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MTMC REPORT OA 76-13

AN ANALYSIS OF THE DEPLOYMENT OF THE 235TH AVIATION COMPANY (ATTACK HELICOPTER)

JULY 1977

MILITARY TRAFFIC MANAGEMENT COMMAND
TRANSPORTATION ENGINEERING AGENCY
NEWPORT NEWS, VIRGINIA 23606

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MTMC REPORT OA 76-13

AN ANALYSIS OF THE DEPLOYMENT OF THE 235TH AVIATION COMPANY (ATTACK HELICOPTER)

July 1977

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SUBJECT: Deployment of the 235th Aviation Company

TO: SEE DISTRIBUTION

This report describes high-density loading techniques employed for oversea movement of helicopters by barge ship. It is one of a continuing series of efforts by this Command to develop optimum methods for deploying unit equipment by modern ocean shipping. Barge ships are among the most versatile ship systems for the transportation of equipment and, as such, will be a valuable asset in future strategic deployments.

ALLEN J. DOWD
Special Assistant for
Transportation Engineering

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ABSTRACT

The objective of this study is to provide a documentary narrative of the use of a barge-ship system for oversea movement of weapon systems and equipment of a US Army unit. This study identifies technical and operational shortcomings and recommends improvements in techniques for transporting Army aircraft in a near flyaway configuration by the modern sealift assets presently available. It was found that by using high-density loading procedures US Army units could be transported efficiently and economically on the SEABEE ship system.

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TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS - cont

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SECTION I

EXECUTIVE SUMMARY

1. Terms of Reference. This study was conducted in consonance with the Military Traffic Management Command (MTMC) mission of providing technical assistance to units selected for deployment in order to achieve economy, improve mobility, and optimize ship utilization. At present only three SEABEE ships exist; however, these offer attractive potential for use in military deployment. The analysis consists of an investigation of a deploying US Army unit by SEABEE ship to the Federal Republic of Germany. Its objective is to provide:

a. A documentary narrative of the use of a barge-ship system for the oversea movement of the weapon systems and equipment of a US Army tactical unit.

b. A detailed analysis of this unit deployment to identify transportability, technical, and operational shortcomings and to recommend improvements.

2. Approach. The approach taken is to explore innovative techniques and procedures for loading Army helicopters in SEABEE barges. To ensure a high level of combat readiness in the operational theater and maximum utilization of transportation assets, Army helicopters are loaded in a high-density configuration with the absolute minimum disassembly.

3. Conclusions.

a. Helicopter preservation requirements for shipment by barge-ship systems should be reduced to those outlined in Appendix A, as modified in paragraph 2 of Section V.

b. High-density loading techniques with minimal disassembly should be employed for helicopter shipments in barge ships.

c. It may be cost effective to utilize SEABEE systems only for unit oversea deployments from port to port as opposed to origin to destination or point to point.

4. Recommendations. It is recommended that:

a. US Army Aviation Systems Command (AVSCOM) modify helicopter preservation requirements for shipment by barge-ship systems, as modified by paragraph 2 of Section V and Appendix A, and incorporate the changes into the appropriate training manuals.

b. Helicopter high-density loading techniques using minimal disassembly be employed for movements in barge-ship systems.

c. Unit moves by barge ships be evaluated on a case-by-case basis to determine whether port-to-port shipments are advantageous to the Government.

SECTION II

INTRODUCTION

1. Purpose. To enhance the oversea transportability of US Army units in both peacetime and contingency situations, using the SEABEE barge-ship system.

2. Objectives. To provide a:

a. Documentary narrative of the use of a barge-ship system[1/] for the oversea deployment of the helicopters and unit equipment of a US Army tactical unit.

b. Detailed analysis of this unit deployment to identify transportability, technical, and operational shortcomings and to recommend improvements.

3. Scope. This study is limited to the deployment of the 235th Aviation Company (Attack Helicopter) from Fort Knox, Kentucky, to Giebelstadt, Germany, in May and June 1976.

4. Background.

a. This study was initiated by the Military Traffic Management Command (MTMC), after observing the deployment of the 235th Aviation Company (Attack Helicopter), in consonance with its mission of providing assistance to units selected for deployment to achieve economy, improve strategic mobility, and optimize ship utilization.

b. Traditionally, military units have been deployed by the rapidly declining fleet of break-bulk ships. Although substantial numbers of break-bulk ships remain in the maritime fleet, many are being phased out and either scrapped or placed in the National Defense Reserve Fleet (NDRF). Seatrain vessels were specially modified to transport military cargo in the mid-sixties but since then have been deactivated and placed in the NDRF. In the past, Army aircraft were transported by US Naval aircraft transporters, however, this strategic lift capability has been deactivated and is no longer available in the active or reserve fleets. Modern ocean shipping has become very specialized with the introduction

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[1/] MTMTS Report 73-33, Barge-Ship System (BSS) Study, Military Traffic Management and Terminal Service, Washington, DC 20315, December 1973.

of container, roll-on/roll-off (RORO), and barge ships. This change in the composition of the maritime fleet has led to development of new concepts and procedures for overocean movement of military units. Although only three SEABEE ships exist, and these are employed on regular trade runs, the system offers attractive potential for use in military deployment when available.

c. The SEABEE barge loading of helicopters and unit equipment at the Alabama State Docks in Mobile, Alabama, was observed and recorded by MTMC, and barge discharge was monitored at the Rhine River Terminal, Mannheim, Germany. Other pertinent data were obtained from Government agencies and oversea commands.

SECTION III

SEABEE BARGE-SHIP SYSTEM

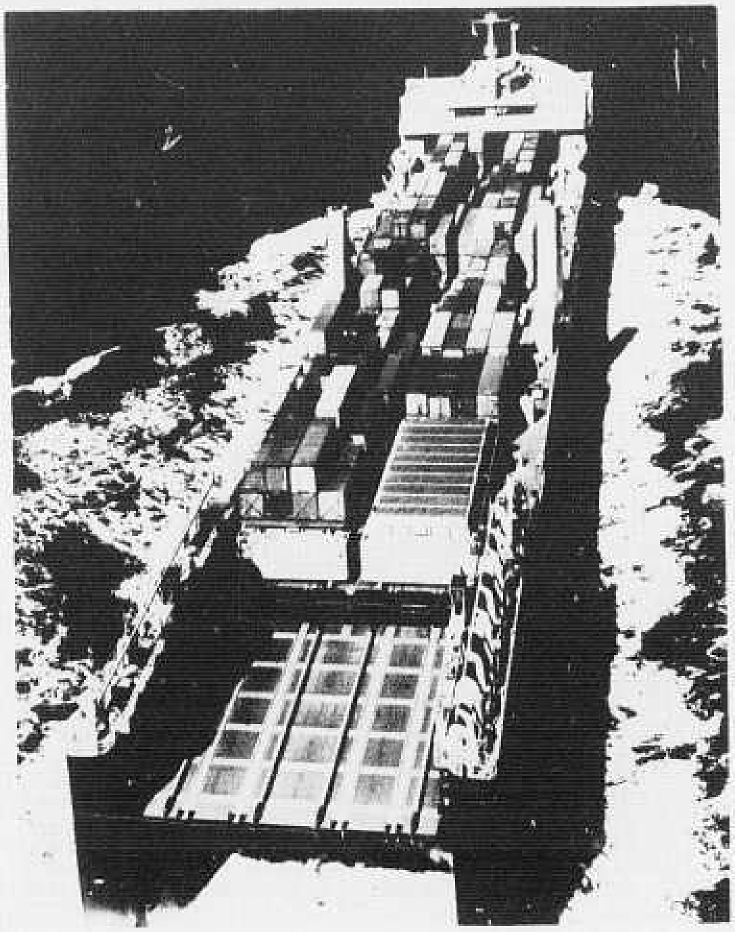
1. General. Specifications of the SEABEE vessel are shown in Figure 1. The SEABEE barge-ship system represents the most versatile multimission capability available to satisfy military deployment requirements.[2] The SEABEE system is designed around a barge-carrying cargo ship 876 feet long and 106 feet abeam. The capability of this system to carry barges, containers, vehicles, and heavy-lift items, as well as general cargo, offers the maritime fleet added strategic lift capability unequalled by other systems. The SEABEE can be configured to provide 146,000 square feet of RORO space or to carry 1,784 20-foot container equivalents in a pure containership configuration. Normally, it carries dry cargo in 38 barges. The barges are stored horizontally on 3 decks, 12 each on the main and lower decks, and 14 on the weather deck.

2. Barge Characteristics. The watertight, double-hull SEABEE barge (Figure 2) has carrying capacity of approximately 1,000 measurement tons (MTON), twice the cargo capacity of a LASH lighter. It is approximately 97 feet long (one-half the length of a river barge) and is designed to provide compatibility with the US towing industry. Its flexibility is its most noteworthy feature. Some specifications are:

a. A limited number of barges can be fitted with a tween deck by installing steel beams athwartship.

