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ASSAULT BOAT FIELD MANUAL

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Chapter I. General

1. The assault boat equipage is employed mainly for troop crossings and for the transport of light loads, as an assault boat, as rafts, and as floating bridges.

2. Employment as assault boats occurs generally during initial crossings and during patrol activities. The assault boat has a carrying capacity of one fully equipped rifle squad or the equivalent.

3. The assault boat/^{raft} has a carrying capacity of two horses, two horse-drawn vehicles, horse and vehicle, field kitchen, light field piece or howitzer without limber, or light motor vehicle.

4. The assault boat ~~xxxxx~~ floating bridge will accommodate a double column of foot troops, a single file of cavalry with riders leading mounts, light field piece or howitzer with limber removed and drawn by troops, or a light motor vehicle.

Chapter II. Handling of Assault Boat Equipage and Lay-out of Bridge Site

A. Description of Equipage and Handling

1. Assault Boat

5. The assault boat (Fig 1) is constructed of wood. Since bow and stern are identical the craft may move in either direction with equal facility.

The gunwales are provided with three pairs of oarlocks for rowing and each end is provided with one oarlock for a steering oar. Each gunwale is provided with two gunwale plates to/^{which}~~with~~ the gunwale hooks of the sill are attached. Guy line rings are provided at the ends of the gunwales (four to a craft) and the inner side of each gunwale has six hand grips for carrying the assault boat.

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Fig 1. Assault Boat (p 10)

The outside surface of the bottom is protected by a pair of runners and floor boards and foot braces are attached to the inside bottom.

The seats are so placed that the marks painted on the gunwales are midway between the suspension hooks of the seat.

6. The dimensions/and weight of the assault boat are as follows:

Length	4.50 meters
Greatest width	1.90 meters
Greatest height	0.65 meters
Weight empty	150 kilograms

7. The elevation of the gunwale above waterline with various loads is as follows:

Empty, but including rowing gear	55 centimeters
500 kilograms	40 centimeters
750 kilograms	35 centimeters
1,000 kilograms	30 centimeters
1,250 kilograms	26 centimeters
1,500 kilograms	22 centimeters
1,750 kilograms	18 centimeters
2,000 kilograms	14 centimeters

8. A squad leader and six men are required to carry the assault boat. When the craft is on the ground and in normal position and it is desired to move the boat to another location the squad leader gives the commands PREPARE TO CARRY -- TAKE POSITIONS when three men take positions on each side of the craft at the hand grips on the gunwale facing in the direction indicated by the squad leader. On the commands UP -- RAISE the men grasp the grips and lift the boat. Movements in carrying the assault boat are executed to the commands of the ^{Finnish} infantry drill regulations.

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9. Transporting of the assault boat over greater distances is more convenient upon the shoulders of the men in an overturned position. The rowing gear must then be carried separately.

10. The boat is carried on edge through dense undergrowth or when passage must be through restricted openings. For this purpose the ends of the guy ropes mentioned in Section 29 of this manual are made fast with appropriate knots to the guy line rings on the opposite end of the craft, one on the outside surface of the boat and the other on the inside. The ropes are drawn taut and the craft placed on edge. Two men take positions on the inner side of the boat near the ends, grasping the rope with one hand and steadying the upper gunwale with the other hand. Four men take positions on the outside, carrying the boat by the outside rope.

2. Other Equipage

11. The seat (Fig 2) has two hooks on either end for suspension from the gunwales of the boat. The ends of the seat are cut at an angle to fit the curvature of the gunwales. This fact must be taken into consideration when placing the seats into position. The seat weighs approximately 6 kilograms.

Fig 2. Assault Boat Seat (p13)

12. The car (Fig 3) has the carlock pin attached. The car may be swung in a complete circle about the carlock, a feature which permits the car to be placed in the carlock from any angle. The car weighs 4 kilograms.

~~IXX Equipment~~
Fig. 3. Car (p 13)

13. The ~~skid~~ ^{Pontoon} ~~float~~ ^{float} ~~assembly~~ ^{assembly} (Fig 4) consists of three members fastened together in such fashion that they fold into a compact unit. This assembly is placed upon the gunwales of the assault boat in the construction of bridges and rafts. The ends of the members which rest

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upon the gunwales are provided with hooks for insertion into the holes of the gunwale plates. The upper surface of the actual sill member is reinforced with a strip of steel upon which the hooks of the deck panels are placed.

Two men are required to carry the ^{float ponton} sill assembly which weighs 50 kilograms.

Fig 4. ~~xxxx~~ ^{Floating Ponton} Sill Assembly (p 14)

14. The abutment sill (Fig 5) is employed on the shore as the first point of attachment in the construction of bridges, as well as in the construction of wharves for rafts. It consists of two planks (end dam and deck panel sill) joined with ~~xxx~~ bracket irons. The ~~xxxxxxx~~ upper surface of the deck panel sill is provided with an angle iron running lengthwise upon which the hooks of the deck panel are placed.

Two men are required to carry the abutment sill which weighs approximately 40 kilograms.

Fig 5. Abutment Sill (p 14)

15. Wooden pickets (Fig 6) are employed to anchor the abutment sill and to make fast the ends of anchor cables and guy lines when no trees or stumps are available on the shores of the stream. Pickets are made in the field as required.

Fig 6. Picket (p 15)

16. ~~xx~~ The deck panel (Fig 7) is a prefabricated unit 4.5 meters long and 0.92 meters wide. Two are required to form the full width of a bridge span or the deck of a raft. The panel consists of four balk (one edge balk, two tread balk, one center balk); the edge and center balk are slightly heavier than the tread balk; flooring, and on the outer edge a curb member ~~xx~~ above the flooring.

The ends of the panel balk are provided with hooks which ^{ponton floating} fasten to the ~~xxxx~~ sill assembly and the abutment sill. The curb and the hooks of the edge balk are provided with holes into which the

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guard rail posts are inserted. A support sill plate at the center of the curb member is designed to take the support sill fastener. The useable width of the span thus made from two deck panels is 1.70 meters. Each deck panel weighs approximately 150 kilograms.

Fig 7. Deck Panel (p 15)

17. A squad leader and four men are required to carry the deck panel, which is executed in a manner similar to that of the assault boat. Passage through undergrowth or through narrow places is negotiated with the panel on edge. This is accomplished with the aid of two guy line ropes tied to form loops measuring about two meters when extended. The loops are passed under the lower edge of the panel, about half a meter from each end. Four men, two on each side of the panel, each place an end of a loop over the shoulder nearest the panel to execute the carry.

18. The support sill (Fig 8) is employed beneath the deck panels of bridges and rafts to prevent sagging under loads by distributing the weight over several balk. The support sill fasteners pass through the holes of the support sill plates in the center of the curbs and are tightened by means of wing nuts. The support sill weighs approximately 8 kilograms.

Fig 8. Support Sill (p 16)

19. The guard rail post (Fig 9) is fastened to the deck panel in the following manner: The end of the post is placed into the hole in the end of the curb; the hook on the lower end of the post is turned to a horizontal position and is pressed into the hole in the hook of the balk, after which the stem of the hook is turned downward.

A rope is provided on the upper end of the guard rail post for lashing the guard rails to the posts and for tying the posts together. The guard rail post weighs approximately 5 kilograms.

