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STUDY OF ARMY MAINTENANCE FLOAT POLICIES AND MANAGEMENT PRACTICES

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US ARMY
DARCOM

U.S. ARMY INVENTORY RESEARCH OFFICE

September 1977

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FINAL REPORT

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SEPTEMBER 1977

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During the past few years, considerable attention has been focused on Army policies and procedures for determining maintenance float requirements and management of float assets. A study team consisting of representatives from the Inventory Research Office (IRO), the Army Materiel Systems Analysis Agency (AMSAA), the Maintenance Management Center (MMC), and the Depot Systems Command (DESCOM) under the sponsorship of the Army Materiel Development & Readiness Command (DARCOM) developed new management concepts and computational methods →

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Abstract continued.

designed to improve the current policies governing maintenance float.

The study methodology included: (a) two sets of questionnaires, one sent to the DARCOM major support commands and project managers and the other sent to DARCOM field maintenance technicians; (b) model development to calculate repair cycle float (RCF) and operational readiness float (ORF) requirements; (c) a review of existing policies and regulations; and (d) the identification of potential data sources which can be used to perform float calculations and verification. The study findings resulted in 14 recommendations relating to the computation of maintenance float distribution and program requirements and the evaluation of float levels against an objective criterion.

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ACKNOWLEDGEMENT

As project sponsor, Dan Taber, DARCOM, contributed the guidance and direction needed during the conduct of the study. He was also instrumental in the development and distribution of the questionnaires. Eileen Farrell (SDC) transmitted the initial data used in demonstrating the models, guided us in its use, and later processed additional data at MMC on alternative weapon systems. Conrad Weiser, DESCOM, responded to questions in the area of depot workloading and management of RCF along with the use of depot standards. Sally Frazza, IRO, performed the data processing work required to demonstrate the models. Bernard Rosenman, IRO, was active during the early developmental phases of the study and coordinated the individual tasking within the study group.

A special acknowledgement is given to the DARCOM major subordinate commands, project managers, and DARCOM field maintenance technicians for their replies to the questionnaires.

STUDY OF ARMY MAINTENANCE FLOAT POLICIES
AND MANAGEMENT PRACTICES
(DARCOM IRO PROJECT NO. 251)

I. SUMMARY.

1.1 BACKGROUND.

1.1.1 During the past few years, considerable attention has been focused on Army policies and procedures for determining maintenance float requirements and management of float assets.

1.1.2 Several investigations and studies have been conducted to determine adequacy of Army maintenance float policy and effectiveness of management procedures and to recommend improvements. In the period between July 1974 and September 1975 the Army Audit Agency (AAA) conducted audits of maintenance float policy and management procedures at Headquarters, Department of the Army (HQ DA), U.S. Army Materiel Development and Readiness Command (DARCOM), U.S. Army Communications and Electronics Materiel Readiness Command (CERCOM), U.S. Army Depot Systems Command (DESCOM), U.S. Army Missile Materiel Readiness Command (MIRCOM), U.S. Army Tank-Automotive Materiel Readiness Command (TARCOM), and units under the control of U.S. Army Forces Command (FORSCOM), U.S. Army Training and Doctrine Command (TRADOC), and U.S. Army, Europe (USAREUR). The AAA Report, NE 76-214, dated 26 March 1976 and titled, "Maintenance Float and Direct Exchange," mainly cited problems and inadequacies within the existing policy for selecting equipment and units supported with float and procedures for establishing and evaluating quantities of equipment required for float.

1.1.3 As a result of the initial AAA findings, HQ DARCOM, on 28 July 1975, tasked the U.S. Army Maintenance Management Center (AMMC) to evaluate the role of maintenance float in contributing to operational readiness and to ascertain the cost impact of maintenance float. The AMMC study was directed mainly towards methods for determining float requirements, management of float assets within the depot and wholesale supply system, and management of float at FORSCOM and TRADOC installations. The AMMC study report, "A Study to Determine the Cost Impact of Maintenance Float," dated

April 1976. provided useful recommendations for improving management and utility of float equipment and so reducing the quantity and cost of ownership of identifiable float stock.

1.1.4 The General Accounting Office (GAO) also performed a study of Army maintenance float. Its report, dated 5 April 1977, was titled. "Better Management of Spare Equipment Will Improve Maintenance Productivity and Save the Army Millions." In general, the GAO reiterated many of the findings of the AAA and AMMC studies and considered the responses by HQ DARCOM and DA to the AAA audit. It concluded that elimination of operational readiness float (ORF) for noncombat units and improvements in computational methods for repair cycle float (RCF) would save the Army many millions of dollars. The report also recognized that this ongoing DARCOM study was directed towards improving computational methods and correcting some of the GAO findings.

1.1.5 In January 1976, the Logistics Evaluation Agency (LEA) of DCSLOG was directed to conduct a study, "Review of Operational Float Concept." Their final report, dated June 1977, addressed itself essentially to needed management improvements of ORF in areas cited by AAA and GAO.

1.1.6 This study was initiated in September 1976 to evaluate and recommend improvements to current policies, management guidance, and methods used to compute RCF requirements. It was to be a complimentary study to the one being performed by LEA on ORF. The scope of the study was later expanded to include those aspects of ORF not addressed by LEA, particularly computational methods and field management of ORF assets. During the performance of this study, participants studiously avoided duplication of efforts that went into performance of those studies mentioned above. However, the findings, recommendations, and methodologies were evaluated for compatibility or modification in light of findings of this study. In addition, participants contributed knowledge gained during other projects such as the Depot Maintenance Mobilization Plan Study in professing alternative management attitudes about float and new computational methods.

1.2 STUDY OBJECTIVES.

The study objectives as established by DA ODCSLOG were:

a. Determine the adequacy of current policies, management guidance, practices, and methods used in computing ORF/RCF.

b. Identify any portion of ORF/RCF policy or guidance which is in need of change.

c. Identify and justify changes which should be incorporated in DA ORF/RCF policy and other guidance.

d. Develop data as necessary to justify methods to compute ORF/RCF requirements and/or justify any proposed changes in computation.

1.3 SUMMARY OF ANALYSIS.

A team was formed with representatives from the Inventory Research Office (IRO), the Army Materiel Systems Analysis Agency (AMSAA), the Maintenance Management Center (MMC), and the Depot System Command (DESCOM). IRO served as the lead agency and was responsible for overall coordination, and was specifically responsible for computation techniques. AMSAA was responsible for ORF/RCF policy and its relationship to the DARCOM Depot Mobilization Plan; MMC was responsible for management and data for ORF at the retail level; and DESCOM was responsible for the workloading and management of RCF at the depot and also the evaluations of depot standards.

The primary methods used by the study team were:

a. Two sets of questionnaires--one sent to the DARCOM major support commands and project managers dealing with policies for determining and verifying maintenance float requirements, and the other dealing with float management practices in the field sent to DARCOM field maintenance technicians.

b. Review of existing policy and procedures, regulations, and agency visits.

c. Model development to calculate RCF and ORF requirements.

d. Identification of potential data sources which can be used to perform float calculations and verifications.

1.4 RECOMMENDATIONS.

The following is a set of recommendations based on the research done by the study team and findings of preceding studies cited in the appendix. With each recommendation is a reference to the paragraph in the study where the support for the recommendation is discussed.

In order to improve the effective use and management of maintenance float, it is recommended that:

a. ORF items should be those items that are "reportable for unit readiness reporting purposes in accordance with AR 220-1." (Paragraph 3.2.5)

b. ORF program quantity *(wartime) should be provided* for deploying combat units (Active Army and Reserve Components) and should be based on their Modification Table of Organization and Equipment (MTOE) "Required" quantities. (Paragraph 3.5.1)

c. The ORF program requirements should be calculated as the average pipeline using wartime data as described in Paragraph 3.5.2. (Paragraph 3.5.3)

d. ORF should be distributed in peacetime to Continental United States (CONUS) installations and to support maintenance units overseas to insure that the units which they support have sufficient assets to carry out their peacetime training mission and to deploy in time to meet mobilization or other contingency requirements. As far as deployment and training readiness are concerned, it is the overall availability (troop unit plus the float pool) which matters. (Paragraphs 3.2.1 and 3.2.6)

e. For each CONUS installation, the model in Appendix F should be used to calculate ORF distribution required to achieve the target availability levels of the supported units which are authorized float support. (Paragraph 3.4.3)

f. Oversea commands should continue to be authorized their full wartime ORF requirement and that the distribution of ORF among the units within the command is left to the discretion of the major command. However, the CONUS distribution model will be made available for OCONUS use and its use encouraged.

g. ORF distribution should be based upon recent performance of the supply and maintenance system as reflected in the failure and downtime data which will be collected per Appendix E utilizing the materiel readiness reports (DA Form 2406). (Paragraph 3.2.4)

h. To insure maximum accessibility of float, the General Supply Unit (GSU) should be the primary holder of float (Appendix F.3).

i. General Support Forces and Reserve Component Units should be authorized ORF support only on an exception basis, with DA approval. (Paragraphs 3.2.2 3.2.3, and 3.2.4)

j. The float management's report cited in Appendix G should be used to track float effectiveness. (Paragraph 3.4.2)

k. The criteria used for issuing ORF to the using unit should be based on local conditions and administrative convenience and should include issue when equipments are in Direct Support (DS), General Support (GS), or organizational repair. (Paragraphs 3.2.6 and 3.2.7)

l. Repair cycle float should be defined as an additional quantity of selected end items/major components of equipment approved for stockage in the wholesale supply system to replace like items of equipment withdrawn from using activities for any authorized depot maintenance. (Paragraph 4.2.2)

m. The RCF program requirements should be computed as part of the DARCOM Depot Maintenance Mobilization Plan, and in so doing the interaction between combat consumption and RCF should be considered. (Paragraph 4.4)

n. The RCF distribution requirement should be produced by the Total Army Equipment Distribution Plan (TAEDP) by counting the assets in the depot pipeline in the not-ready-for-issue account, as is presently done, and by replacing the RCF claimant

requirement by a quantity equal to the forecasted return rate times the order ship time. (Paragraphs 4.2.4 and 4.3)

II. INTRODUCTION

2.1 DIRECTION.

2.1.1 This study was initiated as the result of a letter from the Deputy Chief of Staff for Logistics (DCSLOG), dated 7 September 1976, subject: Repair Cycle Float (RCF). The letter stated in part:

> "There is a need to revalidate the Repair Cycle Float policies of the Department of the Army.
>
> To satisfy this need, it is requested that a study be undertaken to be titled, 'Department of the Army RCF Policy, Management Guidance, Practices, Procedures, and Methods Used to Establish Repair Cycle Float Requirements'."

2.1.2 Investigations were conducted within HQ DARCOM to define the scope and magnitude of the subject and identify those DARCOM activities most capable of contributing to its success. A proposed study plan was drafted and forwarded to DCSLOG for approval on 9 November 1976. The DARCOM Inventory Research Office was selected as the lead activity and was directed to proceed by DRCPA-S letter, dated 16 November 1976. Other participating DARCOM activities were: AMMC; DESCOM; and AMSAA.

2.1.3 The DCSLOG letter, dated 30 December 1976, subject: "Repair Cycle Float Study," directed expansion of the scope of the study. It stated in part:

> "Because maintenance float is the total number of spare major components and end items required to sustain military operations at a desired level while repair or overhaul is performed, it is the combined effect of ORF and RCF which relates to operational readiness. . . . Consequently, all float assets, both ORF and RCF, and their individual and collective impacts on availability or serviceable items to the user should be studied.

> Request the DARCOM study plan be modified to include methods for establishing ORF requirements and management of ORF, as well as for RCF. Care should be exercised to avoid duplication of efforts already expended by the LEA during their study, referenced 1b above."

2.1.4 As the result of this added requirement, the IRO prepared and submitted on 3 February 1977 a completely revised study plan.

NOTE: Complete documents are contained in Appendix B.

2.2 PROBLEM. Conduct a study of policy, practices, procedures, and methods for determining ORF and RCF requirements and advocate necessary changes for improving the efficiency and effectiveness of maintenance float by the Army.

2.3 SCOPE OF STUDY. Perform an indepth analysis of current and proposed Army policies, management practices, and computational methods for ORF and RCF in order to define problem areas ranging from establishment of requirements to management at the user level. Develop and propose new or modified policies, procedures, and computational methods for achieving the greatest economy for ownership of float assets commensurate with preservation of the required peacetime and mobilization operational readiness of the Army. Develop, modify, or identify existing models which can be applied to determine operational readiness and repair cycle float requirements and validate the selected model(s).

2.4 METHODS.

2.4.1 Use of a team effort composed of personnel with diverse skills and representing organizations within DARCOM having interests and responsibilities for varied aspects of float policy and management.

2.4.2 Identification and review of all existing DOD Directives, Army Regulations (AR's), and DA and DARCOM Pamphlets and Circulars bearing on policy and procedures for maintenance float.

2.4.3 Review of all past studies for findings and methods used during the investigation and analysis of findings.

2.4.4 Identification and evaluation of existing analytical models for application or possible modification for use as new computational methods for optimizing float requirements. Develop new models as appropriate.

2.4.5 Use of two sets of questionnaires. One was sent to DARCOM major subordinate commands and project managers dealing with policies for determining and verifying float requirements. The other was sent to DARCOM field maintenance technicians and covered float management practices in the field.

2.4.6 Determination of data sources which can be used to perform float calculations and verification.

III. OPERATIONAL READINESS FLOAT (ORF)

3.1 CURRENT POLICIES.

3.1.1 Purpose of ORF Paragraph 7-1b of AR 750-1 (1972) states that: "Operational readiness floats are established and maintained at CONUS installations and support maintenance units overseas to extend the capability of these activities and units to respond to the materiel readiness requirements of supported activities. This is accomplished by providing supported activities with serviceable replacements from ORF assets when mission essential items of equipment of these activities cannot be repaired within prescribed time limits (Table 7-1)."

