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Report to the Congress; by Elmer B. Staats, Comptroller General.

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Maintenance float is the term used for operating equipment which is stocked at maintenance facilities for use while Army equipment is being repaired. The Army's stated maintenance float requirement is about $966 million, about $553 million of which is in operational readiness float. Findings/Conclusions: In 1976, the Army was still using maintenance float factors developed in 1971 and had no way of knowing its true requirements. Since 1971, the Army has been unable to obtain the required data to evaluate its maintenance float requirements. In addition, certain Army activity groups were uncertain about their float responsibilities. At least $62 million in float requirements was used to support noncombat units such as training battalions and military policy. As a result, unnecessary equipment may have been purchased, and equipment which could have been used to fill Army shortages in active or reserve units was used unnecessarily for maintenance float purposes. If maintenance float support for noncombat units were discontinued, planned procurements could be reduced by about $11.5 million, and about $4.2 million in existing assets could be redistributed. Recommendations: The Army should discontinue the practice of computing maintenance float support for noncombat units except when such support is determined to be essential to the units' missions. The system for estimating requirements should be based on planned overhauls in a wartime environment, realistic performance standards, and improved maintenance concepts. Provisions should be made to periodically revalidate float requirements and collect the necessary data to do so. Future procurement plans should be revised to show any changed float requirements. (RRS)

REPORT TO THE CONGRESS

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

Better Management Of Spare Equipment Will Improve Maintenance Productivity And Save The Army Millions

Department of the Army

The Army buys equipment for maintenance activities to provide to operating units when their own equipment is being repaired to maintain combat readiness.

GAO questions the need for about $62 million of this equipment for noncombat units and about $23 million worth of tank and automotive-type equipment for combat units.

The Army is taking action on GAO's recommendations for improving the way equipment requirements are computed. These changes should result in more realistic estimates of equipment needs to maintain combat readiness.

LCD-76-442

APRIL 5, 1977

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-146896

To the President of the Senate and the
Speaker of the House of Representatives

This report discusses ways to improve the Army's management of spare combat equipment held by maintenance activities and issued to operating forces to replace equipment being repaired. We made this review because this equipment represents a requirement of $966 million and is considered essential to maintain the Army's combat readiness.

Our review was made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

Copies of this report are being sent to the Director, Office of Management and Budget; the Secretary of Defense; and the Secretary of the Army.

Comptroller General
of the United States

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

BETTER MANAGEMENT OF SPARE EQUIPMENT WILL IMPROVE MAINTENANCE PRODUCTIVITY AND SAVE THE ARMY MILLIONS

D I G E S T

The Army buys equipment which maintenance activities give to operating units when their equipment is being repaired. Equipment bought for this purpose is called "maintenance float." The Army's stated maintenance float requirement is about $966 million. Of this, about $553 million is for field maintenance activities and $413 million is for depots. The float concept is designed to maintain the operational readiness of the Army's forces.

The Army has not verified its maintenance float requirements for combat units since about 1971, primarily because no provision had been made to collect the needed data. As a result, the Army could not apply its requirements-computation system to the maintenance float and stated requirements could not be documented. (See pp. 5 to 8.) In addition, several other system-design deficiencies were found.

Over $62 million of the Army's maintenance float requirements support noncombat units such as training battalions and military police. GAO questions the need for these types of units to have maintenance float support because

--they do not engage in combat,

--they can often reschedule their work depending on their missions, and

--they are often collocated with combat units having similar or identical equipment which could be pooled. (See pp. 10 and 11.)

If maintenance float support for noncombat units was discontinued, planned procurements could be reduced. For example, GAO estimates that about $11.5 million in planned procurements for selected tank and automotive equipment could be avoided,

and about $4.2 million in existing assets could be redistributed. (See pp. 10 to 13.)

The Army also needs to revise the way it computes its depot-maintenance float requirements. GAO believes that depot-maintenance float requirements should be based on future overhaul plans and depot performance standards which include wartime needs and new maintenance concepts. GAO estimated that requirements for about $23 million or 16 percent, of tank and automotive depot float requirements, exceeded current needs (see pp. 14 to 19). This included tanks, tractors, cranes, trucks, and other vehicles. (See. p.33.)

In computing field maintenance float requirements, the Army system inflates requirements to cover the inefficiencies of field maintenance units. (See pp. 22 to 26.) In addition, the system does not consider whether investment in float equipment has an impact on the operational readiness of combat units. (See pp. 27 to 29.) At one base, for example, GAO found an investment of $600,000 in armored personnel carrier and tank recovery vehicles would increase the operational readiness of these items from only 1 to 3 percent. (See pp. 28 and 29.)

GAO recommends that the Secretary of Defense require the Army to discontinue the practice of computing maintenance float support for noncombat units except when such support is determined to be essential to the units' missions. Planned procurements should be adjusted to show the reduced total requirements, and current maintenance float assets for noncombat units should be redistributed to meet higher priority needs. (See p. 13.)

For depot float, GAO is recommending that the system for estimating requirements be based on planned overhauls in a wartime environment, realistic performance standards, and improved-maintenance concepts. The system should also identify the portion of the total depot float requirements to be filled for peacetime needs. (See pp. 19 and 20.)

GAO also recommends that the system for computing field maintenance float be revised to consider whether

--the maintenance units and their associated supply systems are operating at reasonable efficiency,

--the introduction of float end-items would greatly affect the units' combat readiness, and

--less costly alternatives, such as increased spare parts, would also achieve the objectives of field float.

Provision should be made to periodically revalidate float requirements and collect the necessary data to do so.

GAO recommends that future procurement plans be revised to show any changed requirements. Some current procurements should be reviewed to determine whether any should be deferred pending implementation of a revised system for computing float requirements. (See pp. 30 and 31.)

The Army agreed that maintenance float is primarily designed for tactical combat units and said that it would review the need for non-combat units to have maintenance float. (See p. 13.)

For combat units, the Army agreed to revise its systems for estimating depot and field float requirements. The Army said that it would revise its depot float policies to assure that the revised system considers matters such as wartime-peacetime needs and revised maintenance concepts. The new depot float system would, however, continue to be based on current production performance instead of performance standards. (See p. 20.) The new field maintenance float system will provide a method for determining whether the maintenance float is the most cost-effective means of ensuring unit readiness before authorizing increased stockage.

The system also provides for the application of performance standards to preclude the use of operational readiness float as a substitute for efficient maintenance and supply practices. (See p. 37.)

For both depot and field maintenance float, the Army agreed to adjust future procurements to show changes in float requirements developed under the revised systems. (See pp. 20 and 31.) For field maintenance float, the Army said that it would closely scrutinize the distribution of assets from current procurements. (See p. 31.)

GAO believes that the Army's proposed actions will eliminate unnecessary float equipment for noncombat units and help to establish more accurate requirements for combat units. (See pp. 13, 25, and 31.) The Army, however, should make every effort to use performance standards in its depot float computation system. The requirement for depot float can be greatly affected when actual production performance is used instead of realistic performance standards. (See p. 17.)

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CHAPTER 1

INTRODUCTION

Maintenance float is operating equipment which is stocked at maintenance activities for use of operating forces that return unserviceable equipmenent for repair or overhaul. Maintenance float is designed to keep the operating forces ready to perform their missions. For example, a combat unit may send a tank to a field maintenance activity for repair. The maintenance activity receives the unserviceable tank and sends another in its place to that unit to maintain its combat readiness.

There are two types of maintenance float. Repair cycle float is held by depots so that equipment can be withdrawn from operating units for scheduled overhaul without affecting the units' readiness. The Army's repair cycle float requirement is valued at about $413 million.

Operational readiness float is controlled by field maintenance activities. The Army has a stated requirement of about $553 million in operational readiness float. Equipment considered as operational readiness float must (1) be essential in accomplishing the Army's missions, (2) require a large amount of maintenance, and (3) be repairable by field maintenance activities.

Maintenance float requirements are a part of the Army's equipment authorized acquisition objective 1/ which is the basis for procurements. Overstated maintenance float requirements could result, therefore, in unneeded procurement and additional storage and maintenance costs. Understated maintenance float requirements may reduce operating force readiness.

