11TH ENGINEER GROUP

555TH ENGINEER GROUP

Demonstrate

RIVER CROSSING EQUIPMENT

BRUHL GERMANY

23 JUNE 1960

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1440 - 1500	M4T6 Raft Demonstration	1st/Lt. D. E. Sagramoso Maj. W. F. Rueff(Alt) (Narrators)
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11th Engineer Group
Col. E. B. Kelly, Commanding

555th Engineer Group
Col. L. W. Correll, Commanding

FLOATING (Swinging) BAILEY BRIDGES

The swinging Bailey Bridges are 1,000 foot (approx), one way floating bridges capable of carrying Class 80 loads. The bridges have been modified so as to be capable of carrying any US standard army vehicle including the 280mm gun.

To permit free river traffic, the bridges are normally "open", i.e., the bridges are disconnected at center connecting joints and each half-bridge section is swung upstream shoreward pivoting on a "pivot" pile located a few feet off-shore from each abutment, and then anchored parallel to the river bank on its respective side. The bridges are closed by conversion; each half of the bridge is swung in a downstream arc, pivoting on the pivot pile, and connected together when each half of the bridge reaches midstream. Adjustable ramps are used to seat the bridge on the abutments on either shore.

Construction details are general in nature since minor variations exist between different bridges. The pontons are non-standard, closed-type, 13 feet 6 inches wide, 52 feet long, and 5 feet 6 inches in depth. Displacement of each is 70 to 80 tons. The pontons are spaced 40 feet center to center with the exception of end sections which vary a little and the two pontons approximately 30 inches apart directly under the ramp tower.

The superstructure is of modified triple-single Bailey construction. The inside panel on each side has been moved 8½ inches outward to give a roadway width of 13 feet 9 inches. The bridge decking is of three-inch hardwood planks which have been impregnated with creosote. The entire bridge has a wear tread of 3 inch hardwood planks nailed securely to the decking. The number of transoms per bay has been increased to four to increase the capacity of the bridge.

The downstream end of each half-bridge has a 50-60 foot ramp section which is of double-single panel construction. The ramp sections are hinged to the bridge proper and may be raised or lowered by means of winch and cable arrangement. This raising and lowering permits the half-bridge to be swung into pinning position without grounding the ramp section. After the bridge is pinned, the ramps are lowered to the concrete abutment.

Each half section of the bridge has a tower, which together with the winch and cable system, supports the ramp. Each tower is of double-single Bailey construction, with the base fitting into the triple-single construction of the bridge. The towers are 30 feet high and are braced by six Bailey transoms and four sway braces on the top panels of the tower. Each half-bridge section is equipped with two 5-ton hand operated winches which are used to raise and lower the ramp section of the bridge. The vertical clearance at the ramp tower is 17 feet 6 inches.

Mooring of the bridge in the "open" position is effected by attaching one-inch cables to stanchions constructed along the top of the river banks. Stanchions generally are of concrete blocks 4 feet by 6 feet by 8 feet deep which are reinforced by two 16 foot and one 26 foot steel piles or other approved design. Standoff piles are driven into the river bed a few feet from shore to keep the pontons from grounding and being damaged.