3.1.2 Establishment and Use of ORF. Normally, ORF assets are located at the installation level in CONUS (including those authorized TOE DS units located on the installation) and at DS units to replace unserviceable, economically reparable items which have a replacement issue priority of IPD 1 through 8 and which cannot be repaired by support maintenance within the following time limits (AR 750-1, par. 7-9):

Priority	Overseas	CONUS
IPD 1-3	12 Calendar Days	8 Calendar Days
IPD 4-8	15 Calendar Days	12 Calendar Days

The decision to issue ORF assets is normally made by the support unit commander; however, the results of the field questionnaire and visits made by members of the study team indicated that the commander of the supported unit plays a strong role in the decision, and that the exchange is normally negotiated.

The proposed revision to AR 750-1 deleted the time limits and delegated the responsibility for establishment of these exchange policies to the major commanders. It did not, however, provide a basis upon which to calculate ORF requirements. The revision states that ORF assets are provided "when like items of equipment of supported activities cannot be repaired/modified in time to meet operational requirements."

3.1.3 Items to be Supported by ORF. AR 750-1 states that the number of line items to be provided float support should be held to a minimum and that alternatives such as the use of direct exchange of modules, standby equipment authorizations, and shifting of support maintenance capabilities to the organizational maintenance level should be considered (par. 7-2).

Paragraph 7-3 of AR 750-1 states that:

"7-3. Maintenance float eligibility criteria. a. Items selected for operational readiness float support must be:

"(1) Mission essential.

"(2) Maintenance significant.

"(3) Authorized maintenance support, on a repair and return to user basis, by maintenance activities below depot level, and above the organizational maintenance level."

Paragraph 7-3d states that end items which are primarily repaired by the replacement of their component end items will be provided ORF support, when warranted, on a component end item basis.

3.1.4 Detemination of ORF Requirements.

Paragraph 7-4 of AR 750-1 states that:

"a. Quantitative requirements for operational readiness float will be determined by:

"(1) Use of appropriate analytical or simulation models; or

"(2) Applying approved ORF factors to TOE/TDA distribution requirements for end items and component end items as reflected in program documents and/or the DA Major Item Distribution Plan. See AR 700-120.

"b. Initial requirements for operational readiness float for a system which is to be provided as component end items will be determined using an allocation model such as the Techniques for Determining Optimal Operational Readiness Float model available from the U.S. Army Materiel Command Maintenance Support Center, Letterkenny Army Depot, Chambersburg, PA 17201.

"c. An operational readiness float requirement will not be computed for aircraft in TDA units."

In paragraph 7-4e it is stated that:

"Program/budget maintenance float (ORF and RCF) requirements will be computed as indicated in current 'PEMA Policy and Guidance for Preparation of Part I of the AMP'."*

3.1.5 Maintenance Float Factors.

Section 7-5b, AR 750-1, required that ORF factors be computed on a line-item basis by national level materiel managers. Separate factors are required for each of several major commands or geographic areas.

Paragraphs 7-5e requires that the factors be reviewed at 2-year intervals, and recomputed when actual experience data indicates that the values used in computing the factors are invalid. Paragraph 7-17 presents the somewhat confusing requirement for an annual review of float levels.

Appendix L presents two methods for computing ORF factors. The first uses the formula

$$\text{ORF factor} = \frac{(\text{OR})\ (\text{MTTR})}{\text{MTBF} + \text{MTTR}}$$

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*NOTE: This document has been superseded by the "Procurement Planning and Policy Guidance," dated 1 December 1975.

where

a. MTBF is the average time between failures which require float issue.

b. MTTR is the average time required to repair items at the support level. It includes transportation time and time awaiting repair as well as shop or bench time.

c. OR is an operational readiness rate specified in program documents or materiel readiness regulations.

The second method presented is a nomograph (Figure L-1) which gives an ORF factor as a function of MTBF, MTTR for those actions requiring a float transaction, and the number of items being supported. The nomograph is designed to yield a float factor which provides 80-percent float availability.

The regulation is very confusing as to when each of the two methods is to be used.

It should be noted that the draft revision to AR 750-1, dated April 1977 deletes the annual review and the nomograph. Instead of the mandatory 2-year review cycle, it requires that the factors be reviewed when the availability rates for the equipment, worldwide or specific major command, as reflected in DA level materiel readiness reports for three consecutive reporting periods show a deviation of 5 percent or more from the DA standard.

3.1.6 Data Sources for Updating ORF Factors.

Paragraph 7-5f specifies that data for updating ORF factors will come from:

a. The maintenance management system.

b. Sample data collection.

c. Maintenance float transaction and usage reports (on DA Form 2407).

d. Information provided by field commands to justify recommended changes in float allowances.

However, no specific procedure is prescribed for data collection and analysis.

3.1.7 Units for Which ORF is Provided.

Authorizations of ORF for the program (wartime) force is contained in the "Procurement Planning and Policy Guidance," and for the distribution (peacetime) force in AR 700-120.

The "Procurement Planning and Policy Guidance" specifies that ORF is to be calculated for the units included in the approved program force, at their "Required" MTOE/TDA levels.

AR 700-120 states that the ORF distribution requirement is to be based on the MTOE/TDA "Authorized" quantities for CONUS Active Army units and the "Required" quantity for overseas units. Reserve Component units are not authorized ORF until mobilized. ORF for aircraft and related items are authorized at the "Required" levels for all commands, Active and Reserve (par. 2-5). ORF is issued to maintenance support units and activities under the same priority as that assigned to supported units for initial issue of items.

3.2 PROBLEMS WITH CURRENT POLICIES. The studies by the General Accounting Office and Army Audit Agency surfaced several problems with the current ORF policies. The study by USALEA addressed most of those problems. During the course of this independent study, it was felt that some of the problems had been adequately addressed by LEA. In several other areas, however, this study takes a different view.

3.2.1 Distribution Requirement vs. Program Requirement.

Although the current version of AR 750-1 mentions both a program (wartime) and distribution (peacetime) requirement for ORF, the emphasis is clearly on the peacetime. This emphasis has led some to assume that a reduction in the distribution of ORF would save vast sums of money, since those assets would not need to be procured. This is not true, since the AAO is composed, in part, of the ORF program requirement, not the distribution requirement. Thus, a reduction in the distribution requirement has no effect on procurement levels.

ORF is distributed in peacetime to CONUS installations and to support maintenance units overseas to insure that the units which they support have sufficient assets to carry out their peacetime training mission and to deploy in time to meet mobilization or other contingency requirements.

Given that the AAO has been filled, the decision to distribute assets as ORF is really a choice between keeping the assets in storage or putting them in the hands of the troops. Items which are distributed and not used will deteriorate faster than if kept in climate-controlled storage. Also, the concern has been expressed that items which are distributed may be used excessively for training which is only marginally effective, and the equipment may be worn out when it is required for war.

If assets are in short supply, the distribution of too much float to some of the higher priority units may degrade the readiness balance of the overall force.

A further problem arises in the distribution of ORF to CONUS installations. The units which they support in peacetime will be deployed elsewhere in wartime, and the ORF will have to be redistributed at a time when the demands upon the transportation and management control systems will be heaviest.

The policies which govern the distribution of ORF in peacetime must reflect these different conditions, and should vary with the type of unit, its location, and its deployment priority.

The calculation methodology for the ORF factor and the data sources for updating are also based on peacetime maintenance rates and turnaround times. DA Form 2407 and sample data collections are cited as the primary source for updating the factors, with no mention given to the need for using the data as a starting point for producing wartime predictions.

The USALEA study states erroneously, it is felt, that the ORF factors contained in SB 710-1-1 are wartime factors, and that the Army has not updated the ORF factors since 1971 because there is little need to do so every 2 years if the "following procedure for determining wartime (sic) ORF factors for new items in paragraph 7-2 or AR 750-1 is followed:".* AR 750-1, however, is clearly oriented toward producing peacetime factors.

It should be noted that a wartime ORF factor would likely be higher than the current factor and that the Army has probably been buying too little ORF.

The proposed revision to AR 750-1 states much more clearly the difference between the program and distribution requirements. It too, however, specifies only one factor, a wartime factor. This factor, when applied to the peacetime force levels, will probably overstate the distribution requirement. This is likely to be much less serious than the understatement of the program requirement.

3.2.2 ORF for General Support Forces.

The LEA report recommends that General Support Forces be authorized ORF support only on an exception basis, with DA approval. They point out that in peacetime, these units (primarily in the CONUS training base) can often obtain assets from an allocated TOE unit without degrading the readiness condition of the loaning unit.

It should be noted that the wartime requirement for these units depends heavily upon the scenario. A short war which requires a "go with what you have" approach would lessen their need for float; whereas, a longer war would place a heavier burden on the training base and increase their float requirement. In that case, however, the training requirement may build up late enough so that the production base may be able to provide the needed equipment.

The exception basis for authorization thus seems quite reasonable.

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*USALEA report, p. 5-1.

3.2.3 ORF Requirements for Reserve Components.

The LEA finding that the program requirement for Reserve Component units is valid, but that the distribution be done on an exception basis (essentially the current AR 750-1 policy) is adequately supported. Their recommendation to revise AR 11-11 to resolve the discrepancy as to the distribution question naturally follows from their study results.

3.2.4 Use of Supply and Maintenance Performance Standards for ORF Distribution.

The LEA implication that supply and maintenance standards be used for float computation is felt to be not valid.

This study proposes to base the ORF distribution instead upon the recent performance of the supply and maintenance systems as reflected in the failure and downtime data which will be collected (see Appendix E). In the first place, as discussed in Section 3.2.1, the distribution of ORF affects mainly the split between the items kept in storage versus those distributed to the field units. Secondly, many of the factors which affect supply and maintenance performance are beyond the control of the units (e.g., personnel strengths, budgets, NICP performance, etc.).

The purpose of the ORF distribution is to maintain deployment and training readiness, not to be used as a club to effect other management improvements. If the supply and maintenance management systems work properly, then the data upon which the distributions are based will reflect this. If the systems are not working properly, it would be shortsighted to "penalize" units by withholding float. To do this is to ultimately penalize the readiness of the force.

3.2.5 ORF Item Selection Criteria.

Since the purpose of ORF is to maintain the materiel readiness of the force, the items selected for ORF support should be consistent with the materiel readiness reporting requirements. In revising AR 220-1, "Unit Readiness Reporting," DA has recognized that an item which is "mission essential" for one unit may not be for another. Accordingly, a change in the method of designating equipment to be reported for readiness status has been initiated by DA. This change will annotate every line item number (LIN) in each TOE with one of the following codes by January 1978:

Code	Readiness Identification
A	Primary Weapons and Equipment
B	Auxiliary Equipment
C	Administrative Support Equipment

Primary Weapons and Equipment (PWE) is defined as a major item of equipment essential to and employed directly in the accomplishment of the unit's primary operational mission. It is these items which will be reported in the unit readiness reports.

Until that annotation is complete, the revised AR 220-1 requires reporting on all RICC-1 items.

The current criterion of "mission essential" should, therefore, be replaced with: "reportable for unit readiness reporting purposes in accordance with AR 220-1."

3.2.6 Turnaround Time Limits for Issuing ORF.

AR 750-1 establishes criteria for issuing float, based on the forecast of the time required to repair the item at support maintenance. The proposed revision deleted these time limits and delegated the responsibility for establishment of the exchange policies to the major commands. It did not, however, provide a basis upon which to calculate the ORF requirements.

These time limits are really an administrative tool which keeps the number of float exchanges to a manageable level. In peacetime, the criterion should vary depending upon local conditions. For example, if a troop unit is about to begin a field training exercise, the time limit should be low so that float assets required for the exercise can be drawn. Conversely, at times when assets are not required for training or deployment, there is little need to make the exchange. Issuing float based on administrative convenience is consistent with the replies received from the questionnaire.

The effect of reducing the time limit is to shift availability from the float pool to the using unit. As far as deployment and training readiness is concerned, it is the overall availability (troop unit plus the float pool) which matters. Discussions with DA DCSOPS personnel revealed that the readiness of the float is not reported in unit readiness reports. This is the apparent cause of some of the problems of float abuse and cannibalization cited in the LEA report and in the field questionnaire (see Appendix D).

In wartime, units are likely to require ORF whenever an item is likely to be down for an extended period. Discussions with U.S. Army Logistics Center personnel involved in maintenance restructuring studies indicated that the trend is toward doing as much maintenance in the forward areas as is practical. This trend makes much less clear the difference between "organizational" and "support" maintenance.

3.2.7 Support vs. Organizational Maintenance.

As noted in Section 3.1.1, the purpose of ORF according to AR 750-1 is, in effect, to retain the materiel readiness of the force. Given the vagueness, though nonetheless the importance of readiness, it seems prudent to place few restrictions on the use of float equipments. Yet, current policy allows float draw only when an equipment failure requires support maintenance. Limiting float draw to these cases implicitly assumes that TOE quantities have a built-in safety factor to protect against amounts in organizational maintenance. This, however, is prohibited by AR 310-34.

Especially in the light of ongoing maintenance restructuring studies, which are obscuring the difference between support and organizational maintenance, the use of ORF to compensate for equipment in organizational maintenance is as much a need as to compensate for support maintenance.

