BY THE U.S. GENERAL ACCOUNTING OFFICE

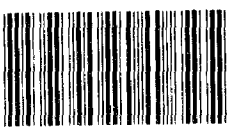
Report To The Secretary Of Defense

Navy Has Opportunities To Reduce Ship Overhaul Costs

The Navy can save several million dollars annually in ship overhaul costs by using the component remove-and-replace concept. Under this concept, damaged parts are removed and sent to an overhaul point for future repair or scrapped. This permits components to be processed economically in batches and avoids unnecessary repair costs for items that are available in the supply system.

This report shows also that one shipyard had $11 million of excess material onhand and/or due in, while the supply system was buying and/or repairing $5.3 million of the same material.

GAO makes several recommendations to correct the problem.



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GAO

United States General Accounting Office
Washington, DC 20548

Logistics and
Communications
Division

B-198595

The Honorable Harold Brown
The Secretary of Defense

Dear Mr. Secretary:

This report discusses ways in which the Navy can reduce ship overhaul costs and increase supply system efficiency and effectiveness. Through greater use of system assets and better visibility of shipyard inventories, the Navy could save several million dollars annually.

This report contains recommendations to you on pages 9 and 15. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Secretary of the Navy; the Director, Office of Management and Budget; and the Chairmen of the appropriate congressional committees.

Sincerely yours,

Donald J. Horan

for R. W. Gutmann
Director

GENERAL ACCOUNTING OFFICE
REPORT TO THE SECRETARY
OF DEFENSE

NAVY HAS OPPORTUNITIES TO REDUCE SHIP OVERHAUL COSTS

D I G E S T

The Navy can reduce ship overhaul costs by sending damaged parts to a central point and either repairing them in batches or scrapping them. Thus, the remove-and-replace concept avoids unnecessary repair of items that are available in the supply system and increases shipyard efficiency.

The Navy uses another repair concept--the concurrent rework concept which entails components being repaired simultaneously with the ship's overhaul. This method is not as efficient as the remove-and-replace concept, which has been set forth in a 1973 Navy policy. However, it has not been followed because implementing procedures were never issued.

In the last 6 years, the Navy overhauled an average of 77 ships a year. Costs per overhaul for this period have increased almost threefold, from $10 million to $27.2 million.

GAO found that the Navy expended about 25,500 hours and $724,000 to rework 110 electronic components on six ships undergoing overhaul at two shipyards. These components were available in the supply system and could have been overhauled at a lower cost through batch processing. Moreover, 37 of the 110 components were in long supply and unnecessary costs of $278,000 were incurred to rework these components. For example:

--An antenna coupler component was repaired by the shipyard at a cost of $18,665, but the supply system had 161 components onhand. Based on supply system demands, this quantity could satisfy requirements for the next 13 years.

--Another antenna coupler component was repaired by the shipyard at a cost of $14,000, but the supply system had 52 components onhand, which could satisfy estimated requirements for the next 26 years.

Assuming that similar conditions exist for other ships undergoing overhaul, the Navy could reduce overhaul costs for electronic components by several million dollars a year by taking full advantage of the remove-and-replace concept. (See ch. 2.)

GAO believes that the Navy should establish procedures to ensure that assets available in the system are adequately considered before initiating any concurrent rework. It should also periodically monitor and evaluate shipyard's implementation of established procedures and policy. (See pp. 8 and 9.)

Navy policy is to ensure that all material is readily available before starting ship overhauls to avoid production stoppages, but in practice, not all of this material is used during overhauls. Therefore, shipyards have accumulated sizable inventories of leftover material.

Greater efficiency and effectiveness is possible through better supply system visibility of shipyard inventories. GAO estimates that the supply system has purchased or repaired items valued at $5.3 million to satisfy customer needs, while the Philadelphia shipyard has identical excess items in its inventory. This occurred because the supply system did not have visibility over the material, and the shipyard did not report the excesses to the supply system in a timely manner.