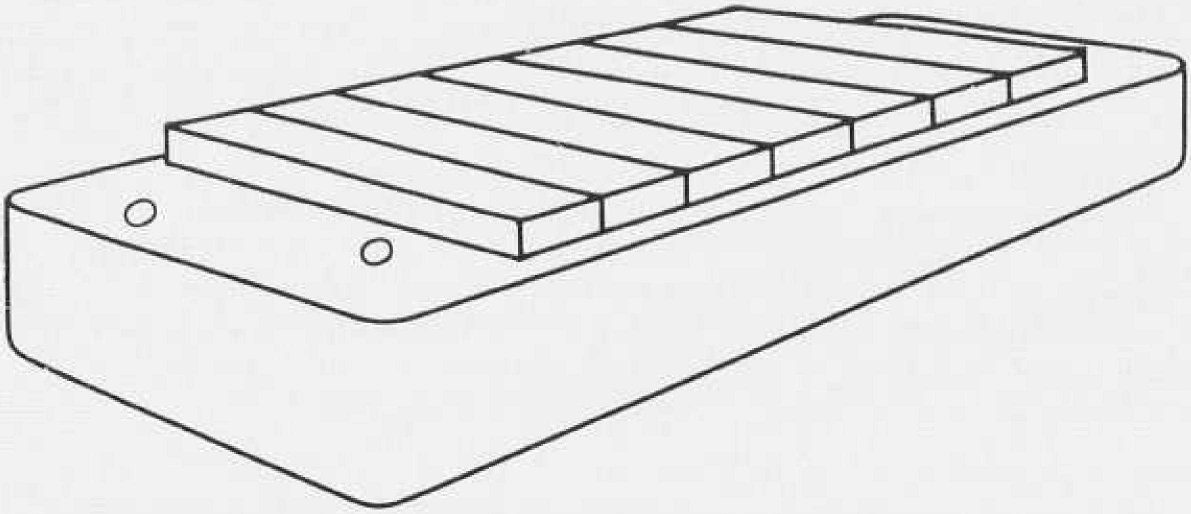
b. By attaching container supports to the barges, sixteen 40-foot containers can be carried atop a portion of the barges on the weather deck.

[2] MTMC Report 75-16, An Analysis of the Initial Deployment of a US Army Unit by a Barge-Ship System, MTMC, April 1975.



External Dimensions:	876' long, 106' wide, 26' maximum draft
Speed:	20.9 knots (approximately)
Barge Capacity:	38
Container Capacity:	Variable - 160 40' containers can be carried on racks atop the upper layer of barges. Ship can carry a maximum of 1,784 20' containers in a pure-containership mode (this requires modification by ship yard)
Total Cargo Capacity:	Approximately 20,000 LTON plus 1,270,000 cu ft of deep-tank capacity
Crane Type and Capacity:	2,000-ton stern elevator and a hydraulic barge-transporter system

Figure 1. SEABEE Ship Specifications.



External:	97'6" long, 35' wide, 16'11" deep
Internal:	90' long, 30'3" wide, 14'7" deep at cover
Hatch Opening:	84' long, 30'3" wide
Hatch Panels:	7 each, approximately 5, 800 lb per panel
Cargo Capacity:	834 LTON/39, 140 cu ft
Empty Draft:	1'9"
Fully Loaded Draft:	10'7"
Lightweight Barge:	150 LTON

Figure 2. Barge Dimensions.

SECTION IV

UNIT DEPLOYMENT

1. General. The 235th Aviation Company (Attack Helicopter) deployed from Fort Knox, Kentucky, to Giebelstadt, Germany. Unit helicopters as well as vehicles were processed and shipped from the Alabama State Docks in Mobile, Alabama (Figure 3). Unit equipment was shipped in 10 Lykes vans from Fort Knox directly to New Orleans, and unit personnel were transported to Germany by commercial and military airlift.

Figure 3. Pier C, Alabama State Docks.

2. Helicopter Loading.

a. Helicopters of the 235th Aviation Company comprised nine AH-1Q Cobras (Figure 4) and three UH-1H Hueys (Figure 5), totaling 1,990 measurement tons (MTON) and 45.4 short tons (STON). Disassembly of the UH-1H helicopters was limited to removal of one tail rotor blade and the FM antenna. The lower rack of the XSM-65, Tow Missile Subsystem and one tail rotor blade were removed from the AH-1Q helicopters. This essential disassembly required less than one man-hour for each aircraft shipped. The helicopters were preserved in accordance with special instructions

Figure 4. Army AH-1Q Model Helicopter.

Figure 5. Army UH-1H Model Helicopter.

from the US Army Aviation Systems Command (Appendix A) at a minimal cost, and with approximately 5.5 man-hours of effort per helicopter. These reduced preservation requirements were designed for barge-ship shipments, and AVSCOM is taking the necessary action to reflect this change in preservation requirements in the appropriate publications. Six SEABEE barges were towed from New Orleans to Pier C, Alabama State Docks. A 30-ton mobile crane was used to open and load the barges.

b. The SEABEE barge loadings were accomplished under the guidance and direction of the Commander, Mobile (Alabama) Detachment, MTMC. The labor force consisted of a supervisor from Mobile and two sections. The stevedore section was composed of 10 men and a foreman. Six barges were used in this deployment, two were loaded with helicopters and four with the vehicles organic to the deploying unit. Each barge loaded with helicopters contained six aircraft; Lykes barge number 94 was loaded with six AH-1Q helicopters (Figure 6), and barge number 170 contained three AH-1Q and three UH-1H aircraft (Figure 7). The high density of the aircraft loads is directly reflected in the number of measurement tons loaded in each barge.[3/] The SEABEE barge has a normal rated capacity of 1,000 MTON. Due to the configuration of aircraft, this capacity can be exceeded by overlapping portions of the aircraft and thereby increasing the total cube (MTON) that can be loaded. In the case of barge 94, 1,126 MTON were

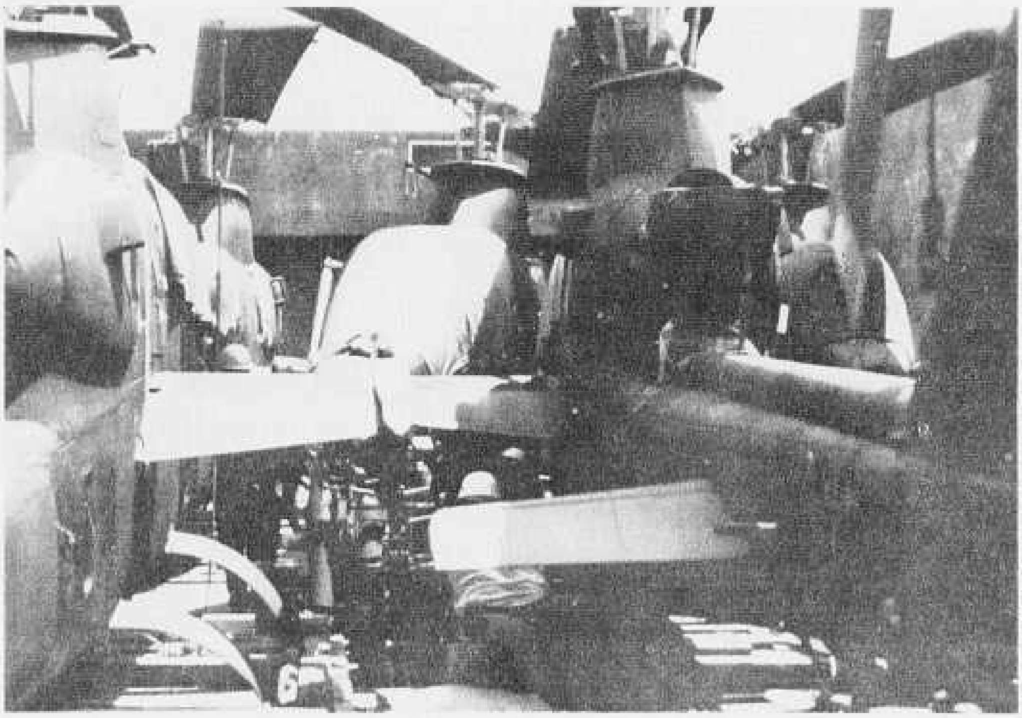


Figure 6. SEABEE Barge Loaded With Six AH-1Q Helicopters.

[3/] This is the volume of space occupied by the item; it is computed by multiplying the extreme horizontal dimension measured from end to end by the extreme horizontal dimension measured from side to side by the extreme vertical dimension from ground level to highest reference point, and the result is expressed in cubic feet. This product is then divided by 40 to give measurement tons.