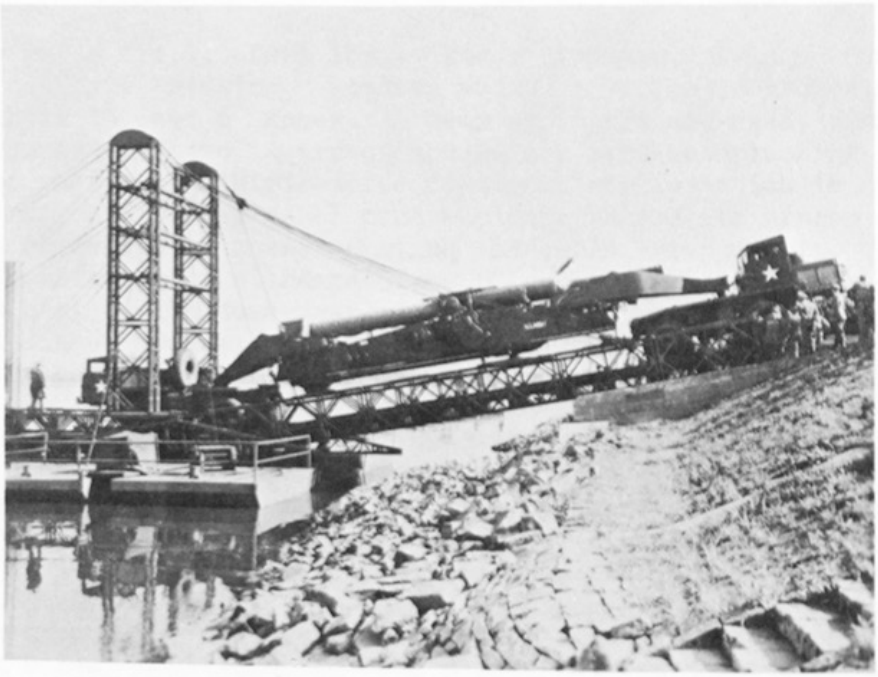
Each half-bridge section pivots on a specially constructed pile driven into the river bottom out from each concrete abutment (except in locations of extremely deep river channel in which cases pivot arms from shore to bridge are employed). These pilings are connected to the bridge by means of two I beams welded to pontons. The I beams are about 30 inches apart with the pile located between the beams. A series of holes in the I beam permits pinning of the bridge at various locations along the beam.

The swing system of the bridge incorporates both the propelling units and the anchor cable system. Propelling units for each half-bridge consists of 2 marine diesel engines (Navy Sea Mules) 115hp mounted on a 60 foot standard section of the bridge. The mules are mounted on these sections rather than on the bridge proper to provide more versitality. The propelling sections permit the bridge commander to move the bridge inshore or offshore as desired and to hold the bridge against the current during pinning of the bridge at midstream. Each half-bridge section is equipped with two 1 inch anchor cables mounted on two 15 ton diesel engine winches. When the bridge is being closed the cables are held taut for control and security of the bridge, and when the bridge is being opened the winches wind up the cable as it becomes slack. The power winches can pull the bridge into the shore, however this practice is not advisable as it puts an excessive strain on the winches and the propulsion units should be used for this purpose. The anchor cables are tied to the stanchions on the bank of the river.

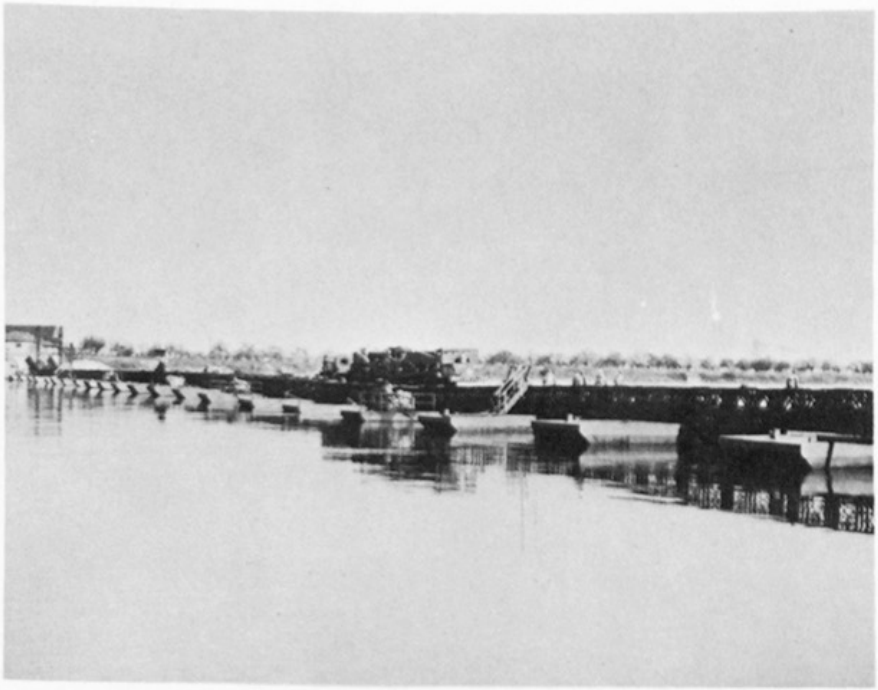
As the two half-bridge sections swing together they are guided into position by guide rails and alignment is maintained by the mules. The power winches hold the bridge in place while the mules adjust their props to push the bridge sections together. If difficulty is encountered getting the bridge together, two hand-operated closing winches mounted on one of the bridge sections can be used. The cables from these winches can be connected to the other half of the bridge and the bridge winched closed. After the bridge is closed, it is pinned, fillers are added, and deck and wear tread are placed, thereby completing the center connection. The complete closing operation takes approximately 30 minutes. Procedure is reversed to move the bridge halves back parallel to the river banks in the "open" position.

