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NEW DIMENSIONS IN SEALIFT

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NEW DIMENSIONS IN SEALIFT

by

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(Why should a strategic mobility capability be retained as a key ingredient in our national strategy? What part will our sealift capability play in major deployment and support operations in the next decade?)

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The Nixon Doctrine stresses a low profile for the United States abroad and enjoins foreign governments to provide the manpower for their own defense. This same doctrine, however, emphasizes that the United States will meet its treaty commitments to its allies. At some time in the future, we again may find it necessary to assist a threatened ally with American military forces. It seems appropriate, therefore, that a strategic mobility capability be retained as a key ingredient in our national strategy.

Strategic mobility involves a combination of two elements. On the one hand there are the forces in being which must be maintained in a high state of readiness in the event they must be introduced in an oversea area. On the other hand there is the need for timely and efficient transportation, both in the initial movement of forces to an area of crisis, and later when providing the support necessary for sustained combat operations.

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In the decade ahead, one can anticipate the full exploitation of air transportation to meet both initial deployment and follow-on support requirements. The Military Airlift Command with its C141 and C5 aircraft, augmented in time of emergency by a growing commercial aircraft fleet, provides a significant mobility capability. Nevertheless, sealift will continue to play a significant, and even predominant, role in major deployment and support operations. Cost factors, configuration of cargo, and aircraft capability and availability all indicate that this will be so. The extensive role and vital need for sealift is illustrated by our experience in Vietnam. At no time during the peak United States involvement in Southeast Asia did airlift account for more than four percent of the total cargo moved to the war zone.[1]

At present, there are three primary sources of sealift available to meet strategic mobility requirements. Two of these sources, the vessels of the Military Sealift Command and the National Defense Reserve Fleet, appear to be destined for a lesser role in any future conflict. Congressional disapproval of new and efficient Multi-Purpose ships for the Military Sealift Command reduces the chances for a substantially modernized or enlarged sealift fleet dedicated to military needs. The present National Defense Reserve Fleet, consisting of ships built during World War II, will be scrapped before the end of this decade. Thus, the remaining source, United States commercial shipping, will be the principal source of sealift for meeting strategic mobility requirements in support of military operations in the years ahead.

The current deplorable state of the United States merchant marine is well known. American ships are generally old and only marginally competitive in world commerce. Fortunately, the outlook for the maritime industry is not completely hopeless. In October 1970, the Congress approved a major new program aimed at revitalizing the United States merchant marine. This program is designed to provide up to 300 modern new merchant ships over the next 10 years. From the viewpoint of the military planner, it is significant to note that most American ship owners interested in obtaining dry cargo vessels under the new maritime program are planning to build specialized ships capable of carrying cargo in barges or containers. In fact, all of the commercial dry cargo ships now under construction in domestic shipyards are either barge or container carriers.[2] These ships are designed to make a profit in international maritime trade and not to move military cargo per se. The introduction of these specialized ships into the commercial fleet raises two fundamental and related questions for the military planner. First, are they suitable in terms of design and operation for strategic mobility requirements? Second, given the fact that these modern specialized ships will be available, is the Army capable of employing them effectively in a strategic mobility role?

DEPLOYMENT AND SUPPORT REQUIREMENTS

The US Army is a mobile army. In a typical unit, the number, weight, and size of the vehicles and aircraft to be deployed are among the critical factors and challenges in strategic mobility planning. In the initial deployment phase of a contingency operation, in which a significant portion of the cargo to be moved will normally consist of vehicles and aircraft, the requirement is for a ship with large unobstructed deck spaces, preferably with internal ramps or elevators, heavy lift gear or a drive-on, drive-off capability. The development of Roll-On/Roll-Off ships and the use of small aircraft carriers to ferry Army aircraft overseas reflect the requirement for these vessel capabilities.