Fig 9. Guard Rail Post (p 16)

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20. Guard rails as well as guard rail posts are employed both on bridges and rafts. Long rails having a length of 5 meters and a diameter of 7 - 8 centimeters are used on bridges and the long sides of rafts. Short rails of a length of 2.5 meters and a diameter of 7 - 8 centimeters are employed on the short sides of rafts. Guard rails are made in the field as required.

21. The equipage includes the following types of ropes and lines:

	<u>Length (meters)</u>	<u>Diameter (millimeters)</u>
Bridle Rope/line	6.5	14
Guard rail post lashing	3.5	10
Anchor cable	50	

22. A bailing scoop (Fig 10) is part of the equipment of each assault boat.

Fig 10. Bailing Scoop (p 17)

23. A boat hook is also included in the equipment of each assault boat.

3. Tools

24. Hand tools such as shovels, axes, mattocks, crowbars, and saws are obtained from the battalion supply.

B. Lay-out of Equipage on Bridge Construction Site

25. The equipage is laid out near the construction site in such manner that it is under cover from enemy aerial and ground reconnaissance and protected against enemy fire by grouping of the various types of equipage. ~~the effect of separate~~

26. The amount of space available on the bridge site and the order of construction determines the locations of the groups of equipment at the site layout (see Figure 11, p 18). The equipment groups must have sufficient separation to avoid interference of operations and movements of adjacent working sections.

27. The materials must be stacked off the ground on cross-

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members, for which some of the materials themselves may be employed, to prevent damage to materials and for ease of handling.

28. The equipment must be cleaned, inspected, and repaired if needed after each use.

Chapter III. Crossings by Means of the Assault Boat

A. Preparation of Assault Boat for Rowing

29. The crew of the assault boat consists of 2 oarsmen and one man to hold the rudder.

The equipage for the assault boat ~~is~~ consists of: 2 seats, 3 oars, 2 mooring lines, 1 bail, and 1 boathook.

The mooring lines are made fast ~~in~~ with appropriate knots to the mooring rings, one at each end of craft, ^{both} and/on the same side. Each line is coiled and stowed in the nearest end.

The seats are fitted into position in such manner that the painted marks on the gunwales are midway between the suspension hooks of the seat. The oars are placed on the seats of the assault boat. The bail and boathook are placed on the floor.

B. Launching and Manning the Assault Boat

1. The Rifle Squad

30. The squad forms as indicated in Figure 12 to carry assault boat to launching site.

31. The assault boat is carried to the launching site and is shoved out far enough so that bottom will not scrape when boat is fully loaded.

Man number 9 removes mooring line from stern end of craft and remains on shore to hold assault boat in tow, as indicated in Figure 13.

The assault boat is loaded in the following order (Figure 13): Man number 1 proceeds to the bow end; the squad leader and man number 2 follow and sit on floor of boat, facing each other; the oarsmen proceed to their positions and place oars into oarlocks; men numbers

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3 and 4 take sitting positions between seats facing each other; men numbers 5, 6, and 7 sit on seat facing toward stern; number 8 sits on floor, facing forward; rudder man steps into stern end and places rudder car into position; number 9 enters last, shoving craft off.

An assault boat loaded in this manner is easy to handle and steer.

2. The Automatic Rifle Squad

32. The automatic rifle squad is ~~loaded~~ placed in the assault boat as indicated in Figure 14.

3. Other Types of Squads

33. Machine gun squads, mortar squads, and others are transported in a manner similar to that outlined in paragraph 31 for the rifle squad. The permitted load, not including the carsman and the rudder man, is 10 men and their equipment, or 1,000 kilograms of dead weight load.

C. General Notes on Crossings

34. Alternates ~~are named as replacements~~ are named as replacements for the carsmen and rudder man to take over if these may be wounded. The carsmen do not carry rifles or packs.

35. When transporting the assault boat packs are carried on the back if the men are so equipped. Rifles are carried in the most convenient manner.

The pack is carried on the arm while entering the assault boat and is held on the knees in the craft. The rifle is held in a vertical position between the legs.

36. Rowing and disembarking are ~~performed without~~ carried out smoothly and without noise. The rudder man is in command during crossings and only he gives orders. No one may move to another position even if the craft should list. Sitting on the gunwales is prohibited.

37. Long wooden members are transported by their centers to avoid damage to bottom of assault boat by the steel connecting linkages

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at the ends.

38. The assault boat must not be loaded while on land.

D. Rowing, Backing the Oars, Holding the Rudder

39. When the assault boat has been launched and manned, the rudder man gives the command

OARS - CLEAR

and the oarsmen place the oars in the center carlocks on the gunwale directly opposite. The blade is held above the surface of the water. The rudder man simultaneously places his oar into the carlock on the stern end. The oarsmen grip the handle of the oar with both hands.

Rowing commences with the command

ROW.

The assault boat is held back with the command

BACK THE OARS.

Initial attention in training is given to correct and uniform execution of commands and only after this has been attained is the attention turned to speed and powerful rowing. Uniformity of execution of commands is governed by the rudder man. The oarsmen must keep their eyes on the rudder man at all times during rowing.

The normal rate of rowing is 25 strokes a minute, but is somewhat faster in a strong headwind or against stream current.

On the command

CEASE

the blade of the oar is raised from the water.

On the command

HOLD

the blade is lowered into the water and the oar is held perpendicular to the gunwale.

In addition to steering with the rudder, turns are executed with the commands

RIGHT - ROW, LEFT - BACK THE OAR

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RIGHT - HOLD, LEFT - ROW

RIGHT - BACK THE OAR, LEFT - CEASE

At the command

OARS - ALONGSIDE

the oars are raised from the locks and are held by the handle with one hand, the blade trailing in the water alongside the assault boat.

In approaching the shore the assault boat is steered at a slight angle upstream. The man in the bow picks up the mooring rope and jumps to shore and steadies the craft while the rest of the men disembark.

E. Platoon Crossing

40. Having received the order to make a crossing the platoon leader performs the following preparatory activities: locates the points of readiness for platoon and assault boats as near the crossing point as conditions or terrain permit; locates the routes to and from the readiness points for each assault boat; locates the disembarkation points on far shore; and gives the order to transport the assault boats to the readiness points and determines what camouflage is required for the assault boats.

Finally, the sequence and method of embarkation is determined at the readiness point, the men are numbered, and the carriers and their alternates are selected.

It is imperative that the enemy remain unaware of the preparations.

41. The assault boat is carried to the shore, launched, loaded, and rowed to the predetermined disembarkation points.

The squads disembark and/^{continue}~~proceed~~ to advance according to orders. The assault boats immediately return to the point of departure, unless ordered otherwise.

The following platoon approaches the shore during this time so that ~~it~~ it is ready to embark immediately upon return of assault

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boats.

Chapter IV. Raft Construction, Propulsion, and Crossing

A. Raft Construction

42. The following equipment is needed at the near shore for the construction of the raft and landing ramp: 2 assault boats, 4 seats, 6 oars, 4 mooring lines, 2 bails, 2 beathooks, 2 floating sills, 4 deck panels, 4 guard rail posts with ropes, 2 long wooden guard rails, 2 short wooden guard rails, 1 transverse balk, 1 abutment sill, 6 cotters, and tools.

43. The materials required for the construction of the landing ramp on the far shore are: 1 abutment sill, 6 cotters, 2 deck panels, and tools.