Items which are excess when individual job orders are complete are not reported as excess until the ship overhaul is complete. The interval between job order completion and ship overhaul completion can vary from a few months to over a year. During this interval the supply system does not have visibility over the excess material and identical items may be procured or repaired by inventory managers to satisfy the needs of other users. (See ch. 3.)

Prior GAO reports have identified similar problems concerning the lack of visibility for shipyard inventories.

RECOMMENDATIONS

GAO recommends that the Secretary of Defense direct the Navy to:

--Discontinue routine concurrent rework except for those items where replacements are not available.

--Develop and implement operating procedures that require shipyards to use the remove-and-replace concept during ship overhauls when replacement items are available in the supply system.

--Periodically monitor and evaluate shipyard efforts in carrying out the Navy policy of using available supply system assets. (See p. 9.)

--Require shipyards to promptly review and report unneeded materials to the supply system after job orders are closed.

--Develop procedures to provide the supply system managers with visibility over all assets, including those earmarked for specific projects. Such procedures would allow the supply system managers to (1) compare shipyard assets with unfilled customer orders and (2) release assets to the highest priority customers when warranted. (See p. 15.)

AGENCY COMMENTS AND GAO'S EVALUATION

In an April 8, 1980, letter, GAO asked the Secretary of Defense to comment on this report within 30 days. Because written comments were not received within the time requested, GAO is issuing this report without DOD's comments. However, GAO met with officials of the Office of the

Secretary of Defense and the Navy to obtain their oral comments, which have been included in this report where appropriate.

The Navy officials generally agreed with the first three recommendations above but they did not agree with the other two. Concerning the recommendation about prompt review and reporting of unneeded materials, Navy officials stated that the material may be needed, even though job orders are closed, in the event that equipment fails during testing. However, as indicated in this report, excess items not used on specific job orders were not subsequently used on other job orders during the completion of the ship overhaul.

Navy officials disagreed with GAO's recommendation concerning supply system visibility because they contend that it would be too costly to implement. GAO believes that the Navy's uniform system for managing wholesale inventories could be used to provide system managers with visibility over assets without extensive revisions. (See pp. 9 and 15.)

Contents

ABBREVIATIONS

APA	appropriation purchase account
GAO	General Accounting Office
NIF	Navy industrial fund

CHAPTER 1

INTRODUCTION

Keeping naval vessels up to date and combat ready requires large expenditures of funds and a tremendous maintenance effort that ranges from simple servicing to major overhauls. The Navy's budget for ship maintenance and modernization in fiscal year 1979 was about $3.26 billion and increased in fiscal year 1980 to over $3.6 billion.

The Navy has a multilevel approach to ship maintenance which, depending on the type and complexity of work, places responsibilities at three different levels:

--Organizational level maintenance is normally the responsibility of ships' crewmembers. Tasks performed at this level include inspecting, servicing, and lubricating equipment.

--Intermediate level maintenance is done by designated intermediate maintenance activities for direct support of the fleet. Assigned work includes calibrating, repairing, or replacing damaged or unserviceable parts, components, or assemblies; modifying material; and providing technical assistance to ship maintenance personnel.

--Depot level maintenance is done by shipyards and other designated industrial-type activities. These activities are generally responsible for making major ship overhauls, conversions, modifications, and repairs to end items and components.

SHIP OVERHAUL COSTS

From fiscal years 1975 through 1980, the Navy overhauled an average of 77 ships a year. Individual ship overhaul costs for this period have increased almost threefold from $10 million to $27.2 million. The Navy attributes the increase in overhaul costs to three factors: (1) an increase in the amount of work being done on ships, (2) an increase in the complexity of ships and changes in the mix of ships in the overhaul program, and (3) inflation.

MAINTENANCE METHODS

In overhauling a Navy ship, it is necessary to repair certain major components/end items of equipment. Two methods of repairing components are the remove-and-replace concept and

the concurrent repair. Under the remove-and-replace concept, a component requiring repair is removed from the ship and replaced with a serviceable one from stock. The damaged component is then sent to a designated overhaul point for future repair or it is scrapped.