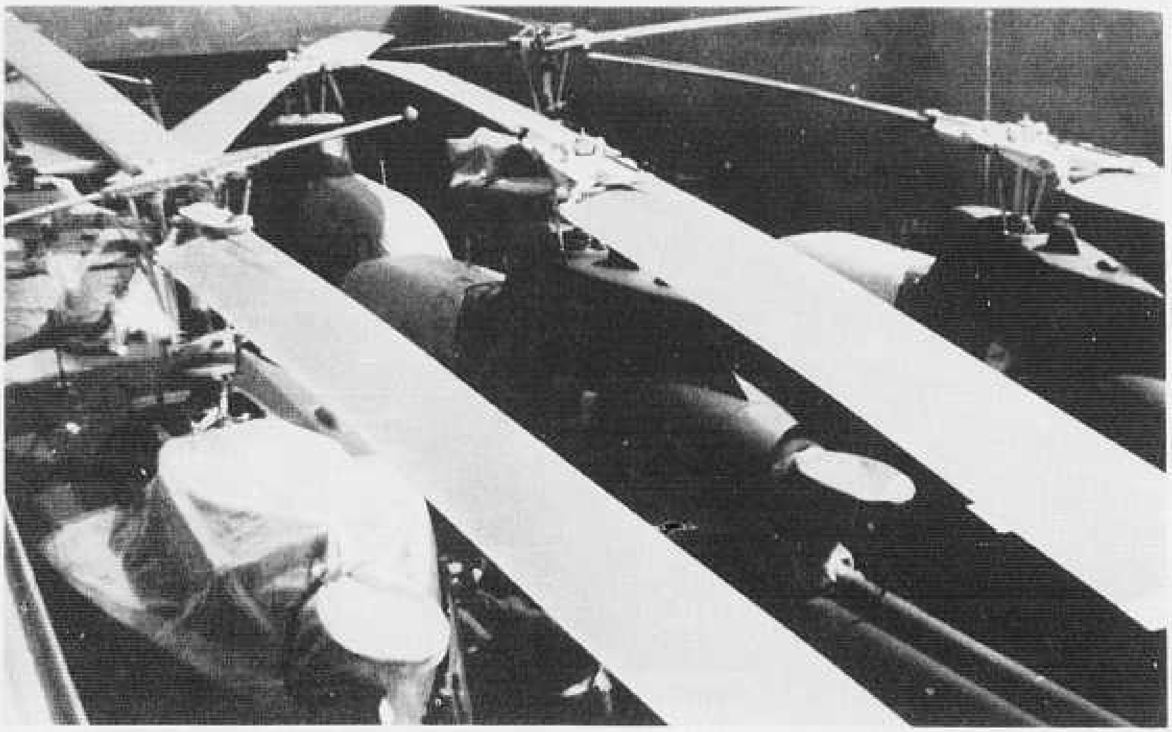


Figure 7. SEABEE Barge Loaded With Three AH-1Q and Three UH-1H Helicopters.

loaded. Lykes Lines approved a MTMC request to install temporary, deck-tiedown fittings making feasible the full use of the high-density loading concept of minimally disassembled helicopters.

c. Prior to loading the helicopters, 1-inch stock dunnage was laid athwartship on the deck in a process similar to strip decking (Figure 8). This strip decking was laid only under the skid tubes, extending from port to starboard bulkheads. Since it was impossible to nail the decking to the steel surface of the barge floor, the decking was classified as "floating"; it is not rigidly fixed, and it is free to yield to a limited extent under external forces. Lumber (4- by 6-inch) was placed parallel to and against each bulkhead, directly over and secured to the dunnage. Helicopter final positioning was accomplished while the aircraft was attached to the mobile crane, and fine adjustments in position were made by manhandling the aircraft into its final stowage position. Due to the high density of the loadings, only inches separated the helicopter from the side bulkheads (Figure 9) as well as the vertical fin from the barge overhang and end bulkhead (Figure 10). Lumber (4- by 6-inch) was positioned parallel to and against the outside of the skid tubes and parallel to and flush with the bulkheads. Bracing was then required to tie the 4- by 6-inch lumber together at both skid tubes and bulkheads. This was accomplished by wedging 4- by 6-inch timbers

Figure 8. "Floating" Deck Being Laid Athwartship.

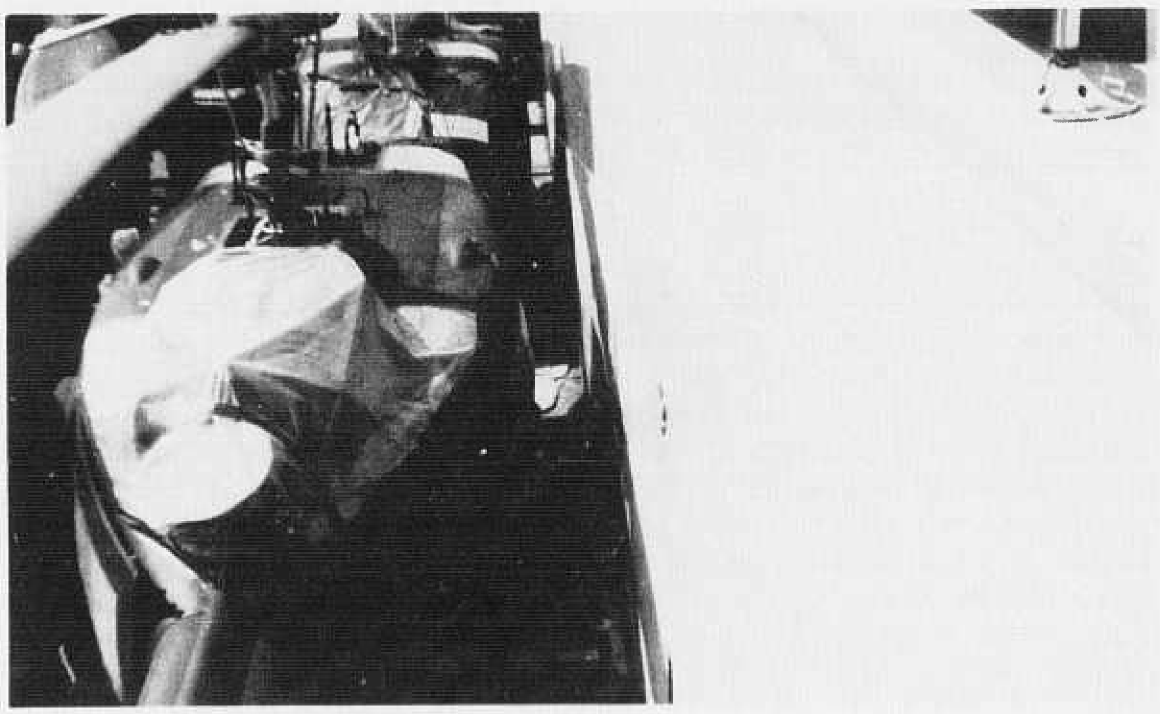


Figure 9. Proximity of Helicopters to Barge Side Bulkheads.

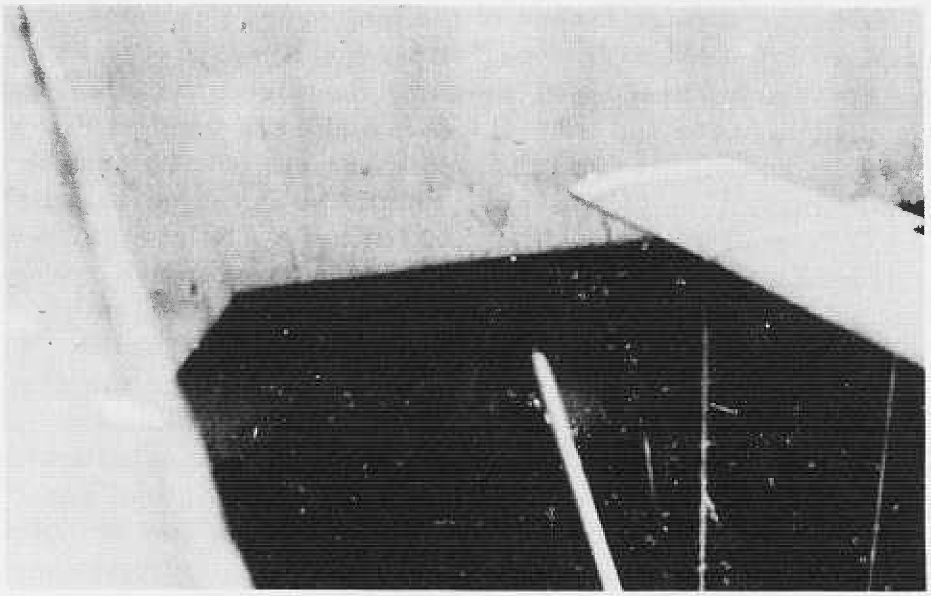


Figure 10. Barge Overhang and End Bulkhead Clearance.

between the two and nailing it to the deck stripping and to the end pieces. Braces were then extended between the skid tubes of adjacently stowed helicopters to unitize the stow and transmit dynamically induced loads to the bulkheads (Figure 11). Vertical restraint was provided by 2- by 4-inch braces secured to the 4- by 6-inch lumber parallel to the skid tubes and extending under the fuselage of the aircraft.