Bridge anchored in 'Open' position

Bridge prepared for traffic in 'Closed' position



Ramp section w/Ramp tower assembly



280mm gun crossing the bridge

CLASS 100 HEAVY RAFT

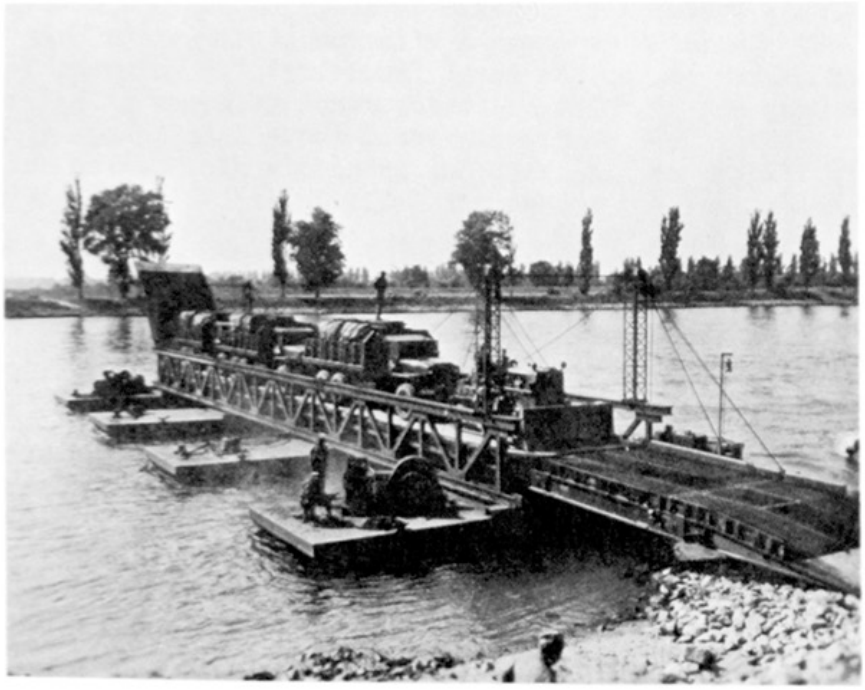
The rafts are 110 feet long. The superstructure is of German Warren Truss Type Bridging. Roadway width is 14 feet 6 inches, and ramp width is 13 feet 6 inches. I beam stringers are used, and the decking consists of two layers of three-inch hardwood planking. Each end of the raft has a thirty-three foot ramp section which is of Class 60 deck, ramp and filler panel construction. Ramps are hinged and may be raised orlowered by means of winch and cable arrangement. Tower sections consisting of standard Class 60 cable anchorage towers (10 feet 9½ inches high), with tower cap assemblies, are mounted on each end of the raft. These towers, together with the winch and cable assembly, support the ramps.

Pontons are non-standard, closed-type, of German manufacture. They are of steel construction. Each ponton is divided into five separate compartments which are accessible by means of man holes. Each of the four pontons is 52 feet long, 13 feet 6 inches wide, and 5 feet 6 inches in depth. Displacement of each ranges from 70 to 80 tons.