44. The following work sections are required at the near shore: abutment sill section, 2 men; construction section, 1 NCO and 4 men; deck panel section, 1 NCO and 4 men; guard rail section, 2 men.

45. The following work sections are required at the far shore: abutment sill section, 2 men; and landing ramp section, 1 NCO and 4 men.

46. The water must be sufficiently deep at the construction site (approximately 50 centimeters) so that the near-shore assault boat will float without touching bottom even when loaded.

The abutment sill section/~~make~~^{levels} the abutment sill near the shore and parallel to the shoreline. The earth is levelled with shovels to form a firm base for the abutment sill. The sill is made fast at each end to the ground with a picket, and the approach side of sill is filled with logs, brush, dirt, or other convenient material.

Pickets are driven on the shoreline approximately 5 meters from the midpoint of the abutment sill to which the mooring lines of the first assault boat are made fast.

The men of the abutment sill section then take positions on either side of the sill as mooring line holders.

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47. The construction section and the deck section each prepare an assault boat in the following manner: the mooring lines are made fast to the mooring rings; the cars, seats, and beathook are placed lengthwise in the bottom of the assault boat; the floating sill is placed on the gunwales and is made fast to the plates on the gunwales by the hooks on the ends; a bail is placed into the assault boat.

The sections then carry the assault boats to the site and launch them as near the abutment sill as possible, side by side and parallel to the shoreline. The mooring line men take hold of the mooring lines of the near-shore assault boat and the section which carried the far-shore assault boat/~~xxxx~~^{ties} its mooring lines temporarily to the mooring rings of the near-shore assault boat.

48. Two men from the construction group take standing positions near each end of the abutment sill on the shore and the other two men enter the near-shore assault boat between the bunks (Note: these two members fit transversally in ponton between the gunwales, one at each end of ponton; ends of ponton sill rest on the midpoints of the bunks. This type of construction is not used in US ponton rafts or bridges.) and take positions on the far-shore side of the assault boat. The carrying section goes into the center of the assault boat on the far-shore side.

The deck panel section carries the downstream deck panel to the site ~~xxxxxxxxxx~~ so that the forward end is even with the abutment sill.

The leader of the deck panel section gives the command

DECK PANEL - FORWARD

and the carriers then lower the panel from their shoulders to their arms, turning to face the panel, ~~xxx~~ and extend the forward end of panel to the two men who were placed at the ends of the abutment sill. These men in turn extend the forward end of panel, ~~xxx~~ with the aid of the

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panel section, to the men in the assault boat who place the fittings on the ends of the balk into the fittings of the ponton sill. The panel is placed so that the siderail side forms the outer edge.

This done, the leader of the construction section gives the order

PREPARE TO LAUNCH - SHOVE OFF

when the men at the rear of the construction section push the deck panel in the direction of the far shore, the assault boat with it, and set the fittings of the panel balk into the fittings of the abutment sill.

The mooring line men keep the assault boat in the proper position.

49. The other deck panel is brought near the abutment sill and the leader of the panel section gives the command

LOWER TO EDGE - LOWER.

The carrying section lowers the panel to their arms and then carefully to the ground so that the siderail side is upward. All of the men of the carrying section then move to the siderail side, distributing themselves along the length of the panel and take hold of the upper treadway balk with one hand.

On the command

MARCH

the panel is carried ~~in~~ on its edge to a position alongside the panel already in place where the construction section takes over and carries the panel to the final position beside the first panel.

The panels must not be dragged or pushed along the deck.

When the deck of the landing ramp is completed the mooring line men make the ends of the lines fast to the mooring pickets on the shore. The panel section moves away.

50. ~~During~~ During the construction of the deck of the raft the men who were in the near-shore assault boat remain there, but the men

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who worked on shore cross ~~ed~~ over the near-shore assault boat to the far-shore boat with the section leader. The mooring line men stationed on shore now enter the near-shore assault boat and unfasten mooring lines of the far-shore boat from the near-shore assault boats and hold the lines in their hands.

The deck panel section carries the panels to the site and the construction section fits them into place as in the construction of the landing ramp. The mooring lines of the far-shore assault boat are untied and made fast to the far-shore gunwale.

51. The construction section puts the transverse balk into place beneath the deck of the raft. The hooks of the transverse balk hangers are fitted through holes in the steel plates on the upper surface of the siderails, after which the wing nuts are tightened. The transverse balk is not made fast to the under side of the landing ramp.

52. The guard rail section has procured the guard rails in the meantime. The guard rail posts are made fast to the deck by placing the bolts into the holes in the steel plates of the siderail and pressing the hook on the lower end in a horizontal position into the hole ~~of~~ for the balk fastener and then turning the stem of the hook downward.

The long guard rails are fastened first, to the inner side of the guard rail posts by means of the trestle lashings. Only the short guard rail at the far-shore end is fastened into place at this time. The near-shore short rail is made fast after the raft has been loaded; the landing ramp is not provided with guard rails. The raft and landing ramp are illustrated in Figure 15.

B. Propulsion

53. After completion of the raft a transporting section and a landing ramp section are formed from the raft construction section. The transporting section consists of 1 raft chief, 2 rudder men, and 4 carsmen.

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The ramp section consists of a section leader, 2 cable men, and 4 ramp men.

54. Upon embarking with the raft the leader of the transporting section takes his position on the deck of the raft and an carsman enters each bow and stern (4 carsmen) of the assault boats. The carsmen take the seats from the bottom of the crafts and place them bottom side up across the gunwales (with suspension hooks outside of gunwales and pointing downward; see Figure 16, p 31) in the most convenient position for handling the cars. (Note: This is not the regular method of placing seats for rowing; presence of raft deck prevents placing of seats in standard position.) The cars are placed into position, blade ends extending outward (not between assault boats). The rudder men take their positions at the stern ends of the crafts (2 rudder men) sitting on the inner gunwale side of the stern seats, lower blades of rudder oars into water and hold ~~them~~ them under arm.

55. The cable men take hold of the mooring lines when the raft is ready to embark, holding the raft to shore while the ramp is being removed.

To remove the ramp the section stands on ^{the siderail ~~at~~ edge of} one ramp panel and turns the other panel on edge with the siderail side upward. The men then take hold with one hand of the upper treadway balk of the ramp panel and carry it to shore.

The men in the assault boat then lower the end of the remaining panel into the water and the men on shore pull the panel to land.

The mooring lines are tossed into the ends of the assault boats and the ramp section helps to free raft from shore, when necessary.

56. Propulsion of the raft is governed by the regulations for the handling of the assault boat.

The carsmen at the stern face toward the bow and row in reverse (i.e., back up with the oars) when the carsmen ~~at~~ in the bow ends row forward. Since the amount of space in the stern ends of the assault

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boats is limited in this operation the rudder cars cannot be placed into the rudder car locks, but must be held under the arm by the rudder men.

C. Preparation of Far-shore Landing Site

57. After the raft has been constructed it is employed to transport the men and equipment specified in paragraphs 43 and 45.

58. A landing site which permits the raft to come near to the shore even when loaded is selected and which permits the unloading of vehicles and their egress.

59. The abutment sill is placed on the shore as in the construction of the loading ramp and is made fast with pickets and levelled with fill on the shore side.