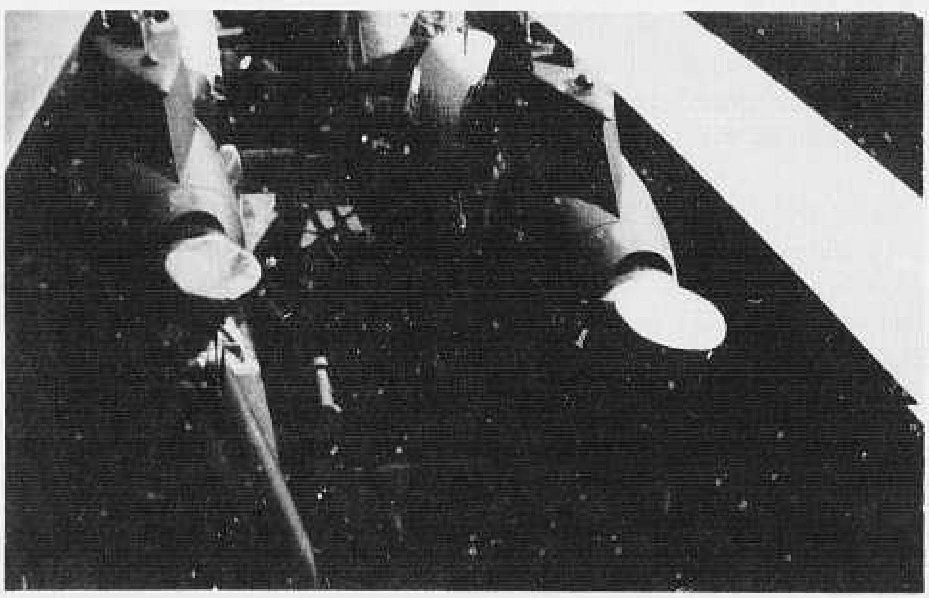


Figure 11. 4- by 6-Inch Lumber Required to Unitize the Stow.

d. Helicopters were lashed to the temporary deck tiedown fittings using standard 5/8-inch wire rope, clips, and eye-and-eye end-pull turnbuckles. Four jack fittings with mooring shackles were provided as auxiliary equipment for the AH-1Q Cobra and were used at two jack points on the fuselage and on the two outboard wing pylons. To use the wing pylon jack fittings, the ejector tube assemblies in the outboard armament rack have to be substituted for the jack fittings. The aircraft were shipped with the armament systems attached to preclude extensive reassembly and bore sighting; therefore, these tiedown points were eliminated. The two fuselage fittings are rated for 700 to 1,000 pounds of tension. The temporary deck tiedown fittings to the barge floor, maintain the desired tiedown pattern and floor angles of 30 degrees. These additional fittings made possible optimum vertical restraint and maximum utilization of barge deck space. Cable tension, a significant factor in vertical restraint, was checked for excess tension by the deflection method, and no potentially damaging cable tension was observed.

e. The four jack/tiedown points on the UH-1H Huey helicopter are under the fuselage and rated for 1,000 pounds of vertical and 500 pounds of lateral and fore-and-aft tension. All of the designated tiedown fittings were used to secure the UH-1H aircraft. Desired pattern and angles for optimum restraint were maintained (Figures 12 and 13).

f. Vertical clearance under the hatch covers was adequate for both the UH-1H and AH-1Q (Figure 14). Clearance for the vertical fin stowed under the barge overhang presented a problem with UH-1H aircraft because the vertical fin extended above the lower protrusion of the overhang. This problem was solved by placing a 4- by 4-inch piece of lumber crosswise under the forward cross tubes and beneath the skid tubes of the aircraft. By raising the forward end of the aircraft skids, the vertical fin was lowered sufficiently to stow it safely under the barge overhang (Figure 15).

g. The two barges were loaded with 12 helicopters, beginning at 0800 on 24 May. Final tiedowns were completed and barge hatch covers replaced later the same afternoon. The total loading time was less than 7 hours for the 12 helicopters. This time period is considered highly acceptable.

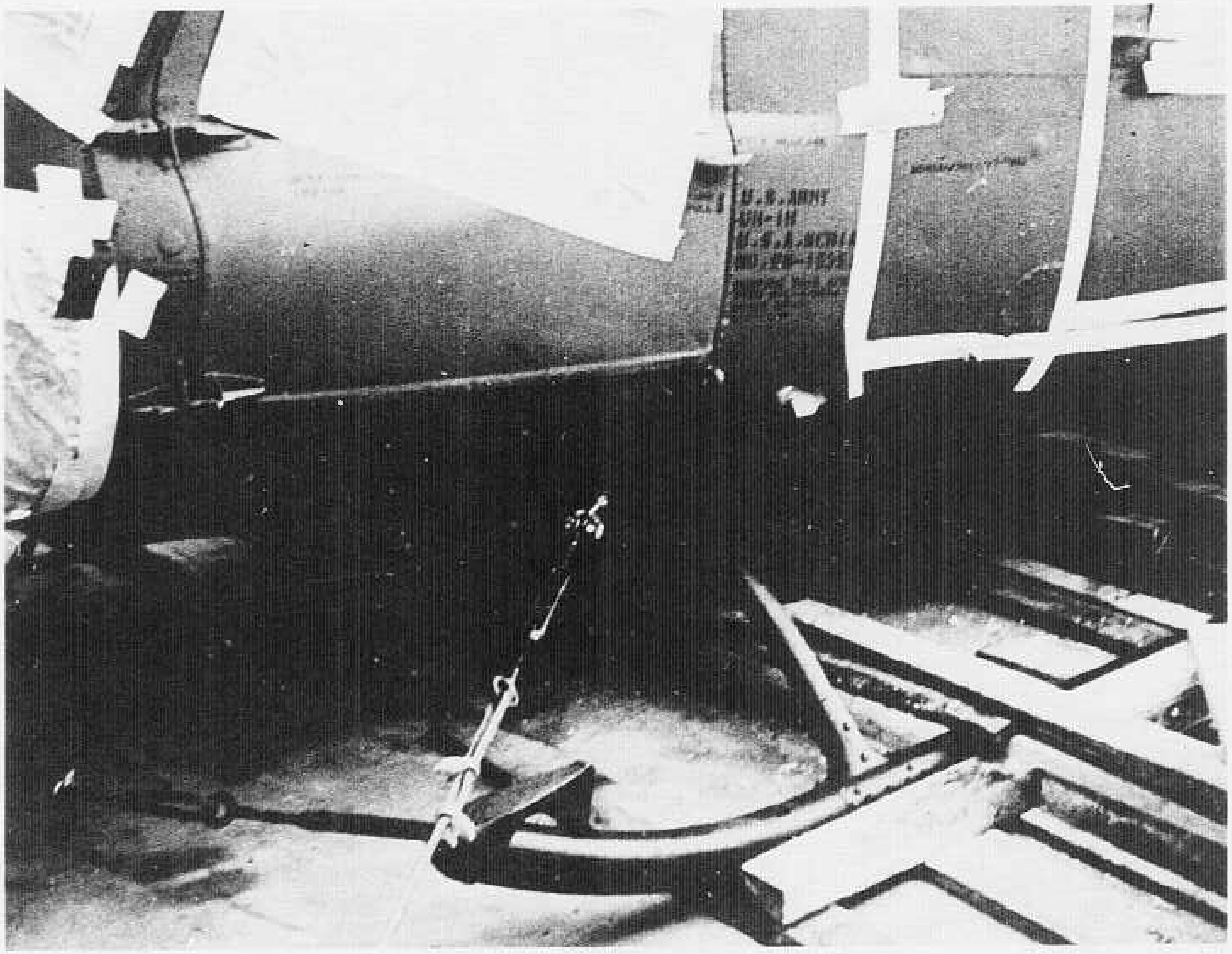


Figure 12. UH-1H Helicopter Forward Jack/Tiedown Fitting.

Figure 13. UH-1H Helicopter Aft Jack/Tiedown Fitting.

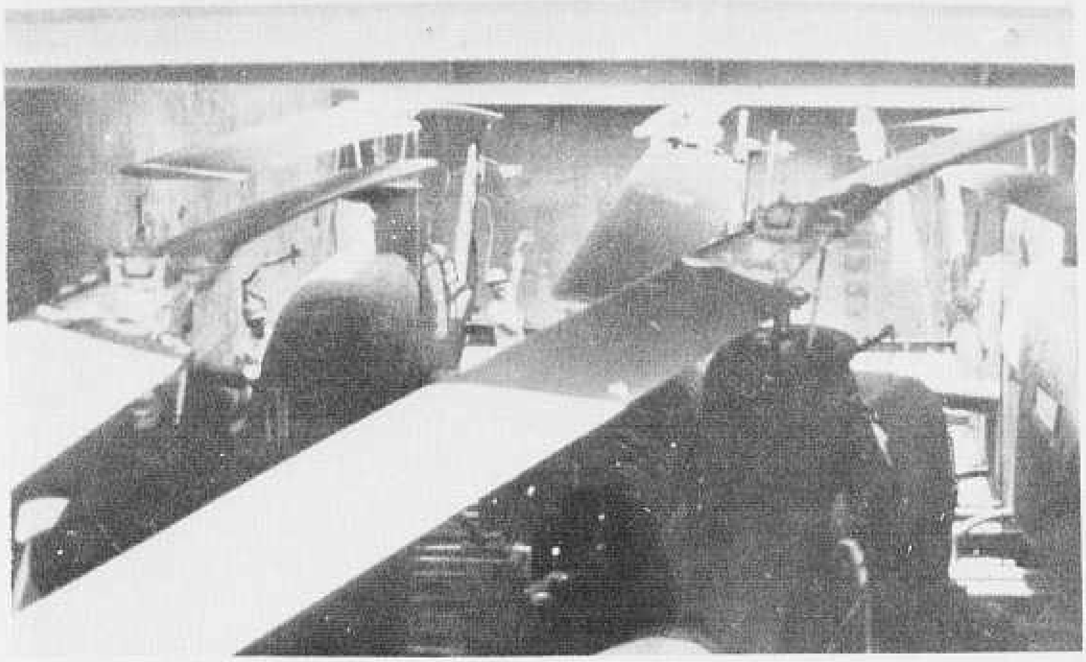


Figure 14. Adequate Vertical Clearance Under Barge Hatch Covers.