REQUIREMENTS DEVELOPMENT PROCESS

The maintenance float requirements development process is designed to estimate the amount of equipment needed which will be undergoing field and depot

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1/The quantity of an item authorized for peacetime acquisition to equip the U.S. Army approved force and specified allies in peacetime and sustain these forces in wartime from D-day through a specified period.

maintenance at any one time. These are the quantities needed for operating units to maintain their operational readiness when their own equipment is inoperable.

As shown on page 3, the data needed to calculate requirements is supposed to be accumulated by the Army maintenance management system and be provided to item managers at the Army's commodity commands. 1/

The commodity commands calculate maintenance float factors by using mathematical formulas which take into account data such as the average time for repairing items and the average operating time between equipment failures. The formulas are designed to estimate the percent of each type of equipment undergoing overhaul (repair cycle float factor) and extended field repair (operational readiness float factor) at any one time. The commodity commands are required to update maintenance float factors every 2 years and submit them to the U.S. Army Major Item Data Agency.

The agency computes worldwide equipment requirements for all Army units. Maintenance float requirements are part of the worldwide requirements and are computed by multiplying the equipment requirements of active Army units by maintenance float factors. For example, if the active Army requirement for a piece of equipment was 1,000 and the repair cycle and operational readiness float factors were 10 percent and 5 percent, respectively, the maintenance float requirements would be 100 (1,000 x .10) and 50 (1,000 x .05), respectively.

ALLOCATION AND USE OF MAINTENANCE FLOAT ASSETS

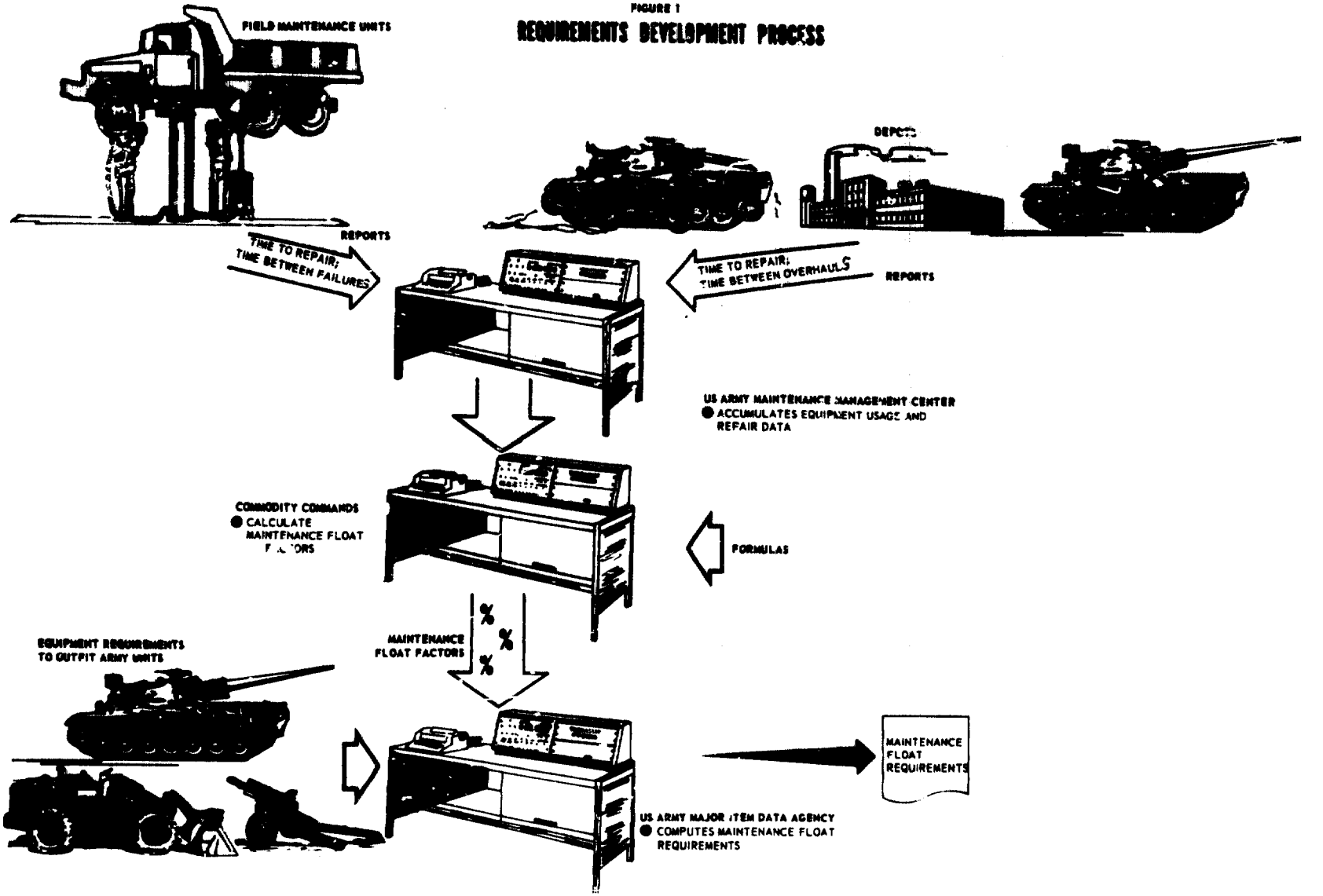
Army Headquarters is responsible for controlling the allocation of repair cycle float to depots supporting its overhaul programs.

Commodity commands allocate operational readiness float to major Army operating commands in accordance with the Army's equipment distribution plan. The major commands are responsible for redistributing the equipment to their subcommands. The equipment is located at field maintenance activities.

1/The commodity commands are responsible for overall management of equipment. For example, the Tank and Automotive Command is responsible for managing tanks and automotive equipment.

FIGURE 1

REQUIREMENTS DEVELOPMENT PROCESS



Maintenance activities issue operational readiness float assets to units in exchange for similar unserviceable items on the basis of the (1) operational readiness of the unit, (2) complexity of repairs, and (3) availability of parts and assemblies. For example, in the continental United States, operational readiness float equipment can replace equipment which will take more than 8 days to repair.

The major Army commands must review their allocations annually. When necessary, they should redistribute float equipment among their subcommands. However, approval to increase or decrease their overall operational readiness float allocations must be obtained from item managers at the commodity commands.

CHAPTER 2

MAINTENANCE FLOAT REQUIREMENTS

NOT VALIDATED

The Army computes its maintenance float requirements by multiplying the total active Army requirements for selected items of equipment by a factor called a maintenance float factor. Quantities derived from computing repair cycle float represent the number of equipment items estimated to be undergoing depot overhaul. For operational readiness float, the quantities from Army computations represent the number of equipment items which are estimated to require field maintenance exceeding a particular number of days. These quantities, together with other equipment requirements, comprise the Army's total equipment requirements for procurement planning and asset distribution purposes. Understated float quantities impair combat readiness, while overstated quantities will divert funds from more useful purposes. Therefore, maintenance float requirements must be periodically validated. Army regulations require that each requirements factor be validated every 2 years.

In 1976 the Army was still using maintenance float factors developed in 1971 and had no way of knowing its true requirements. Since 1971 the Army has not been able to obtain the required data to evaluate its maintenance float requirements.

In addition, Army activities were uncertain about their responsibilities in implementing the maintenance float management system.

REQUIRED DATA GENERALLY NOT AVAILABLE

The following information is required to recompute a repair cycle float factor:

--Shipping time from operating unit to depot.

--Time awaiting overhaul at the depot.

--Time to overhaul.

--Time between overhauls.

The above information is to be reported through the Army's maintenance management system. However, with the exception of the overhaul time, none of the data required to recompute repair cycle float factors was available in the Army's maintenance management system because it had not been collected.

For example, at the Red River Army Depot, no requirement existed to accumulate the required data to recompute repair cycle float factors. The data could only be obtained by examining individual records of depot transactions.