60. The deck panels are lifted to shore and are placed back of the sill in a position in which their longitudinal axes are perpendicular to the shoreline.

61. The men remain in readiness to lift the ramp into place as the raft approaches shore and to aid in unloading if needed.

D. Crossing with the Raft

1. Transport of Horses

62. When the raft is ready for loading the members of the transporting and ramp section are placed as indicated in Figure 15 (p 28). The positions of the men are as follows: the raft chief is on the deck; the carsmen and rudder men are in their assigned stations; the cable men are holding the lines on the shore; the ramp men are standing on both sides of the ramp; the leader of the ramp section is on the shore.

Horses are lead, one at a time, to the deck of the raft, two abreast. The ramp men make the shore-side guard rail fast and remove the ramp.

63. Rowing is accomplished as specified in paragraph 39 (see Figure 16). The raft is guided to shore in such manner that the

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horse will be facing toward shore.

64. When the raft approaches the abutment sill the carsmen of the shore-side raft cease rowing, place their cars on the floor of the assault boat, and throw the mooring lines to the cable men standing on shore. The cable men draw the raft near shore. The ramp section brings the first deck (ramp) panel and places the forward end on the ponton sill. This done, the raft is pushed farther away from shore and the other end of the panel is placed on the abutment sill. The other panel is carried on edge along the one already in place and is set into position adjoining the first panel. The cable men assist in the operation as ordered by the section leader.

The shore side guard is removed after the ramp has been put into position and the horses are led to shore, one at a time. The ramp is removed and the raft departs for another load.

2. Transport of Vehicles

65. Two single-axel, horse-drawn vehicles may be transported simultaneously with the assault boat raft. Loading, transporting, and unloading are carried out as in the transport of horses.

The vehicles are moved upon the raft with the shafts foremost. The shafts are inclined upward as in loading upon railroad cars. The material in the vehicles must be loaded securely. Chocks are placed beneath the wheels to prevent movement of vehicles on the raft. The shafts must be pointing toward shore in making the landing (Figure 17). The raft has space for only one vehicle of the double-axel type.

3. Transport of Horse and Vehicle

66. Owing to the small amount of deck space of the raft it is more advantageous to transport either two horses or two vehicles at once on the raft. When necessary, a horse and vehicle may be loaded as follows:

The horse is led upon the raft in such manner that its head is

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near the far-shore guard rail. The vehicle is then pulled upon the raft so that the horse stands between the shafts. The shafts are then lowered ~~up~~ to the deck. The shore-side guard rail is made fast and chocks are placed under the wheels.

The horse's head is toward shore when approaching the landing (Figure 18, p 33).

4. Transport of Field Kitchen, Field Gun, and Field Howitzer

67. The field kitchen is loaded upon the raft in fashion similar to that of other vehicles.

The limbers of field pieces and howitzers are uncoupled and transported separately. Loading is carried out as for other vehicles. Extreme care must be exercised in the loading of field pieces, since these are considerably heavier than ordinary vehicles. The light field howitzer is the heaviest single item that may be transported with the assault boat raft. The greatest load is on the shore-side boat as the piece is transferred from ramp to raft and this assault boat therefore lists the most. The raft must be cleared of all unnecessary personnel during transfer of howitzer from ramp to raft. After the piece is on the raft and supported equally by two assault boats, it may be transported quite easily. The crew of the howitzer is transported separately when making crossings over swift streams or rough water.

Field pieces as well as other heavy vehicles are lowered by means of ropes upon the raft where the banks are steep. Similarly in unloading in such circumstances the items are pulled up with ropes.

The wheels must be chocked with care. The piece must be made fast with ropes to the raft to prevent movement of the load as the raft aways, especially in rough water. A piece of board, or some such object must be placed under the spur of the piece to prevent ~~it~~ damage to the deck. The weight of the load must be distributed equally between the two boats, even though the spur may extend beyond the

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deck of the raft (Figure 19).

5. Transport of Supplies

68. The weight of the load must be distributed uniformly over the deck of the raft when transporting supplies. The permitted load is 2,000 kilograms in addition to the ~~transporting~~ raft crew.

Chapter V. Bridge Construction and Dismantling

A. Continuous Construction from Bridgehead

1. General

69. Construction of bridges by deck spans is defined as continuous construction from the bridgehead, in sections each the length of a deck panel. The assault boats are moved into position on the end of the bridge and the deck is constructed over them from the bridge.

70. The equipment for the bridge construction is arranged generally as specified in paragraphs 25 to 27.

71. The composition of the construction section is usually as follows: leader of construction section, 1 officer; near-shore abutment sill and cable group, 2 men; far-shore abutment sill group, 2 men; group which prepares the assault boats, 4 men, and two groups of ~~2~~ oarsmen of 2 men each, with 1 NCO for the eight men; construction group, 1 NCO and 4 men; first deck panel group, 1 NCO and 4 men; second deck panel group, 1 NCO and 4 men; anchor group, 4 men; and a guard rail group, 4 men.

Construction of extremely long bridges is speeded by increasing the number of oarsmen and deck panel groups.

2. Construction

72. The platoon leader determines the line of the bridge, which is identical to the center line. The line of the bridge is marked on the near shore with two stakes, each approximately 3 meters in length. The stakes must be placed sufficiently far from the shoreline in order not to interfere with the work and that they will not be displaced in

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the handling of the materials.

73. The abutment sill group sets the sill near the shoreline with the middle point of the sill on the ~~xxxxx~~ line of the bridge at right angles. The site is levelled and the sill is made fast at each end with two pickets, one on either side of the sill. The near-shore side of the sill is then levelled with convenient fill material.

The stakes for making fast the mooring lines of the first assault boat are driven into the ground at the shoreline, approximately 5 meters distant from the line of the bridge (Figure 20, p 40).

This done, the men of the abutment sill group take positions on either side of the abutment sill as cable men.

74. The first assault boat that is put into readiness is employed to transport the far-shore abutment sill group to the far shore. If the stream is narrow (30-40 meters), the width of the stream can be measured with a cable with sufficient accuracy to enable the location of the site of the abutment sill and the site may thus be levelled in advance for the laying of the sill. The sill is made fast with the pickets only after the final deck panels are in place. When the width of the stream cannot be determined in advance, the site of the sill is not prepared until the head of the bridge has reached near enough to the far shore to permit accurate measurement to determine the position of the sill.

The mooring ~~x~~ lines of the final assault boat are made fast in the manner of those of the first assault boat.

75. The group which ~~xxx~~ readies the assault boats equips the boats with the articles and materials required in joining the boats into the bridge. These items consist of: 2 mooring lines attached to mooring rings (final assault boat requires 4 mooring lines); 3 oars placed on floor of boat; 1 transverse balk placed on floor of boat; 2 guard rail posts with ropes, placed on floor of boat (final assault

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boat requires 4 posts); 1 bail in bottom of boat; 1 boathook in bottom of boat; 2 seats, suspended from gunwales by their hooks; 1 ponton sill made fast to attachment plates of gunwale.

76. The assault boats are carried to the launching site by the men who put the boats into readiness, assisted by the two oarsmen who are to man the boat. The readiness men then return to prepare the next boat. The oarsmen row the assault boat in the upstream direction (Figure 11) to a point near the abutment sill on the line of the bridge, throw the mooring lines to the cable men on shore, and depart for the next boat.