Under the other method, concurrent repair, components are removed from a ship and are repaired simultaneously with the ship being overhauled. The components are routed to various shipyard shops, tested, repaired, and returned to the ship.

The Navy policy, as expressed in an August 1973 instruction, is to use supply system assets in ship overhaul programs in lieu of concurrent component repair to the extent assets and overhaul schedules permit. In other words, use the remove-and-replace concept when possible. The remove-and-repair concept is advantageous because it affords greater efficiency and effectiveness through the use of available system components inventories. Thus, it (1) permits the accumulation of replaced components so they can be repaired in economical batches and (2) avoids the costs related to unnecessary repair of items in long supply.

SCOPE OF REVIEW

Our review concentrated on the extent to which the remove-and-replace concept had been applied to electronic components for six ships undergoing overhaul--four surface ships at the Philadelphia Naval Shipyard and two submarines at the Portsmouth Naval Shipyard. In addition, we examined the visibility and control the supply system has over material not needed for ship overhauls at the Philadelphia Naval Shipyard.

We examined numerous documents, including job orders, various technical documents, stock status records, inventory accounts, procurement contracts, and repair directives and had discussions with Navy personnel at the locations visited. The following is a list of the activities included in our review.

--Naval Material Command, Washington, D.C.

--Naval Sea Systems Command, Arlington, Virginia.

--Naval Electronics Systems Command, Arlington, Virginia.

--Naval Surface Force, Atlantic-Fleet, Norfolk, Virginia.

--Ships Parts Control Center, Mechanicsburg, Pennsylvania.

--Philadelphia Naval Shipyard, Philadelphia, Pennsylvania.

--Portsmouth Naval Shipyard, Portsmouth, New Hampshire.

--Shore Intermediate Maintenance Activity, Norfolk, Virginia.

--Submarine Support Facility, New London, Connecticut.

CHAPTER 2

OPPORTUNITIES EXIST FOR GREATER USE OF THE COMPONENT REMOVE-AND-REPLACE CONCEPT

The Navy can reduce ship overhaul costs and increase shipyard efficiency by taking advantage of opportunities to use the component remove-and-replace concept. The Navy had not developed implementing procedures for the use of available system assets and consequently is not fully using such assets to replace damaged components in lieu of concurrent repair. It has not taken advantage of the increased efficiency that batch processing of components provides and it has incurred unnecessary overhaul costs to repair components that are in long supply at the system level.

The Navy expended about 25,500 hours and $724,000 to rework 110 electronic components on six ships undergoing overhaul at two shipyards. These components were available in the supply system and could have been overhauled at a lower cost through batch processing. Moreoever, 37 of the 110 components were in long supply and unnecessary costs of $278,000 were incurred to rework these 37 components. (See apps. I and II.) Assuming that similar conditions exist for other ships undergoing overhaul, the Navy could reduce overhaul costs for electronic components by several million dollars a year by taking full advantage of the remove-and-replace concept.

NEED TO DEVELOP IMPLEMENTING PROCEDURES FOR USING SYSTEM ASSETS

In 1973, seven years ago, the Chief of Naval Operations issued an instruction which established the remove-and-replace concept for ship overhauls. It specifically stated that system assets will be used in ship overhaul programs to the extent system assets, and when overhaul schedules, permit. At one shipyard, we could not find a copy of this instruction. At another shipyard, not all organizational units had copies.

The instruction further required that the Chief of Navy Material develop implementing procedures, but they were never issued. In the absence of such procedures, shipyards may not be aware of Navy policy and made no real effort to obtain replacement items from the supply system before authorizing concurrent repair during ship overhaul.

Navy officials stated that implementing procedures are not easy to develop because complex issues are involved. However, the Navy has no overall plan for issuance of the procedures.