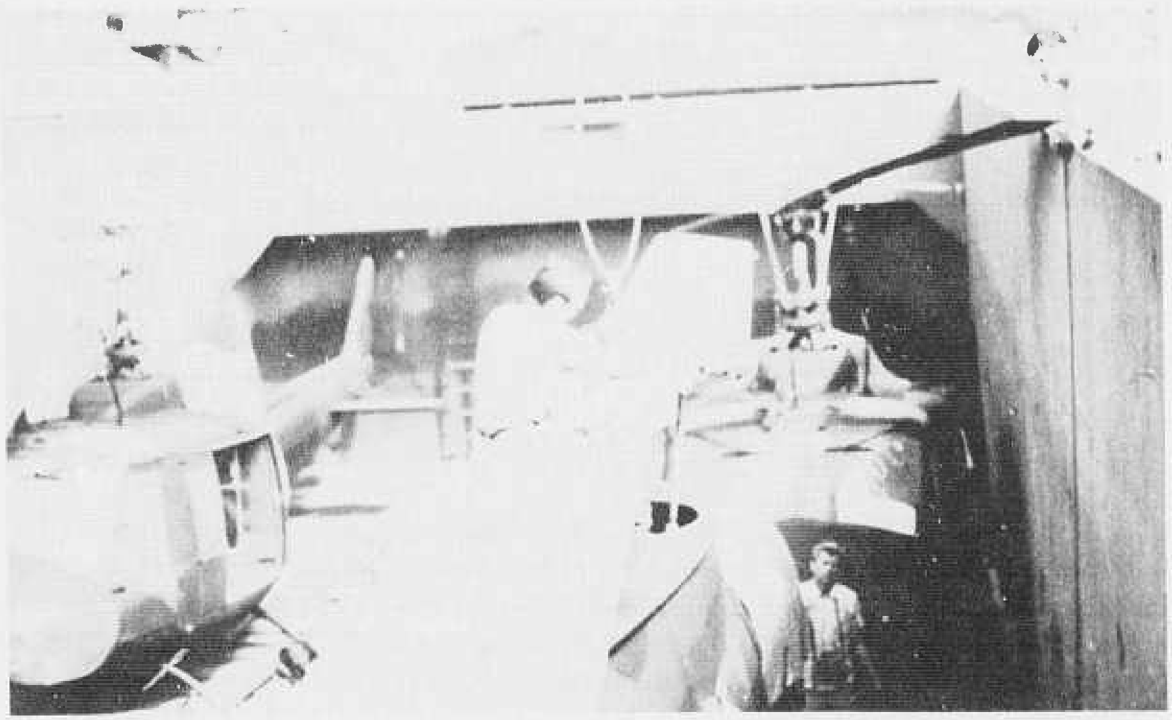


Figure 15. UH-1H Helicopters With 4- by 4-Inch Lumber Under Forward Cross Tubes and Beneath Skid Tubes to Allow Vertical Clearance.

3. Unit Vehicles and Equipment Loading.

a. On 6 May the unit equipment of the 235th Aviation Company (Attack Helicopter) was shipped on 27 railcars from Fort Knox to the port of Mobile. It consisted of 72 assorted vehicles and 4 pieces of military impedimenta, totaling 1,815 MTON (344 STON). The unit did not use its available organic vehicle cargo space. Miscellaneous organic equipment and supplies should be prepared, packed, and loaded on organic vehicles to reduce the cube of movement requirements.[4] Had organic vehicles been loaded to the reduced capacity specified in AR 220-10, an additional 160 MTON of cargo could have been shipped in the vehicles, and the requirement for Lykes vans would have been decreased by as much as 50 percent. The vertical dimension of SEABEE barges permits the loading of organizational vehicles to operational height. Had this been done, van requirements and associated costs could have been reduced by 80 percent.

4/ FORSCOM Regulation 55-1, Transportation and Travel, Unit Movement Plans and Reports, FORSOM, Fort McPherson, GA 30330, September 1976.

b. Four of the six barges towed from New Orleans to Mobile were loaded with unit vehicles. Loading of these barges commenced on the afternoon of 24 May 1976. The heaviest pieces of equipment were loaded first and were placed in the corners of the barges. The first barge was loaded within 3 hours, including removal of hatch covers, securing vehicles, and sealing barges. The following vehicles comprised the first barge load:

7 1/4-ton trailers
1 2-1/2-ton fire truck
6 5-ton cargo trucks
1 forklift truck
1 5-ton wrecker

c. Preload dunnaging required for wheeled vehicles was minimal: 8, 500 board feet of 4- by 6-inch and 1, 000 board feet of 2- by 4-inch lumber. Lumber (4- by 6-inch), positioned parallel to the side bulkheads, served as spacers to preclude contact of the vehicle with the side of the barge. Vehicles were lowered directly into final stowage position with the tires bearing directly against the bulkhead dunnage. Minimum space was provided between the vehicle and end bulkhead to facilitate blocking and lashing. Loading of the barges proceeded by alternating vehicles from opposite ends and loading toward the center portion of the barge.

d. The procedures used to secure the vehicles equaled or exceeded those specified[5] for wheeled vehicles stowed below deck. Smallest dunnage used was 2- by 4-inch stock (softwood): vehicles were lashed by means of 5/8- or 3/8-inch wire rope and clips, depending on weight of vehicles; and by 1- or 1/2-inch shackles, and 1- or 1/2-inch eye-and-eye turnbuckles having a clear opening between heads of 18 or 12 inches.

e. Blocking was installed parallel to the wheels of vehicles and flush against the tires. Lumber was placed directly fore and aft of the tires of single-axle vehicles (Figure 16). Chocking in this manner prevented fore-and-aft movement of the vehicles in stow. These chocks were installed over the parallel blocking and were securely fastened with 40d common nails. Blocking was then braced to the sides and bulkheads of the barge. To unitize the stow, this blocking was tied to the blocking and bracing of individual vehicles with lumber of the same size and braced from vehicle to vehicle. Density of the stow and the method employed to secure the vehicles resulted in minimum void space in each barge, reducing the potential for shifting cargo.

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[5] MTMCEA Regulation 55-36, Lashing, Securing and Chocking of Wheeled Vehicles and Other Cargoes Stowed in MSC Procured Vessels, February 1972, Change 1, December 1973.

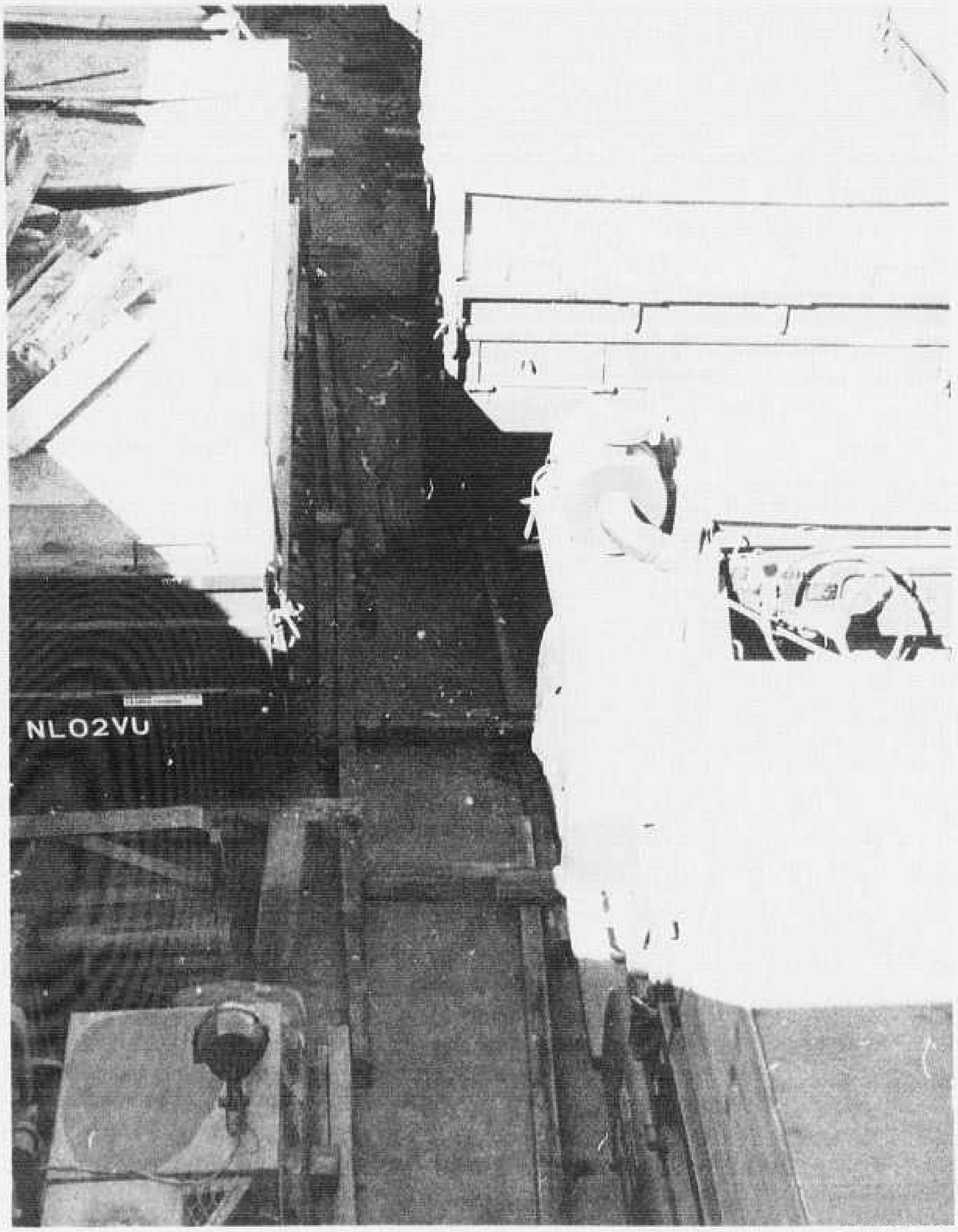

Figure 16. Blocking Utilized to Unitize Vehicle Loads.

f. Vehicles were secured to each other by means of No. 9 gauge annealed wire and then lashed to the bulkheads with appropriate-size wire rope (Figure 17). Four lashing points were used to secure each vehicle either to the lowest bulkhead tiedown fitting or to the immediately adjacent vehicle fitting. The desired tiedown pattern of 30 degrees was used as often as possible. This additional unitization served to ensure the stability of the stow and reduce damage.