If float items were not permitted to be exchanged for items in organizational maintenance, then more float would be required to meet the unit's readiness goals. This seemingly paradoxical conclusion follows because a given float item is able to be used more frequently, and hence more effectively, if it is used to cover organizational as well as support maintenance. For example, if a unit's item is in organizational repair, and the unit needs that item then not allowing the unit to exchange for an available float item arbitrarily penalizes the readiness position, and wastes an available float item. On the other hand, if there were no float items available for exchange, then as far as readiness is concerned, it does not matter in any practical way if float is permitted to cover organizational repair or not. Consequently, for a given amount of float stock, unit readiness is improved by allowing the items to cover both organization and support maintenance. That there will be more demands for float if organizational repair is covered, only means that the given amount of float will be used more effectively to maintain readiness. It does not mean that more float will be required. It is important to note that in paragraph 3.2.6, it is recommended that the criteria for drawing float is left up to the commander and should be based on administrative convenience.

It, therefore, appears that the restriction that float may not be issued to cover organizational maintenance downtimes should be removed. The change in the float management procedure required to effect this change should not be too drastic.

If the troop unit needs a float item to replace an item which is down for organizational maintenance, a loan can be effected. Alternatively, a delayed exchange can be effected with the unserviceable item being sent to the float pool after it is repaired.

3.3 PROPOSED ORF POLICIES.

The remainder of this chapter presents the proposed policies for determining ORF distribution (peacetime) and program (wartime) requirements, and methods for calculating them.

3.4 ORF DISTRIBUTION REQUIREMENT.

3.4.1 Purpose of ORF in Peacetime.

ORF is distributed in peacetime to CONUS installations and to support maintenance units overseas. The objective is to insure that the units which they support have sufficient assets to carry out their peacetime training mission and to deploy in time to meet mobilization or other contingency requirements. These requirements will vary with the type of unit and its location. The policies which govern the distribution of ORF in peacetime must reflect these different conditions.

3.4.2 Overseas Commands.

These units will be the first to engage in combat in the event of war. Because of this, their readiness and training requirements are high. The current policy allocates to them their full wartime requirement (the wartime ORF factor times the "Required" MTOE quantities). Distribution of ORF among the units within the command is left to the discretion of the major command. The distribution regulation, AR 700-120 (par. 2-17a) states that the overseas command need not requisition the full requirement if demand experience or the lack of adequate storage facilities makes it desirable. These policies appear reasonable, so long as the commander has an adequate management control system to insure that ORF which is distributed to the units is being properly utilized.

It is proposed, therefore, that for the Major Item Distribution Plan (MIDP), overseas commands continue to be authorized their full wartime requirement. To assist the overseas commands in making their troop unit allocations, the model which is proposed for CONUS units (discussed in a subsequent section of this chapter and Appendix F) should be provided to them. Also, it is proposed that the float management report which is discussed in Appendix G be used to track float effectiveness.

3.4.3 CONUS Based Active Army Units.

These units must also maintain a high state of readiness in order to be ready to deploy in time to meet the requirements of approved contingency plans. This deployment requirement also imposes a training requirement which is fairly constant.

The deployment (and hence the training) priority of these units may vary, however, and this should be reflected in their ORF authorizations.

The proposed revision to AR 220-1 provides varying equipment availability targets, depending upon the unit's Authorized Level of Organization (ALO). For ALO 1 units, the target is an average availability rate for all reportable items of 90 percent. In addition, AR 220-1 identifies certain "pacing items" by TOE series. Pacing items are defined as: "Major weapons systems and selected command and control equipment of such importance that they are subject to continuous monitoring and management at all levels of command. These items pace Army readiness as a whole" (par. A-2m). The pacing items for an ALO 1 unit are required to meet the DA availability standard specified in Table 1, AR 750-52 or Appendix A, AR 95-33 (for aircraft).

The following table summarizes the requirements for the different ALO's.

	AR 220-1 TARGETS	
AUTHORIZED LEVEL OF ORGANIZATION	AVERAGE AVAILABILITY OF ALL REPORTABLE ITEMS	PACING ITEM AVAILABILITY
ALO 1	90%	DA STD
ALO 1	80%	DA STD–5%
ALO 3	70%	DA STD–10%

For each CONUS installation, it is proposed to apply the model described in Appendix F. The model calculates the peacetime ORF level which is required to achieve the target availability levels of the supported units which are authorized float support (see Section 3.2.2).

For a given item, the model is applied as follows:

Step 1: For each unit at a given installation, the "Authorized" quantity and the unit's ALO is obtained from the Structure and Composition System (SACS).

Step 2: The overall availability requirement for the item at the installation is calculated as follows:

$$A_R = \sum_{i=1}^{M} N_i A_i \ / \sum_{i=1}^{M} N_i$$

where A_R = availability requirement at the installation level

M = number of units authorized the item

A_i = availability target for the item, depending upon the ALO of unit i

N_i = "Authorized" quantity of the item for unit i

Step 3: The failure rates and maintenance turnaround times for the item at the given installation is then obtained in accordance with Appendix E.

Step 4: The model described in Appendix F is then applied to determine the ORF requirement for the installation.

Step 5: The ORF requirements for each installation is then rolled up by major command (FORSCOM/TRADOC).

3.4.4 Reserve Component Units.

As noted in Section 3.2.3, it is proposed that ORF be authorized to Reserve Component units only on an exception basis. For those units which are authorized ORF, the method of Section 3.4.3 is proposed.

3.5 ORF PROGRAM REQUIREMENTS.

3.5.1 Purpose of ORF in Wartime.

ORF for wartime is provided to sustain the capability of combat units by providing replacement assets for those items which require maintenance and which cannot be repaired and returned to the unit in time to meet operational requirements. Since the program requirement is intended to support the wartime force, it must reflect anticipated equipment and logistics system performance under full-scale wartime conditions. based on approved scenarios.

ORF should be provided for all deploying combat units (Active Army and Reserve Components) and should be based on their MTOE "Required" quantities.

3.5.2 Inputs Required for Calculating Wartime ORF Factors.

Basically, the type of estimates required to calculate wartime ORF are the same as those for peacetime (i.e., maintenance frequencies and turnaround times).

The estimates must reflect anticipated wartime conditions, though.

A. Wartime Maintenance Frequency.

The frequency with which items require maintenance must be based upon anticipated combat end-item utilization rates (e.g., miles/month/vehicle) and should include those maintenance actions resulting from normal wear and tear and from nonlethal combat damage. These estimates are not yet available. However, two studies have been done, one by AMSAA (on the AH-1 helicopter) and one by the Ordinance Center and School (the CODAM Study on the M60 tank) to predict combat damage.

A pilot program is currently being initiated by DA DCSLOG to combine the results of nonlethal battle damage with combat operation wear and tear of equipment to estimate repair parts and maintenance requirements for combat-essential equipment. This will be a follow-on effort to the CODAM and AMSAA AN-1 studies. Initial results of the pilot project for the M-113, AH-1S, and AN/TSQ-73 will not be available until the third quarter of FY 78. A limited number of other combat-essential equipment will be addressed in follow-on studies. When data becomes available from this program, it should be applied to determine wartime ORF. Until such data is available, other data such as engineering estimates, WARPAC FM's data from test projects such as BART, and the wartime/peacetime failure factors which are being developed by DARCOM in support of the TLR/S effort should be used.

B. Maintenance Turnaround Times.

These turnaround times depend upon the in-theatre transportation system, parts availability, and maintenance system capacities.

(1) Transportation Times.

The study team has been unable to find a source for definitive estimates of these times. The only estimates which were found were provided by the USAOC&S to the U.S. Army Logistics Center, and were for M60 tank engines, based on a force in the SCORES MEII scenario.

	TRANS.	TIMES	(HRS)
	MIN	PROB	MAX
User to organization maintenance	2	3	7
Org. maint. to DSU (forward)	7	15	31
DSU (forward) to DSU (rear)	10	12	24
DSU (rear) to GSU	12	24	48

The estimates of transportation times depend upon the item to be moved, the deployment, and the availability of transportation resources. The most likely source of such information would be a theatre-level war game, such as that done at the Concepts Analysis Agency. Their current models, however, do not calculate transportation times.

(2) Availability of Repair Parts.

Standards do exist in AR 710-2 which provide a basis for estimating the average waiting time for parts. That regulation specifies target demand accommodation rates (percent of items stocked) and demand satisfaction rates (percent of demand for stocked items which can be satisfied immediately, from stock on hand). These standards could be used as follows:

Let d = demand accommodation rate

s = demand satisfaction rate for a stocked item

r = reorder cycle time for a stocked item

t = time required to obtain a nonstocked item

The average wait for parts is

W = [Expected wait for stocked items] X [Prob demand is for a stocked item]

\+ [Expected wait for nonstocked items] X [Prob demand is for a nonstocked item]

The expected wait for a stocked item is simply the

[Expected wait given the item is out of stock]

x [Prob item is out of stock]

Now the expected wait given the item is out of stock is one half of the expected stockout period or $(1-s)r/2$; and the probability the item is out of stock is simply $1-s$.

The overall average wait is thus

$$W = (d)\,(1-s)^2\,\left(\frac{r}{2}\right) + (1-d)t$$

For example, assume

that nonstocked items must be requisitioned from CONUS and that the UMMIPS time standard (DODD 4500.32R) for IPG 1 applies. Then $t = 12$ days

that the reorder cycle, $r = 30$ days

that $d = .8$

that $s = .75$

Then the average wait would be

$$W = (.8)\,(.25)^2(30 \text{ days}/2) + (.2)\,(12 \text{ days}) = 3.15 \text{ days}$$

A possible extension of this approach would be to calculate the proportion of the repair parts in prepositioned war reserves versus that in CONUS, apply an in-theatre requisition time to the former, and the UMMIPS time to the latter.

(3) Maintenance Times.

Estimates of the wartime maintenance times depend upon the availability of maintenance units and their capacities given that they are actually deployed.

If the planned maintenance units cannot be deployed due to strategic lift constraints or *the shortage of* other required assets, more float must be bought to account for the additional waiting time. This would impact most heavily upon early deploying units. One approach would be to use the actual deployment schedule, and include waiting time based upon that schedule. This would be extremely cumbersome, however. The impact of assuming that the maintenance units are deployed as required would be minimized by the fact that the ORF quantity which is calculated for the total force would be available for use by the early deploying units until the maintenance system can catch up. This latter approach is recommended.

Given that the maintenance units exist, their capacities in terms of the projected wartime repair times must be estimated. Currently, no generally accepted estimates exist. Until the DCSLOG pilot project (previously cited) is completed, interim estimates such as those in the WARPAC FM's must be used.

(4) Waiting Times at Maintenance Facilities.

The time which an item spends waiting in a queue at the maintenance facility depends upon the capacity of the facility relative to the damands which are placed upon it.

The current method for sizing maintenance organizations is not based upon a waiting time limit. The MACRIT process merely sizes the maintenance organization to provide enough direct labor man-hours to match the anticipated workload in terms of the man-hour requirement.

The most reasonable option at this time is to use peacetime data and accept the float requirement as a lower bound.

3.5.3 Method of Calculation.

Given the current paucity of input data, it is recommended that the ORF program requirement be calculated as the average pipeline quantity. That is:

$$\text{ORF Program Quantity} = \begin{array}{c}\text{Failure Rate}\\ \text{(Per Deployed Item)}\end{array} \times \begin{array}{c}\text{Average Turnaround}\\ \text{Time}\end{array} \times \begin{array}{c}\text{Wartime Initial}\\ \text{Issue Quantity}\end{array}$$

A further reason for adopting this approach is that the AAO (wartime) is relatively insensitive to the ORF component. For many of the major firepower items, the combat consumption requirement greatly overshadows the ORF, and the estimate of combat consumption is greatly dependent upon assumptions concerning deployment schedules, enemy threat, and tactics.

The precision to be gained by using more sophisticated models for ORF just would not be worth the extra effort. Later, as better forecasts become available, it may be worth using more precise models.

IV. REPAIR CYCLE FLOAT (RCF).

4.1 CURRENT POLICIES.

4.1.4 Purpose of RCF.

Paragraph 7-1c of AR 750-1 states the purpose of RCF as follows: "The repair cycle float is established to permit withdrawal of equipment from using organizations of commands for scheduled cyclic depot maintenance and for the repair at depot maintenance facilities of crash-damaged aircraft without detracting from the materiel readiness of the organization or command. The RCF is used to extend the economic service life of Army materiel by providing for its timely depot maintenance on a cyclic basis. Quantities of RCF assets as authorized by ODCSLOG, DA are maintained within the supply system to provide exchange assets to using organizations or commands for equipment entering DA-scheduled depot maintenance programs and for those crash-damaged aircraft evacuated to depot maintenance facilities for corrective maintenance."

4.1.2 Establishment and Use of RCF.

The establishment and use of RCF is controlled by HQ DA and is governed by the requirements of funded end item depot overhaul program (AR 759-1, par. 7-6f). Accountability for RCF is maintained by the NICP and control over allocation is the responsibility of the depot overhaul program manager (AR 750-1, par. 7-10b).

4.1.3 Items to be Supported by RCF.

Paragraph 7-3b, AR 750-1 states that: "Items selected for repair cycle float support must be:

"(1) Mission essential.

"(2) Authorized for withdrawal from using units/commands for overhaul in depot maintenance facilities after scheduled periods of use (calendar time) or operation (hours, miles, or rounds fired)."

4.1.4 Determination of RCF Requirements.

Paragraphs 7-4d and e of AR 750-1 states that:

"d. Quantitative requirements for repair cycle float (RCF) will be determined by:

"(1) Use of appropriate analytical or simulation model; or

"(2) Applying approved RCF factors to that increment of the population of items authorized RCF support forecasted for or included in approved depot maintenance (overhaul) programs.

"e. Program/budget maintenance float (ORF and RCF) requirements will be computed as indicated in current 'PEMA Policy and Guidance for Preparation of Part I of the AMP'."

AR 700-120 states that the RCF distribution requirement is based on the density of equipment authorized in the MTOE's and TDA's of the units being supported and is utilized to cover equipment awaiting overhaul, in the overhaul process, and in transit to and from depot overhaul (par. 2-9).