REMOVE-AND-REPLACE METHOD AFFORDS GREATER EFFICIENCY

The remove-and-replace method is more efficient than the concurrent rework method because (1) it permits the accumulation of similar replaced components which can be scheduled for overhaul in economical lot sizes--batch processing--and (2) it avoids the cost of unnecessarily repairing components that are in long supply. As stated previously, concurrent rework occurs when components are removed from a ship and are repaired while the ship is being overhauled. The components are routed to various shipyard shops for repair and then returned to the ship. This practice is time consuming and expensive. It is more efficient to schedule overhaul of similar components in economical lot sizes.

In prior reports, 1/ we have stated that batch processing offers various advantages over concurrent rework, including

--less schedule interruption,

--greater worker efficiency,

--improved equipment utilization,

--shorter turnaround times, and

--reduced cost while increasing production quantities.

The designated overhaul point usually does a more comprehensive overhaul at a lower cost than the shipyards' concurrent rework. The following examples demonstrate the inefficiency and extra costs associated with concurrently repairing components at shipyards as opposed to batch processing at the designated overhaul point.

1/"Navy Aircraft Overhaul Depots Could be More Productive" (LCD-75-432, Dec. 23, 1975) and "If Army Helicopter Maintenance Is To Be Ready For Wartime, It Must Be Made Efficient and Effective in Peacetime" (LCD-79-407, May 10, 1979).

--Seventeen radio receivers were concurrently repaired at a cost of $33,334. The overhaul point's cost to repair the same receivers averaged $17,000, or $16,334 less than the shipyard's cost.

--Four antennas were concurrently repaired at a cost of $1,798. The overhaul point's cost to repair the antennas was $476, about $1,332 less than the shipyard's cost.

--A group of 11 radio transmitting sets was concurrently repaired at a cost of $32,700. The designated overhaul point's cost to repair the sets was only $16,500, or about half the shipyard's cost.

--A transmitting set was concurrently repaired in 70 hours at a cost of $2,000. This same repair at the overhaul point would require only 36 hours and a cost of about $1,000.

--A radar test set was concurrently repaired at a cost of $7,738. The designated overhaul point's cost to repair the test set was $4,000, or $3,738 less than the shipyard's cost.

--A direction antenna was concurrently repaired at a cost of $4,840. The designated overhaul point's cost to repair the antenna was $1,550, or about one-third the shipyard's costs.

--Four radio receivers were concurrently repaired at a cost of $5,593. The designated overhaul point's cost to repair these items was $3,828, or $1,765 less than the shipyard's cost.

Navy officials stated that the designated overhaul costs cited in the above examples may not include overhead costs in all cases, whereas amounts shown for shipyard repairs do include overhead costs. Therefore the difference between repair and overhaul costs could be less than cited.

We obtained the overhaul costs from reports submitted to inventory managers, but we did not review these costs. As stated previously, overhauling in economical lot sizes is generally more economical than concurrent repair work at shipyards. We recognize that in some cases the overhaul point's costs could exceed the shipyard's repair costs. However, the amount of work performed by the designated overhaul

point is more extensive than the repair work performed at the shipyard. The objective of an overhaul is to have a component in a like new condition, whereas a repair only brings a component up to a serviceable, but not like new, condition.

Concurrent repair inefficiencies increased

Concurrent repair inefficiencies are even greater when repairs are made to components having system assets onhand excess to foreseeable requirements. Concurrent repair of these components unnecessarily involves using labor hours that could be used to do other work, and therefore, reduces productivity. In addition, money is expended unnecessarily on material obtained for the repair, material that could end up being scrapped if it is not used or needed elsewhere. This review as well as a prior review 1/ has shown that a high percentage of material obtained is not used during the ship overhaul.

As previously stated, 37 components being concurrently repaired had assets exceeding the supply system's foreseeable requirements, and $278,000 was unnecessarily expended to repair these components. The inventories of some of these components, when compared to requirements, is such that repair may not have been required for several years, if at all. The following examples illustrate this situation.

--An antenna coupler group was repaired by the shipyard in 654 hours at a cost of $18,665. While the shipyard was doing the repair, the supply system had 161 identical units onhand and only needed 43 to satisfy system current and anticipated requirements. Based on system requirements, stock onhand was sufficient to satisfy system needs for more than 13 years.