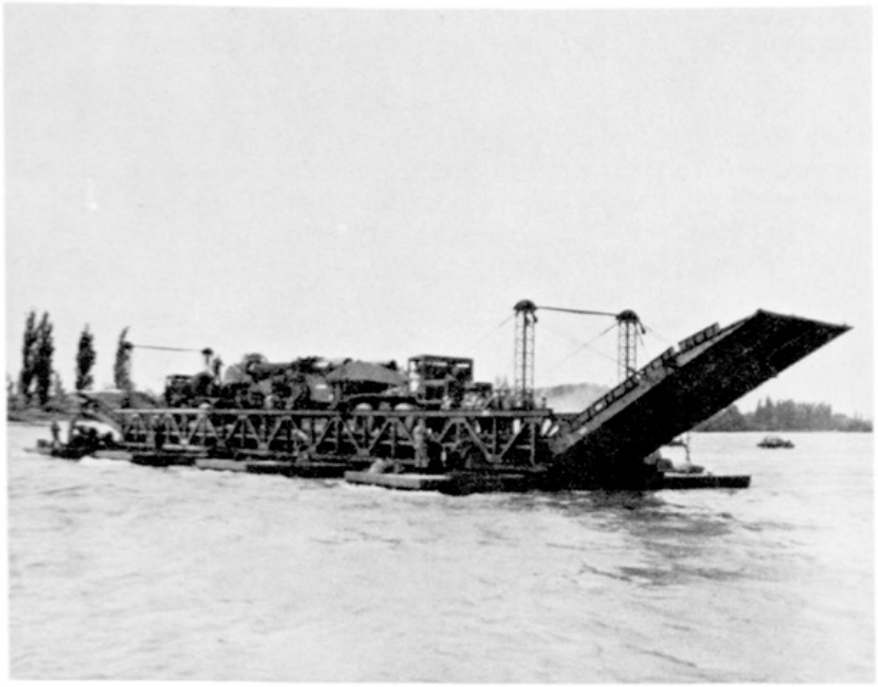
The propelling units are two 115 horsepower marine diesel engines (Navy Sea Mules) mounted on saddles placed between the center two pontons of the raft.

To operate the raft under normal conditions thirteen men are required; one non-commissioned officer, two Mule operators, two winch operators, and eight mooring linemen, (two on the raft and three on each shore).

CLASS 100 RAFT



Unloading of Engineer Bridging Equipment and D7 Tractor



280mm Gun of Raft

M4T6 FLOATING BRIDGE

The M4T6 is a Class 60 floating bridge. The bridge can be constructed by hand if required, normally a crane is desired. The bridge is capable of carrying all divisional loads and can be transported by air. The bridge is normally constructed, contains 24-ton pneumatic pontons regularly spaced at 15 foot intervals with a deck composed of aluminum balk which act as both stringers and decking. An 18-balk clear roadway, 167 inches wide, is utilized throughout the entire length of the bridge.

The M4T6 bridge can safely cross 60-ton tanks having an overall track width of 143 inches or more in currents up to 5 feet per second. An M4T6 4 ponton raft can safely cross Class 55 loads in currents up to 5 feet per second and Class 45 loads in currents up to 8 feet per second.

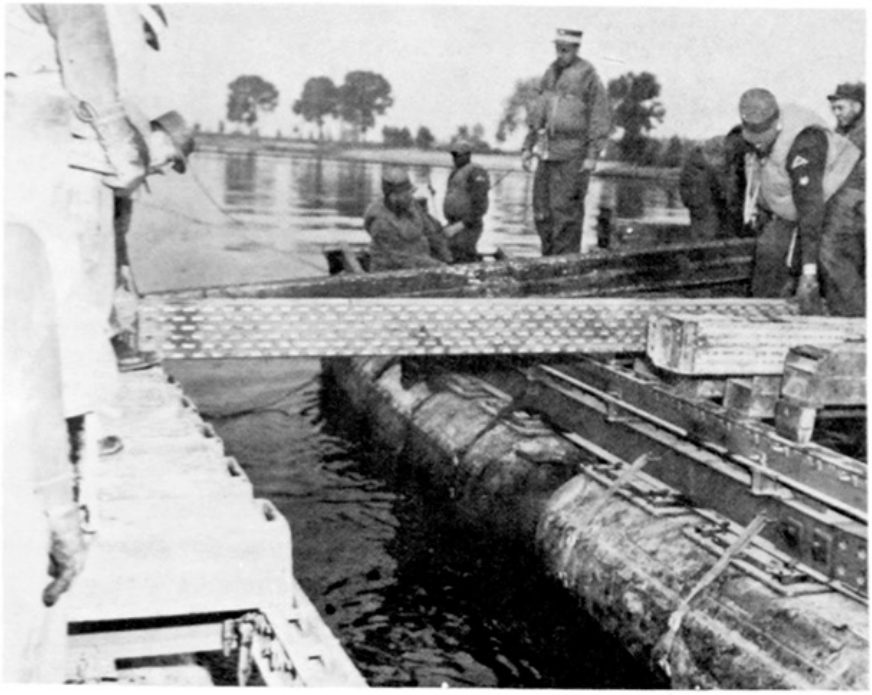
The deck of the bridge is composed of three types of deck balk, normal (15 feet long), short (8 feet 4 inches long), and tapered (6 feet 8 inches long). Each of the aluminum alloy balk is approximately 9 inches square, hollow, and water tight. Normal balk are used in each span of the bridge. The short and tapered balk are used to fill the gaps caused by staggering the normal balk and on ramps.