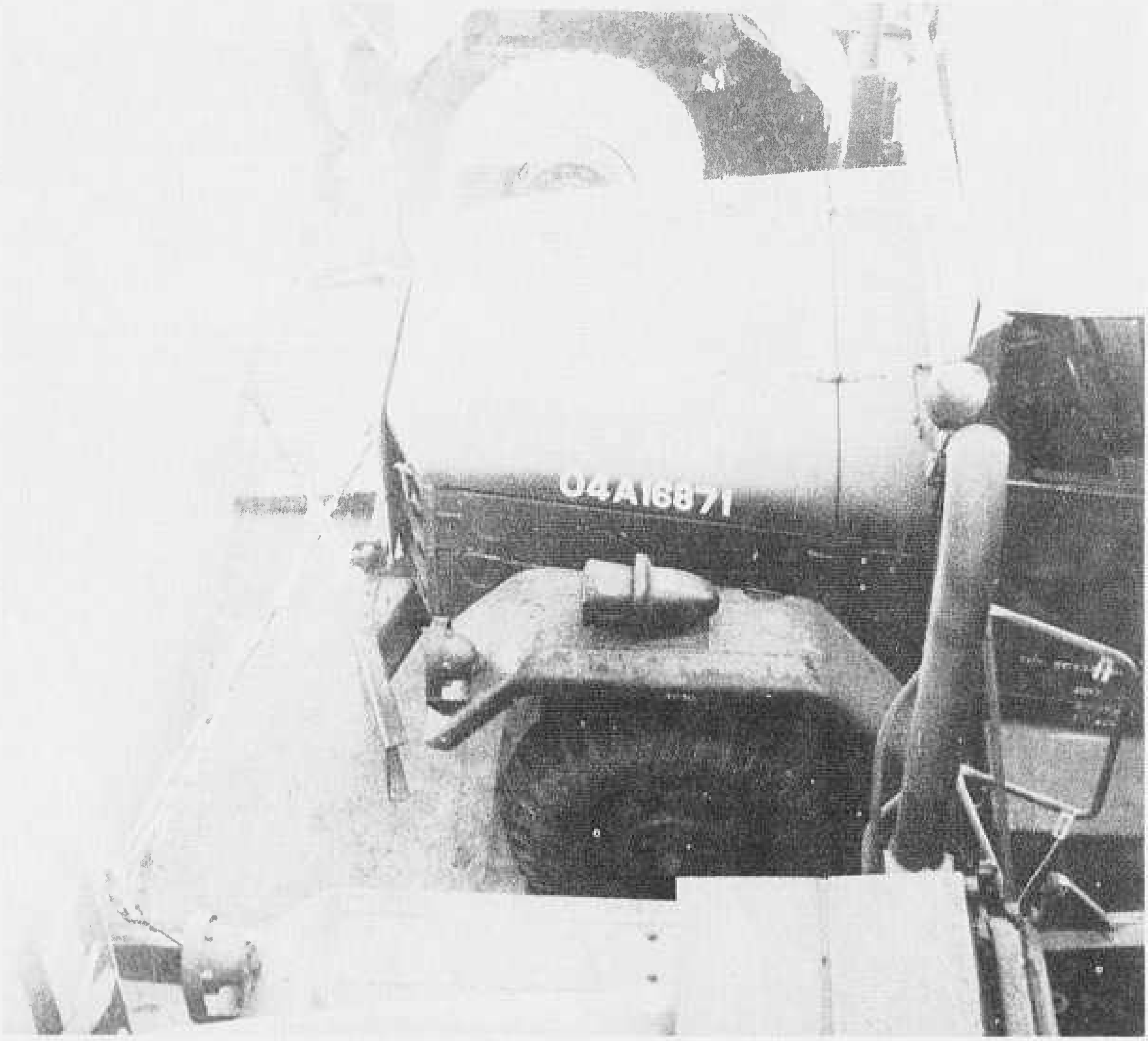

Figure 17. Vehicles Properly Secured to End Bulkhead.

g. A sensitive cargo shipment on one railcar (box), consisting of 37 pieces and 11.7 MTON, was shipped from Fort Knox, Kentucky, to Sunny Point, North Carolina, to the Federal Republic of Germany on the vessel American Ranger.

h. Lykes vans were loaded at Fort Knox, Kentucky, and subsequently shipped to New Orleans for shipment aboard the *Dr. Lykes* and the *Almeria Lykes*. Container cube utilization exceeded 75 percent for unit equipment. Eight containers were shipped on the *Dr. Lykes* and the remaining two containers were shipped aboard the *Almeria Lykes*.

4. Intertheater Transit. The six loaded barges were towed back to New Orleans, and on 1 June the SEABEE ship, *Almeria Lykes*, sailed from the port of New Orleans with helicopters and equipment totaling 3,363 MTON. The *Almeria Lykes* arrived in Rotterdam, Holland, on 14 June; barges were discharged, made into tows, and transported approximately 200 miles up the Rhine River to Mannheim, Germany (Figure 18).

Figure 18. Berthing Facilities at Rhenus Rheinau I.

5. Destination Handling.

a. The Mannheim River terminal complex is primarily a commercial operation with 40 different cargo-handling sites. The US Army R[illegible]ne River terminal handles Government cargo through civilian contra[illegible]. The first barges arrived in Mannheim 18 June and were spotted at [illegible]enus

Rheinau I (Figure 19), a commercial contractor site south of Mannheim. Site selection was based on availability and the proximity of the site to Coleman Barracks, where the discharged aircraft were scheduled to fly. Port facilities included two tracked gantry cranes, hardstand storage, gravel storage, hard-surface access roads, and rail sidings parallel to the quay.

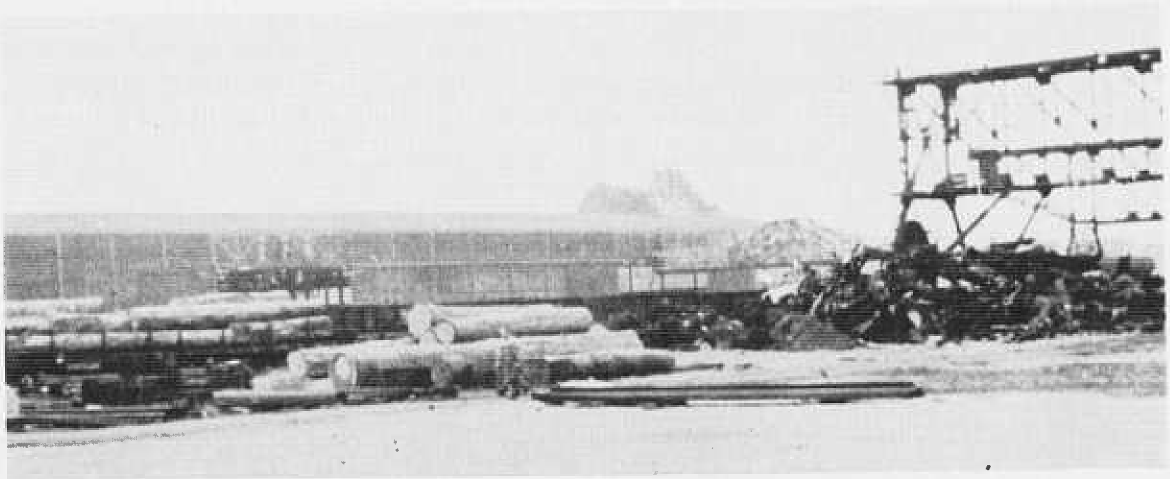

Figure 19. Contractors' Staging Area at Rhenus Rheinau I.

b. As the six barges were opened, a thorough inspection was made to determine if there was any accumulation of moisture in the barges; none was found; also inspection was made to determine the extent of damage, if any. The only exceptions noted during the inspection were: a 1/4-ton truck was found in stowage with a broken windshield, and one 5-ton truck and one 2-1/2-ton truck were found with tailgates bent. It is suspected that the damage occurred during loading, because the restraints were still intact. There was no damage to the helicopters. Unloading commenced at 0800 hours 21 June and was completed by 1200 hours 22 June. The two barges containing helicopters, discharged first, were completed by 1200 hours 21 June, and by 1500 hours the aircraft had cleared the port. Actual offloading time for all six barges was 12 hours and 15 minutes.

c. Port clearance was effected as follows:

(1) A total of 72 vehicles and 4 pieces of military impedimenta went to Giebelstadt by unit driveaway.