--Another antenna coupler group was repaired by the shipyard in 497 hours at a cost of over $14,000. The supply system had 52 units onhand and only had a requirement for 21. Based on supply system demands, the assets onhand were sufficient to last over 26 years before procurement or repair would be necessary.

1/"Naval Shipyards--Better Definition of Mobilization Requirements and Improved Peacetime Operations are Needed" (LCD-77-450, Mar. 31, 1978).

--An antenna group was repaired by the shipyard in 616 hours at a cost of about $17,000. When the repair was accomplished, the supply system had 615 units ready for issue and only 192 were needed. Assets onhand were sufficient to satisfy system needs for many years.

--An antenna coupler was concurrently repaired by the shipyard at a cost of $2,626. The supply system had 30 couplers ready for issue and only needed 3 to satisfy their present and anticipated needs. The inventory manager said that because demand for the item is so low, there is probably a 99-year supply onhand.

Advance funding

The Navy's annual operation and maintenance budget request includes over $120 million for advance funding which includes, among other items, material needed before the start of a ship overhaul. The amount of advance funding could be reduced if greater use were made of material and equipment available in the supply system.

Navy policy is to advance order materials believed to be needed for concurrent component repair and have it available before the start of ship overhaul. By using available system assets in long supply to replace damaged components, the Navy could eliminate the need for various repair parts used in the rework process. Consequently, the need for advanced funding would be reduced. The following example illustrates this point. The Navy advance ordered material valued at over $5,000 to concurrently repair a digital converter on the U.S.S. Pratt. The supply system had 28 converters onhand which, based on system requirements, was sufficient stock to satisfy system needs for 25 years. Had the Navy used one of the excess converters stored in the system rather than concurrently repairing it, advanced ordering of materials would not have been necessary. Furthermore, as previously stated, much of the material ordered by the shipyards to accomplish concurrent repair is not used and subsequently becomes excess. The matter of shipyard excesses is discussed in chapter 3 of this report.

CONCLUSION

The Navy can reduce ship overhaul costs and improve shipyard efficiency by making greater use of the component remove-and-replace method. Greater use of this method would improve efficiency because replaced components can be accumulated and repaired in economical batch lots. Moreover, ship overhaul costs would also be reduced by avoiding unnecessary repair of components that are in long supply.

Although Navy policy is to use system assets in lieu of concurrent rework, the shipyards have not done so because the Navy has not issued operating procedures to implement the policy. As a result, opportunities for productivity gains through batch processing are lost. We believe that the Navy should establish implementing procedures to ensure that assets available in the system are adequately considered before initiating any concurrent rework. It should also periodically monitor and evaluate shipyard efforts in implementing established procedures and policy.

RECOMMENDATIONS

We recommend that the Secretary of Defense direct the Navy to:

--Discontinue routine concurrent rework except for those items where replacements are not available.

--Develop and implement operating procedures that require shipyards to use the remove-and-replace concept during ship overhaul when replacement components are available in the supply system.

--Periodically monitor and evaluate shipyard efforts in carrying out Navy policy of using available supply system assets.

AGENCY COMMENTS

Navy officials generally agreed with the first two of the above recommendations, but stated that they were somewhat restrictive. They agreed with the third one.

Navy officials stated that they generally agreed that the remove-and-replace concept, which affords opportunities for batch processing, is usually more economical than concurrent rework. However, they said that equipment accessibility in older ships can be a problem which limits the use of the remove-and-replace concept.

Although we recognize that accessibility may be a problem in some cases, in our review we selected only those components that were removed from the ships and returned to shipyard shops for repair. Therefore, accessibility is not an issue when components are removed from the ship and sent to the shipyard shops for concurrent rework.