The "Procurement Planning and Policy Guidance" states that the RCF program requirement is obtained by multiplying the RCF factor from the SSN file times the MTOE "Required" quantities of the program force (par. 3.2.1b).

4.1.5 RCF Factors.

Paragraph 7-5d of AR 750-1 requires that RCF factors be computed on a line item basis by national level materiel managers for all end items selected for RCF support. Separate factors are required for: (1) USAREUR, (2) USARPAC, and (3) other areas.

Appendix L gives the following formula for computing the RCF factor:

RCF = OCT/TBO, where

OCT is the overhaul cycle time and TBO is the time between overhauls. Basically, the formula provides an RCF quantity equal to the average unserviceable pipeline.

The overhaul cycle time is the time required to evacuate items scheduled for cyclic overhaul from using commands to depot maintenance facilities and to accomplish the scheduled overhaul. Paragraph L-5 specifies that for new items the OCT should include the standard transportation time from the using command to the depot, the estimated time required to perform the overhaul, and a waiting time equal to twice the time required to perform the overhaul. For items deployed 2 years or more, paragraph L-8 specifies that the OCT should be determined from depot maintenance performance reports.

Paragraph L-5 requires that estimates of the time between overhaul (TBO) for new items be derived from acquisition and maintenance support planning documents. For items deployed 2 years or more, the TBO is to be determined from the reported mileage, usage, or acquisition data, or from data of items actually overhauled (par. L-8).

For aircraft, the same basic procedure is used, except that the RCF factor includes the element of crash damage.

In February 1976, DARCOM implemented a program for updating RCF factors based on data in the DESCOM files. TBO data is taken from the unserviceable generation factor (UGF) file. The UGF is a 3-year moving average of actual returns per fielded end item density.

The OCT includes a pipeline time of ½-month for CONUS, 2½ months for Europe, and 4 months for the Pacific. (This will be used until better pipeline data can be collected from the Continuing Balance System). The "repair cycle time" (shop time to overhaul the item) is taken from DESCOM's Master File for Maintenance (MFM). The time awaiting overhaul is set at twice the repair cycle time.

4.2 PROBLEMS WITH CURRENT POLICIES.

4.2.1 *Distribution Requirement vs. Program Requirement.*

Much of the discussion of this problem in the chapter dealing with ORF applies to RCF as well. The current RCF factors are based on peacetime. A further problem which exists for RCF is that the composition of the CONUS depots' workloads may be drastically different in wartime than in peacetime. Thus, there may be an RCF requirement in the AAO when there are no plans for depot maintenance of that item during wartime. Conversely, there may be no RCF peacetime requirement even though there are plans for wartime depot maintenance.

4.2.2 Restriction of RCF to Overhaul.

Current policies restrict RCF to a level sufficient to support funded overhaul programs (AR 750-1, par. 7-5h). However, depot level maintenance operations are not restricted to cyclic (which is a term which, loosely taken, encompasses the new Reliability-Centered Maintenance Concepts) overhaul. Table 1-2, AR 750-1 indicates that the depots perform other types of maintenance, too. Since the purpose of RCF in peacetime is to maintain force readiness, it must be provided to cover all authorized maintenance operations which require evacuation of items from the field units to the CONUS depots. Therefore, it is recommended that repair cycle float be defined as an additional quantity of selected end items/major components of equipment approved for stockage in the wholesale supply system to replace like items of equipment withdrawn from using activities for depot maintenance.

4.2.3 Forecasting of Equipment Return Rates.

The GAO report (Chapter 4) points out that the current method of forecasting unserviceable equipment returns to the depots, which uses a 3-year moving average, may not be responsive to changes in maintenance concepts and other factors affecting future depot maintenance requirements.

A previous IRO study* determined from the data which was then available, that the moving average, density related, forecast performed better than other statistical forecasting techniques. It is obvious, however, that policy changes may invalidate any purely statistical forecast and that the system should reflect such changes and selectively adjust the forecasts.

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*W. Karl Kruse, "Comparison of Asset Return Forecasting Techniques," IRO Report No. 212, Dec 74.

4.2.4 Relationship of Peacetime RCF to the Funded Depot Maintenance Program.

Among the distribution requirements for field units included in the Category II MIDP are those quantities required for: (1) filling shortages to the units' authorizations; (2) replacement of normal attrition; and (3) replacement of those items which are evacuated to the CONUS depots for maintenance (RCF).

Although these separate requirements are calculated, no separate accounting is done for three separate pools of equipment. The CONUS depots' assets are merely classified as "ready for issue" (RFI) and as "not ready for issue" (NRFI). The RFI quantity is increased by receipts from procurement and by the output of the depot maintenance process. It is decreased by the actual distribution of the items.

In practice, assets are distributed by filling requisitions on the basis of the priorities established by AR 11-12. A unit which returns an unserviceable asset for depot maintenance transfers accountability for the item to the NICP. As far as the unit is concerned the item is lost, just as if the asset were lost through attrition. When the unserviceable asset has been repaired, it is placed in an RFI status and becomes available to fill the highest priority requisition. Thus, the unit with the highest priority will receive an asset first, irrespective of the cause for its requisition (to fill a shortage to its authorization, to replace an asset which was consumed, or to replace an asset which was returned for depot maintenance).

If a high priority unit requisitions an asset to replace one which was returned for depot maintenance, its requisition will be filled even if the RFI pool includes no items which have come from depot maintenance. If assets are available, the unit's effective order ship time is that which is required to fill its requisition.

Currently, the MIDP RCF procedures doubly account for the RCF requirement by both adding an RCF requirement for each claimant to be filled with ready-for-issue stock, and also by generating the assets in the depot maintenance pipeline which appear in the not-ready-for-issue account. The MIDP is scheduled to be replaced by the Total Army Equipment Distribution Plan (TAEDP), in June 1978. The double accounting has been corrected in the TAEDP by removing the assets in the depot pipeline from the not-ready-for-issue account. However, our proposed method requires that the TAEDP retain the depot pipeline amounts in the not-ready-for-issue account, and replace the RCF claimant requirement by the computation as discussed 4.5. This method is easily able to handle fluctuations in the depot maintenance pipeline due to changing return quantities. Moreover, it also more closely simulates reality by recognizing that the output of depot maintenance can be used to fill any distribution requirement.

4.3 PROPOSED METHOD FOR COMPUTING THE RCF DISTRIBUTION REQUIREMENT.

Based on the discussion in Section 4.2.4, it is recommended that the RCF distribution requirement be calculated similar to that for attrition losses, as found in AR 700-120, par. 7-2. Under that procedure, the overseas commands are authorized an "operating level" (specified by AR 11-11) and a pipeline quantity ("in-use" density times the consumption (loss) rate times an order ship time). The total quantity is limited to 150 days of supply.

The main difference for RCF is that there should be no "operating level" quantity. The term "operating level," as used in AR 700-120, really corresponds to a safety level in supply management terminology. Since returns for depot maintenance are more predictable than attrition losses, and are somewhat *controllable*, there is little need for such a safety level.

The RCF distribution requirement should be calculated as follows:

RCF = (RR) (OST)

when RR = the forecasted return rate (using either a historical average unserviceable generation factor times the in-use density or an adjusted forecast, as required.)

OST = The same order ship time as used for the attrition requirement.

The OST would be limited to 150 days minus the AR 11-11 operating level.

4.4 PROPOSED POLICIES FOR THE RCF PROGRAM REQUIREMENT.

4.4.1 Relationship Between RCF and the Depot Maintenance Mobilization Plan.

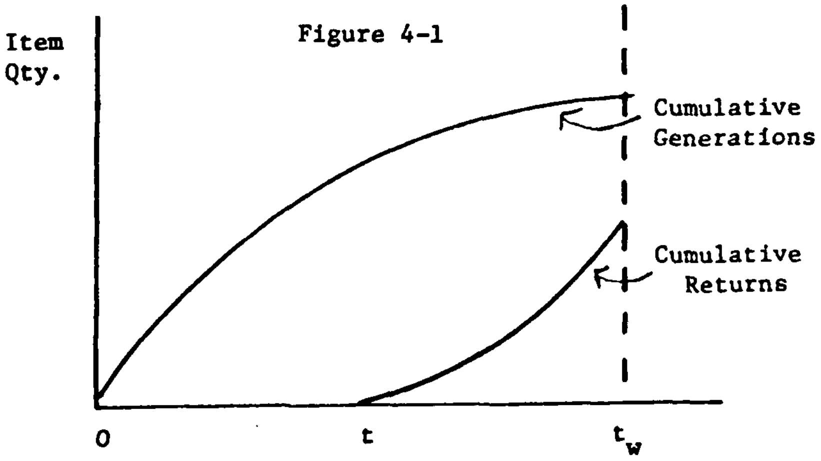
The program (wartime) requirement for RCF depends upon the decisions which are made regarding the planned depot maintenance mobilization workload. It must be consistent with the forecasts of items to be returned from the combat theatre and upon the projection of the depots' capabilities to restore items to serviceability. It also depends upon the ability of the transportation system to move assets from and to the theatre.

Conversely, decisions concerning the sizing of the depot complex to meet the wartime workload depend upon the cost of the float which would be required to support a given allocation of the depot maintenance capacity.

The determination of the RCF program requirement must, therefore, be done as part of an integrated planning system, that is the DARCOM Depot Maintenance Mobilization Plan. This plan is required to be developed biennially, each even calendar year. The discussion which follows shows how the determination of the RCF requirement can be integrated with that plan.

Figure 4-1 shows the cumulative generations of unserviceables and the cumulative returns from the depots over the duration of a wartime scenario (t_W), from the perspective of the combat theatre. A graph such as this would be constructed for each item (major or secondary) which is included in the Depot Maintenance Mobilization Plan (DMMP).

Figure 4-1



The cumulative generations curve is the basic input to the DMMP and depends upon the deployment schedules, intensity of equipment usage, and the rate at which items become unserviceable (e.g., quantity/mile/end item deployed).

The slope of the cumulative returns curve depends upon the output rate of the depot over time, which is based upon the portion of the depot capacity which is allocated to the repair of the item. It should be noted that the cumulative return curve reflects only the depots' output of these items which were evacuated during the war.

The initial time lag, t, depends upon the transportation times, the time required by the depot to reduce the backlog of M-day unserviceables, and the depot turnaround time for the item.

The monthly RCF requirement is computed from the difference between these two curves, and the maximum being the overall RCF requirement.

It should be noted that this is basically the same method which is used to calculate the combat consumption quantity for the AAO. Losses are accumulated over the duration of the war, and the maximum quantity is taken (see Figure 4-2 graph). Unlike the proposed RCF, there are no offsetting returns to use; therefore, the maximum occurs at the end of the war.

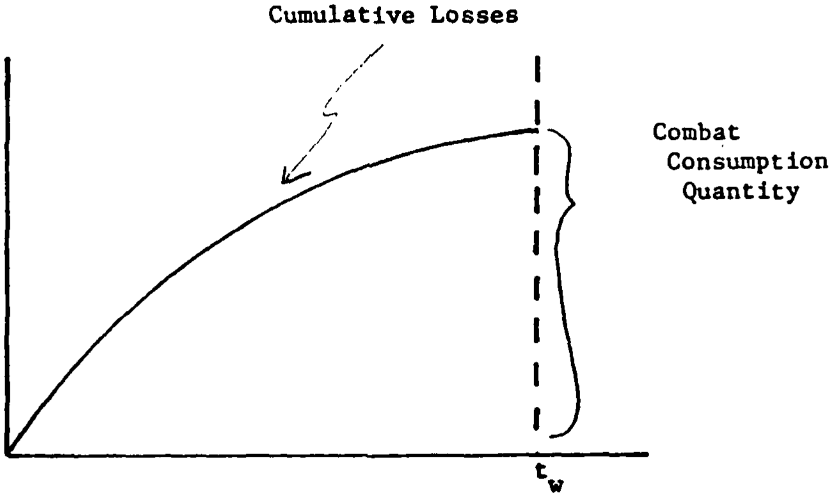


Figure 4-2

Example number 1 in Appendix H illustrates the application of the proposed method to a hypothetical item.

4.4.2 Interactions Between the Combat Consumption and Repair Cycle Float Requirements.

For items which have a combat consumption requirement, a quantity of equipment is included in the AAO to replace combat losses during the war. As previously mentioned, the method used is basically the same as that which is being proposed for RCF. It should be noted that the requirement for replacing losses occurs over time, however. Therefore, if we have bought the total AAO, assets which were bought for combat consumption may be available to serve as repair cycle float. Conversely, if the maximum repair cycle float requirement occurs early in the war (as in the example), the depots' output will be available to replace combat losses later. It is quite possible, therefore that separate calculations of combat consumption and RCF may overstate the total requirement.

Example number 2 of Appendix H illustrates how the joint requirement determination can be done.

4.4.3 Updating in Odd Calendar Years.

Since the DMMP is required to be routinely updated each even calendar year, there will be years when the RCF computation must be based on a DMMP which is based on a different deployment schedule. One method of updating the RCF requirement would be to:

(1) Recompute the generations using the ratios of generations to density from the DMMP times the new deployed densities.

(2) Use the transportation and depot repair times and the maximum induction rates from the DMMP.

(3) Update the forecast of the D-Day unserviceables.

(4) Recalculate the cumulative generations and depot output based on the above.

(5) Combine the output of (4) with the updated cumulative combat consumption quantity and determine the joint requirement.

