.
<i>Br. Dk.</i> Bridge deck.	<i>L. L. L.</i> Light load line.
<i>Bt. Dk.</i> Boat deck.	<i>L. O. A.</i> Length over-all.
<i>Car.</i> Carpenter.	<i>Longl.</i> Longitudinal.
<i>C. Fr.</i> Cant frame.	<i>L. W. L.</i> Load water line.
<i>Ck.</i> Countersink.	<i>Marg. Plt.</i> Margin plate.
<i>Ck. O.</i> Countersink other side.	<i>M. Dk.</i> Main deck.
<i>C. L.</i> Center line.	<i>Mk.</i> Mark.
<i>C. P.</i> Coaling port.	<i>M. L.</i> Molded line.
<i>Dia.</i> Diameter.	<i>Mld.</i> Molded.
<i>Diag. L.</i> Diagonal line.	<i>Mld. Bwth.</i> Molded breadth.
<i>Div.</i> Division.	<i>Mld. Dpth.</i> Molded depth.
<i>Dk.</i> Deck.	<i>M. P.</i> Mooring pipe.
<i>Dr.</i> Door.	<i>O. D.</i> Outside diameter.
<i>D. T.</i> Dusttight.	<i>Op.</i> Operator.
<i>Elev.</i> Elevation.	<i>O. T.</i> Oiltight.
<i>Emerg.</i> Emergency.	<i>Out. Bd.</i> Outboard.
<i>Eng.</i> Engine.	<i>Pant. Stgr.</i> Panting stringer.
<i>Eng. Rm. Bhd.</i> Engine room bulkhead.	<i>P. Dk.</i> Poop deck.
<i>Exp. T.</i> Expansion tank.	<i>Perp.</i> Perpendicular.
<i>F. B.</i> Flat bar.	<i>P. Mk.</i> Pitch mark.
<i>F. Cant.</i> Forward cant frames.	<i>Prot. Dk.</i> Protective deck.
<i>F. K.</i> Flat keel.	<i>Qtrs.</i> Quarters.
<i>Fl. Pl.</i> Flange plate.	<i>Rad.</i> Radius.
<i>Focastle, Dk.</i> Forecastle deck.	<i>Rivs.</i> Rivets.
<i>Ford.</i> Forward.	<i>Rm.</i> Room.
<i>F. P. a.</i> Forepeak.	<i>Rol. K.</i> Rolling keel.
<i>b.</i> Forward perpendicular.	<i>S. A.</i> Shaft alley.
<i>Fr.</i> Frame.	<i>Scr. Bhd.</i> Screen bulkhead.
<i>Freebd.</i> Freeboard.	<i>Set. Tk.</i> Settling tank.
<i>Garbd. Stk.</i> Garboard strake.	<i>Shltr. Dk.</i> Shelter deck.
<i>Gird.</i> Girder.	<i>S. P.</i> Sternpost.
<i>H. L.</i> Horizontal line.	<i>Sq.</i> Square.
<i>Hlf. Bwth.</i> Half breadth.	<i>S. R.</i> Stateroom.

*Stgr.* Stringer.  
*Stiffr.* Stiffener.  
*St. M.* Set mark.  
*Sw. Pl.* Swash plates.  
*T.* Top.  
*Temp.* Template.  
*Tk.* Tank.  
*Trans. Gird.* Transverse girder.

*T. S.* Topside.  
*T. T.* Tank top.  
*Up. Dk.* Upper deck.  
*Vert.* Vertical.  
*V. K.* Vertical keel.  
*W. L.* Water line.  
*W. T.* Watertight.  
*W. T. Flt.* Watertight flat.

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