To recompute an operational readiness float factor for field maintenance units, the following information is needed:

--Transportation time from operating unit to field maintenance unit.

--Time awaiting repair at the field maintenance unit.

--Time to repair.

--Time between repairs.

None of the above information was available in the Army's maintenance management system. The only information available in the system was the number of operational readiness float transactions and this information was incomplete.

We visited three field maintenance units at Fort Hood, Texas, and found that the only way to obtain the required data was by screening the records of each maintenance job.

To determine the effect of not updating operational readiness float factors, we compiled the required data from maintenance transactions and recomputed the operational readiness float requirements of the three maintenance activities at Fort Hood in the method prescribed by the Army. Because float authorizations were based on outdated Army float factors, about $1.2 million of unneeded equipment was on hand, and about $169,000 worth of other needed equipment was unavailable.

	M-113A1 armored personnel carrier	M-88 tank recovery vehicle	UH-1H helicopter
Quantity on hand	7	2	8
Quantity required	3	3	5
Quantity excess (short)	4	(1)	3
Value of excess (shortage)	$137,512	$(169,400)	$1,034,439

The Army recognized as early as 1973 that its maintenance management system did not provide required data and waived the requirement to update maintenance float factors until 1975. In a 1974 study, the Army Maintenance Management Center recommended that the management system be revised to provide necessary data.

In January 1976 the Army began another study to determine the type of data needed and the availability of data for updating operational readiness float factors.

In March 1976 the Army Audit Agency recommended that the required information be obtained from more reliable records outside the maintenance management system. In reply, the Army noted that the documents referred to by the Agency were also unreliable.

At the time of our review, no action had been taken to implement an effective system to obtain the required information for computing maintenance float support.

We believe that, even if the data were available, the Army's system would be inadequate to forecast future float requirements. (See chs. 4 and 5.)

ARMY ACTIVITIES UNCERTAIN OF THEIR RESPONSIBILITIES

In our discussions with officials at various levels of command, it was apparent to us that there was some confusion regarding their responsibilities in computing the depot repair cycle float requirements.

For example, Army regulations prescribe that, after a float factor is established, float quantities be compared

with the funded depot overhaul program regarding the piece of equipment to determine that the quantity of calculated repair cycle float supports the overhaul program. Officials at Army headquarters said that this comparison was the responsibility of the commodity commands. Officials at the Army Tank and Automotive Command said that Army Headquarters was responsible for this. As a result, no such comparison was made and we found several types of equipment having no planned overhauls for which repair cycle float quantities were being calculated. (See app. I.)

The Army Audit Agency, in a 1975 report on the management of maintenance float by the U.S. Army Electronics Command, reported similar instances where agency officials were not certain of their responsibilities. The agency said that the Command recomputed repair cycle float factors for 146 items as a result of a 1971 audit, but did not use them because Command personnel were unfamiliar with Army and local regulations on maintenance float.

CONCLUSIONS

The Army has not updated many of its maintenance float factors since 1971 primarily because the required information is not accumulated in its system. Additionally, some Army activities were uncertain as to their responsibilities regarding validating these float factors.

As a result, the Army is uncertain whether its stated float requirements show what is actually needed. Although several attempts have been made to update its requirements, these attempts have been concerned mostly with finding alternate sources of data to revise the float factors.

As described in chapters 3, 4, and 5, we found several other ways to improve the Army's maintenance float system. Our recommendations are contained in these chapters.

CHAPTER 3

MAINTENANCE FLOAT NOT NEEDED FOR ALL NONCOMBAT UNITS

The Army's policy is to compute maintenance float requirements for all active Army units. With the exception of aircraft, the Army does not consider unit missions. We estimate that at least $62 million in maintenance float requirements were for noncombat units, such as training battalions and military police, whose need for such support is questionable. We believe that as a result, (1) unnecessary equipment may be purchased and (2) equipment which could be used to fill Army shortages in active or reserve combat units will be used unnecessarily for maintenance float purposes.

EXTENT OF MAINTENANCE FLOAT SUPPORT FOR NONCOMBAT UNITS

The Army does not maintain separate records of maintenance float requirements for noncombat units. Detailed analyses must be made of the records supporting the Army's stated maintenance float requirements to estimate the extent of float for noncombat units. We, therefore, relied on work previously done by the Army Audit Agency in analyzing tank-, automotive-, electronic-, and missile-type equipment. We analyzed the supporting records for armaments and troop-support equipment. In total, we were able to identify about $62.8 million in maintenance float requirements for noncombat units as follows.

Commodity	Maintenance float requirement
	(millions)
Tank and automotive	$36.6
Electronic	9.1
Missile	4.0
Armaments	8.6
Troop support	4.5
Total	$62.8

Following are some examples of the equipment included in the $62.8 million.

Type of equipment	Quantity	Value (millions)
Tank, M-60A1	42	$11.1
Crane shovel, 20-ton	98	6.1
Bulldozer	78	2.6
Howitzer, light-towed	25	1.6
Diesel generator, 60KW-60H	91	.8

QUESTIONABLE NEED FOR NONCOMBAT UNITS TO HAVE MAINTENANCE FLOAT SUPPORT

In determining the combat readiness of its forces, the Army makes a distinction between so called "readiness reporting" units and "nonreadiness" units. Readiness units are combat units which are constantly monitored to evaluate their ability to do their assigned combat mission. The loss of a piece of equipment for repair or overhaul could weaken their ability to fight.

Nonreadiness units do not, by definition, engage in combat and, therefore, are not required to report their combat readiness. Their equipment requirements are based on their current missions and workloads which, in many cases, can be programed in advance and coordinated with the maintenance operation. For example, a training unit at a school may need tanks, machine guns, and rifles to meet training commitments; but the class dates and the equipment needs are preplanned with equipment not in constant use. In other cases, work can be either deferred (for example, a road repair job on a military base) if equipment is being repaired, or equipment could be rented to meet peak workloads.

Also, noncombat units are often collocated on bases with combat units having similar or identical equipment which could be pooled. In a recent report to the Congress, 1/ we noted that 183 types of equipment were common to both combat and noncombat units stationed at one base; at another

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1/"Developing Equipment Needs for Army Missions Requires Constant Attention" (LCD-75-442, May 10, 1976.)

base, 386 were common. At a third base, the Army had a stated requirement of 26 M-60A1 tanks valued at about $6.9 million for maintenance float to support the 161 tanks authorized for 2 training units. These units were collocated with 2 combat units which were authorized 102 tanks, including 16 for maintenance float.

In addition to lacking a combat role, noncombat units have options unavailable to combat units to accomplish their missions should their own equipment be undergoing repair. We, therefore, believe that maintenance float support is unnecessary for most noncombat units.

The Army Audit Agency also questioned the Army's policy of providing maintenance float support to noncombat units. In response, Army officials said that noncombat units already have a lower level of maintenance float support than combat units because their requisitions for such support did not have as high a priority as those for combat units.

RESULTS OF DISCONTINUING MAINTENANCE FLOAT SUPPORT TO NONCOMBAT UNITS

If the practice of computing maintenance float requirements for noncombat units was discontinued, the benefits would be twofold. First, planned procurements could be reduced, and, second, existing maintenance float assets could be redistributed.

Planned procurements could be reduced

The Army does not buy equipment specifically for maintenance float purposes but compares the total requirements for each item with the total assets on hand. Furthermore, requirements change frequently and circumstances often make it difficult to implement procurement plans. Therefore, although future procurements are affected by the maintenance float requirements of noncombat units, the extent is difficult to assess.