The readiness men prepare all of the assault boats as outlined above and the oarsmen bring the boats by turn to the head of the bridge. Construction of the bridge must not be hindered for lack of assault boats. Four mooring lines are required for the final boat, i.e., one in each mooring ring. Two of the lines are made fast to the mooring rings of the next to the last boat and the other two are made fast to pickets driven on the far shore.

77. Two men of the construction group take positions on the shore near the ends of the abutment sill and the other two enter the near-shore assault boat, taking positions near the far-shore gunwale between the bunks. The group leader takes a position amidship near the far-shore gunwale.

The deck panel groups are placed near the deck panels and the leader of the first group gives the command

TO SHOULDERS - RAISE.

The men at the layout site take hold of the panel with one hand ~~underneath~~ underneath and the other on the upper surface and quickly lift the panel upon their shoulders simultaneously turning to face the direction of travel.

On the command

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the shore
 the panel is carried to ~~the shore~~ in such manner
 that the front end of the panel is near the abutment sill, when the
 leader of the deck panel group gives the command

HALT.

On the commands

PANEL - FORWARD

the deck panel is lowered to the forearms of the carriers who simul-
 taneously turn to face the panel, the men on the forward end ~~of~~ extend-
 ing the panel to the construction group on shore. These men in turn
 extend the panel with the aid of the carriers, to the men of the construction group in the assault
 boat who place the hooks of the panel balk upon the ponton sill. The
 panel is placed into position in such manner that the siderail side
 of the panel is on the outer ~~side~~ edge.

This done, the leader of the construction group gives the com-
 mands

PREPARE TO LAUNCH - LAUNCH

~~whereupon~~ whereupon the men at the rearward end of panel push stream-
 ward to launch the assault boat and place the hooks of the panel balk
 upon the abutment sill.

The cable men hold the assault boat in the line of bridge cons-
 truction.

78. The second deck panel group brings the other panel of the
 pair to the construction site as was the first panel. The leader of
 the deck panel group then gives the commands

UPON EDGE - LOWER .

The panel is first lowered to the forearms of the carriers and then
 carefully to the ground with the siderail edge uppermost. All of the
~~the~~ carriers then move to the siderail side of the panel along its
 entire length and take hold of the upper treadway balk with one hand.

On the command

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the panel is carried along the one already in place where the men of the construction group take the panel and carefully place it into position beside the first panel.

The deck panels must not be pushed or dragged along the bridge.

When the deck panels of the first span are in place the cable men make fast the ends of the mooring lines to pickets on the shore. The deck panel group moves off.

79. The men of the construction group who are in the near-shore assault boat remain there during the construction of the following deck span, but those who had been on shore cross over the near-shore boat into the streamward assault boat. The group leader does likewise. The cable men from the shore move into the near-shore boat and take the mooring lines of the next assault boat from the carsmen. The carsmen leave the boat.

The first deck panel group brings a deck panel to the head of the bridge on the deck. The panel is handed to the construction group and placed into position as indicated in paragraph 77.

The second panel group brings the mate panel section upon the panel already in place. Handling and placement of mate panel is described in paragraph 78.

When both deck panels are in place the cable men tie the ends of the mooring lines to the mooring rings of the near-shore boat with the appropriate knots.

Construction is continued in this manner until the bridge extends across the stream. The far-shore abutment sill is made fast with pickets only after the final deck span has been built. The shore-side mooring lines of the last assault boat are tied with the appropriate knots to pickets driven on the shore.

80. The bridge anchored into position with upstream and downstream anchors.

The anchor group drives the anchor pickets into the positions

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indicated in Figure 20. The ends of the anchor cables are made fast to these pickets with mooring knots. The other end of the cable brought along the bridge to the assault boat selected by the bridge officer. When the selected boat has been maneuvered into position on the line of construction of the bridge the end of the cable is wound three or four times around the bunk and is then made fast with the appropriate knot.

The number of anchor cables is determined by the force of the current. With a stream velocity of 60 to 70 centimeters per second an anchor cable is fastened to every third assault boat.

Stream-bottom anchors are employed when the bridge cannot be anchored to the shores. These are constructed of local materials as indicated in Figure 21.

The materials required for the construction of a bottom anchor consist of: a pole 2.5 meters long with a diameter of 6 centimeters to form the shank; four cross-pieces, length 1.2 meters, diameter 5 centimeters; a 30-meter length of annealed steel wire, diameter 2 millimeters; 20 staples; 4 or 5 sandbags to be filled with coarse gravel or small stones; 2 lashings to tie sandbags to anchor.

The anchors are cast approximately 40 meters distant from the line of bridge construction. The line of anchors is marked in advance with stakes in the same fashion as the bridge line was marked.

81. Guard rails are installed by the guard rail group. Two men fast the guard rail posts; the posts for the beginning end of the bridge are carried from shore, but as the construction progresses posts are placed in the bottom of each assault boat to be taken to the head of the bridge. The other two men of the group lash the guard rails on the inner sides of the posts. The ends of the rails overlap each other and are tied with the same lashing.

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The guard rail group works about three deck panel spans behind the head of the bridge. The operations of the guard rail group must not interfere with the movements of the deck panel groups. The movements of the guard rail group upon the bridge are limited to the carrying of the rails and moving forward with construction. The posts are set into place and the rails lashed with the men working from the assault boats. The seats may be set into place if needed.

82. As the construction group completes the laying of each deck panel span the transverse balk are set into place. Two men from the construction group are required for this operation. The transverse balk is lifted from the bottom of the assault boat and its ends are placed upon the bunks of the boat below the deck of the bridge. The men climb to the deck of the bridge and, grasping the tie clamps, center the balk underneath the deck span, guide the hooks of the clamps through the holes of the clamp plates on the upper surface of the siderails and tighten the wing nuts. Special men are appointed to fasten the transverse balk in the construction of longer bridges. The completed bridge appears in Figure 22.

3. Dismantling

83. The bridge may be dismantled from either end. The same division of labor is generally observed in dismantling as in construction. When the order for dismantling has been received, the groups are placed in the following order from the end at which the dismantling is to begin: the abutment sill group takes a position near the sill; the carsmen enter the bow and stern ends of the first two assault boats; the cable men enter the bow and stern ends of the second boat; the construction group goes into the first two boats, the group leader goes into the first boat; two men of the anchor group go into the first boat which has anchor lines, the other men take positions on shore near the points of attachment of the anchor lines; the guard rail group

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is placed upon the first deck panel span; the second deck panel group is placed on the first deck panel span; the first deck panel group is placed on the third deck panel span.

84. The guard rail group dismantles the guard rail, places the posts ~~in~~ in the bottom of the assault boats, and carries the guard rails to the prescribed location on shore.

The men of the construction group in the first assault boat unfasten the transverse balk of the first deck panel span and place it on the bottom of the boat.

The second deck panel group lifts either one of the deck panels on edge upon the other panel with the aid ~~in~~ of the construction group and the abutment sill group. The deck panel is carried on edge to the first complete deck panel span where it is raised to the shoulders and then carried to the prescribed location.

The mate deck panel is lifted at one end by the abutment sill group and by the construction group at the other end and is thus transferred to the deck of the bridge. The first deck panel group carries it upon their shoulders to the prescribed location.