APPENDIX A

REFERENCES

1. Letters, DRCMM-M, dated 9 Nov 76 and 22 Dec 76, subject: Repair Cycle Float Study.

2. Letter, DRCPA-S, dated 16 Nov 76, subject same as 1.

3. Letter, DRCMM-MS, dated 2 Dec 76, subject same as 1.

4. Letter, DALO-SML, dated 30 Dec 76, subject same as 1.

5. Report of Audit, "Commodity Command Functional Audit Maintenance Float and Direct Exchange U.S. Army Tank-Automotive Command, Warren, Michigan," Audit Report: NE 75-54, U.S. Army Audit Agency, 28 Apr 75.

6. "Audit of Maintenance Float and Direct Exchange," Audit Report: NE 76-214, U.S. Army Audit Agency, 26 Mar 76.

7. Report of Audit "Maintenance Float U.S. Army Electronics Command, Ft. Monmouth, NJ," Audit Report: NE 75-68, U.S. Army Audit Agency, 30 Jun 75.

8. Draft "Improvements Needed in Computing the Requirements for Spare Equipment at Army Maintenance Activities to Maintain Operational Readiness," DA (Code 9472.6) prepared by U.S. General Accounting Office, 19 Sep 76.

9. "Better Management of Spare Equipment Will Improve Maintenance Productivity and Save the Army Millions," LCO-76-442, prepared by U.S. General Accounting Office, 5 Apr 77.

10. "A Study to Determine the Cost Impact of Maintenance Floats," U.S. Army Maintenance Management Center, Lexington, KY, April 1976.

11. Draft, "Review of Operational Readiness Float Concept," U.S. Army Logistics Evaluation Agency, New Cumberland, PA, Nov 76.

12. "Review of Operational Readiness Float Concept," U.S. Army Logistics Evaluation Agency, New Cumberland, PA, Jun 77.

13. AR 1-1, Planning, Programing, and Budgeting Within the DA, 25 May 76.

14. AR 220-1, Unit Readiness Reporting, 17 March 1975.

15. AR 700-120, Materiel Distribution Management, 14 Mar 74.

16. AR 750-1, Army Materiel Maintenance, Concepts, and Policies, 1 May 72, Draft Change 1, 5 Dec 75, Draft Change

17. AR 750-37, Sample Data Collection, The Army Maintenance Management System (TAMMS), 24 Mar 71.

18. AMCP 750-6, Maintenance of Supplies and Equipment, Techniques for Determining Optimal Operational Readiness Float, Jun 71.

19. AMCP 750-7, Techniques for Determining Repair Cycle Float, Jun 71.

20. TM 38-750, The Army Maintenance Management System (TAMMS), Nov 72.

21. TM 38-750-1, The Army Maintenance Management System (TAMMS) Field Command Procedures, Nov 72.

22. Sherbrooke, Craig C., "An Extension of Palm's Theorem for (M G s) Queues to the Case Where Arrival and Service Rates Depend on the Number of Busy Channels," P-3406-1, The RAND Corp., Nov 66.

23. Sherbrooke, Craig C., "Metric: A Multi-Echelon Technique for Recoverable Item Control, "Memorandum RM-5078-PR, The RAND Corp., Nov 66.

24. Muckstadt, John A., "Model for Multi-Item, Multi-Echelon, Multi-Indenture Inventory Systems," Management Science, Volume 20, No. 4, Dec 73.

25. Muckstadt, John A., "Estimation of Optimal Depot Stock in Two-Echelon Inventory Systems for Recoverable Items," The RAND Corp.

26. Teletype, DALO-SML, dated 7 March 77, subject: Operational Readiness Float Study.

APPENDIX B

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR LOGISTICS
WASHINGTON, D.C. 20310

21190

30 DEC 1976

DALO-SML

SUBJECT: Repair Cycle Float Study

Commander
US Army Materiel Development
and Readiness Command
5001 Eisenhower Avenue
Alexandria, VA 22333

1. References:

a. Letter DALO-SML dated 7 September 1976, subject, Repair Cycle Float (RCF).

b. LEA Draft Report, dated November 1976, subject, Review of Operational Readiness Float (ORF) Concept.

2. Referenced letter requested DARCOM perform a study on the Repair Cycle Float (RCF) portion of Maintenance Float. Because maintenance float is the total number of spare major components and end items required to sustain military operations at a desired level while repair or overhaul is performed, it is the combined effect of ORF and RCF which relates to operational readiness. It makes little or no difference to the user whether the items are being repaired at DSU/GSU or at a depot; in either case they are not available to him. Consequently, all float assets, both ORF and RCF, and their individual and collective impacts on availability or serviceable items to the user should be studied.

3. The problems of the float manager/user at the Division and separate Brigade level are keynote to this study. Request that in conjunction with the overall maintenance float study, a survey to disclose current problems at the retail level be conducted. This should result in a philosophy of investing ORF resources only in high payoff strategies.

30 DEC 1976

DALO-SML 21190
SUBJECT: Repair Cycle Float Study

4. Request the DARCOM study plan be modified to include methods for establishing ORF requirements and management of ORF, as well as for RCF. Care should be exercised to avoid duplication of efforts already expended by the LEA during their study, referenced 1.b. above.

5. This additional requirement does not change the expected completion date of May 1977.

FOR THE DEPUTY CHIEF OF STAFF FOR LOGISTICS:

ROBERT L. SHAFFER
COL, GS
Chief, ILS and Maintenance
Engineering Division

DEPARTMENT OF THE ARMY
HEADQUARTERS US ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND
5001 EISENHOWER AVE., ALEXANDRIA, VA. 22333

43

16 NOV 1976

DRCPA-S

SUBJECT: Repair Cycle Float (RCF)

Director
Inventory Research Office, ALMC
Room 800, US Custom House
2d and Chestnut Streets
Philadelphia, PA 19106

1. Reference is made to inclosed DF, DRCMM-M, 15 November 1976, subject as above.

2. Request that your office take the lead in the subject study. Actual participation of other DARCOM activities, centers and offices on the study will be determined during the meeting referred to in paragraph 5 of the referenced DF. The study plan is also included in the referenced DF.

3. Points of contact for this effort will be Mr. Dan Taber (DRCMM-M/Autovon 284-8575) and Mr. Clair Weiss (DRCPA-S/Autovon 284-9456).

1 Incl
as

JOSEPH A. DONNAN
COL, GS
Chief, Systems Analysis Division

CF:
DRCMM-M
Cmdt, ALMC (DRXMC)
Cmdt, ALMC (DRXMC-LSO)
Dir, AMSAA (DRXSY-CL)

44

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR LOGISTICS
WASHINGTON, D.C. 20310

7 SEP 1976

DALO-SML 19090

SUBJECT: Repair Cycle Float (RCF)

Commander
US Army Materiel Development
and Readiness Command
ATTN: DRCRE
5001 Eisenhower Avenue
Alexandria, Virginia 22333

1. There is a need to revalidate the Repair Cycle Float policies of the Department of the Army.

2. To satisfy this need it is requested that a study be undertaken to be titled "Department of the Army RCF Policy, Management Guidance, Practices, Procedures and Methods Used to Establish Repair Cycle Float Requirements". The objectives of this study should be:

a. Determine the adequacy of current policies, management guidance, practices and methods used in computing RCF,

b. Identification of any portion of RCF policy or guidance which is in need of change.

c. Identification and justification of changes which should be incorporated in DA RCF policy and other guidance,

d. Development of data as necessary to justify methods used to compute RCF requirements and/or justify any proposed changes in computation.

3. It is further requested that HQDA (DALO-SML), Washington, D.C. 20310 be advised NLT 20 Sep 76 as to the activity which will conduct the study and a general study plan with milestones

Incl. 1

7 SEP 1976

DALO-SML
SUBJECT: Repair Cycle Float (RCF)

including the projected date on which results of the study can be made available to HQDA (DALO-SML). Further request that a point of contact for matters concerned with the study be designated. HQDA contact is Mr, W.H, Nichols, HQDA (DALO-SML), telephone: 675-6962.

FOR THE DEPUTY CHIEF OF STAFF FOR LOGISTICS:

ROBERT L. SHAFFER
COL, GS
Chief, ILS & Maintenance
Engineering Division

44

DRCMM-M

SUBJECT: Repair Cycle Float (RCF)

NOV 9 1976

HQ DA (DALO-SML)
WASH DC 20310

1. Reference is made to letter DALO-SML dated 7 September 1976, subject, Repair Cycle Float (RCF.) w/1st Ind DRCMM-MS dated 23 September 1976.

2. An outline study plan, with a schedule for accomplishment, has been developed based on evaluation of the scope and magnitude of subject matter that must be addressed. It is forwarded for your information.

3. Point of contact for this project in Hq DARCOM is Mr. Dan Taber, telephone, 274-8585.

FOR THE COMMANDER:

[illegible] GORDON
Acting
Associate Dir, Maintenance

1 Incl
as

R. D. DESCOTEAU
Colonel, GS
Associate Director for
Maintenance

CY FURNISHED:
DRCPA

STUDY PLAN

TITLE: U.S. Army Repair Cycle Float Policy and Procedures

REFERENCE: Letter DALO-SML dated 7 September 1976. subject, Repair Cycle Float (RCF)

PURPOSE: Review and recommend changes as appropriate to Army RCF policy, management guidance, practices, and procedures and methods used to establish and validate RCF requirements.

SPONSOR:
U.S. Army Development and Readiness Command
Directorate for Materiel Management
ATTN: DRCMM-M
5001 Eisenhower Avenue
Alexandria, VA 22333

STUDY LEAD AGENCIES/ ACTIVITIES:
U.S. Army DARCOM Inventory Research Office
U.S. Customs House
2d and Chestnut Streets
Philadelphia, PA 19106

U.S. Army Maintenance Management Center
ATTN: DRXMD-M
Lexington, KY 40507

PARTICIPATING AGENCIES/ ACTIVITIES:
U.S. Army Depot System Command
Chambersburg, PA 17201

U.S. Army Materiel Systems Analysis Activity
ATTN: DRXSY-P
Aberdeen Proving Ground, MD 21005

SCOPE: 1. Review and evaluate current policies and procedures for establishing and validating RCF requirements including DOD, DA, DARCOM, and DARCOM Commodity/Readiness Commands.

2. Review recent studies and reports on RCF for problem areas and alleged deficiencies in present policies and procedures, so as to avoid duplication of effort. (AAA Audits, GAO Draft Report, AMMC Study, etc.)

3. Identify and evaluate methods for establishing float factors and control of float assets used by other services for possible applicability to Army.

4. Review technical and operations research literature for developed methods which may be adaptable to Army use.

5. Study depot programing and scheduling process to ascertain validity of current formulas and standards.

6. Develop new formulas for establishing RCF factors, if appropriate.

SCHEDULE: 1. October 1976

a. Preliminary studies by HQ DARCOM and the Inventory Research Office to define scope of project.

b. Review AVSCOM projects to validate Maintenance Float Factors and new methods for predicting attrition rates.

2. November 1976

a. Establish Study Advisory Group (SAG) comprised of representatives from HQ DARCOM, Lead and Participating Activities.

b. Prepare and issue specific tasking instructions to all participants.

3. December 1976-March 1977 Participants conduct studies in assigned areas. Monthly progress meetings by SAG.

4. April 1977--Prepare draft report.

5. May 1977--Staff report and forward to DA.

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APPENDIX C

WHOLESALE QUESTIONNAIRE

C.1 Introduction.

A questionnaire was developed and sent out to the DARCOM major support commands and project managers in an effort to find out how Repair Cycle and Operational Readiness Float requirements are established and managed at the wholesale level.

Section C.3 summarizes the responses to this questionnaire (complete questionnaire responses are in the IRO files). Project manager responses are summarized along with the MSC responses. It should be kept in mind, however, the PM's enter the float determination process mainly when the item is in the development stage.

C.2 Sample Questionnaire and Letter of Direction.

DEPARTMENT OF THE ARMY
DRC INVENTORY RESEARCH OFFICE-ALMC
800 U. S. CUSTOM HOUSE
2ND and CHESTNUT STS., PHILADELPHIA, PA. 19106

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REPLY TO
ATTENTION OF:
DRCIRO

14 January 1977

SUBJECT: Study on Repair Cycle Floats

TO: SEE DISTRIBUTION ATTACHED

1. References:

a. AR 750-1, Army Materiel Maintenance Concepts and Policies, May 1972.

b. AMC Pamphlet 750-7, Techniques for Determining Repair Cycle Float.

2. DARCOM has been requested by the DCSLOG to conduct a comprehensive study of the Army Maintenance Float policies and procedures. To this end, a study project has been initiated with the DRC Inventory Research Office (IRO) as the lead study activity; other activities that will be involved in the project are the Army Materiel Systems Analysis Activity (AMSAA), the Depot Systems Command (DESCOM) and the Maintenance Management Center (MMC). Head of the Study Advisory Group for the study is Mr. Dan Taber of DARCOM (DRCMM-M).

3. As one of the first tasks, we want to find out how Repair Cycle and Operational Readiness Float requirements are established and managed by your organization. A questionnaire has been developed for this purpose and is inclosed. Would you please fill it out to the best of your abilities and return it by no later than 4 February 1977 to -

Director
DARCOM Inventory Research Office
Room 800 - US Custom House
Philadelphia, PA 19106

If there are any questions, please call Mr. Rosenman or Mr. [illegible]twals at the IRO (AV 348-6984).

4. It is likely that there will be a few meetings while new policies and methodologies are under development and participation by your Activity

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will in all likelihood be desired. Would you please designate someone who could serve as focal point for future contacts and give his organization symbol and phone number?