Accordingly, we selected some equipment items at the U.S. Army Tank and Automotive Command for which planned procurements would satisfy the Army's total requirements by 1979. We then reduced the requirements and the procurement quantities by the amount of maintenance float for noncombat units and found that, by doing so, an estimated

$11.5 million in planned procurements could be avoided as follows:

Equipment	Quantity	Value
Crane wheel, 20 tons	3	$ 340,482
Grader	89	2,004,369
Crane shovel crawler	6	660,000
Crane shovel truck, 20 tons	98	6,145,188
Cargo truck, 2-1/2 tons	10	93,800
Tank fuel truck, 2-1/2 tons	1	15,626
Utility truck, 1/4 tons	17	64,023
Truck wrecker, 10 tons	1	32,029
Recovery vehicle, M-88	12	2,032,800
Heavy equipment transporter	2	132,000
Total	239	$11,520,317

The Army Audit Agency, in its work at the U.S. Electronics Command, found that the procurement of 196 vehicle intercom units costing about $134,000 could also be avoided if the float requirements for noncombat units were eliminated.

Existing assets could be redistributed

The problem of estimating the amount of maintenance float assets onhand for noncombat units is similar to the problem of estimating the amount of planned maintenance float procurements. The Army's system does not separately account for float assets for noncombat units.

We, therefore, selected some equipment for which total active Army onhand assets were equal to requirements and determined the extent to which float requirements for noncombat units were included in the total requirements. We applied this rate to the total amount of onhand assets and estimated the amount of assets available for redistribution to meet other requirements, such as the reserve forces needs. By this method, we estimated that about $4.2 million of assets being used as maintenance float support for noncombat units could be redistributed to meet other requirements if maintenance float was eliminated for noncombat units. Following are some examples.

Equipment	Quantity	Value
Loader scoop	51	$1,081,863
Howitzer, heavy, self-propelled	7	1,080,268
Generator, ST diesel engine	112	765,520
Carrier, personnel M-113A1	13	450,814
Repeater set radio, AN/TRC-138	1	244,857
Truck cargo, 2 1/2 tons	10	93,800
Public address, AN/TIQ-2A	39	62,400

CONCLUSIONS

We believe that the Army should carefully evaluate the need for maintenance float support for all noncombat units. Their noncombat status and the nature of their workloads do not always, in our opinion, justify over $62 million in maintenance float support. We believe that some of the funds for planned procurements to provide maintenance float to noncombat units could be better spent on meeting other combat readiness Army requirements. Equipment already on hand for maintenance float support could be used to fill shortages.

RECOMMENDATIONS

We recommend that the Secretary of Defense require the Army to discontinue the practice of computing maintenance float support for noncombat units except when such support is determined to be essential to unit missions. Planned procurements should be reduced to show the reduced total requirements, and maintenance float assets currently on hand for noncombat units should be redistributed to meet higher priority needs.

AGENCY COMMENTS AND OUR EVALUATION

On January 4, 1977, the Acting Assistant Secretary of the Army, Installations and Logistics, provide written comments on behalf of the Secretary of Defense (see App. II). The Army agreed with our recommendations and said that maintenance float is primarily designed for tactical combat units. The Army agreed to review the need for noncombat units to have such support, revise procurement plans accordingly, and redistribute any onhand assets not needed.

In our opinion, the Army's proposed actions should result in eliminating much of the unnecessary maintenance float equipment for noncombat units.

CHAPTER 4

BASIS FOR COMPUTING REPAIR CYCLE FLOAT REQUIREMENTS FOR DEPOTS NEEDS TO BE REVISED

A system for computing depot repair cycle float requirements must be able to estimate combat-essential equipment pieces which should be undergoing overhaul at depots. An extra stock of equipment can then be bought for issue to the operating units so that their combat readiness does not suffer while their own equipment is being overhauled.

Their system has not been functioning properly. As discussed in chapter 2, the Army has not used its system for updating repair cycle float requirements since 1971. Furthermore, if the system were used as intended, the resulting requirement computations would be inaccurate because the system uses past overhaul rates to project future requirements. Not only is this method unresponsive to changes in overhaul schedules, but it does not consider possible increased requirements during wartime periods. In making its computations, the system also relies on historical production performance instead of its own standards.

As a result, the Army has no way of knowing its complete repair cycle float requirements. Of the Army's stated requirements for about $413 million in depot repair cycle float, we examined about $142 million, and estimated that about $23 million exceeded current needs.

THE SYSTEM SHOULD RELATE FLOAT REQUIREMENTS TO FUTURE OVERHAUL PROJECTIONS

In its system for computing repair cycle depot float requirements, the Army estimates the extra equipment which must be provided in the supply system to be used by the operating units while their own equipment is being overhauled. To accomplish this, a mathematical formula has

been devised 1/ to develop a repair cycle float factor which, when multiplied by the total active Army requirements, yields the estimated number of items undergoing overhaul at any given time.

We found that, while the use of such a method would produce adequate estimates if equipment were overhauled at a constant rate each year, this method is inadequate to forecast repair cycle float requirements because of changing maintenance concepts, increased overhaul requirements in wartime, and other factors affecting future overhaul needs. This inadequacy occurs because the system is designed to forecast future needs using only past overhaul rates.

For example, suppose the Army had a requirement for 1,000 pieces of equipment with the following historical characteristics:

Shipping time from operating unit to depot	0.5 month
Time awaiting overhaul at the depot	1.0 month
Time to overhaul	2.0 months
Time between overhaul	60.0 months
Number overhauled annually	200 items

By using the Army's formula, the repair cycle float factor would be .058 2/ and which, when multiplied by 1,000, would yield a repair cycle float requirement of 58 items. In other words, 58 extra items would be needed to compensate those undergoing overhaul. As long as overhauls proceed at the rate of 200 per year, taking 3.5 months to overhaul each item, the Army's formula would accurately predict the quantity of repair cycle float assets needed.

The system, however, considers only what has happened in the past and does little to forecast the Army's real needs. For example, equipment usage generally increases in wartime and requires more frequent overhauls. While the

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1/Repair cycle float factor equals (shipping time from operating unit to depot, plus time awaiting overhaul at the depot, plus time to overhaul) divided by the time between overhauls.

2/Mathematically, the repair cycle float factor of 0.58 is computed as follows: .058 = [(.5 + 1.0 + 2.0) - 60].

Army has attempted to estimate its depot manpower requirements under mobilization conditions, the use of a system which computes maintenance float requirements on the basis of historical peacetime overhaul rates would not likely provide enough float equipment to support wartime overhaul requirements. As a result, the Army's combat readiness--the prime objective of having maintenance float--would suffer.

In addition, a system which uses only historical overhaul rates is not responsive to changing maintenance concepts and practices. For example, the Army is currently studying the feasibility of changing the 5,000-mile overhaul criterion for combat vehicles to a more realistic and economical criterion. This may result in a rate for most tanks of about 8,000 miles. Implementing a new criterion such as this would cause less required repair cycle float because proportionally fewer tanks would be undergoing overhaul. The use of historical overhaul schedules would, therefore, be inappropriate for forecasting the newer, lower requirements.

THE PROPOSED SYSTEM RELIES ON ACTUAL PERFORMANCE DATA INSTEAD OF STANDARDS

If the Army were to implement its own system for computing repair cycle float requirements, it would collect actual historical data on transit times, time awaiting overhaul, and overhaul time for use in the prescribed mathematical formula. As a result, in addition to the discrepancies between computed and real repair cycle float-needs caused by using only historical overhaul rates, an additional element of distortion would be introduced whenever actual performance deviated from realistic performance standards.

For example, at the Red River Army Depot, we examined the records of 50 randomly selected M-113A1 armored personnel carriers and 97 M-88 tank recovery vehicles which had recently been overhauled. From this analysis, we obtained actual performance data for computing repair cycle float factors. We then compared the actual performance with available Army standards.

Performance data for computing repair depot cycle float factor	Months			
	M-113A1 armored personnel carrier		M-88 tank recovery vehicle	
	Standard	Actual	Standard	Actual
Shipping time from operating unit to depot	0.5	0.3	0.5	0.5
Time awaiting overhaul at the depot	4.4	12.1	6.6	27.6
Time to overhaul	2.2	4.2	3.3	6.9
Time between overhauls	-	68.9	-	a/69.7

a/Insufficient data was available at the depot to determine the time between overhauls for all M-88 tank recovery vehicles examined. We obtained the figure of 69.7 months from the vehicles for which records were available.