CHAPTER 3

NEED TO IMPROVE VISIBILITY OF SHIPYARD EXCESSES TO PREVENT UNNEEDED PROCUREMENT AND REPAIR

Greater efficiency and effectiveness is possible through better supply system visibility of shipyard inventories. We found that the Philadelphia shipyard had a large number of excess items onhand and/or due in its inventory and, at the same time, identical items were being procured and/or repaired by supply system inventory managers to satisfy the needs of other users. This resulted because the supply system does not have visibility of these assets and they are not timely reported to the system by the shipyard.

Historically, lack of visibility (reporting) of the total inventory and its fluctuations has been one of the greatest obstacles to efficient management of Navy inventories. The Military Standard Transaction Reporting and Accounting Procedures system provides visibility of assets in the wholesale distribution system. Reporting is generally accomplished by means of daily transaction item reports, which advise the system inventory manager of changes in item stock status. Some visibility is also provided over ship inventories through periodic asset reporting, but generally there is no visibility below the wholesale level. Neither the daily transaction item reporting nor the periodic reporting apply to the shipyards direct material inventory account, and therefore, the importance of timely review and reporting of excess materials by the shipyard is obvious.

SHIPYARD INVENTORIES

Navy policy is to ensure that all material is readily available before starting ship overhauls to avoid production stoppages, but in practice, not all of this material is used during overhauls. Therefore, shipyards have accumulated sizable inventories of leftover material.

Shipyard direct material inventories consist mainly of two types of material: (1) appropriation purchase account (APA) and (2) Navy industrial fund (NIF) material. APA material, which is mainly reparable components, is issued free of charge to the shipyard by the system inventory control points; therefore, the material is non-reimbursable if, and when, it is returned. This material is initially purchased by the inventory control points with appropriated funds and stored until requisitioned by shipyards and other customers.

NIF material, on the other hand, must be purchased by the shipyard. However, most of the NIF items can be obtained from the supply system.

Excess inventories not reported in a timely manner

As of June 30, 1979, the Philadelphia Naval Shipyard's direct material inventory account contained 88,357 items valued at $17.64 million. In addition, 22,714 items valued at $40.5 million were due in. None of this material was visible to the supply system managers, including the sizable part of the inventory which was designated as excess because it was left over from completed job orders.

In September 1979, 20,709 items were designated as excess pending review onhand and/or due in the shipyards direct material inventory account. (See app. III.) Based on statistical random sampling techniques, we estimated the value of this excess material at $11 million. This included 699 APA and 20,010 NIF items valued at about $8 million and $3 million, respectively.

Navy policy requires that only material required for authorized work on overhauls or material that may be needed should be ordered by the shipyard. The policy also prescribes that material left over from a completed overhaul be returned to the supply system or scrapped, unless it is likely to be needed on future overhauls.

Although the shipyard designates material as excess when the job order to which it is applicable is closed, no action is taken to review and report APA items as excess until the ship overhaul is completed. NIF standard stock items, on the other hand, are not even reviewed and reported when the ship overhaul is completed. Instead, they are automatically transferred to an unassigned material inventory account where, if not needed in the meantime, they remain for another year before being reviewed. Shipyard experience shows that from 50 to 60 percent of the NIF items transferred to the unassigned material account are eventually needed by the shipyard.

Although ship overhauls were not completed for many of the excess items we examined, about 35 percent of the items were for job orders that had been closed for 6 months or more, and some for as long as 23 months. Action is not taken to review and report the items as excess until individual ship overhauls are complete.

The interval between job order completion and ship overhaul completion generally ranged from 5 to 16 months, as illustrated by the following schedule.

Ship	Job order Number	Job order Closing date	Customer order closing date	Time interval between job order and customer order closing date
Dahlgren	1634624150	7/21/78	10/04/79	14 months
Ainsworth	3034525601	10/27/78	7/02/79	8 months
Dahlgren	4234648130	5/12/78	10/04/79	16 months
Concord	1630857156	9/21/78	5/02/79	7 months
Concord	1630831151	10/03/78	5/02/79	7 months
Ainsworth	1634548141	8/11/78	7/02/79	11 months
Dahlgren	1634641150	9/15/78	10/04/79	13 months
Adam	1630758110	5/25/79	1/22/80	8 months
Hart	1630342410	5/04/79	10/26/79	5 months

Excess items not used on specific job orders were not subsequently used on other job orders during completion of the ship overhaul. Since material applicable to closed job orders is not reviewed to determine its status until the ship overhaul is completed, excess shipyard material that is needed elsewhere in the system is not used effectively.