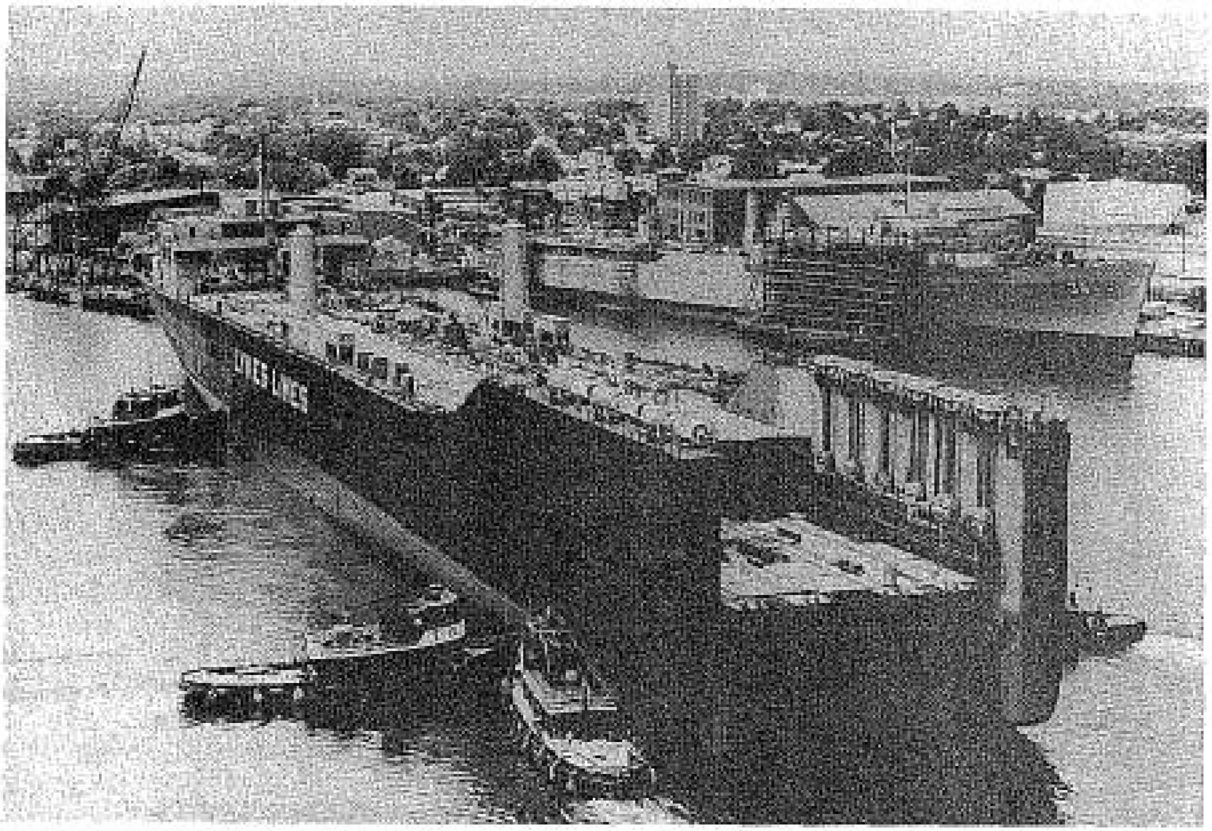
Provisions for the follow-on logistical support required to sustain combat operations also pose challenges for the strategic mobility planner. Today, new concepts are being studied and applied in the logistical support of Army forces overseas. Much of what is new and innovative in logistical operations is based on the rapid and direct movement of supplies and equipment from CONUS depots to units overseas. Here the goal of the logistician is to provide more responsive support and to reduce both the amount of stock and number of supply echelons in oversea areas. These direct delivery concepts are tied to the movement of materiel in containers. Typically, the containers used are the size of the trailers commonly seen on the nation's highways; however, the chassis can be detached from the container to permit compact loading aboard ship. Forward-thinking logistical planners envision the container as the unifying bond throughout the entire supply distribution system. Thus, the use and handling of containers must be integrated into logistical planning for the support of combat forces during future contingency operations.

BARGE AND CONTAINER SHIPS

What are the characteristics and capabilities of the modern specialized ships and their usefulness in meeting military requirements?