Using the figures above, we then calculated the repair cycle float requirements using the Army's prescribed system and available Army performance standards.

Repair cycle quantity	M-113A1 armored personnel carrier	M-88 tank recovery vehicle
Using actual performance	1,178	263
Using available Army standards	503	78
Difference	675	185

While neither of the computed repair cycle float factors above shows the actual needs of the Army, both reveal that, by using performance standards instead of actual production performance, the resulting repair cycle float quantities were greatly affected.

In addition, as pointed out in several previous GAO reports 1/, performance standards themselves are either based

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1/"Industrial Management Review of the Army Aeronautical Depot Maintenance Center, Corpus Christi, Texas" (B-159896, Dec. 17, 1973); "An Industrial Management Review of the Maintenance Directorate San Antonio Air Material Area, San Antonio, Texas" (B-158896, Apr. 11, 1974); "Improving Depot Maintenance of Combat and Tactical Vehicles" (LCD-75-424, Sept. 3, 1975); "Improvements Needed in Defense's Efforts to Use Work Measurement" (LCD-76-401, Aug. 31, 1976).

on overall historical performance or are set arbitrarily. For example, the Army standards for overhaul time shown in the above table were based on historical performance and the standard for time awaiting overhaul was merely twice the overhaul time.

We believe that float requirements should be based on realistic standards set by work measurement analysis. Inadequate standards would result in substandard performance by providing excessive float to compensate for it, while procurement funds would be used to buy unneeded maintenance float and to subsidize the inefficient use of operations and maintenance funds.

IMPACT OF THE ARMY'S LACK OF ADEQUATE REPAIR CYCLE FLOAT CALCULATIONS

As mentioned previously, the objective of any system for computing depot repair cycle float requirements is to estimate the extra combat-essential equipment needed for operating units to maintain combat readiness when their own equipment is being overhauled. The repair cycle float quantity result should therefore be equivalent to the quantity of equipment being overhauled.

To determine the extent to which the Army's current repair cycle float requirements reflected the estimated number of items being overhauled at one time, we reviewed the Army's stated equipment requirements managed by the Army Tank and Automotive Command. In studying the fiscal year 1976 depot overhaul program, we estimated, using available performance standards, how many items should be in transit, awaiting overhaul, or undergoing overhaul. The figure was compared with the Army's stated float requirements.

We analyzed 23 types of equipment having stated depot repair cycle float requirements of about $142 million and found:

Condition	Number of items	Stated requirements	Over or under(-) stated repair cycle float requirement
		(millions)	
Float requirements for items having no overhaul program	6	$ 13.0	$13.0
Float requirements overstated	13	84.3	22.7
Float requirements understated	4	45.1	-13.0
Total	23	142.4	$22.7

(App. I on page 33 shows the equipment considered in our analysis.)

Since we did not adjust the overhaul programs to exclude all but equipment being overhauled for active-duty combat units, some of the overhaul equipment may be for either non-combat units or other requirements, such as reserve force needs.

CONCLUSIONS

Because the Army relies on historical overhaul rates which do not consider wartime requirements and other factors which may affect future overhaul programs, its system of calculating repair cycle float requirements cannot determine future needs. The system further distorts float requirements by using actual historical production data instead of performance standards. As a result of these problems and the system's lack of use, the Army's stated repair cycle float requirements bear only a coincidental relationship to actual needs.

RECOMMENDATIONS

We recommend that the Secretary of Defense require the Army to:

--Revise the current system for computing repair cycle float requirements by establishing needs based on planned overhauls for combat units in a wartime environment, realistic performance standards, and improved maintenance concepts.

--Determine the portion of the total repair cycle in which float requirements will be filled for peacetime needs.

--Revise its procurement plans to show any changed requirements for repair cycle float.

AGENCY COMMENTS AND OUR EVALUATION

The Army agreed that more precise methods are needed to predict and compute repair cycle float requirements and has begun a study to develop such methods. In addition, the Army agreed to change its repair cycle float review policies to consider wartime and peacetime needs and to assess availability, priorities, and revised maintenance concepts. As repair cycle float requirements are revised, procurement plans will be adjusted accordingly. The Army stated that the new review system will also be based on current production performance.

We believe that these actions will help the Army to make more accurate estimates of its repair cycle float requirements and better use of available funds.

As pointed out on pages 16 and 17 however, we found that the requirements for repair cycle float can be greatly affected when actual production performance is used instead of realistic performance standards. We believe, therefore, that the Army should make every effort to use performance standards in its repair cycle float-computation system.

CHAPTER 5

NEED TO REVISE THE SYSTEM FOR COMPUTING OPERATIONAL READINESS FLOAT REQUIREMENTS

To keep its equipment operationally ready, the Army's field maintenance activities must provide good maintenance and spare parts support. In addition, a stock of float equipment for operational readiness is maintained at the field level for issue to operating units to maintain their combat readiness while their equipment is being repaired.

Obviously, the Army cannot invest in float equipment as a contingency for all maintenance and supply disruptions because of monetary constraints. Therefore, tradeoffs are involved. The emphasis must be on effective field maintenance and repair parts support supplemented by careful calculation of float requirements, so that investments in these additional assets are limited to those which can have the greatest effect on readiness.

The Army recognizes this fact. Thus, its policy is to invest only in float equipment which is essential for mission performance, requires much maintenance, and which cannot be repaired within a specified time--generally 18 days for helicopters and 8 days for other equipment located in the continental United States. The Army has a stated requirement of about $527 million for operational readiness float equipment for combat units.

The Army has not validated its operational readiness float requirements since about 1971. Moreover, if the data were available, the Army's system for computing its operational readiness float requirements would not produce valid requirements. The system operates to reward inefficient maintenance and supply support with extra float equipment. Furthermore, the system does not provide for determining whether an investment in specific float assets will produce an appreciable increase in operational readiness.

We believe that millions of dollars of the Army's funds may be spent to procure unnecessary operational readiness float assets and that existing assets worth millions of dollars, which could be redistributed to meet other Army needs, are unnecessarily being used as maintenance float.

REQUIREMENTS COMPUTATION SYSTEM SHOULD CONSIDER WHETHER FIELD MAINTENANCE UNITS' FLOAT REQUIREMENTS ARE REASONABLE

The Army's prescribed requirements computation system is based on historical data with no provision to determine whether this historical data is reasonable and represents what could realistically be achieved during wartime with proper supply support and efficient maintenance. As a result, a float pool may be established as a substitute for good supply and maintenance practices.

Maintenance float requirements increase proportionally with maintenance time

The time taken to repair equipment influences the quantity of operational readiness float equipment for field maintenance units. We examined the records of three field maintenance units at Fort Hood, Texas, and identified, for the M-113A1 armored personnel carrier, the M-88 tank recovery vehicle and the UH-1H helicopter, whose maintenance actions, which, according to Army criteria, result in the need for operational readiness float. Using this information, we found that the Fort Hood units were entitled to about $2.3 million in float equipment which included three M-113A1 armored personnel carriers (worth $0.1 million), three M-88 tank recovery vehicles (worth $0.5 million), and five UH-1H helicopters (worth $1.7 million).

Analyzing the supporting repair data, we found the following:

Maintenance Unit	Average days to repair		
	M-113A1	M-88	UH-1H
A	11.2	35.0	75.0
B	13.2	26.3	56.4
C	(a)	(a)	29.0

a/Unit C did not repair M-113A1 and M-88 vehicles.

As shown above, repair times differed markedly in most cases among the three maintenance units.

We then compared the quantity of operational combat equipment supported by each maintenance unit with the quantity of operational readiness float equipment to which

each was entitled and found that float allowances increased proportionately with repair times. In other words, the units which repaired equipment inefficiently were rewarded with more float equipment. For example, unit C which supported 42 combat helicopters was entitled to 1 float helicopter. Units A and B, which supported only 13 combat helicopters apiece, were entitled to 2 float helicopters each. The primary reason was because units A and B required more time to repair their helicopters than did unit C.