Bernard B Rosenman

Incl as

BERNARD B. ROSENMAN
Director, DRC Inventory Rsearch Office
US Army Logistics Management Center

Copies furnished:
AMSAA - Larry Smith, DRXSY-CL
MMC - Conrad Weisser, DRSDS-LL
DESCOM - John Fortune, DRXMD-MS
Ray Astor, Logistics Evaluation Agency
DRCMM-M - Dan Taber

cc: ✓DRCIRO Proj 251 File
DRCIRO Reading File
DRCPA-S
ALMC Reading File

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US Army Tank-Automotive Materiel Readiness Command
US Army Armament Command
US Army Electronics Command
US Army Missile Command
US Army Troop Support Command
US Army Aviation Systems Command
US Army Test & Evaluation Command
US Army Mobility Equipment Research & Development Command

PROJECT MANAGERS

COL Edward M. Browne, AVSCOM
COL Russell W. Parker, ARMCOM
LTC William R. Green, ECOM
BG William J. Hilsman, ECOM
COL Ronald E. Philipp, Picatinny Arsenal
COL Howard C. Whittaker, MICOM
COL Charles F. Drenz, AVSCOM
COL Fred Hissong, Jr., TARCOM
COL Arthur L. Coodall, MICOM
COL Max. B. Scheider, Ft. Belvoir, VA
COL William J. Harrison, ECOM
COL Kenneth S. Heitzke, MICOM
MAJ John W. Hocking, TARCOM
COL Charles C. Adsit, TARADCOM
COL Donald P. Whalen, MICOM
COL Robert E. Butler, TARCOM
LTC Benjamin A. Huggin, ARMCOM
COL Roy A. Cunniff, TARCOM
BG Stan R. Sheridan, TARADCOM
COL Ralph H. Sievers, Jr., Springfield, VA
MG Charles F. Means, MICOM
COL Larry H. Hunt, MICOM
COL William D. Clingempeel, ECOM
COL David E. Green, MICOM
BG Frank P. Ragano, MICOM
COL Richard D. Kenyon, AVSCOM
COL Hubert W. Lacquement, MICOM
MG Robert J. Baer, TARADCOM
COL Patrick M. Reddy, Redstone Arsenal

MAINTENANCE FLOAT QUESTIONNAIRE

(Use Separate Pages to the Extent Necessary)

1. What organization in your activity is responsible for:

   a. Determining the end items for which Maintenance Float should be authorized?

      (1) Repair Cycle Float.

      (2) Operational Readiness Float.

   b. Performing the calculations to determine Maintenance Float quantities?

      (1) RCF.

      (2) ORF.

   c. The approval of 1a and 1b for budget submission?

      (1) RCF.

      (2) ORF.

2. What criteria are used in selecting the end items and major components for which a Maintenance Float should be authorized? Not authorized?

   (1) RCF.

   (2) ORF.

3. What model(s) or formulas are used at your Activity for calculating Maintenance Float quantities? (Cite references—e.g., AR, DARCOM Pamphlet, Technical Report, etc.—where the model(s) are described.)

   (1) RCF.

   (2) ORF.

4. Do you take into account the Operational Readiness or Availability Target(s) for the end items for which Maintenance Floats are calculated?

a. If so, how are these targets expressed?

(1) RCF.

(2) ORF.

b. Where are these targets obtained (e.g., AR)?

(1) RCF.

(2) ORF.

5. Select five representative systems for which float has been authorized and tell us what percentage of the RCF and ORF was actually procured.

		RCF		ORF	
	System	Quantity Procured	% of Authorized	Quantity Procured	% of Authorized
(1)					
(2)					
(3)					
(4)					
(5)					

6. How do you estimate the following demands on the Repair Cycle Float for the RCF calculations?

a. Scheduled overhauls?

b. Failures from GSU-DSU?

c. Unscheduled overhauls?

d. In determining the above estimate, do you consider wartime or peacetime conditions?

7. How do you estimate the demands on the Operational Readiness Float?

8. How do you estimate the Depot Repair Cycle Time for the RCF calculations?

a. Do you estimate the elements of the Depot Repair Cycle Time? If so, how?

(1) Time awaiting induction into depot overhaul?

(2) Actual shop time?

(3) Time awaiting pickup (i.e., assignment either to user or transfer to RCF)?

9. How do you estimate the DSU/GSU repair time for the ORF calculations?

10. From what sources, and how, do you obtain the data needed for Questions 6, 7, 8, and 9?

11. Do you maintain a data base for the purpose of Maintenance Float calculations and updating? If yes,

a. In what form is the data base (i.e., hard copy, computer tapes)?

(1) RCF.

(2) ORF.

b. How often is the data base updated?

(1) RCF.

(2) ORF.

12. Do you have in process any study at your activity designed to improve the Maintenance Float calculations? If so, please describe the nature of the effort. (Who's doing it? What approaches are being taken, etc.?)

13. In terms of Float Management:

a. Is float stock differentiated from other stock?

(1) RCF.

(2) ORF.

b. Do end items which were exchanged for float items and subsequently, repaired or overhauled return to the float or to other stock such as war reserve or POMCUS?

(1) RCF.

(2) ORF.

c. Is any maintenance performed on Maintenance Float stock?

(1) RCF.

(2) ORF.

d. How is serviceable RCF treated at depot, e.g., preserved for storage, exercised regularly, modifications applied, etc.?

e. Are unserviceables, waiting for overhaul or repair considered part of the float quantity?

(1) RCF.

(2) ORF.

f. Is there a specific organization within your activity responsible for float management? If so who?

14. In a few words please describe what is involved in issuing an end item from the Maintenance Float including the:

a. Decision process in determining whether an issue should be made.

b. Timing of the exchange.

c. Responsible activity.

(1) RCF.

(2) ORF.

15. What suggestions could you offer to improve the policies governing the establishment and control of Maintenance Float and for improving the methods by which the Maintenance Float quantities are calculated?

C.3 SUMMARY OF RESPONSES TO THE COMMODITY COMMAND WHOLESALE QUESTIONNAIRE.

1. What organization in your activity is responsible for:

a. Determining the end items for which Maintenance Float should be authorized?

Except for AVSCOM and MIRCOM, the MSC Maintenance Directorates decide what items should have maintenance floats. At AVSCOM, float authorizations are reserved for DA decision. At MIRCOM, the authorization decisions are made jointly by the maintenance and engineering directorates and the project manager. PM's also participate in the decision-making process at the other MSC's to varying degrees.

b. Performing the calculations to determine maintenance float quantities?

RCF and ORF calculations are made mostly in the maintenance directorates. At MIRCOM, PM's may take an active part in quantitative determinations on some systems. At AVSCOM, the Systems Analysis Office has performed ORF calculations on some aircraft and their methodology has been approved by DA for general use on future aircraft ORF calculations. As a general rule, the PM's are responsible for generating the data needed for float calculations for systems in developmental stages.

c. The approval of 1a and 1b for budget submission?

Answers to this question were quite varied indicating perhaps that the question was interpreted differently by the respondents. In most instances, the maintenance directorates are involved in the approval process, along with materiel management directorates and project managers. At MIRCOM, the PM's are are responsible for the budget submission and, at AVSCOM, DA takes an active part in budget development.

2. What criteria are used in selecting the end items and major components for which a Maintenance Float should be authorized? Not authorized?

All respondents indicated that the criteria contained in AR 750-1 are applied in deciding which items should have floats. ECOM indicates that they will sometimes use the

Generalized Electronics Maintenance Model (GEMM) to determine which items need floats in order to achieve operational availability targets.

3. What model(s) or formulas are used at your activity for calculating maintenance float quantities? (Cite references—e.g., AR, DARCOM Pamphlet, Technical Report, etc.—where the model(s) are described.)

All commands indicate that they use AR 750-1 and, in some instances, AMCP 750-6 and 750-7, for float calculations. At MIRCOM, however, where Repair Cycle Floats have not been requested in the past, special studies have been undertaken for certain missile systems to determine whether RCF's should be acquired. Also at MIRCOM, a specially designed multiechelon simulation model was used to determine HAWK and IHAWK ORF requirements; and, as indicated above, ECOM has used GEMM, and AVSCOM has used a model developed by their Systems Analysis Office, for some systems.

4. Do you take into account the operational readiness or availability target(s) for the end items for which Maintenance Floats are calculated?

a. If so, how are these targets expressed?

b. Where are these targets obtained (e.g., AR)?

Responses to these questions were quite varied. For the most part, however, commands seem to be using at least implicitly the 80-percent satisfaction of demands for ORF items target given in AR 750-1. No target is used for RCF. One response mentioned use of the required operational capability document as the basis and source of its operational availability target and, in another instance, the Materiel Need document was cited as the basis for determining system overhaul frequency and, thus, the RCF requirement. Surprisingly, no response mentioned readiness or equipment availability targets given in AR 220-1 and AR 750-52.

5. Select five representative systems for which float has been authorized and tell us what percentage of the RCF and ORF was actually procured.

Three of the commands reported that they did not have the data to answer this question, although they could tell us what portion of the AAO was authorized and procured. Statistics on two of the others (ARRCOM and TARCOM) were as follows:

NO. OF SYSTEMS REPORTED	% AUTH RCF PROCURED	NO. OF SYSTEMS REPORTED	% AUTH ORF PROCURED
5	100	6	100
3	0	1	0

MIR OM is a special case because of systems like HAWK and PERSHING where different amounts of ORF are authorized for the individual major items comprising the system. They reported on 19 major items as shown below:

NO. OF MAJOR ITEMS	% FLOAT PROCURED
12	100
3	85--99
4	less than 85

MIRCOM had no RCF's authorized.

6. How do you estimate the following demands on the Repair Cycle Float for the RCF calculations?

a. Scheduled overhauls?

b. Failures from GSU-DSU?

c. Unscheduled overhauls?

d. In determining the above estimate, do you consider wartime or peacetime conditions?

7. How do you estimate the demands on the Operational Readiness Float?

8. How do you estimate the Depot Repair Cycle Time for the RCF calculations?

   a. Do you estimate the elements of the Depot Repair Cycle Time?

      (1) Time awaiting induction into depot overhaul?

      (2) Actual shop time?

      (3) Time awaiting pickup (i.e., assignment either to user or transfer to RCF)?

9. How do you estimate the DSU/GSU repair time for the ORF calculations?

10. From what sources, and how, do you obtain the data needed for Questions 6, 7, 8, and 9?

Answers to Questions 6–10 can all be summarized together.

In developmental stage, most commands that do float calculations use engineering data and data collected for the Logistics Support Analysis Record (LSAR) in their float calculations. Standard Transit, Awaiting Repair and Days in Ship Times in AR 750-1, Appendix L, are used when other data are not available. As mentioned above, AVSCOM has used regression techniques on data obtained from DA 1352 Reports (Aircraft Status and Flying Hours) to obtain estimates of maintenance frequencies and times for some aircraft and will presumably use these techniques more generally in the future.

In responding to the question of whether peacetime or wartime conditions are assumed when estimating RCF requirements, three commands responded WAR; two PEACE! (MIRCOM did not respond since they did not compute RCF's.) Obviously, here is an area where policy must be clarified.

11. Do you maintain a data base for the purpose of Maintenance Float calculations and updating? If yes:

   a. In what form is the data base (i.e., hard copy, computer tapes)?

b. How often is the data base updated?

Most commands have data bases at least partially automated that contain data needed for float calculations when systems are in the developmental stage. With the exception of AVSCOM, however, which used an automated DA 1352 file, none of the commands has any data from which RCF and ORF determinations could be reviewed after the equipment has been deployed. There is information coming from the field on maintenance actions or float status except to a limited degree that these Sample Data Collection (SDC) plans but even here it does not appear that these data contain sufficient information to run RCF and ORF calculations. Indeed, several commands commented that the AR 750-1 requirement for biennial updating of float factors should be deleted unless a field data collection program can be set up.

12. Do you have in process any study at your activity designed to improve the Maintenance Float calculations? If so, please describe the nature of the effort. (Who's doing it? What approaches are being taken, etc.?)

With the exception of the work done by the AVSCOM Systems Analysis Office, no commands reported any significant study efforts in progress.

13. In terms of float management:

a. Is float stock differentiated from other stock?

Except for locomotives, all commands reported that float items are handled like any other items, being issued in accordance with AR 11-12 priorities. We interpret their replies as applying to float items in the hands of the NICP's, since responses to field questionnaires show that some differentiations are observed.

b. Do end items which were exchanged for float items and, subsequently, repaired or overhauled return to the float or to other stock such as War Reserve or POMCUS?

All are returned to Condition Code A stock and issued in accordance with AR 11-12 priorities.

c. Is any maintenance performed on Maintenance Float stock?

Five commands responded yes to the question; one did not know.

d. How is serviceable RCF treated at depot, e.g., preserved for storage, exercised regularly, modifications applied, etc.?

Five commands responded that RCF items are treated like any other A stock (preventive maintenance, maintenance in storage); one did not know.

e. Are serviceables, waiting for overhaul or repair, considered part of the float quantity?

Since float assets are not differentiated, this question is not germane.

f. Is there a specific organization within your activity responsible for float management? If so, who?

The answer to this was uniformily "No."

14. In a few words please describe what is involved in issuing an end item from the Maintenance Float including the:

a. Decision process in determining whether an issue should be made.

b. Timing of the exchange.

c. Responsible activity.

From the NICP's standpoint, float assets are not differentiated from other assets and are issued in response to customer requisitions in the same way as requisitions for other purposes, in accordance with AR 725-50 and AR 11-12.

15. **What suggestions could you offer to improve the policies governing the establishment and control of maintenance floats and for improving the methods by which the Maintenance Float quantities are calculated?**

The most frequently voiced suggestion was to remove the AR 750-1 requirement for biennial update of RCF/ORF factors until data can be obtained for this purpose. Allied to this is the suggestion that a feedback reporting system be set up on float utilization.

One command recommended that the term "wartime" needs a much more specific definition before it can be used in RCF/ORF calculations.

One other command felt that the recent GAO/AAA recommendations were appropriate. Further, it was proposed that float at wholesale level be abolished and that major commands be permitted to determine and justify their float requirements.