LIGHTER ABOARD SHIP VESSELS

The lighter aboard ship vessels (LASH) are essentially powered hulls designed to carry floating barges which can be loaded or unloaded without the use of fixed port facilities. The barges are loaded and discharged over the stern of the vessel by means of an installed gantry crane. The crane is designed to handle the barges on a 15-minute cycle. Each barge is of standard design and dimensions, with a capacity of up to 415 tons of cargo—large enough to accommodate nearly all the tracked and wheeled vehicles in the Army inventory. The barges can also accommodate the UH-1 series helicopter with minimum disassembly; however, movement of larger helicopters would require considerable prior disassembly due to the height of the barges. The LASH system is patented and owned by LASH Systems, Inc.[3] The barges are not self-propelled; a tugboat is required to move



U S ARMY

The Sea Barge (SEABEE) is well suited for moving both vehicles and aircraft.

them between the ship and wharves or piers where they can be loaded or discharged. The big advantage of the LASH ships is that they need not remain in port while the barges are being filled or emptied. A ship can discharge and reload an entire complement of barges in a matter of hours and be on its way again. This is in sharp contrast to the several days normally required to load or discharge a conventional cargo ship.

With the LASH system, the barges are stacked one upon the other up to six high. The ship itself has only one deck level. This single deck is a definite limitation when considering other uses for the ship. For example, the LASH vessel would not be an efficient or economical carrier in a conventional Roll-On/Roll-Off mode. LASH ships are also being designed to carry a combination load of barges and conventional trailer-sized containers. A second and smaller gantry crane is provided on the ship to handle the container portion of the load. Loading and discharging these containers, of course, requires that the ship come alongside a pier or that it operate with lighterage capable of moving the containers to or from the ship and the shore.

THE SEA BARGE

The Sea Barge (SEABEE) is another version of the barge ship. Such vessels are being built by General Dynamics Corporation for the Lykes Brothers Steamship Company. The barges used with the SEABEE ships are larger than those used aboard the LASH vessels; they have a rated capacity of 930 tons.[4] This increased size provides a potential for better use of available space when carrying loads of vehicles and aircraft. As is the case with the LASH barges, SEABEE barge height limitations restrict effective use in moving helicopters larger than the UH-1 series.

The most significant difference between the SEABEE and LASH ships is that the SEABEE has three deck levels. Also, the barges carried on SEABEE ships are loaded and unloaded by an elevator at the stern of the vessel rather than by a gantry crane. The SEABEE ships do not have a special crane designed to handle trailer-sized containers similar to the one on the LASH ships. On SEABEE vessels, containers are carried either inside the barges or in trays on the open deck. This requires use of special materials handling and stacking equipment.[5] The SEABEE ships offer great potential for use in a regular Roll-On/Roll-Off mode; i.e., using the vessel to carry vehicles and aircraft on its decks rather than inside barges. The total space available on the ship's three decks compares very favorably with the Roll-On/Roll-Off capacity of the highly regarded ADMIRAL CALLAGHAN now in service between the East Coast and Europe.

CONTAINERSHIPS

Ships designed to carry trailer-sized containers have been in service for nearly 15 years, and their impact on international shipping and the maritime industry has been growing steadily. The first containerships were self-sustaining; the special cranes required to move the containers between ship and pier were an integral part of the vessels. As the use of containers and special containerships has expanded, nonself-sustaining containerships have come to dominate the industry. Both the major containership companies and the major world ports involved in containership trade are building, or have already built, elaborate shore complexes with pier-side cranes and marshalling areas to support the nonself-sustaining vessels. The military planner must be concerned with the use of these ships since they do require highly specialized support facilities.

Planners must also face the fact that the containership operators have not standardized the dimensions of their containers. Generally, the containers in common use today are about 8 feet wide and 8 feet high, but they vary in length from 20 to 40 feet. Two of the largest domestic containership operating companies use containers which are 24 and 35 feet in length—sizes offering the least potential for standardization. This variation in container lengths limits the possible interchange of support equipment and facilities.

THE ROLE OF SPECIALIZED SHIPS IN MILITARY OPERATIONS

In meeting sealift requirements for initial deployments, one can largely rule out a role for a ship capable of carrying only trailer-sized containers, since they cannot accommodate any but the smallest vehicles. Equally important, the containership is not well suited for moving unit impedimenta or accompanying supplies. In moving this type of cargo, maintaining a high degree of integrity with the unit's vehicles and/or aircraft is essential. If containers of unit equipment and accompanying supplies were consolidated to obtain a reasonably full shipload, the cargo most likely would not be at the right place at the right time.

The LASH type vessel offers considerably more potential for unit deployments. The LASH barges can accommodate a variety of wheeled and tracked vehicles, and the container capability of these vessels provides an option for conveniently moving other impedimenta and supplies along with the unit's major items of equipment. The ship's barge handling capability also offers an excellent potential for efficient multi-port loading and discharge. Finally, the LASH ship has the integral small gantry crane for handling trailer-sized containers of follow-on supplies and is not dependent on special port equipment for unstowing the containers on board.