The deck of the bridge is supported on pneumatic pontons each having a displacement of 24 tons with 4 inches of free-board. The 24 ton ponton contains two 12 ton half-floats joined together to form one unit. The half-floats are made of neoprene-coated nylon fabric. Each half-float consists of three identical tubes 3 feet in diameter and 22 feet long. The tubes are placed together with rope and each contains four compartments filled with air to a pressure of 2 psi. A saddle assembly consisting of pin connected steel beams and plywood saddle panels is used to provide stiffness and distribute the load to the pneumatic float.

The M4T6 floating bridge is considered to be highly suitable for airborne operations because of the light weight of its component parts. The heaviest item is the 12-ton half-float which weighs approximately 750 pounds. The bridge is normally transported on 5-ton bridge trucks, each truck carrying a 15 foot section of floating bridge.

Aluminum balk being installed

M4T6 Floating Bridge under construction



Installation of aluminum balk

M4T6 Bridge under construction

AMPHIBIOUS RIVER CROSSING EQUIPMENT

1. The purpose of the tests of the Amphibious River Crossing Equipment now being conducted by the 11th Engineer Group is to determine the suitability of this equipment as a replacement for standard river crossing equipment now being used during the initial assault phases during deliberate river crossings.

2. The basic unit of all three vehicles is approximately the same. The hulls are a water-tight ponton of welded steel plate. On the inside it is divided into five compartments by water-tight bulkheads. To insure stability and buoyancy during navigation each unit is equipped with two pneumatic floats. The operating power for wheels which are retractable, propeller, hydraulic system, and other accessories is supplied by a 222 hp diesel engine. The vehicles are equipped with power steering and electric operated gear shifts. Operation, preparation for the water, and rigging for highway travel are accomplished by the four man crew of each vehicle without any requirement for additional personnel, equipment, or tools, other then those carried on each vehicle.

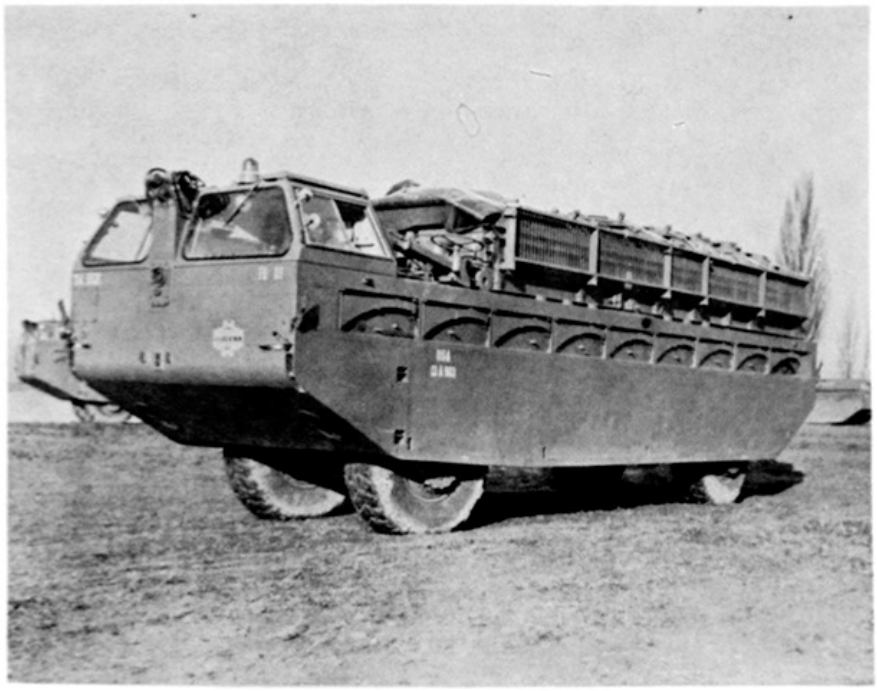
3. The three types of Amphibious Vehicles are as follows:

a. Class 20 Ferry: The ferry is end-loaded and vehicles must either be backed on or off the unit. A hydraulic ramp, 16' 5" in length, hinged to the bow of the unit is folded back on the deck during cross-country movement. The ferry can carry loads up to Class 25 or 23 tons. The ramp can receive loads up to 10' above the water level and to 1' below water level. This permits the ferry to operate from unimproved banks of carying heights.

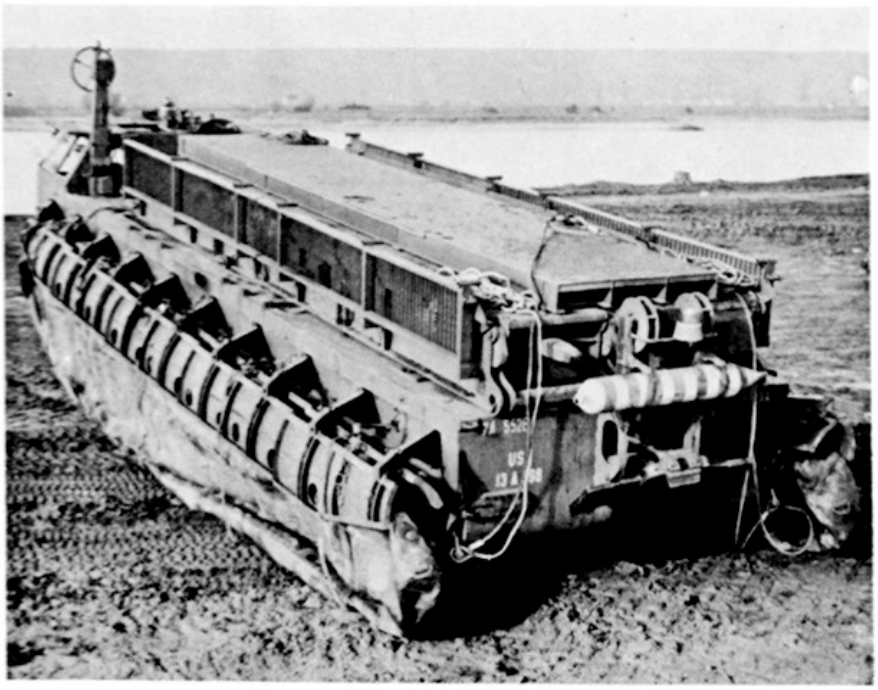
b. Bridge Unit: The bridge unit carries 26' 3" of deck which is folded for road travel. On entering the water the deck section is rotated 90 degrees, widened to 13', and the center portion of the deck is hydraulically lowered into position filling the deck completly. The unit is then connected to the next unit. The units are connected together by a male and female locking device and final connection is completed by a hydraulic pin that is set from the side of the vehicle.

c. Ramp Unit: The ramp unit carries the ramp which is 26' 3" long. Upon entering the water the ramp section is rotated 90 degrees and connected to the end section of the bridge. The center portion of the ramp is filled with panels that are attached to the ramp by means of hinges. The vehicle has a removable plug over the wheel wells. After the ramp has been connected this plug is removed allowing air to escape. This causes the ramp vehicle to settle 6 inches deeper in the water. The ramps are then hydraulicalli lifted in the air and the ramp vehicle is then removed.