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APPENDIX D

FIELD QUESTIONNAIRE

INTRODUCTION

D.1 As an additional requirement to this study, DA requested that a field survey be conducted to uncover current problems in management and utilization of operational readiness float resources at the retail level. The intent of the survey is to help in determining strategies for the use of ORF stock.

In an effort to perform this task, a field questionnaire was prepared under the auspices of DARCOM and distributed through the commodity command Logistics Assistance Offices (LAO) to the field maintenance technician (FMT). By so doing, it was hoped that we would get to those people most familiar with the problem. A diversity of opinion was obtained by sampling across the commodity commands and MACOM's. The responses reflected a sincere and cooperative effort between MACOM personnel and the FMT to report the facts.

Thirty responses were received in time for evaluation. These represented the six Commodity Commands and the four MACOM's and also from company level to battalion. The majority of the responses appeared to be from the FMT and clearly spell out their thoughts concerning retail management and use of ORF. By this type of response, we assume that we have what "is" and not what "should be."

In reporting the results from this survey (Section D.37), we will take each question and give a brief synopsis of the responses to indicate the general trend (most popular reply) and indicate any differences between command and theatres. A more detail breakdown of the replies can be found on spread sheets which are available from the Army Inventory Research Office.

D.2 Sample Questionnaire and Letter of Direction.

MM

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R 071625Z MAR 77

FM DA WASHDC //DALO-SML//

TO AIG 7406

BT

UNCLAS E F T O

SUBJECT: OPERATIONAL READINESS FLOAT (ORF) SURVEY

1. BY DIRECTION OF HQDA, DARCOM IS CONDUCTING A STUDY OF MAINTENANCE FLOAT TO DETERMINE WHAT MANAGERIAL IMPROVEMENTS ARE REQUIRED TO ACHIEVE THE MAXIMUM READINESS PAYOFF FROM THE MAINTENANCE FLOAT INVESTMENT. AS PART OF THIS STUDY DARCOM HAS BEEN SPECIFICALLY REQUESTED TO CONDUCT A SURVEY OF THE PROCESS AND PROBLEMS OF THE FLOAT MANAGER/USER AT THE DIVISION AND SEPARATE BRIGADE LEVEL.

2. IN ORDER TO COLLECT THE REQUIRED INFORMATION AND DATA WIYH THE LEAST POSSIBLE BURDEN TO YOUR HQ, SUPPORT UNITS AND SUPPORTED UNITS, THE DARCOM SURVEY PLAN PROVIDES FOR INFO COLLECTION BY THE COMMODITY/READINESS COMMAND FIELD MAINTENANCE TECHNICIANS (FMT) A SIMPLE THREE PAGE, TEN ITEM QUESTIONAIRE HAS BEEN PROVIDED THE FMT'S TO BE COMPLETED THROUGH INTERVIEW WITH FLOAT MANAGERS/ USERS AT SELECTED SUPPORT UNITS. NO MORE THAN THREE SUPPORT UNITS

PAGE 2 RUEADWD1604 UNCLAS E F T O

IN EACH MAJOR COMMAND WILL BE SURVEYED BY A FMT OF EACH OF THE COMMANDS (AVSCOM, TROSCOM, ECOM, TARCOM, MIRCOM AND ARMCOM).

3. THE DARCOM LOGISTICS ASSISTANCE OFFICER ON SITE WITH EACH MAJOR COMMAND CAN PROVIDE DETAILS ON THE CONDUCT OF THE SURVEY IF ADDITIONAL INFORMATION IS REQUIRED BY YOUR HEADQUARTERS.

4. HQ DARCOM POINT OF CONTACT FOR THIS SURVEY IS MR. DAN TABER, DRCMM-MS (AUTOVON 284-8576).

5. THE COMPLETION DATE FOR THE SURVEY IS 25 MAR 77. THIS EARLY TARGET DATE FOR COMPLETION HAS BEEN ESTABLISHED TO PROVIDE TIMELY INPUT INTO THE OVERALL MAINTENANCE FLOAT STUDY WHICH IS SCHEDULED TO BE COMPLETED BY MAY 1977.

6. YOUR COOPERATION IN THE CONDUCT OF THIS SURVEY IS APPRECIATED.

BT

#1604

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DEPARTMENT OF THE ARMY
HEADQUARTERS US ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND
5001 EISENHOWER AVE., ALEXANDRIA, VA. 22333

2 MAR 1977

DRCMM-MS

SUBJECT: Maintenance Float Study

SEE DISTRIBUTION

1. Reference is made to DRCMM-M letter dated 25 February 1977, subject as above (Inclosed).

2. This Command has been requested by the DA to conduct a survey of Operational Readiness Float as a part of the overall study of Maintenance Float. We believe that the most accurate information for such a survey can be obtained by having it gathered by our field maintenance technicians (FMT). These people have the most intimate acquaintanceship with personnel in the support units and the operations of those units. Accordingly, we have prepared a questionnaire to be filled out by the FMT's. A copy of the questionnaire and instructions for its use are attached for your information.

3. Distribution of the questionnaires will be made by the DARCOM Commodity/Readiness Commands to their Senior Staff Technical Representatives. The survey is to be conducted on only a sample number of support units in each MACOM. In no case will it exceed three per commodity group per MACOM. Because of the limited scope of the sample, some LAO's may not be involved in the survey. However, if these questionnaires arrive in your area, request that you provide your support during conduct of the survey.

4. The DA DCSLOG is sending a message to all of the MACOM's requesting their cooperation in this undertaking.

FOR THE COMMANDER:

AT Conroy

Incl
as

A. T. CONROY
LTC, GS
Executive Officer
Directorate for Materiel Management

DRCMM-MS
SUBJECT: Maintenance Float Study

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DRCQM-[illegible]
SUBJECT: Maintenance Float Study

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DEPARTMENT OF THE ARMY
HEADQUARTERS US ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND
5001 EISENHOWER AVE., ALEXANDRIA, VA. 22333

25 FEB 1977

DRCMM-MS

SUBJECT: Maintenance Float Study

SEE DISTRIBUTION

1. This command has been directed to conduct a study of maintenance float as a follow-up to other studies conducted by LEA and within DARCOM MSC's. As part of this study we were requested to conduct a survey of the process and problems of the float manager/user at the division and separate brigade level. It is hoped that the information derived from this survey will result in improved managerial direction and investment in operational readiness float (ORF) resources in a manner which will insure the highest payoff to the Army. We solicit your participation in this undertaking.

2. In order to conduct the requested survey in the most accurate manner, and with the least expenditure of resources, we propose that it be conducted on a sampling basis by the DARCOM personnel most familiar with operations at the user level - the Commodity/Readiness Command field maintenance technicians (FMT). It is recognized that this is additional workload and beyond the normal scope of duties assigned to these personnel. However, because of the criticality of maintenance float to Army operations, it is felt that the potential benefits are well worth the effort.

3. A questionnaire has been prepared by the DARCOM Inventory Research Office for use in the conduct of this survey. A copy of the questionnaire and instructions for its use is attached. This will simplify the task for all concerned and help assure uniformity of the type of data required. By using a sampling method, it is anticipated that only a small percentage of the FMT's need be engaged and hopefully not more than one day of effort on the part of any individual.

4. Request that the attached questionnaire be filled out by your personnel assigned at the major user commands. The size of the sample for your commodity materiel is limited to no more than three per MACOM and should be adjusted in accordance with the attached instructions. The precise number and distribution is left to your discretion. The

completed questionnaires are to be returned directly to:

Director
DARCOM Inventory Research Office
Room 800, USA Customs House
Philadelphia, PA 19106

5. DCSLOG will advise the MACOM's of this survey and request their cooperation in providing the information required by your FMT's.

6. Because the entire DARCOM study must be concluded by May 1977, request that the completed questionnaires be submitted no later than 25 March 1977. Thank you for your cooperation.

FOR THE COMMANDER:

M. I. Hinson

M. I. HINSON
DEPUTY DIRECTOR
OF MATERIEL MANAGEMENT

2 Incl
1. Questionnaire
2. DA Ltr, 30 Dec 76

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QUESTIONNAIRE

OPERATIONAL READINESS FLOAT

Major Command:____________________________
Support Unit Surveyed:______________________
Commodity Group:___________________________
Division and/or Separate Brigades Supported:
____
____
____

Support Unit Personnel Contacted (Name, Rank, Position)
____
____
____

Person Conducting Survey (Name, Title):
____
____

____
Signature Date

OPERATIONAL READINESS FLOAT

GENERAL INSTRUCTIONS FOR SURVEY

1. Only maintenance battalions or companies supporting tactical divisions or separate brigades are to be included in the survey.

2. A separate questionnaire is to be completed for each commodity group of materiel, e.g., communications-electronics, firepower-mobility, etc.

3. The questionnaire should be filled out by the FMT for that commodity in coordination with personnel in the maintenance battalion or DS company.

4. The survey should be confined to a representative sample of 1-3 support units per commodity per MACOM, according to the size and diversity of operations within the MACOM. For instance, only one set of commodity questionnaires might be appropriate for USARAL and three for USAREUR.

QUESTIONNAIRE
OPERATIONAL READINESS FLOAT

Use a continuation sheet for any narrative answers requiring more space then provided on the form.

1. The attached form is designed to provide a broad sample of maintenance float items held by support units. Please fill out the form in accordance with its preceding instructions.

2. Location of ORF stock, e.g., DS, GS Maintenance, GS Supply, Installation Support, other, etc.

   a. Opinion on where to position large items of float if other than location stated above - for instance at the tactical unit or threater stockage.

3. Is float stock differentiated from other stock?

   How?

4. Maintenance of float.

   a. How often is float stock inspected/tested for serviceability?

   b. What is percentage of total maintenance workload expended on float stocks? (If precise records are not available, give best estimate.)

   c. What priority is usually assigned to work orders on float items?

5. Briefly describe how the decision is made to issue a float item. Include the following considerations.

a. Criteria of magnitude and time to perform the required maintenance.

b. Who is involved in making the decision?

c. Influence that the user has on the decision to accept a float in exchange? Any differences whether the float is a component or an end item.

6. Is there a difference between the accountable property officer, the person who signs for the equipment, and the person responsible for maintenance of it? Describe the differences, inter-relationships and impact on management of float.

7. Pick the three highest density items which have float support and for the past three months indicate for each:

a. The number of times the items were repaired and returned to the user without issuance of a float.

b. Average turn around time for these repairs.

Item	No. Repaired	TAT
1.		
2.		
3.		

8. Is there an adequate number and type of personnel and facilities available in the support unit to maintain, store and assure optimum utilization of the float?

a. If not, how many additional personnel, their MOS and what facilities are required to support the authorized float?

9. Is any record kept that documents the float transaction? (yes/no)

a. If so identify or describe what form is used - DA or local?

b. Is this data kept in any files?

c. Where are the files kept?

d. What report and how often is it provided to the MACOM HQ for management of float assets?

10. Please provide your recommendations to improve DA or local policies and procedures for management of operational readiness float. Describe how these recommendations would benefit the equipment user and the support organizations. Your recommendations will be given serious consideration during the current revision efforts to ARs governing maintenance float.

INSTRUCTIONS FOR FILLING OUT FORM

General. This form is intended to provide a statistical survey of the disposition and condition of ORF items on the day it is filled out. Only columns 10, 11 and 12 will require any historical data search. If estimated data is entered in these columns, it should be so noted.

1. End Item. List by name and NSN all end items that are authorized to be supported with float such as tanks, APCs, aircraft. In the case of communication, electronic and other equipments for which float is provided mainly as major components, enter the 10 most populous float components. If components are listed, add a note at the bottom showing the total number of lines of component float carried, including the 10 individual lines listed above.

2. Components of End Items. When end items listed in Column 1 also have major components which are carried as float, list these opposite the end item.

3. Substitute Items. Indicate if float stock consists wholly or partially of items different than that assigned to supported TOE's but is issued as a substitute when required. An example is a gasoline powered APC which is issued in lieu of a diesel powered APC.

4. Number Supported. The number of items in TOE units supported by the authorized float.

5. Authorized. Number of float authorized by the MACOM.

6. On-Hand. Number of float items actually on hand.

7. Serviceable. Number of float on-hand that is serviceable and available for issue. (On date of questionnaire.)

8. Not Operationally Ready, Supply. Number of float items that are NORS and average length of time NORS in days. (On date of questionnaire.)

9. Not Operationally Ready, Maintenance. Number of items NORM, due either to waiting for maintenance or in process of maintenance. (On date of questionnaire.)

10. Demands, 90 days. Number of ORF exchanges requested by supported TOE's during the prior 90 day period.

11. Satisfied Demands. Number of requests for a float item which could be satisfied by the support unit within 24 hours, over the prior 90 day period.

12. Number Repaired, 90 days. Number of float repaired and returned to serviceable condition in the past 90 days. This does not include items repaired and returned to user without issuance of a float.

13. Turn Around Time, 90 Day Average. Average time to return to a serviceable condition, an item for which a float had been exchanged.

OPERATIONAL READINESS FLOAT

1. End Items Name/NSN	2. Components of End Items Name/NSN	3. Substitute Items Name/NSN	4. No. Suptd	5. Authorized	6. On-Hand	7. Serv	8. NORS/Days	9. NORM/Days	10. Demand 90 Days	11. Demand, Satis 90 Days	12. No Reqd	13. TAT Avg 90 Days	14. Remarks

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DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR LOGISTICS
WASHINGTON, D.C. 20310

21190

30 DEC 1976

DALO-SML

SUBJECT: Repair Cycle Float Study

Commander
US Army Materiel Development
and Readiness Command
5001 Eisenhower Avenue
Alexandria, VA 22333

1. References:

a. Letter DALO-SML dated 7 September 1976, subject, Repair Cycle Float (RCF).

b. LEA Draft Report, dated November 1976, subject, Review of Operational Readiness Float (ORF) Concept.