The LASH vessels, however, do appear to have significant limitations in supporting the initial deployment of typical combat units. The LASH ship, with its single deck, is not an efficient vehicle carrier in a Roll-On/Roll-Off mode. The loading of vehicles inside the barges will result in considerable lost space (broken stowage) despite the planner's best efforts to tailor loads to the space available. Equally important is the very real problem of removing heavy vehicles from the barges at primitive ports or stretches of open beach. The 20-ton cranes organic to the present Army Terminal Service Company are not adequate to lift tanks, self-propelled artillery pieces, or engineer construction equipment. A floating crane, of course, could do the job—if one were available. In a rapid deployment situation, a floating crane towed from the United States by a slow tug might not arrive in the objective area in time to meet contingency plans and deployment schedules. **A** possible solution to the problem would be to mount a suitable heavy lift gantry crane on a modified LASH barge. This modified barge could then be moved to the discharge site on the first trip of a LASH type ship and perform heavy lift functions throughout the deployment operation.

The SEABEE vessel is better suited to support the initial deployment of military units. As already mentioned, the SEABEE ship is well suited for use in a Roll-On/Roll-Off mode. As a Roll-On/Roll-Off vessel, the SEABEE would prove satisfactory even in a primitive port or beach environment, if it could "marry-up" its stern ramp with a firm surface leading to the shore. This same type of intermediate transfer operation would be required under similar conditions with any Roll-On/Roll-Off ocean going vessel. A ship-to-shore transfer of vehicles could be accomplished by constructing a causeway using barges and equipment carried aboard the SEABEE. In other situations, the use of beach lighters, such as the Army's JOHN U D PAGE, would be desirable for the ship-to-shore transfer of vehicles. However, the planner is faced with the problem of having vessels like the JOHN U D PAGE positioned in the objective area in time to function effectively during the initial deployment phase of a contingency operation. In concluding an analysis of SEABEE vessel capabilities, two points should be made—one is a useful capability and the other is a limitation. On the plus side, the top deck of the SEABEE is suitable for carrying helicopters without any disassembly. Also, the stern elevator is designed to permit helicopter rotowash to pass through; this makes it possible for helicopters to operate from the ship.[6] On the negative side, the SEABEE vessel does not have an installed gantry crane; therefore, outside assistance would be required for over-the-side transfer of conventional trailer-sized containers.

A few general comments are in order on the use of barge ships, either the LASH or SEABEE, in support of military operations. One limitation on the use of barges in the early stages of a rapid deployment situation is that some means of power is required to move them from the ship to the point where they are to be unloaded. A small tugboat, if available, would be adequate. Also, as one analyst has suggested, barges intended for use in areas lacking suitable port facilities could be equipped with outboard motors to move them short distances.[7] Another factor to be considered is the effect of weather on scheduled unloading operations in unsheltered areas. The contingency planner must be prepared to cope with those operational limitations imposed by severe sea conditions. In adverse weather, it is possible that barge discharge activity could be slowed or even halted completely.