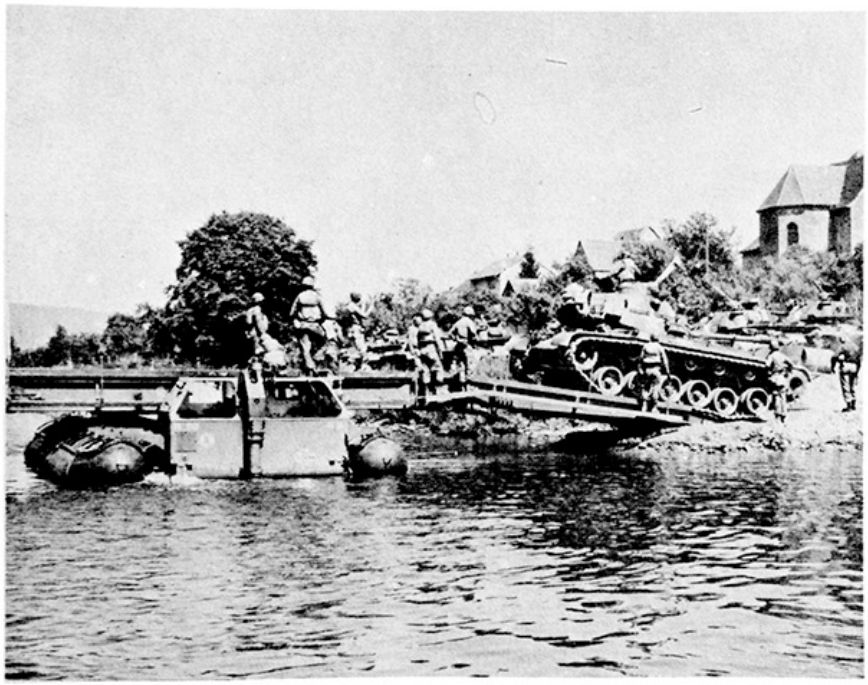
4. The Amphibious Equipment is highly mobile on all types of roads and highways. They have an operating range of 350 miles and are capable of speeds of 40 MPH. Cross-country mobility compares favorably with the 5-ton bridge truck. The units are capable of negotiating 50% slopes and can enter or leave the water without outside assistance under all but the most adverse bank conditions.



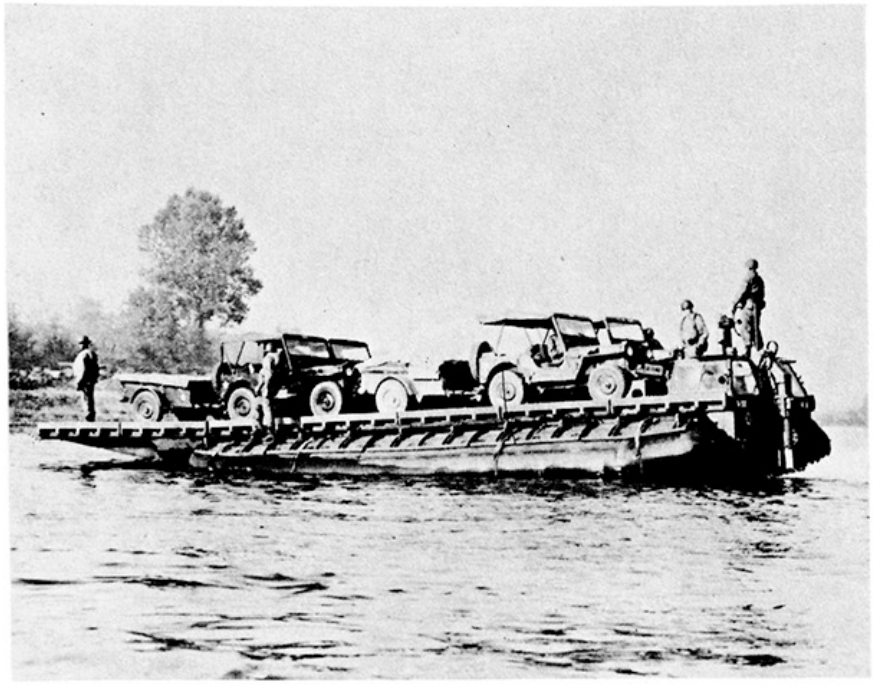
Amphibious Bridge Vehicle
(Prepared for road travel)



Amphibious Bridge Vehicle
(Floats attached, being prepared for water travel; rear wheels are retracked)



Loading of M-48 tanks on raft



Ferry with 4 Jeeps with $\frac{1}{4}$-ton trailers