The cable men untie the mooring lines from the mooring rings of the second assault boat and remain in readiness to pull the boat by means of the mooring lines to the end of the bridge.

The second deck panel group removes either deck panel of the second span with the aid of the construction group as explained above.

The first deck panel group removes the mate panel with the assistance of the men of the construction group in the assault boat who raise the rear end of the panel from the ponton sill, extending that end to the nearest men of the deck panel group. The leader of the construction group then gives the commands

PULL TO - PULL.

The deck panel group pulls the first assault boat to the second

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boat by means of the deck panel and assisted by the cable men. The men of the construction group in the first assault boat raise the front end of the deck panel from the ponton sill and extend it to the first men of the deck panel group. The panel is lifted to the shoulders and carried away.

The foremost men of the construction group proceed over one assault boat into the following boat, removing the transverse balk of the last deck panel span as they do so, and place the balk on the bottom of the boat.

The assault boat thus freed is used to carry away the abutment sill group and sill equipment. The assault boat preparation men pull the boats to shore and remove the equipment in them. The oarsmen proceed along the bridge to convey away the freed boats.

The anchor cables are removed from the assault boats as they are freed from the end of the bridge. The cables are dropped into the water and the anchor men on shore draw them to the shore.

The other abutment sill is the final item to be removed.

B. Construction by Bays

1. General

85. Construction of the bridge by bays is defined as that method in which sections of bridge of one or more deck panel spans are first built and then maneuvered into the line of the bridge and are joined together.

Construction by bays is advantageous under the following conditions: when the bays can be constructed in protected areas away from the bridge site in locations offering cover from enemy ground and air attack, and when rapid construction is desired with an element of surprise, and when branches of the stream, protected bays, and other natural features may be employed as construction sites for

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bays; when rapid dismantling of bridge by bays is desired with subsequent assembling by bays; when it is desired to move the bridge to another location.

Construction by bays is advantageous only in fairly wide bodies of water.

2. Construction of Bays

86. The composition of the construction section for a single-span bay is generally as follows: cable group, 2 men; construction group, 1 NCO and 4 men; deck panel group, 1 NCO and 4 men; guard rail group, 2 men.

In addition to these, the following groups are required in the construction of a bridge: near-shore abutment sill and cable group, 2 men; far-shore abutment sill group, 2 men; anchor group, 4 men.

The number of bay construction sections is determined by the length of the bridge.

87. Bays are generally constructed with two assault boats, but they may ^{be} made longer, limited only by the velocity of the current and the force of the waves, provided that the area in which to maneuver the bays is sufficiently large. A four-ponton bay (section) is illustrated in Figure 23 (page 47).

88. The bays are constructed according to the instructions in paragraphs 42-52, taking into consideration these exceptions: the abutment sill is not set into place; the ends of the first deck panels rest on the ground; the construction and panel group prepares the assault boats for assembly into the bridge section.

The assault boats are launched before the deck is assembled. The mooring lines of the near-shore boat are made fast to pickets and the mooring lines of following boats are always made fast to the mooring rings of the previous boat.

89. When the bay has been constructed two deck panel sections

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are placed on the deck of the bay, one above the other with their siderail edges outward. Four deck panel sections are placed on the deck of the first bay. Two of the deck panels are used to join the bay to the near-shore abutment sill (as a hinge span) and the other two are used to join the following bay to the bridge.

The following equipment is also placed on the deck of each bay for use in assembling the connecting panel spans: 1 transverse balk, 2 guard rail posts, 2 guard rails.

The guard rail group prepares the materials for the guard rails of the first (hinge) deck panel span.

90. The following activities are performed during construction of the bays: the ^{near-shore} abutment sill group ~~is~~ sets the abutment sill into place, drives the pickets on the shore, and remains in readiness to receive the bay; the far-shore abutment sill group is transported to the far shore where they remain in readiness to set the far-shore abutment in place when the bridge construction reaches the stage at which this may be done; the anchor group makes fast the ends of the anchor cables on both shores and remain prepared to bring the ends of the cables along the bridge to the assault boats specified by the officer in charge of the bridge construction.

3. Joining Bays to Bridge

91. The composition of the construction section is reorganized ~~is~~ ~~is~~ along the following lines after completion of the bridge bays: near-
/far-shore abutment sill and cable group, 2 men; far-shore abutment sill group, 2 men; construction group, 1 NCO and 4 men; first, second, and third ^{bay transporting} ~~construction~~ groups, each consisting of 1 NCO and 6 men; anchor group, 4 men; guard rail group, 2 men.

92. The construction group and the guard rail group take positions near the abutment sill when as transporting of bays to bridge site begins. As the bays are brought to the bridge the construction

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group sets the connecting deck panel sections into place and fastens the transverse balk. The guard rail group erects the missing guard rail posts and lashes the guard rails into place.

The bay transporting group takes positions on the bridge section as indicated in Figure 23 (page 47). The bay is transported in the manner of a raft.

The bay is brought as near as possible to the abutment sill. The oarsmen of the shore-end assault boat throw their mooring lines to the cable men on shore, who then pull the bay to shore. Two men of the construction group step upon the deck, and with the aid of the oarsmen, extend the end of a deck panel section to the construction group on shore, placing the panel upon the abutment sill. This done, the leader of the construction gives the commands:

PREPARE TO LAUNCH - LAUNCH.

The bay is then pushed by means of the deck panel section sufficiently far out upon the water to permit placing the ~~shore~~ end of the deck panel upon the ponton sill. The cable men guide the bay into the line of the bridge. The mate deck panel is carried on edge and is set into position beside the first panel section.

The anchor group takes the end of the anchor cable to the boat at the far-shore end of the bay and makes it fast to the bunk of that boat. The transverse balk is set into place and the guard rail is erected.

93. The cable men move to the far-shore assault boat of the first bay when the second bay is brought to the end of the bridge and receive the mooring lines of the second bay. Two men of the construction group move to the deck of the ~~near-shore~~ near-shore boat of the second bay, the others remaining on the deck of the first bay. The bays are connected as explained above, with the exception that the first connecting deck panel is first placed upon

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the ponton sill of the near-shore boat of the second bay.

4. Opening and Closing the Channel Passage

94. In opening a channel passage in the bridge the oarsmen take positions in the end boats of the section to be detached, as indicated in Figure 23.

Two cable men also go into the end boats of the section to be detached to untie the mooring lines.

One NCO and 4 men (the construction group) take positions on the last deck span of each end of the bridge that will remain in place.

An assault boat which does not have a ponton sill is placed under that deck span from which the panel sections are to be removed first.

The guard rails and transverse balk are removed from the deck spans which are to be dismantled and these are placed on the ends of the bridge.

95. The deck panel section under which the assault boat was placed is removed first. The construction group is divided equally on either side of the deck span to be removed. One deck panel is turned on edge and carried upon the bridge, the mate deck panel is lifted from the sills and, by use of the assault boat, is pulled to the end of the bridge and lifted upon the deck. In emergencies, or when an extra assault boat is not available, one end of the deck panel may be lowered into the water and thus pulled to the bridge.

One deck panel at the other end of the section to be detached is removed as above. The bridge end of the mate panel is unfastened from that sill and the panel is used to pull the detached section to the end of the bridge and the panel is then lifted upon the bridge.

The oarsmen permit the current to carry the detached channel section downstream, out of the line of the bridge, and then take it aside.