FOLLOW-ON SUPPORT OPERATIONS

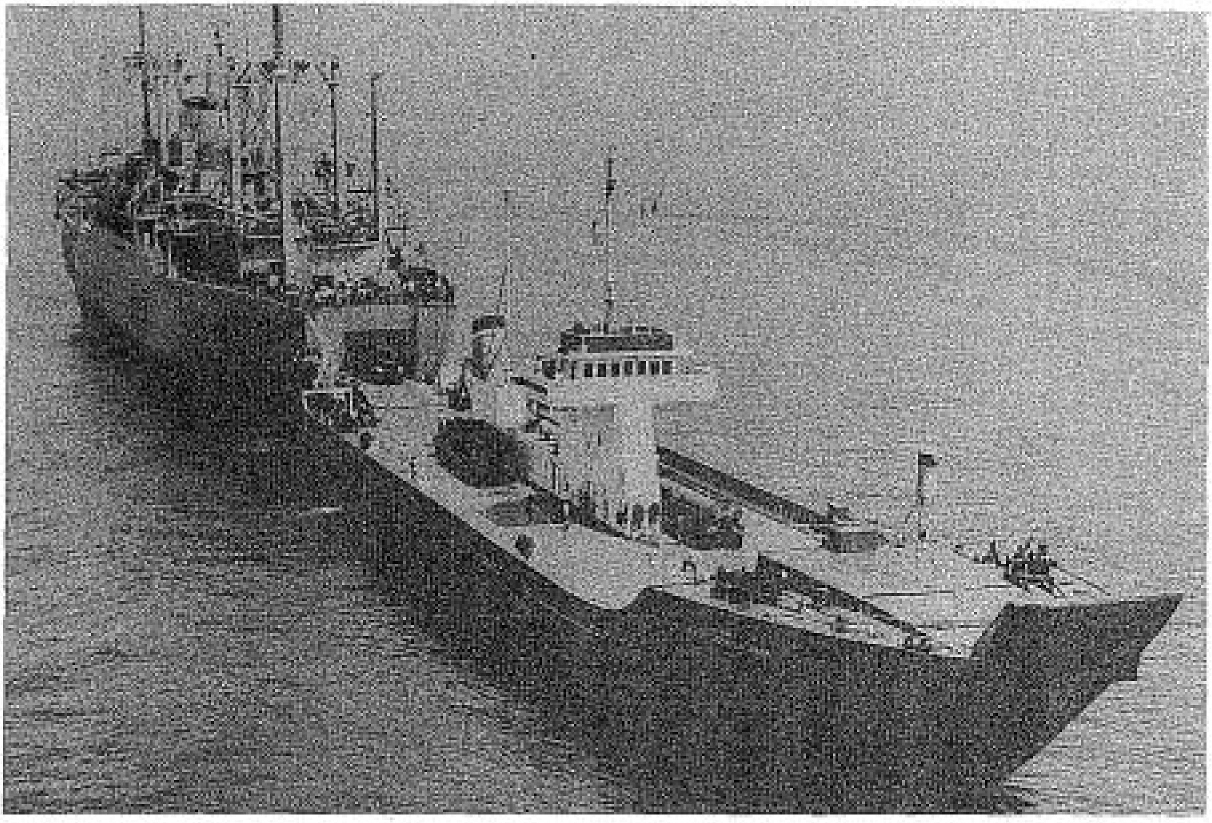
The remaining factor to be considered in analyzing the role of specialized vessels in meeting strategic mobility requirements is their capability for providing follow-on logistical support to the deployed forces.

The barge ships have been highly touted as a panacea for military cargo movements. Do they, in fact, offer an answer to tomorrow's requirements and concepts for resupplying forces overseas? Both the SEABEE and LASH vessels compare favorably in terms of speed with the conventional break-bulk cargo ships in use today. Also, they compare most favorably in the amount of cargo carried per ship. In terms of loading and unloading time, the barge ships can be turned around in a matter of hours; however, the extraction of cargo from individual barges would probably be at a slower rate than the discharge of cargo from a hatch on a conventional ship. The use of barges and barge ships does have an additional dimension in terms of potential use in a support role during contingency operations. The barges could be used for the accumulation and storage of prepositioned stocks. Government owned or leased barges capable of being moved by either LASH or SEABEE vessels could be pre-stocked and held in readiness for pick-up by a mother ship for emergency movement to any destination worldwide. A somewhat related potential use for the barges would be to employ them as semi-permanent floating storage points in the rear of a combat zone. Employing them in this role would reduce both the immediate and long-range need for shore-based facilities and would free critical construction resources for other requirements.

The use of barges is only minimally compatible with direct delivery concepts. A barge provides a consolidated entity for the documentation and control of a block of cargo; barges also lend themselves to multi-port discharge and enroute diversion without extensive cargo rehandling. Nevertheless, the barge is not the answer to the concept of direct delivery of supplies from CONUS to units deployed overseas. The barge fails this test because, in nearly every case, the cargo must be loaded and unloaded at a port and moved onward to its destination by other modes of transportation. This deficiency could be overcome by loading trailer-sized containers in the barges so that direct inland delivery of containerized lots of cargo could be accomplished by rail, highway, or air transportation. The efficient use of containers in this manner, however, would require adequate heavy lift shore-side or floating cranes suitably prepositioned in the objective area.