Supply problems

Average repair time appeared unreasonably high because the large number of spare part problems accounted for a large portion of the total repair time. For the M-113A1 and M-88 vehicles, for example, between 61 and 92 percent of all repair time was spent awaiting spare parts.

Maintenance officials at Fort Hood attributed supply problems to a variety of factors including (1) funding limitations, (2) slow supply system at Fort Hood, (3) unavailability of current part stock numbers, (4) incorrect use of stock numbers by maintenance personnel when ordering, (5) failure to fill requisitions for onhand parts because supply personnel did not know what the parts looked like, and (6) sudden demands for a particular part due to high usage, such as from field exercises.

One maintenance officials said that it took as long as 5 days to clear a requisition through the Fort Hood supply system. Others stated that on many occasions their maintenance personnel had found spare parts in the Fort Hood supply system to fill requisitions after supply personnel had said none were on hand.

Several officials of the maintenance units we visited said that most maintenance float requirements for selected equipment could be eliminated by a strong management program for spare parts. One official said that actions such as providing more spare engines could reduce operational readiness float requirements in the unit from 20 to 4 helicopters. Another stated that most operational readiness float aircraft could be eliminated by good supply response.

Repair problems

The actual time to repair a piece of equipment once the spare parts are obtained is another important factor affecting maintenance float requirements. Repair time is influenced by the number of personnel on hand and the extent to which they are productively employed.

Although maintenance units kept records of the staff-hours needed to repair equipment, we visited units which did not use work measurement standards to compare actual staff-hours with standard staff-hours on repair jobs and did not use management reports on direct labor hours to be charged as a percent of available hours. Furthermore, time spent awaiting necessary spare parts identified as such after a job had started, was sometimes counted as time undergoing repair. It was difficult, therefore, to determine the efficiency with which jobs were done. We performed the following analysis for all jobs entering each field maintenance unit for our sample.

	Number of jobs started July-Sept. 1975	Average staff-days to repair	Average elapsed days to repair (note a)	Ratio of repair days to staff-days
Unit A:				
M-113 armored personnel carrier	78	1.1	1.1	1 to 1
M-88 tank recovery vehicle	19	2.4	12.9	5.4 to 1
UH-1H helicopter	31	9.8	11.8	1.2 to 1
Unit B:				
M-113 armored personnel carrier	86	0.8	2.3	2.9 to 1
M-88 tank recovery vehicle	16	1.2	1.9	1.6 to 1
UH-1H helicopter	54	1.8	10.2	5.7 to 1

a/Excludes time awaiting repair.

As shown above, between 1 and 5.7 days were spent on equipment undergoing repair for each staff-day charged to the job. This could have been caused by a variety of reasons including poor manpower scheduling, time awaiting needed spare parts identified after repair work had started, nonavailability of manpower, or simply bad data. It was not the purpose of this review to make a productivity analysis of the indicated poor performance.

We have reported 1/ in the past, that Army field maintenance units were not productively using their assigned personnel, and took too long to repair necessary equipment. For example, we reported that in a sample of Army field maintenance units, only about 17 percent of available staff-hours were charged to production jobs. Also, the Army Audit Agency in June 1975 reported that only about 29 percent of all aviation field maintenance staff-hours at Fort Hood were being charged to production jobs.

In discussing maintenance efficiency with Army officials, we were told that productivity has suffered because of demands for extra duty, non-mission-related work, and time off for personal reasons. During a sample week, one maintenance company reported that only 52 percent of its assigned personnel were present.

Clearly, the use of repair data obtained from the poor peacetime performance record described above should not be used as a guide for computing operational readiness float requirements. The computation should be based on the full-time availability of assigned labor working on a wartime basis.

Improved supply and maintenance efficiency reduces the requirements for operational readiness float equipment

To show how the application of reasonable standards of supply and maintenance efficiency would affect operational

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1/"Improving Productivity Through Better Management of Maintenance Operations in Europe" (LCD-74-401, Mar. 7, 1975) and "Productivity of Military Below-Depot Maintenance--Repairs Less Complex Than Provided at Depot--Can Be Improved" (LCD-75-422, July 29, 1975).

readiness float requirements at field maintenance units, we first computed the requirements of the three units we visited using the Army's prescribed method. We then compared these requirements with what the requirements would be if each maintenance unit were operating at the same efficiency rate as the best maintenance unit. We determined how many M-113A1 armored personnel carriers unit B would need for maintenance float if it repaired its M-113A1's at the better efficiency rate of unit A.

As shown below, the operational readiness float requirements of the three field maintenance units could be reduced by about $0.9 million (38 percent) if each unit operated at an efficiency rate equivalent to the best rate achieved for each type of equipment.

Types of equipment	Float requirements				Difference	
	At present efficiency		At best efficiency			
	Quantity	Value	Quantity	Value	Quantity	Value
		(thousands)		(thousands)		(thousands)
M-113A1 armored personnel carrier:						
Unit A	1	$ 34.7	1	$ 34.7	-	$ -
Unit B	2	69.4	1	34.7	1	34.7
M-88 tank recovery vehicle:						
Unit A	2	338.8	1	169.4	1	169.4
Unit B	1	169.4	1	169.4	-	-
UH-1H helicopter:						
Unit A	2	689.6	1	344.8	1	344.8
Unit B	2	689.6	1	344.8	1	344.8
Unit C	1	344.8	1	344.8	-	-
Total	11	$2,336.3	7	$1,442.6	4	$893.7

REQUIREMENTS COMPUTATION SYSTEM SHOULD CONSIDER WHETHER THE INVESTMENT IN OPERATIONAL READINESS FLOAT SIGNIFICANTLY INCREASES OPERATIONAL READINESS

The primary purpose of operational readiness float is to maintain the equipment readiness of operating units. It follows, therefore, that a decision to invest funds in float equipment which produces only a marginal increase in the readiness of operating units should be carefully weighed to be sure that the benefits are worth the investment.

We found that the Army's system for computing operational readiness float requirements does not consider the potential impact such float equipment could have on its combat readiness. As a result, the Army may be computing requirements and procuring equipment to meet marginal needs when the funds could be directed towards higher priority requirements.

Illustration of limited impact on operational readiness

To illustrate the impact of operational readiness float on equipment readiness, we reviewed the equipment readiness rates of some selected equipment possessed by combat units at Fort Hood for a typical 3-month period. By analyzing the equipment maintenance records of their supporting field maintenance units, we were able to compare their readiness positions both with and without operational readiness float as follows.

	Number of equipment days available (note a)	Without use of float		With full use of float		Pe-cent increase in operational readiness by full use of float
		Days operational	Percent operational	Days operational (note b)	Percent operational	
M-113A1 armored personnel carrier:						
2d Armored Division	28,980	27,028	93	27,151	94	1
1st Cavalry Division	26,009	22,652	87	22,798	88	1
M-88 tank recovery vehicle:						
2d Armored Division	2,484	2,016	81	2,092	84	3
1st Cavalry Division	2,318	1,553	67	1,596	69	2
UH-1H helicopter:						
2d Armored Division	1,196	900	75	996	83	8
1st Cavalry Division	1,472	1,098	75	1,231	84	9
6th Air Cavalry Combat Brigade	4,262	3,084	72	3,273	77	5

a/Number of days available is computed by multiplying the number of vehicles on hand by the number of days in the quarter. For example, the 2d Armored Division had 315 M-113A1s on hand during the quarter and the quarter had 92 days. The number of days available was therefore 28,960 (315 x 92).

b/In calculating the number of operational days by using float, we used Army criteria. For example, if a vehicle was undergoing field maintenance for 8 or more days, we counted all such maintenance days as being eligible for the use of float. For helicopters, we used 18 or more days as being eligible for float.

As can be seen, maximum use of operational readiness float would only increase the combat units' readiness rates for armored personnel carriers and tank recovery vehicles by 1 to 3 percent. On the other hand, operational readiness float would improve the readiness position of helicopters by 5 to 9 percent.