If the current is too strong for the oarsmen to control the

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movement of the channel span, the operation may be performed by cables made fast to the end boats of the channel span.

The anchor cables are made fast to the last boats which are to remain in each part of the bridge before the channel passage is opened.

96. The procedure is reversed in closing the channel passage. The channel span is either rowed or pulled by cables to either end of the bridge and the deck panels are put into place.

The last deck panel span is assembled by means of an assault boat which is used to set the first deck panel into place. The mate panel is carried on edge along the one already in place and is set into position alongside.

The guard rail is finally assembled and the transverse balk is fastened into place.

5. Dispersion of Bridge

97. If destruction of the bridge by enemy air or artillery action appears imminent, or if the bridge is not to be used for some time, it may be dismantled by bays (sections) which are then taken to shore and camouflaged.

The officer in charge of bridge construction determines the number of ~~sections~~ ~~which~~ ~~the~~ ~~bridge~~ ~~is~~ ~~to~~ ~~be~~ ~~dis-~~ ~~mantled~~ assault boats each section will contain. Each section will have a crew of oarsmen consisting of 1 NCO and 6 men who take positions on the section as indicated in Figure 23; a construction (or dismantling) group of 1 NCO and 4 men is also necessary to dismantle the guard rail, transverse balk, and deck panels at the points at which the sections are to be taken apart.

The bridge may be reassembled as needed, either at the former site or at a new location.

6. Dismantling by Sections

98. In dismantling the bridge by sections, each section is

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rowed to a suitable location on shore where it is finally dismantled and the equipment loaded on vehicles.

C. Construction in Shallow Water

99. When the water is too shallow to float a fully loaded assault boat freely, use of timber trestle (or cribbage trestles) of the type illustrated in Figure 24 (page 52) is necessary. The regular ponton sill and bunks of the floating bridge are employed by the construction of trestles ~~of~~ from local materials to replace the assault boats.

The members of the trestle must be fastened together to avoid falling apart. Lateral movement of the timbers is prevented by two pickets driven into the bottom at each corner of the trestle. The top ends of ~~the pickets~~ each pair of pickets are lashed together with rope or wire. If timber hooks (dogs) are available, these may be used to tie the timbers of the trestle together, in which case the use of pickets is not necessary.

The ponton sill assembly (sill and bunks) is placed upon the trestle and is made fast to the uppermost timbers with trestle clamps or square lashings. Under no circumstances must the sill assembly be fastened to the trestle by means of timber hooks.

Chapter VI. Crossing on the Bridge

A. Maximum Loading

100. The following types and formations of traffic are permitted on floating bridges: a double column of infantry marching in route step; a single file of cavalry with men leading their mounts; a horse-drawn vehicle of the single or double axle type whose weight does not exceed 900 kilograms (the field kitchen); light field piece or howitzer when drawn by men (with limber detached and drawn separately); a motor vehicle with a maximum weight of 1,500 kilograms moving at a speed of 8 kilometers per hour.

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101. The commander of the body of troops determines the order in which the units will cross. The commander appoints officers to see that the units arrive at the approach area in the proper sequence, that congestion of troops and vehicles does not occur at the bridge, and that excessively heavy vehicles are removed in time from the approaching column.

The bridge officer, who is generally the same officer under whose direction the bridge was built, is responsible for the serviceability of the bridge from the technical standpoint and sees that movement on the bridge and in the immediate vicinity ~~of it~~ occurs in a quiet and orderly manner. When necessary, men equipped with long ropes are stationed at either end of the bridge to assist in the movement of vehicles from shore to bridge and from bridge to shore.

If movement of unit in process of crossing must be halted owing to damage to bridge or to excessive and dangerous movement of the bridge, the bridge officer will give the command HALT, whereupon movement over the bridge stops. It is the responsibility of every officer to maintain order by all available means.

102. The assault boat bridge cannot accommodate two-way traffic. When traffic must move in both directions it must be organized on an alternating basis.

Troop units must be organized into crossing formation at least 100 meters from the bridge and may resume the regular marching order after crossing when the final unit has advanced 100 meters beyond the bridge.

Vehicles must be separated by at least 20 meters and must ~~move~~ cross along the center line of the bridge.

Figure 25 (page 54) illustrates a troop crossing in double column and Figure 26 (page 55) a vehicular crossing.

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C. Bridge Operation and Maintenance

103. Bridge operation and maintenance includes traffic control on the bridge and vicinity, bridge ~~security~~ guard duty, and maintenance. It may also include bridge security.

Bridge operation and maintenance is directed by the bridge officer, which functions are performed by: bridge officer of the day who is, whenever possible, an officer; a bridge guard unit; a bridge maintenance crew.

104. The bridge officer of the day directs and supervises these operations following the orders and instructions given by the bridge officer. He remains as near the bridge as possible in order to be available at all times. In the event of unexpected danger he must be prepared to take necessary precautionary measures on his own initiative, such as the halting of traffic on the bridge. He must immediately notify the bridge officer of the events and measures taken.

105. The bridge guard unit maintains order on the bridge and in the vicinity, guards bridge material and vehicle storage areas, and posts aircraft observers when necessary.

A pair of guards/~~are~~^{is} stationed at each end of the bridge; in the case of short bridges guards are posted only at one end. Their duties include surveillance of the bridge, observation of aircraft, exclusion of unauthorized persons from the bridge, and preventing the simultaneous entry of vehicles crossing in opposite directions upon the bridge.

106. The bridge maintenance crew provides the technical function of maintenance of the bridge itself as well as ~~the~~ of those duties arising on the upstream and downstream sides. The duties include maintenance of the bridge in serviceable condition, securing the bridge from damage by objects carried by the current, opening and closing of channel passage, and dismantling of the bridge.

Damaged parts of the bridge must be replaced with new parts.

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The maintenance crew must also keep the assault boats bailed of water and see that all lashings and clamps are secure.

The bridge construction section is employed as the bridge operation and maintenance body with reinforcements when necessary.

Chapter VII. Safety Precautions and Rescue Procedure

107. The officers in charge of bridge construction and of crossings organize the safety precautionary measures and rescue procedures to fit the existing conditions and see that these measures are observed.

The officer in command appoints an officer or NCO to be in charge of safety and rescue operations, who also acts as chief of the safety personnel and equipment.

Rescue personnel and equipment must be so located that they will be as near as possible to the actual area of operations. These precautions special attention during periods of darkness, fog, and other adverse conditions.

108. The rescue personnel and the troops that are to make a crossing must be briefed and trained in the safety and rescue measures prescribed in each instance.

109. The extent of rescue operations under combat conditions are determined by the tactical situation.

Shortage of rescue equipment in peacetime training operations must not result in deficient rescue measures and procedures.

Rescue personnel remain neutral in field maneuvers.

110. Assault boats, ordinary boats, and other craft may be employed for rescue purposes; the more speedy craft are to be preferred. Whenever possible, these boats are to be equipped with ropes, life rings, lengths of boards, and any other items that can be used for the rescue of persons in the water. Pocket lamps, lanterns, flare pistols, and other illumination equipment are used during periods of darkness. A/cable may be ^{taut} ~~extended~~ extended across narrow streams

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on the downstream side to a handhold for those who may fall off the bridge. The rescue personnel must be able to swim.