Containerships appear to offer the best means of providing responsive follow-up support to deployed forces. As was pointed out earlier, containers are already the focal point of new supply distribution and transportation concepts and systems. Like the LASH and SEABEE vessels, the new containerships are much faster than typical conventional cargo vessels. The cargo carrying capability of new containerships is even more impressive. Considering an average capacity of 10 tons per 20 foot container, a new vessel now under construction can lift as much as 22,940 tons of cargo.[8] Modern containerships have one limitation that overshadows all the advantages which can be listed—they require external support to operate in primitive ports or to deliver cargo across a beach. From a military viewpoint, there is a need for an interface between the fast containership and the forces operating in a land environment away from modern fixed port facilities. There are two parts to this necessary interface: first, the containers must be discharged from the ship and placed ashore; and second, a means must be provided for moving them inland to the final destination.

The fist part of the problem is the more complex and difficult to solve. One means of discharging nonself-sustaining containerships, of course, is to build and install the necessary piers and cranes in the objective area. This was done at Cam Ranh Bay in 1966 to support operations in Vietnam. While this might be considered the ultimate solution, it is not acceptable in a rapid deployment situation where a means of discharging containerships might well be required in a matter of days. A second alternative would be to plan on using a containership interchange point at a modern, highly developed port outside but near the area of conflict. Nonself-sustaining containerships could be routed to this port, and the containers could be transhipped to final destination in either the older and smaller self-sustaining containerships or in other types of ocean-going vessels. This offers some potential in localized contingency situations; however, over-reliance on this alternative in the future would be inadvisable. Arrangements to permit support of United States military operations elsewhere would have to be made with countries having the necessary container handling facilities. In many cases, these arrangements would be politically difficult; at the least, they might be time-consuming. Also, the distance between CONUS ports, the interchange port and the area being supported might well degrade timely follow-on support



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The Beach Discharge Lighter PAGE receiving vehicles in open water from a Roll-On/Roll-Offship. The PAGE is the only ship of its type in the Army's inventory.

for the deployed forces. Finally, in any widespread conflict situation, the fixed port facilities at the interchange port would be vulnerable to enemy action.

A third alternative might be to discharge and reload containerships with heavy-lift helicopters. This concept appears to be technically feasible. In 1967, American Export Isbrandtsen Lines conducted experiments using a commercial version of the CH-54 helicopter and achieved a discharge rate of six containers an hour under relatively adverse weather conditions.[9] The Military Sealift Command and the Army have also conducted studies and tests on container discharge by helicopter. Currently, however, there is no helicopter available which is capable of lifting a fully loaded container. The development of such an aircraft is just getting underway. Rapid and efficient containership discharge by helicopter is a concept and not a capability available for use in the short-range future.

A final alternative for discharging nonself-sustaining containerships involves the use of a floating gantry crane to remove the containers from the vessel so they can be deposited either on a pier or into lighterage for further movement to the shore. The inherent value and potential of containership support is lost, however, if a high rate of container discharge cannot be achieved. The floating cranes now in the Army's inventory are very slow and inadequate for such operations. A discharge rate of 6 containers per hour would be quite good with these cranes, whereas a sustained discharge rate of up to 30 containers per hour would be required for reasonably efficient containership operations. Although a special floating port facility that could provide adequate crane service has been designed, its cost is estimated at $60,000, and thus is clearly not cost feasible. A more practical solution is needed. One proposal which has been offered is to modify old tankers or ore ships by installing modern high speed gantry cranes capable of loading and unloading containerships efficiently. These ships could be brought alongside the nonself-sustaining containerships to move the containers into lighterage or onto piers and wharves as required.[10] Several of the ships could be completely modified and maintained in a ready-for-sailing status; these modified ships would appear to be cost competitive with potential helicopter discharge systems. With proper planning, the modified ships could be scheduled into any possible contingency area in time to handle containerships when they first arrived.

In situations where floating equipment might be used to discharge containers from ships into lighterage, the lighterage used should be of a type which would permit the container to be placed directly on a chassis as it is removed from the ship, thus precluding a second lifting operation when the container reached the shore. Beach discharge lighters larger than the JOHN U D PAGE with an unobstructed deck space wide enough to permit tractors and trailers to maneuver freely, would greatly facilitate rapid and efficient movement of the containers. Two or three of these vessels could work with one containership and maintain a very acceptable discharge rate.