(2) The helicopters were flown from the port to Coleman Barracks for further processing and then flown to Giebelstadt.

d. The large gantry crane carried the helicopters (Figure 20) over the railroad tracks to the staging area about 75 yards from the quay. A paved road parallel to the quay was used as the aircraft staging area (Figure 21). Ground-handling wheels were installed, and the helicopters were moved farther down the road to allow the remaining helicopters to be discharged. The aircraft, when they were in the final staging area, were processed for flight (Figure 22) and thoroughly preflighted by the unit's test pilots for the 20-minute flight to Coleman Barracks. Total elapsed processing time was 6 hours; however, processing for individual aircraft averaged approximately 1 hour. No significant maintenance problems were encountered during processing, preflight, and aircraft runup. All aircraft had flown clear of the port by 1500 hours (Figure 23).

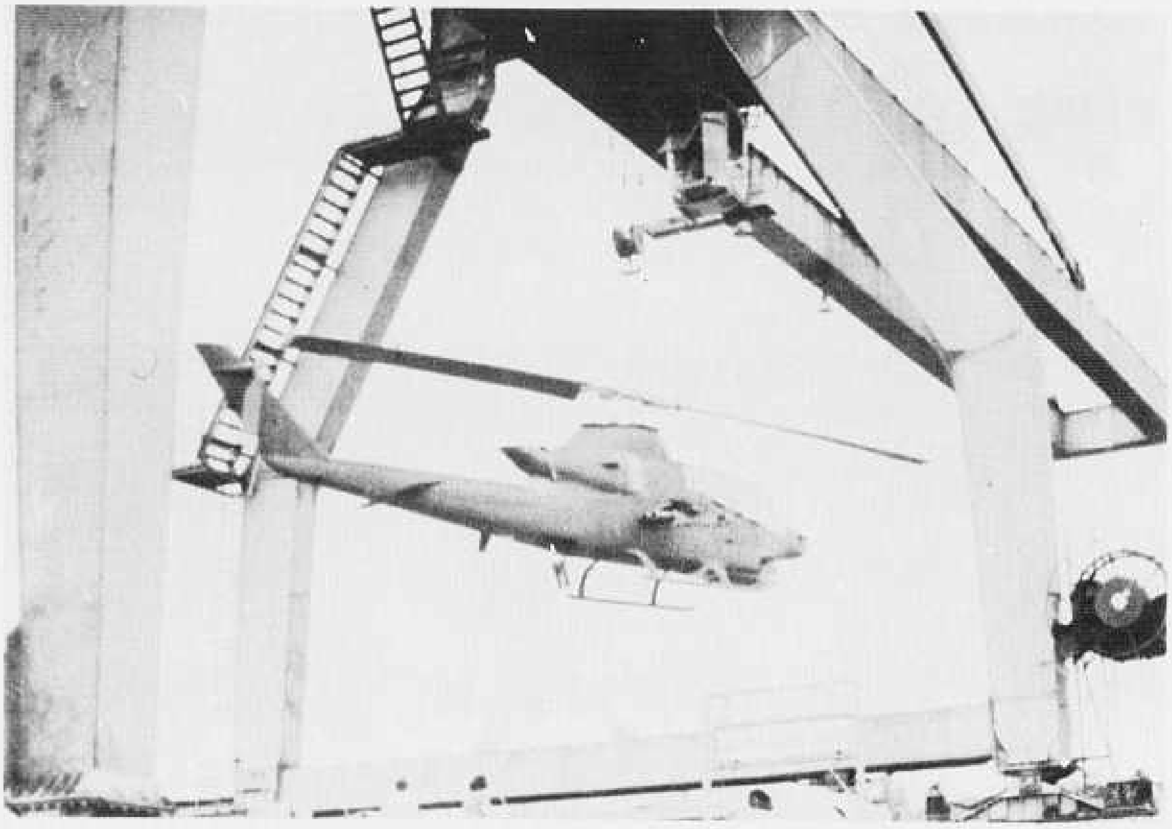

Figure 20. Gantry Crane Discharging Helicopters.

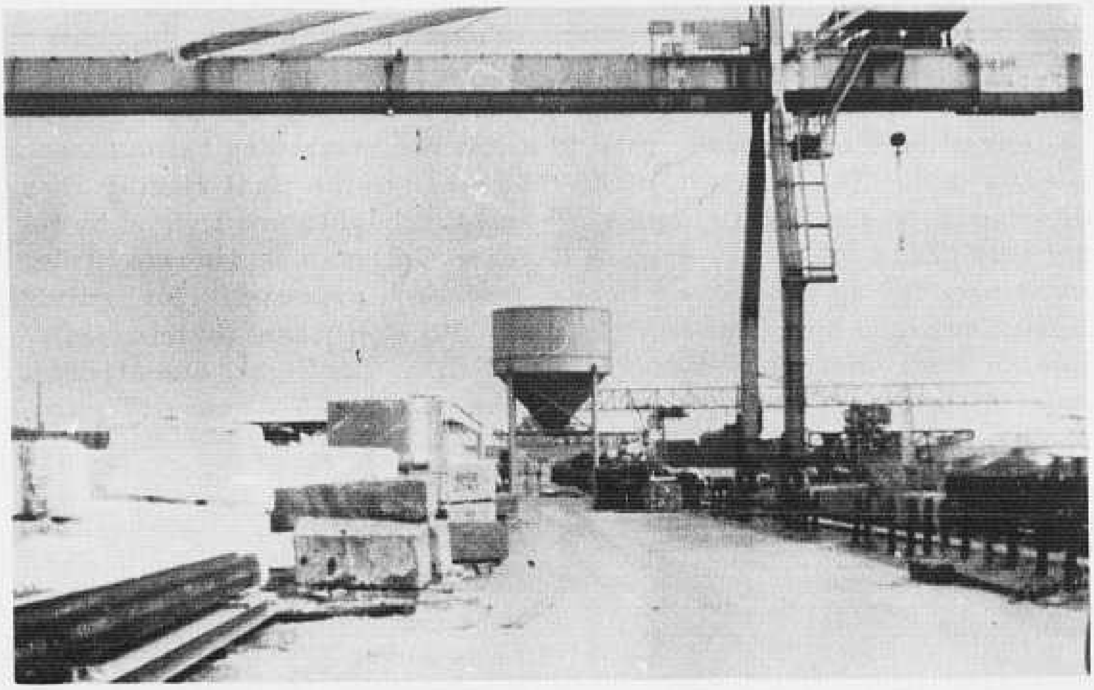

Figure 21. Helicopter Staging Area.

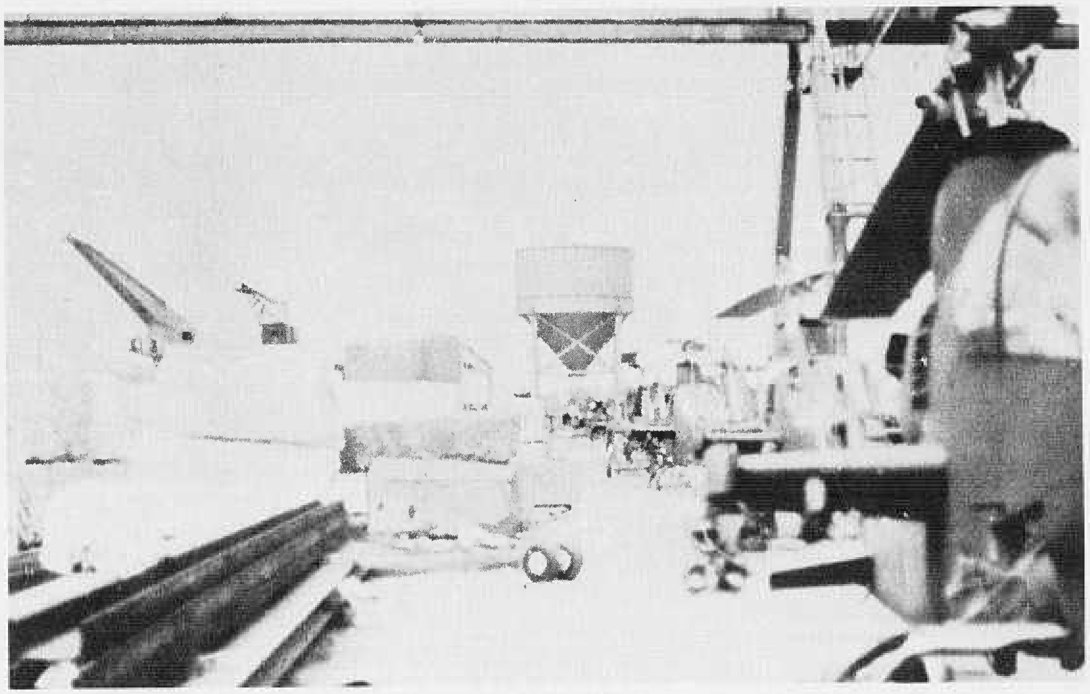

Figure 22. Helicopters Being Prepared for Flight to Coleman Barracks.