Shipyard excess material is needed elsewhere

We estimate that in September 1979, the shipyard had $5.3 million worth of excess items onhand and/or due in, while identical items were being procured and/or repaired by the supply system to satisfy its customer needs. This included $3.5 million in APA and $1.8 million in NIF items.

Our examination of 211 excess items showed that 52 were on backorder at the system level and 114, valued at $530,000, were being procured and/or repaired by the supply system to satisfy customer requirements.

As illustrated by the following examples, many of the procurement actions by the supply system were made several months after the job orders were closed. Therefore, had the supply system managers known of the excesses, customer needs possibly could have been satisfied more expeditiously and unnecessary procurements avoided.

--An excess log detector assembly, valued at $1,366, was applicable to a job order closed in August 1978 and a

ship overhaul completed in July 1979. The supply system, unable to fully satisfy customer requirements for the log detector assembly, purchased the detector in September 1979, or about 13 months after the job order had been closed and 2 months after the ship overhaul had been completed. The inventory manager stated that he was not aware of the excess detector assembly in the shipyard's inventory.

--Five delay lines, excess at the shipyard, were valued at $3,420. The job order to which they were applicable was closed in October 1977. In September 1978, nearly 11 months after the job order was closed, the supply system purchased 161 delay lines. As of September 10, 1979, customer requisitions for 148 delay lines had not been satisfied. The inventory manager was unaware of the shipyard's excess.

--A coupler, valued at $5,300, was applicable to a job order that closed in April 1978. The supply system purchased the coupler in June 1979, 15 months after the shipyard knew it no longer needed the item. As in the previous examples, the supply system inventory manager had no knowledge of the shipyard excesses.

PRIOR REVIEWS

Although our review of inventories only included the Philadelphia shipyard, prior reviews indicated that other shipyards have also accumulated excess material. We reported 1/ in 1971 that primarily because shipyards ordered material far in advance of actual need, the material demand and use data was inaccurate and substantial excess material had accumulated. We also reported that internal audits and Navy studies of supply management at shipyards identified similar weaknesses but that recommendations had not been fully implemented by shipyards.

In 1976 we reported 2/ on the Navy's fleet modernization program. We said that the Navy needed to improve visibility of onhand alteration material and that the Long Beach and

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1/"Inventories at Naval Shipyards--Excesses and Improvements Made" (B-125057, May 28, 1971).

2/"Improvement Needed in the Navy's Fleet Modernization Program" (LCD-76-406, Mar. 15, 1976).

Norfolk Navy Shipyards were retaining material for which no apparent need existed. Although the shipyards subsequently submitted a list of apparently unneeded material to the Naval Supply Center for screening, this action apparently was unique because a 1978 report 1/ showed continuing problems in this area. The 1978 report showed that shipyards were ordering more material than necessary because they were unable to reliably estimate the material they would need. It was reported that over $12.9 million, or about 38 percent, of all material ordered for just six ships overhauled at the Norfolk shipyard was not used during the overhaul.

CONCLUSION

Shipyards have large inventories of material that are not visible to supply system managers. As shown in our current and prior reviews, a sizable amount of this material is excess. The Philadelphia Naval Shipyard had a large number of excess material items relating to completed job orders. The shipyard did not review and report the material as excess until individual ship overhauls were completed. During this interval, between job order completion and ship overhaul completion, the supply system did not have visibility over the excess material items and identical items were acquired by the supply system inventory managers to satisfy the needs of other users.