The second part of the containership interface problem, moving the containers inland to their ultimate destination, appears to be less difficult to solve. In any major contingency operation, initial deployment plans could include provisions for the delivery of container chassis and motive power to the objective area in advance of, or concurrently with, the arrival of the first containership. The containers could then be moved inland to combat and support units as needed. Unfortunately, there is one consideration which complicates this aspect of a direct delivery system—indeed, one which may come to haunt military planners in future rapid deployment situations. This is the variation in container lengths. It is entirely possible that several types and sizes of chassis would be required to support a large scale containership operation.

SUPPORT EQUIPMENT FOR SPECIALIZED SHIPS

Achieving acceptable cargo discharge rates with barge ships and containerships during contingency operations will require adequate cargo handling equipment as well as personnel properly organized and trained in its use. For example, the increased use of containers will result in large numbers of these trailer-sized boxes accumulating at ports and beach discharge sites. Containers will be held temporarily after arrival waiting transportation for onward movement. Empty containers will be returned to port areas and accumulated for back-loading on ships returning to the United States. Adequate marshalling areas will be required in the vicinity of every site served by containerships. The size of these marshalling areas would be minimized, thereby saving construction time and effort, if the containers could be stacked one upon the other. A wide variety of lifting devices has been designed to support similar commercial container handling requirements. These very necessary devices are not in the Anny's inventory, so they are not now available to support strategic mobility requirements. Of equal importance, rapid and efficient cargo handling away from major ports can only be achieved if properly trained and equipped units are on site and ready to function; port operating units should be in being and ready to respond to any contingency.

CONCLUSIONS

The two questions posed at the beginning of this article were: First, are the specialized ships suitable in terms of design and operation for strategic mobility requirements? Second, is the military capable of employing these ships effectively in a strategic mobility role?

In determining the answer to the first question, it is necessary to divide military requirements into two parts, because different ship characteristics are desirable for unit deployment and follow-up support operation. A ship used in the initial unit deployment phase of a contingency operation must be capable of efficiently handling large numbers of vehicles and contribute to maintaining unit integrity. On the other hand, new concepts in follow-up support require a ship that facilitates the through movement of cargo and its delivery direct from CONUS to deployed units.

The new specialized commercial ships have certain characteristics which are favorable to both unit deployment and support operations. In every case, they are faster and have a greater cargo carrying capacity than most conventional dry cargo ships now in service; thus, they can provide timely support. Considering the different types of specialized ships, the SEABEE vessel, with its excellent Roll-On/Roll-Off capability, is best suited for unit deployments. The LASH ship can also be used for unit deployments, but it is somewhat less desirable than the SEABEE. The containership is relatively useless for unit deployments since it cannot carry any but the smallest sized military vehicles.

In the follow-up support role, the characteristics of the ships produce a different order of utility. The containership provides a capability for unitizing cargo. Moreover, containerization is clearly the trend in future logistical support concepts. The LASH ship can carry containers, so it also has utility in the support role. While the SEABEE ship can carry containers, major internal adaptations and support equipment are required. SEABEE and LASH barges are not compatible with future through movement support concepts unless they are filled with conventional containers. The barges, however, do provide a means of prepositioning and storing reserve stocks in areas of possible future need. The LASH barge is perhaps best for this purpose since it can be carried aboard both LASH and SEABEE vessels.

On balance, then, the answer to the first question is a qualified yes. The new specialized commercial ships can meet strategic mobility requirements providing they are used in the proper role.

The answer to the second question, the capability of the Army to employ the new ships effectively, is considerably less favorable. A number of problem areas have been surfaced. An ability to project military land power and to support this power in areas without sophisticated port facilities is fundamental to an acceptable strategic mobility posture. The speed and cargo carrying capacity of the specialized ships is not an asset unless the ships can be discharged rapidly and efficiently wherever and whenever a contingency situation exists. To a very large degree, the Army currently lacks this capability. The problems associated with attaining acceptable discharge rates in undeveloped areas are not insurmountable, but they do require additional study, experimentation, and above all, resources.