The cost, however, of using operational readiness float as a tool for improving or maintaining equipment readiness is high. In the examples above, 11 major pieces of equipment valued at about $2.3 million would be required, including 3 armored personnel carriers ($0.1 million), 3 tank recovery vehicles ($0.5 million), and 5 UH-1H helicopters ($1.7 million).

We believe that, in addition to considering the essentiality and maintenance requirements of an item before establishing an operational readiness float pool, consideration should also be given to whether the item will improve combat readiness. In the case of armored personnel carriers, for example, the answer may be that a 1 percent increase in operational readiness may not be worth the investment. The funds used to meet the worldwide operational readiness requirement for these vehicles ($1.7 million) may be better spent filling shortages of other equipment. As for the helicopters,it may be that funds for the worldwide operational readiness float requirements ($91.4 million) could more effectively be invested in spare engines and other components.

AVOIDING PROCUREMENTS AND REDISTRIBUTING EXISTING ASSETS BY RECOMPUTING OPERATIONAL READINESS FLOAT REQUIREMENTS

As discussed on pages 11 to 13, a change in operational readiness float requirements can affect future procurements and allow existing maintenance float equipment to be redistributed.

To indicate the potential for avoiding unnecessary procurements, we selected some items at the U.S. Army Tank and Automotive Command for which planned procurements would, by 1979, satisfy the Army's total requirements, and we then reduced the total requirements and the procurement quantities by the amount of operational readiness float for combat units. We estimated that the Army is planning to buy about $21.6 million of tank-and automotive-type equipment to satisfy its operational readiness float requirements for combat units.

Included are 24 M-88 tank recovery vehicles valued at about $4.1 million. These vehicles' requirements were inflated to the extent that supply and maintenance inefficiencies developed which did little to improve combat readiness at the units we tested at Fort Hood.

Also, using the methods described in chapter 2, we estimated that some of about $15.3 million in existing tank- and automotive-type operational readiness float equipment could be redistributed.

While we believe that there are valid needs for operational readiness float, we believe that some planned procurements could be avoided or reprogramed. Some existing assets could be redistributed to meet other needs by calculating float requirements on the basis of achievable supply and maintenance performance, and by carefully weighing the impact that float can have on combat readiness.

CONCLUSIONS

Operational readiness float is an expensive, but sometimes unavoidable, way of supplementing field supply and maintenance capability to sustain combat readiness. Funds should be invested in float equipment very carefully. In our opinion, the Army's system for computing requirements by considering only historical peacetime performance uses maintenance float as a substitute instead of a supplement to good supply and maintenance practices. Furthermore, the Army's system does not consider whether float equipment would sufficiently affect equipment readiness to make the investment worthwhile. Because of these weaknesses, we believe that the Army may be unnecessarily investing funds in operational readiness float equipment instead of redistributing some existing equipment to meet more urgent needs.

RECOMMENDATIONS

We recommend that the Secretary of Defense direct the Army to revise its system for computing operational readiness float by determining whether

--the maintenance unit and its associated supply system are operating at a reasonable level of efficiency,

--the introduction of float end-items would greatly affect the readiness of the combat units to be supported, and

--less costly alternatives, such as increased spare parts, would achieve the objectives of operational readiness float.

Provisions should also be made to periodically revalidate float requirements and collect the necessary data to do so.

We also recommend that all planned procurements be reviewed to determine whether that portion which would satisfy the Army's currently stated operational readiness float requirements should be deferred pending such time as a revised system for computing requirements is implemented.

AGENCY COMMENTS AND OUR EVALUATION

The Army agreed to revise its system of computing operational readiness float requirements to (1) prevent the use of float as a substitute for efficient maintenance and supply practices, (2) make sure that float is a cost-effective way of insuring the required degree of operational readiness, and (3) see if the objectives of operational readiness float would be less expensive with more spare parts. The Army also stated that new procedures are being developed to periodically update operational readiness float requirements.

The Army disagreed with our recommendation that all planned procurements be reviewed for possible deferment pending implementation of a revised system for computing operational readiness float requirements. The Army pointed out that because of worldwide equipment shortages and long lead times, it would be unwise to reduce currently planned procurements. The Army said that it would rather scrutinize the distribution of assets from planned procurements to insure that the use of each of these for operational readiness float is justified. Future procurements will be adjusted upon implementing the revised system for computing operational readiness float requirements.

In our opinion, the Army's actions are responsive to our recommendations and will help to establish realistic operational readiness float requirements.

CHAPTER 6

SCOPE OF REVIEW

We reviewed records and held discussions with officials at the following locations:

--Department of the Army Headquarters;

--Headquarters, U.S. Army Materiel Development and Readiness Command, Alexandria, Virginia;

--U.S. Army Tank and Automotive Command, Warren, Michigan;

--U.S. Army Major Item Data Agency, Letterkenny Army Depot, Chambersburg, Pennsylvania;

--Corpus Christi Army Depot, Corpus Christi, Texas;

--Red River Army Depot, Texarkana, Texas;

--Selected Army units at Fort Hood, Texas.

APPENDIX I

ANALYSIS OF STATED REPAIR CYCLE FLOAT REQUIREMENTS

Depot maintenance--fiscal year 1976

Equipment	Stated repair cycle float requirement Quantity	Value	Fiscal year 76 Overhaul program	Average number overhaul per month	Average Overhaul cycle time (note a)	Estimated number in overhaul cycle	Over or Under (-) stated repair cycle float requirements Quantity	Value
		(millions)			(months)			(millions)
Carrier, cargo-tracked	20	$ 0.640	37	3	5.3	16	4	$0.128
Carrier, command post	65	2.315	85	7	6.0	42	23	0.819
Carrier, full tracked, M-114	67	2.843	-	-	-	-	67	2.843
Carrier, 81MM mortar	11	.412	48	4	4.8	19	-8	-.300
Carrier, 107MM mortar	17	0.689	23	2	4.8	10	7	0.284
Carrier, personnel, M-113A1	184	6.381	468	39	5.3	206	-22	-.763
Vehicle, armored reconnais-sance air-borne	99	31.012	206	17	6.5	111	-12	-3.759
Vehicle combat engineer	7	2.111	1	-	-	-	7	2.111
Vehicle, recovery	43	7.284	177	15	6.1	91	-48	-8.131
Tank combat M60A1	240	63.480	414	35	5.8	203	37	9.787
Crane, wheeled, M-446	24	0.900	8	1	7.4	7	17	0.637
Crane, wheeled, 20T	21	2.383	10	1	8.5	8	13	1.475
Grader, 12 WNTED	79	1.779	17	1	6.0	6	73	1.644
Tract[illegible], full tracked	149	4.904	-	-	-	-	149	4.904
Tract[illegible], wheeled diesel	64	3.566	76	6	7.1	43	21	1.170
Loader, scoop	95	2.015	48	4	7.4	29	66	1.400
Truck, ambulance,								
Scraper, euclid	32	0.525	15	1	4.3	4	28	.459
Crane, shovel M-22	66	4.139	-	-	-	-	66	4.139
Crane, shovel 22BM	22	0.751	-	-	-	-	22	0.751
1/4-ton, M-792	18	0.251	-	-	-	-	18	0.251
Truck, instrument, repair shop	7	0.083	-	-	-	-	7	0.083
Truck, van expansible, 5 ton	32	0.861	19	2	2.8	6	26	0.699
Truck, wrecker, 5 ton	112	3,116	95	8	4.5	36	76	2.115
	1474	142.440	1747	-	-	-	-	-
Total excesses							727	35.699
Total shortages							-90	-12.953
Net excesses							637	22.746

a/In computing average overhaul cycle time, we used overall historical averages of the overhaul time. To this, we added 0.5 months for transit time to the depot and 2 months for time awaiting overhaul.

APPENDIX II

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310

4 JAN 1977

Mr. Fred J. Shafer
Director, Logistics and Communications
Division
US General Accounting Office
Washington, D. C. 20548

Dear Mr. Shafer:

This is in reply to your letter of 10 September 1976 to Secretary Donald Rumsfeld regarding Army's computation of Maintenance Float Requirements, Code 947216 (OSD Case # 4452).