Figure 23. Helicopters Departing for Coleman Barracks.

SECTION V

DEPLOYMENT ANALYSIS

1. General.

a. This oversea deployment of a US Army unit by the SEABEE system was an unqualified success; it demonstrated that the SEABEE system would be highly desirable for future unit moves. Possible additional economies in future deployments of this nature are discussed in subsequent portions of this analysis.

b. For this move, helicopters were preserved in accordance with special AVSCOM instructions. This was done in a warehouse close to the loading site at the Alabama State Docks. This preservation, while abbreviated to some degree from that required for below-deck storage, was still above that required for movement in watertight barges.

c. It was possible to load six helicopters per barge by using temporary deck tiedown fittings. The Government was billed at the break-bulk rate (by measurement ton) shipped. Had the barges been utilized from port to port only, the freight all kinds (FAK) rate (two-thirds utilization of barge cube) could have been applied. The FAK or flat rate from port to port offered a saving of ocean charges of approximately $35,000. However, these potential savings would be offset by costs incurred at the port of debarkation for line haul and helicopter flying hours to destination.

d. The SEABEE system offers inland river origin port to destination port service under one through bill of lading and minimizes intermodal transfers. The SEABEE system contains four CONUS inland river origin ports: Chicago, Illinois; St Louis, Missouri; Memphis, Tennessee; and Birmingham, Alabama. Although the SEABEE system minimizes intermodal transfers, it may not be cost competitive to utilize the full system. In this case, the extremely high commodity rates charged at inland river ports for SEABEE barges made it economical to utilize rail and highway line-haul, combined with air ferry of the helicopters from origin to CONUS ocean port (Table 1).

2. Helicopter Preservation. Coordination with AVSCOM determined preservation requirements for Army helicopters transported under the controlled conditions of the SEABEE barge system. Reduced preservation requirements were developed by AVSCOM for the two series of Army Helicopters (AH-1Q and UH-1H) for barge loading and unloading at fresh water ports and/or at salt water terminals when exposure to the salt water

TABLE I
DEPLOYMENT COST COMPARISON

	Actual		St. Louis (Barge)
Equipment Cost			
Container Line-Haul	5,629		-----
Rail to POE	14,990		-----
Hel Flt to POE (Est)	6,922		-----
POE - Stevedore (Veh)	4,384		-----
(Hel)	1,748		-----
POE - Equip Rental	1,809		-----
POE - Misc Expenses	90		-----
		$ 55,572	-----
Ocean Tran		149,058	211,310.47
Container Line Haul	3,340		
POE Stevedore	2,305		
Hel Flt to Destination	2,130		
		7,775	7,775.00
Total Equipment Cost		192,405	219,085.47[6/]
Personnel Cost			
Advance Party (20 Pax)	4,052		
C-141 two sorties (94 pax)	56,774		
Closing party (14 pax)	4,080		
Total Personnel Cost		64,906	64,906.00
		$257,311	$283,991.47

[6/] No associated CONUS line haul or stevedore costs were computed since these would only increase the cost differential between these systems.

environment is minimal. These reduced preservation requirements (Appendix A) could be further reduced by eliminating the procedures specified in paragraphs 9, 10, and 11d, e, h, i, j, and k of Appendix A. This level of preservation would save significant amounts of time and effort and still provide the necessary transportation safeguards. AVSCOM will issue reduced preservation requirements when they are necessary.

3. Helicopter Loadings.

a. Methods were investigated to increase the efficiency of transporting helicopters in the SEABEE barge-ship system. The primary concern was to keep the helicopters in as close to flyaway configuration as possible. When helicopters were shipped by SEABEE ship in the past, excessive disassembly and preservation were required. Extensive disassembly results in increased man-hours expended in maintenance, preservation, and documentation. The goal was to reduce the amount of preservation and disassembly and at the same time to increase the barge-loading density.

b. SEABEE operators will now permit the installation of temporary barge deck tiedown fittings. With the use of these fittings many loading options became available to the shippers of US Army helicopters.[7] In this case, six AH-1Q helicopters were loaded with only one tail rotor blade removed, and a mixed bargeload of three UH-1H and three AH-1Q helicopters was loaded with one tail rotor blade removed.

4. Unit Equipment Loading. The unit wheeled vehicles were adequately secured for transport aboard the SEABEE barge without additional deck tiedowns. However, had these fittings been available, a substantial amount of dunnage could have been saved.

[7] MTMC Report 75-16, *op. cit.*

SECTION VI

CONCLUSIONS AND RECOMMENDATIONS

1. Conclusions.

a. Helicopter preservation requirements for shipment by barge-ship systems should be reduced to those outlined in Appendix A, as modified in paragraph 2 of Section V above.

b. High-density loading techniques with minimal disassembly should be employed for helicopter shipments in barge ships.

c. It may be cost effective to utilize SEABEE systems for unit oversea deployments from port to port only as opposed to origin to destination or point to point.

2. Recommendations. It is recommended that:

a. AVSCOM modify US Army helicopter preservation requirements for shipment by barge-ship systems (paragraph 2 of Section V and Appendix A) and incorporate such guidance into the appropriate training manuals.

b. Helicopter high-density loading techniques with minimal disassembly be employed for movements in barge-ship systems.

c. Unit moves by barge ships be evaluated on a case-by-case basis to determine whether port-to-port shipments are advantageous to the Government.

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APPENDIX

SPECIAL INSTRUCTIONS FOR FORT KNOX SEA BARGE SHIPMENT

(REDUCED REQUIREMENTS)

1. Cleaning. Clean the helicopter, as necessary, in accordance with TM1-UH-1-S and TM1-AH-1-S.

2. Lubrication. Lubricate helicopter, as necessary, in accordance with the lubrication chart.

3. Remove ejector cartridges in accordance with the appropriate maintenance manual (AH-1).

4. Canopy removal system. Deactivate canopy ejection system in accordance with the appropriate maintenance manual (AH-1).

5. Battery.

a. Clean battery compartment and battery as necessary.

b. Pull quick disconnect plug.

c. Cover the quick disconnect plug outlet on the battery with PPP-T-60 tape.

d. The quick disconnect plug will be covered with MIL-B-131 barrier material held in place with PPP-T-60 tape to prevent short circuits and to exclude dirt.

e. To prevent movement of the quick disconnect plug, use PPP-T-60 tape and fasten it in a safe position.

6. Fill fuel tanks to no more than three-quarters capacity. Secure a tag to the filler cap stating "AIRCRAFT FUELED WITH JP-4 FUEL, NO SMOKING."

7. Service the oil tank, transmission, and tail rotor gear boxes to normal operating level with the appropriate operating oil.

8. Fill hydraulic reservoirs to operating level.

9. Bare metal surfaces. Coat bare metal surfaces (not otherwise protected) with MIL-C-16173 Type P-2 preservative, as applicable.

10. Install engine inlet and exhaust covers.

NOTE

When covers are not available, seal opening with MIL-B-131 barrier material and secure with PPP-T-60 tape.

11. Fuselage.

a. After all applicable entries have been made in the equipment log book, and in maintenance and historical records, these documents will be placed in a plastic bag, identified, sealed and secured to the pilot's seat with the safety belt (refer to AR 750-31 and TM 38-750).

NOTE

The pilot's and gunner's safety belt and shoulder harness are attached together and tightened to eliminate slack in belts. Roll loose ends of belts and secure with PPP-T-60 tape.

b. Deenergize the circuit breaker panels.

c. Cage all instruments as necessary.

d. Secure the cockpit lights to panel fixtures with PPP-T-60 tape.

e. Flush the relief tubes with water and clean the area in and around the horns with O-D-406, or equivalent, disinfectant-deodorant solution.

f. Lock cyclic and collective pitch controls.

g. Secure all loose gear within the helicopter with nylon straps.

h. Cover the static air pressure vents with MIL-B-131 barrier material and secure barrier cover with PPP-T-60 tape.

i. Install pitot cover. If cover is not available, wrap pitot tube with MIL-B-131 barrier material and secure wrap with PPP-T-60 tape.

j. Cover all fuselage openings with MIL-B-131 barrier material and secure with PPP-T-60 tape.

k. If applicable, prepare helicopter for quarantine inspection in accordance with TM1-UH-1-S and TM1-AH-1-S.

12. Tiedown of UH-1s. Secure to barge, utilizing the four fuselage tiedown points.

13. Tiedown of the AH-1s.

a. Attach the two tiedown fittings to the fuselage and secure aircraft to the barge.

b. Brace the skid landing gear with 4- x 4-inch lumber along the outside of the skid tubes. Secure these braces by placing 4- x 4-inch lumber over the skid tubes from one brace to the other. Secure to the deck of the barge.

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Analysis of deployment; 235th Aviation Company (Attack Helicopter); barge ship systems; oversea deployment.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The objective of this study is to provide a documentary narrative of the use of a barge-ship system for oversea movement of weapons systems and equipment of a US Army unit. This study identifies technical and operational shortcomings and recommends improvements in techniques for transporting Army aircraft in a near fly-away configuration by the modern sealift assets available. It was found that by using high density loading procedures US Army units could be transported efficiently and economically on the SEABEE ship system.

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