Supply system efficiency and effectiveness could be improved if the system had visibility over shipyard material inventories and if the shipyards reviewed and reported their excess material to the supply system in a more timely manner. We realize that retaining material with a potential future need is cheaper than returning it to the supply system and then having to reorder it. However, the shipyard's retention of all excess material is not justified because the material is seldom used after the job order is completed or for subsequent ship overhaul tasks, and the supply system could use much of the material.

1/"Naval Shipyards--Better Definition of Mobilization Requirements and Improved Peacetime Operations are Needed" (LCD-77-450, Mar. 31, 1978).

RECOMMENDATIONS

We recommend that the Secretary of Defense direct the Navy to:

--Require shipyards to promptly review and report unneeded materials to the supply system after job orders are closed.

--Develop procedures to provide the supply system managers with visibility over all assets, including those earmarked for specific projects. Such procedures would allow the supply system managers to (1) compare shipyard assets with unfilled customer orders and (2) release assets to the highest priority customers when warranted.

AGENCY COMMENTS

Navy officials did not agree with either of the above recommendations. Concerning the first recommendation, they stated that material may be needed even though job orders are closed because testing may not be completed and parts may be needed if equipment fails.

We recognize that equipment may fail during testing and that it is desirable to have needed materials available so corrective repair can be made expeditiously. However, as stated previously, items not used on completed job orders were not subsequently used during completion of the ship overhaul. Furethermore, in view of the sizable investment in material that the shipyard has onhand for completed job orders that could be used elsewhere in the system, we do not believe that retention of the material applicable to closed job orders is justified.

Navy officials also disagreed with our recommendation of providing supply system managers with visibility over all shipyard assets. They stated that it would be too costly to implement.

The Navy did not furnish us with any estimates of what it would cost to implement a system that would provide the system managers with shipyard inventory visibility. However, we believe the Navy's uniform system of managing wholesale inventories could provide the system managers with visibility without extensive revisions.

APPENDIX I

SCHEDULE OF HOURS AND COSTS TO REPAIR ITEMS THAT WERE AVAILABLE IN THE SUPPLY SYSTEM

Ship	Repair to components available in system		Repair to components in long supply	
	Hours expended	Costs	Hours expended	Costs
U.S.S. Pratt	5,701	$160,436	2,341	$ 65,876
U.S.S. Adams	3,837	108,932	1,312	37,247
U.S.S. Mt. Whitney	6,983	204,532	3,283	95,529
U.S.S. Guadalcanal	6,986	199,378	2,342	66,841
U.S.S. Stonewall Jackson	a/983	24,575	a/114	2,850
U.S.S. Simon Bolivar	a/1,024	26,255	390	10,000
Total	25,514	$724,108	9,782	$278,343

a/Estimate based on an equal allocation of total job order hours to each of the components included on the job order in those cases where more than one component was repaired.

SUMMARY OF CONCURRENTLY REWORKED ELECTRONIC COMPONENTS EXAMINED

Ship	No. of job orders reviewed	No. of components identified by stock number	No. of components with stock information available	No. of components with assets onhand (note a)	No. of components in long supply
U.S.S. Pratt	18	52	44	26	11
U.S.S. Adams	8	29	28	14	6
U.S.S. Mt. Whitney	25	38	32	22	7
U.S.S. Guadalcanal	15	65	60	26	8
U.S.S. Stonewall Jackson	19	48	31	11	1
U.S.S. Simon Bolivar	18	37	28	11	4
Total	103	269	223	110	37

a/Ready for issue items only, excluding unserviceable items in stock.

APPENDIX II

APPENDIX III

SUMMARY OF PHILADELPHIA SHIPYARD EXCESS ITEMS AS OF SEPTEMBER 1979

Inventory type	Shipyard excess inventory onhand and/or due in		Excess items reviewed by GAO			
	Number	Value	Number	No. on back-order	No. on procure-ment	Value of shipyard excess items being procured by system
APA	699	$ 7,954,200	103	32	63	$521,481
NIF	20,010	3,037,400	108	20	51	8,957
Total	20,709	$10,991,600	211	52	114	$530,438

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