Modern high speed floating cranes are required to work with the specialized ships; both barge-mounted cranes and specially designed crane ships are practical and feasible. The needed types should be added to the Army's equipment inventory. Each of the new ships draws in excess of 30 feet of water. This limits their ability to operate in minor ports and to approach beach discharge sites. Modern lighterage capable of providing the interface between the specialized ships and the shore is essential. Beach discharge lighters of the JOHN U D PAGE class, but larger, are needed to support nonself-sustaining containerships and Roll-On/Roll-Off operations in situations where piers or causeways are not available. The use of helicopters to discharge barges and to move containers from ship to shore, or even further inland, offers considerable potential. Both helicopter capabilities and the techniques for their employment require further experimentation and development.

Other problem areas also require attention before the answer to the second question can be answered affirmatively. The current variations in container sizes will be an albatross around the neck of military planners in the future. This lack of standardization limits needed flexibility in loading ships and may require that several different sized chassis be available in an oversea area. The equipment currently authorized in military port units also requires scrutiny. Modern lighterage, cranes and other materials handling equipment are needed if the full potential of modern specialized ships is to be realized.

It is essential that we recognize that these modern specialized ships will be the backbone of our future commercial fleet. When these ships are used in the proper role and phase of an operation, when the proper units and equipment are available to handle their cargo, they will enhance our strategic mobility posture.

NOTES

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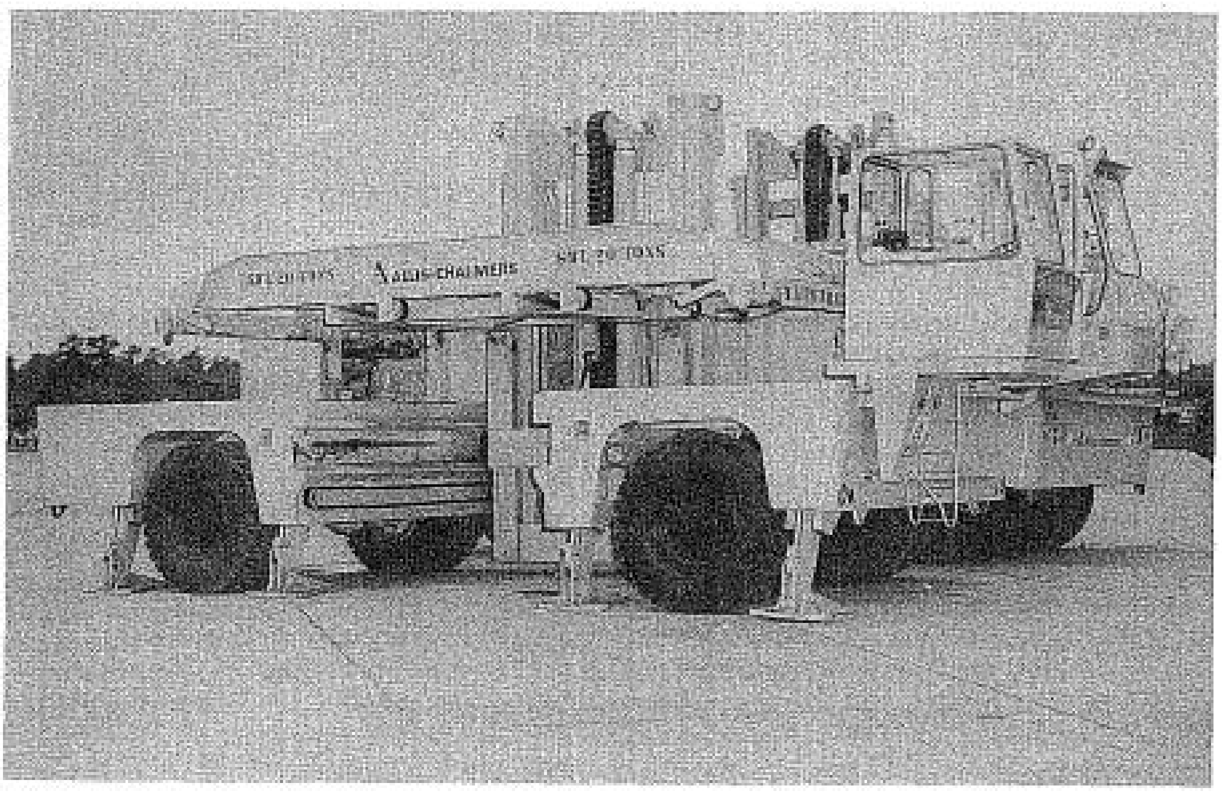

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Modern commercial container lifting equipment.