111. Whenever possible, personnel making a crossing will be equipped either with life preservers, lengths of planks, or other similar objects. An increase in safety measures is necessary in the absence of life preservers.

112. Rescue craft are ^{manned} ~~sketches~~ and kept in readiness on the downstream side of bridges, both during construction and during crossings.

Chapter VIII. Assault Boat Unit Assemblage

A. Assault Boat Equipage

113. The assault boat equipage unit includes the following items:

<u>Item</u>	<u>Weight (kilograms)</u>	<u>Single Load</u>	
		<u>Number</u>	<u>Weight</u>
Deck panel section	150	6	900
Ponton sill assembly	50	4	200
Oar	4	12	48
Seat	6	8	48
Transverse bulk	8	3	24
Abutment sill	40	1	40
Guard rail post and lashing	5	8	40
Mooring line	1	8	8
Anchor cable	10	1	10
Bail	1	4	4
Boat hook	2	4	8
Assault boat	150	4	600
Total			1,930

The lengths of bridges which can be built from various numbers of loads (equipage units) are given as follows (Figure 27, page 59):

1 load 3 spans 13.5 meters (one abutment sill must be improvised)

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2 loads	6 spans	27 meters
3 loads	9 spans	40.5 meters
4 loads	12 spans	54 meters
5 loads	15 spans	67.5 meters
6 loads	18 spans	81 meters
7 loads	21 spans	94.5 meters
8 loads	24 spans	108 meters
9 loads	27 spans	121.5 meters

114. A raft ferry, including loading ramps for each shore, may be built from the equipage in one load. The abutment sill for the loading ramp on one shore must be improvised, however, ~~when~~ if additional equipment is not available.

115. Tools and implements required in ~~the~~ bridge construction and in propelling rafts are obtained from the equipment assemblage. Ropes and cables as required are also obtained from the same source.

B. Transport Vehicles and Personnel

116. The equipage is transported on ~~trucks~~ motor trucks. The platforms of the trucks must be at least three meters long, otherwise the weight of the load will extend too far to the rear of the vehicle.

The side walls and end gate are removed from the platform. If the interior width of the platform exceeds 2.0 meters, only the end gate need be removed.

C. Loading and Unloading

117. A truck load consists of the items listed in paragraph 113. The items are loaded in the order of the listing and all loads are made alike.

118. A loading group of 8 men and a group leader are required; 2 men on the platform set the items into place; 4 men carry the deck panels, following the commands of the group leader; 2 men tie the cars, seats, guard rail posts, transverse balk, boat hooks, and bails into

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bundles.

119. The first two deck panels are placed one at a time upon the platform in such manner that their siderail edges are adjacent at the center of the platform, with the ~~sk~~ curbs upward, as indicated in Figure 28 (page 60). The next pair of deck panels is placed upon the first pair, with the curbs downward and outward.

The following pairs of deck panels are stacked upon these with the curbs downward and alternating inward and outward.

120. The other items are placed between the bulk and above them in such manner that the bottom assault boat does not rest on these items. The ponton sill assemblies are folded and placed between the bulk at the center of the load. The cars are tied into a bundle, using a mooring line, and the bundle is placed upon the pontons sill assemblies. The abutment sill is placed between the treadway bulk of the panel sections. The transverse bulk are tied together with a mooring line and the bundle is placed between the two outer bulk on one side of the load. The seats are tied together with a mooring line and the bundle is placed upon the sills beside the cars. The guard rail posts are tied together with the guard rail lashings and the bundle is placed beside the cars on the opposite side. The bails are tied together with a mooring line and the bundle is placed into a convenient space in the load. The remaining mooring lines and the anchor cable are coiled and placed on top of all the other equipment (see Figure 29, page 61).

121. The assault boats are ~~placed~~ loaded last, in an inverted position and nesting within each other. Following the commands of the group leader, six men carry the boats to the rear end of the truck and lift them one at a time upon the load. The two men on the load assist in this operation. The assault boats are placed as far forward as possible on the truck; the bottom boat is placed in such fashion that it rests only on its gunwales.

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The load is made secure with three ropes which are provided for each truck. These ropes are of the same type as those used for the mooring lines of the assault boats.

The securing ropes are tied as indicated in Figure 30 (page 62). The rope is threaded through the mooring rings of the uppermost assault boat at both the rear and forward ends to prevent slippage of the rope from the top of the load.

If the truck is to carry only assault boats and the rowing implements, the loading is carried out as explained above. The rowing implements are tied into bundles which are placed upon the platform of the truck. The assault boats are ~~xxxxxxxxxxxx~~ inverted over these items. Removal of the side walls of the truck platform is not necessary in most instances since the maximum width of an assault boat does not exceed 1.90 meters. The completed load of assault boats is illustrated in Figure 31 (page 63). The load consists of the following items, which are listed in order of loading:

<u>Item</u>	<u>Number</u>	<u>Weight (kg)</u>
Oar	36	144
Seat	24	144
Bail	12	12
Mooring line	24	24
Boat hook	12	24
Assault boat	12	1,800
Total weight of load		2,148

122. Unloading requires the same working party as loading.

Two men take positions at the forward end of the load. They raise the front end of the assault boat, and assisted by the carrying party, move the boat to the rear. The carrying party takes the boat directly upon their shoulders and carry it to the prescribed location.

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The cars, seats, ponton sill assemblies, and other smaller items that are unloaded in reverse order to/used in loading.

The deck panels are removed by lifting them rearward directly upon the shoulders of the carrying party who carry them to the prescribed location.

Chapter IX. Manpower and Time Requirements

123. Several examples of manpower and time requirements of various typical tasks to be performed with the assault boat equipage are presented in the accompanying table. The time entries do not include the time required for the organization of working parties and explanation of duties.

Task	Strength		Time (min)
	Officers	NCO's Men	
Ferrying a squad from an assembly point (located 100 meters from stream) across a stream 100 meters wide, and manning the assault boat . . .		3	5
Ferrying a platoon across a stream 100 meters wide, using four assault boats, in three crossings		12	15
Construction of raft and ramps when the equipage is located on the shore	2	12	10
Construction of raft and ramps when the equipage is loaded on truck	2	12	15
Construction of a raft ferrying site, i.e., raft and ramps on near shore and landing stage on far shore, when stream width is 100 meters	3	18	30
Loading of raft, ferrying across stream 100 meters wide, unloading, and return	3	18	15
Construction of bridge 40 meters long by bays, when equipage is assembled on shore	1	4	32 45

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Finnish ponton bridges and equipage appear to differ from similar US types in several respects, some of which may be summed up as follows:

1. The deck consists of prefabricated sections or panels, each half the width of the deck and the length of one span. The panels include the chess, balk, siderails, and other fittings as an integral unit.
2. The ponton sill assembly, or ponton transom assembly, consists of three members; the sill and two identical cross-pieces attached to the ends of the sill in such manner that they may be folded without dismantling into the axis of the sill. No equivalent appears to exist in US bridge literature for these cross-pieces, which the Finns call "pankkakalusto" (bunk equipage), since unlike US ponton bridges, they suspend a ponton sill at the center of the ponton. The function of the bunks is to support the ends of the sill between the gunwales of the assault boat employed as a ponton.
3. In as far as possible, loading on trucks is so arranged that each load is a complete bridge unit in itself.

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