The inclosed statement providing the Department of Defense position, reflects agreement with the audit findings; however, we do not agree with the recommended procedures for reviewing planned procurements.

Sincerely,

Edwin Greiner
Acting Assistant Secretary of the Army
(Installations and Logistics)

APPENDIX II

DEPARTMENT OF THE ARMY

RESPONSE TO GAO RECOMMENDATIONS

"Improvements needed in computing the Requirements for Spare Equipment at Army Maintenance Activities to Maintain Operational Readiness"

(OSD Case #4452)

The GAO recommends that the Secretary of Defense require the Army to:

Recommendation: Discontinue the practice of computing maintenance float support for noncombat units except where it is determined that such support is essential to the units' missions. Planned procurements should be reduced to reflect the resulting reduced total requirements and maintenance float assets currently on hand for noncombat units should be redistributed to fill higher priority needs (p. 16).

Response: Concur. While it has been Army general policy (AR 750-1, "Army Materiel Maintenance Concepts and Policies") to use operational readiness float to support tactical unit requirements, this policy has been liberally applied to include CONUS training and support activities. The bulk of maintenance float requirements for "noncombat" units, i.e., nonreadiness reporting units are generated here. The Army will review the need for maintenance float support for each such activity and either validate or eliminate the requirement. Some of these activities such as schools and training activities may require float equipment because of the cost impact of equipment non-availability on school courses and training schedules. Resulting changes in maintenance float requirements will be reflected in total Army requirements which procurement planning addresses. Similarly, items on-hand in these activities as maintenance float for which a requirement is not recognized, will be reported to the parent Major Army Command or wholesale item manager for redistribution.

Recommendation: Revise the current system for computing repair cycle float requirements by establishing needs based on planned overhauls for combat units in a wartime environment, realistic performance standards, and improved maintenance concepts (p. 25).

Response: Concur that more precise methods are needed to predict and compute repair cycle float requirements. The extent to which planned overhauls for combat units in a wartime environment are addressed by these methods will be governed by Department of Defense Planning and Programming Guidance documents. The Army completed a study in June 1976 to determine mission essential and maintenance pipeline requirements necessary to ensure the availability of aircraft with minimum impact on operational readiness. The study reduced repair cycle float requirements by an average of 30% per aircraft system. In September 1976, a study of policies, practices and methods for predicting and managing repair cycle float was initiated. This study will include the development of improved mathematical methods for predicting repair cycle float requirements and operational readiness float requirements for commodities other than aircraft. Expected completion date for this study is Mid-1977. The Army is currently testing a system to monitor and ensure update of the repair cycle float requirement annually using depot maintenance production and other data maintained by the Depot Systems Command. This system is intended to keep planning closer to reality by presenting the repair cycle float requirement based on current production performance for management review and action. These actions should result in the development of valid repair cycle float requirements.

Recommendation: Determine what portion of the total repair cycle float requirements will be filled for peacetime recognizing that other needs will be competing for the same funds (p. 25).

Response: Concur that all needs for funds must be considered in determining what repair cycle float requirements will be filled. These determinations are made through the Army annual planning, programming and budgeting process. For example, the Army Research Development and Acquisition Committee (RDAC) reviews and approves all requirements for RCF as well as all other major and secondary item procurement requirements. The system being tested to update the repair cycle float requirement annually based on current production performance will assist in this process. The repair cycle float requirement will be reviewed taking into consideration assets, priorities, changing maintenance concepts, depot maintenance requirements and projected needs.

Recommendation: Revise its procurement plans to reflect any changed requirements for repair cycle float (p. 25).

APPENDIX II

Response: Concur. Changes in repair cycle float requirements resulting from on-going studies will be reflected in future computations of the Army's equipment authorized acquisition objective (AAO) which is the basis for procurements. However, it should be noted that repair cycle float requirements represents an extremely small portion of the AAO computation and may have only a negligible impact on planned procurements.

Recommendation: Revise its system for computing operational readiness float. The system should consider whether:

-- The maintenance unit and its associated supply system are operating at a reasonable level of efficiency;

-- The introduction of float end items would significantly affect the readiness of the combat units to be supported;

-- Less costly alternatives such as increased spare parts and components will not achieve the objectives of operational readiness float (p. 37).

Response: Concur. The development of improved mathematical methods for predicting operational readiness float requirements is being addressed as part of the study effort described in response to the recommendation for the revision of the system for computing repair cycle float requirements. The current system for computing operational readiness float requirements provides for the consideration by commodity commands of less costly alternatives such as increased spares and components in making the initial determination to provide operational readiness float support for an item. It also provides for the determination that such support is the most cost-effective means of ensuring the required degree of materiel readiness as part of this decision. The system is being revised to provide for similar determinations by Major Army Commands prior to establishing, or authorizing an increase in the stockage of operational readiness float at command installations and maintenance activities. This revision will also provide for the application at Major Army Command level of performance standards to preclude the use of operational readiness float as a substitute for efficient maintenance and supply practices.

Recommendation: Provision should also be made to periodically revalidate float requirements and collect the necessary data to do so (p. 37).

Concur.

Response: /Army policy is to review, validate and recompute ORF factors at two year intervals (Para 7-5, AR 750-1); however, this policy has been followed only for some commodities. The Army revalidated its float requirements for aircraft in June 1976. The improved methods for predicting float requirements to be developed by the study effort to be completed in May 1977 will be used as the basis for revalidation of float requirements for other commodities. The Army Materiel Readiness Reporting and Sample Data Collection systems are the means envisioned for collecting equipment performance and workforce performance data for use in determining the need for and accomplishing periodic revalidations of operational readiness float requirements. In addition, the Army Maintenance Management Center is engaged in a project to determine if standardized reports can be developed and applied to allow periodic adjustment of operational readiness float requirements both by Major Army Commands and wholesale item managers. This project is planned to be completed in December 1976. Uniform Major Command reporting procedures resulting from this project will be implemented expeditiously.

Recommendation: We also recommend that all planned procurements be reviewed to determine whether that portion which would satisfy the Army's currently stated operational readiness float requirements should be deferred pending such time as a revised system for computing requirements is implemented (p. 37).

Response: Nonconcur. The Army's procurement program is computed against the gross authorized acquisition objective (AAO) requirement for each item of equipment and not against specific segments of the AAO, i.e., operational readiness float (ORF) requirements. Although the validity of factors used in computing currently stated ORF requirements is questionable, the ORF requirement represents only a small portion of the gross AAO requirement. The on-going maintenance float study will improve the validity of future ORF factors used in the computation of AAO's. Due to the world wide equipment shortage and extremely long production lead times, it is considered imprudent to curtail planned procurements. As an interim measure, pending implementation of a revised system for computing operational readiness float requirements, the Army will closely scrutinize the distribution of assets delivered from planned procurements to ensure that the issue of any such assets for use as operational readiness float is justified.

APPENDIX III

PRINCIPAL OFFICIALS RESPONSIBLE FOR ADMINISTERING ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF DEFENSE		
SECRETARY OF DEFENSE:		
Dr. Harold Brown	Jan. 1977	Present
Donald H. Rumsfeld	Nov. 1975	Jan. 1977
James R. Schlesinger	July 1973	Nov. 1975
William P. Clements (acting)	May 1973	July 1973
Elliot L. Richardson	Jan. 1973	May 1973
Melvin R. Laird	Jan. 1969	Jan. 1973
DEPUTY SECRETARY OF DEFENSE:		
Charles W. Duncan, Jr.	Jan. 1977	Present
William P. Clements	Jan. 1973	Jan. 1977
Kenneth Rush	Feb. 1972	Jan. 1973
Vacant	Jan. 1972	Feb. 1972
David Packard	Jan. 1969	Dec. 1971
DEPARTMENT OF THE ARMY		
SECRETARY OF THE ARMY:		
Clifford L. Alexander, Jr.	Jan. 1977	Present
Martin R. Hoffman	Aug. 1975	Jan. 1977
Howard H. Callaway	May 1973	July 1975
Robert F. Froehlke	July 1971	May 1973