2. Referenced letter requested DARCOM perform a study on the Repair Cycle Float (RCF) portion of Maintenance Float. Because maintenance float is the total number of spare major components and end items required to sustain military operations at a desired level while repair or overhaul is performed, it is the combined effect of ORF and RCF which relates to operational readiness. It makes little or no difference to the user whether the items are being repaired at DSU/GSU or at a depot; in either case they are not available to him. Consequently, all float assets, both ORF and RCF, and their individual and collective impacts on availability or serviceable items to the user should be studied.

3. The problems of the float manager/user at the Division and separate Brigade level are keynote to this study. Request that in conjunction with the overall maintenance float study, a survey to disclose current problems at the retail level be conducted. This should result in a philosophy of investing ORF resources only in high payoff strategies.

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30 DEC 1976

DALO-SML 21190

SUBJECT: Repair Cycle Float Study

4. Request the DARCOM study plan be modified to include methods for establishing ORF requirements and management of ORF, as well as for RCF. Care should be exercised to avoid duplication of efforts already expended by the LEA during their study, referenced 1.b. above.

5. This additional requirement does not change the expected completion date of May 1977.

FOR THE DEPUTY CHIEF OF STAFF FOR LOGISTICS:

Robert L. Shaffer

ROBERT L. SHAFFER
COL, GS
Chief, ILS and Maintenance
Engineering Division

D.3 Summary of Responses to the Field Questionnaire.

D.3.1 Responses Part One.

1. The attached form is designed to provide a broad sample of Maintenance Float items held by support units. Please fill out the form in accordance with its preceding instructions.

2. Location of ORF stock, e.g., DS, GS maintenance, GS supply, installation support, other, etc.

a. Opinion on where to position large items of float if other than location stated above–for instance at the tactical unit or theatre stockage.

In response to the current location of ORF stock, the majority indicated that it is kept at the DS level (especially OCONUS) or at installation support (especially CONUS). Only one of the OCONUS responses indicated GS location of the ORF.

In response to their opinion on where to position float, 60 percent of the respondents said that they preferred to keep or move the ORF to the DS level whereas 15 percent (CONUS) preferred to keep the stock at the installation support. Other replies were theatre stockage and controlled by shop officer.

3. Is float stock differentiated from other stock? How?

An overwhelming 93 percent of the respondents indicated that ORF stock is managed on a control basis and is indeed differentiated from other stock. Most of OCONUS said that they keep their ORF stock physically separated from other stockage. Separate records for float items are kept by 54 percent of the respondents.

4. Maintenance of float.

a. How often is float stock inspected/tested for serviceability?

b. What is percentage of total maintenance workload expended on float stocks? (If precise records are not available, give best estimate.)

c. What priority is usually assigned to work orders on float items?

Responses to 4a ranged from no check to weekly checks. Inference is that no set guidelines have been established, either by the commodity commands or by the MACOM's.

In response to 4b, MIRCOM led with an approximate 30-percent workload dedication to ORF whereas ARRCOM had the least with about 2-percent dedications. These differences may imply that the type of equipment plays a major role in deciding ORF workload requirements.

In 4c, 44 percent gave their ORF an 02 priority rating and 24 percent said that they gave the same priority as the end item. Hence, the float work orders were given a high priority in 68 percent of the cases.

5. Briefly describe how the decision is made to issue a float item. Include the following considerations.

a. Criteria of magnitude and time to perform the required maintenance.

b. Who is involved in making the decision?

c. Influence that the user has on the decision to accept a float in exchange? Any differences whether the float is a component or an end item.

At first glance, the responses to these questions seem to dramatize the lack of continuity in the decision process of float transactions. However, we feel the replies indicate that the field environment is so varied even within theatre that different policies are followed depending on the local conditions.

For example, 23 percent of the responses to 5b cited production control as being primarily involved in the decision process, 29 percent cited the maintenance shop officer, 17 percent DMMC, 8 percent company maintenance officer, and 8 percent battalion commander.

Most (80 percent) of the responses to 5a indicated a time and mission priority criteria, but based on our interviews in the field, we saw that this time interval has a large variance.

An interesting point was that 80 percent said that the user had an active role in negotiating the float transactions. In 10 cases the users were cited as having the option of accepting or rejecting the float items.

6. Is there a difference between the accountable property officer, the person who signs for the equipment, and the person responsible for maintenance of it? Describe the differences, interrelationships and impact on management of float.

In this question, an effort was made to define the duties/responsibilities and "pindown" those actually held accountable for such. By specifically segregating the leading question into the difference between the accountable property officer, the person who signs for the equipment, and the person responsible for its maintenance, the differences concerning accountability among the units could surface.

Although several gave good responses, answers by some, such as "The Float Officer is appointed on orders as the Float Accountable Officer. He is the Float Manager.," indicate that many personnel in the field really do not know the hierarchy involved.

The accountable property officer was stated to be the division property officer in 39 percent of the responses and to be the battalion maintenance officer in 25 percent. He was listed in other areas in 20 percent of the responses and not applicable or no difference, etc., in the remainder.

The maintenance officers at both battalion and company are normally the personnel responsible for signing for the equipment although approximately 10 percent are signed for by supply officers. Twenty percent were signed for by installation support organizations (CONUS only) but did not indicate who actually signed for the equipment.

Responsibility for pulling maintenance on equipment was roughly proportional to those that signed for the equipment. One exception noted was that the company production control unit may have had responsibility in one or two units.

7. Pick the three highest density items which have float support and for the past 3 months indicate for each:

a. The number of times the items were repaired and returned to the user without issuance of a float.

b. Average turnaround time for these repairs.

The intent of this question was to determine the typical length of turnaround time (TAT) of those maintenance actions on float-supported items which required no issuance of float.

Significantly, the array of these TAT's was so dispersed that no common time-to-issue float criterion appeared within theatre or commodity command.

As an example, by simply comparing the highs and lows within theatre yields the following table:

THEATRE	HIGH (COMMAND)	LOW (COMMAND)
Pacific	12 days (TARCOM)	1 day (ECOM)
Europe	55 days (TARCOM)	2 days (AVSCOM & MIRCOM)
CONUS	700^+ days (TARCOM)	2 days (ECOM)

The results from this question shows that the old AR 750-1 time requirements are invalid in that they do not reflect the differences of commodity. For instance, TARCOM items had the highest average TAT's on the questionnaires (OCONUS & CONUS) (and in all theatres) and were over the AR timeframes whereas ECOM items generally had the lowest TAT of the high density items and seldom exceeded the AR timeframe.

8. Is there an adequate number and type of personnel and facilities available in the support unit to maintain, store, and insure optimum utilization of the float?

a. If not, how many additional personnel, their MOS, and what facilities are required to support the authorized float?

A surprising 70 percent said that they had both adequate facilities and adequate personnel to maintain and manage ORF. Of the 30 percent who requested increases in either facilities or personnel, the desired additions varied with no common rationale apparent in the opinions.

It was interesting that many of the responses of the 30-percent group did require clerical assistance to maintain float records. Evidently, they cannot maintain the many different records required for management.

If the record system could be streamlined and purged, no doubt the abilities of the units to keep accurate files would eliminate the need for clerical help.

9. Is any record kept that documents the float transaction (yes/no)?

a. If so, identify or describe what form is used—DA or local?

b. Is this data kept in any files?

c. Where are the files kept?

d. What report and how often is it provided to the MACOM HQ for management of float assets?

The responses to these questions reinforced the comments made to the previous questions in regards to a streamlined record system.

There are so many forms to fill out that the troops seem vague as to what goes where. A case in point, 3 percent of the replies said that they used the DA Form 3029 as part of the record system to keep track of float—DA Form 3029 is a direct exchange (DX) record and should not be used as a float record. Conversely, only 42 percent of the respondents indicated that they used the DA Form 1296 and this form is required as a record as stated in FM 29-25. Fifty-three percent used the maintenance form, DA Form

2407, for float documentation. To our knowledge, the latest requirement for float code on the DA Form 2407 is for aircraft use only. Only 21 percent said that they used the DA Form 2067 which should be used to keep summary of float transactions by the supply elements within the maintenance units. A total of 10 different forms were used to record the float position. All respondents that were authorized float indicated that they did keep records of some kind or other. The records were stored basically at 3d echelon although the OCONUS units, using the SAILS, stored at the Division Materiel Management Center. Since the responses gave answers that ranged from company shop to float storage area to Battalion Maintenance Operations Office at 3d echelon, we can surmise that the record storage process is somewhat less than standardized.

In reporting to the MACOM the field response again showed diversity. In fact, 10.7 percent indicated no reporting to MACOM at all. Those units using the SAILS forwarded float data using the SAILS reports. Eighteen percent used the Form 589-R. The latter is a form that is tailored to each MACOM's needs and is currently required by FORSCOM on a semiannual basis. Other reporting methods are in the appendix.

10. Please provide your recommendations to improve DA or local policies and procedures for management of operational readiness float. Describe how these recommendations would benefit the equipment user and the support organizations. Your recommendations will be given serious consideration during the current revision efforts to AR's governing Maintenance Float.

Twenty-one (70 percent) of the respondents made recommendations in an effort to improve the local policies and procedures for ORF management. The most popular of these dealt with: the addition of equipment and personnel to maintain float assets, the need for a more efficient recordkeeping system, the use of component items as float rather than the items itself, and the overall updating or revision of the present regulations. Some of the individual comments are as follows:

1. Larger amount of float stock for using activities because of the transportation problem to the GS shop (AVSCOM—Europe).

2. a. Float should be hand receipted to user in order to facilitate the transaction.

b. The units that maintain the float should be signed with the item.

c. ORF should be available to all units within a theatre.

d. Component floating from end item (MIRCOM–Europe).

3. The unit turning in a vehicle be held responsible for any other conditions, (to prevent a total rebuild) then original fault (ARRCOM–Europe).

4. Special requirements are placed on the float by commanders such as some of the float is directed to critical radio nets, to backup critical nets or stations or used during field exercises. At these times, the equipment is pulled away from the float, thus reducing the quantity of float on hand. Recommendations: Radio should be authorized on the units' TOE to fully support the division's mission (ECOM–CONUS).

5. Recommend some of the low density items which have more than one commodity command involved be included in a RCF rather than a local ORF. Example: Chapparrels, Vulcans, M551 AR/AAV, M60 Tanks, TOW, etc., can be repaired at DS level for the automotive but to no great extent on the armament portion of the system. *An ORF, if used right, needs a section* dedicated to support, account, and exchange it as it was orginally intended to be used (ARCOM–Pacific).

D.3.2 Observation.

One problem area needing further consideration and study is that of the communication form between the MACOM's and the DARCOM commodity commands. The problem itself is that no effective means of transferring the information of float usage, demands, etc., from the MACOM to the commodity command is in existence. For instance, FORSCOM uses the 589-R forms and compiles a semiannual demand/usage data base but the data has not been received at the commodity command's maintenance divisions who could use the information in recomputing ORF requirements and updating ORF factors.

D.3.3 Responses Part Two: ORF FLOAT DISPOSITION AND CONDITION.

The field questionnaire included a section on the present disposition and condition of ORF items. The type of information requested included such items as the amount of float authorized, amount on hand, amount serviceable, number of demands on float, number of demands satisfied, etc. Since these data elements by themselves are not readily comparable, indicator functions were developed (e.g., number of float items per number items supported as opposed to only the number of float items). The remainder of the analysis of the field questions addresses these indicators.

1. Estimated Float Factor. (Number of float items authorized by the MACOM ÷ the number of items in TOE units supported by the authorized float.) This indicator showed a variation from a low average .006 for a CONUS airborne division to high average of .24 for many of the MIRCOM supported items. Uniformity within the commodity commands was evident indicating the use of consistent float factors within commands.

2. Percent Authorized Which Were on Hand. (Number of float items actually on hand ÷ number of float items authorized by the MACOM.) Across the board this indicator appeared relatively high. In some instances, AVSCOM items, there were more on hand than authorized. Seventy percent of the units reported having at least 80 percent of their authorized float items on hand. Of the remaining units, values as low as 14 percent were submitted. One of the low responses was attributed to having had their float removed from the theatre to support a much needed overhaul program (IHAWK).

3. Percent on Hand in Serviceable Condition. (Number of float on hand that is serviceable and available for use ÷ number of float items actually on hand.) This indicator also appears to be relatively high with 65 percent of the respondents indicating at least 60 percent of their float assets in serviceable condition. On the other hand, there were three units with extremely low values (MIRCOM–Europe, ECOM–Europe, TARCOM–CONUS). In the case of ECOM with large quantities of float assets, the respondent indicated that the current field exercises had depleted most of his/her float stock hence causing a low serviceable condition to prevail.

4. Demands on Float Per Supported End Item. (Number of ORF exchanges requested by supported TOE's during the prior 90-day period ÷ number of items in the TOE unit supported by the authorized float.)

This indicator was developed to compare the demands on float per supported end item between the various commodities.

It is interesting to note that there appears to be a correlation between this and the first indicator. Those items with high estimated float factors also exhibited the greatest demands per supported item and similarly those with low float factors were related to those with lesser demands. This observation gives credence to the present authorized float quantities exhibited by the responses.

5. Percent Demands Satisfied. (Number of requests satisfied for a float item over the prior 90 days ÷ number of requests made in the prior 90 days.)

This percentage is relatively high (85 percent–100 percent) across the board except in the following cases:

a. MIRCOM–Europe–Their response was low because they had only 26 percent of their authorized float on hand.

b. TARCOM–Pacific–In this case only 43 percent of their on-hand stock was in serviceable condition.

c. AVSCOM–CONUS–70 percent of authorized was in serviceable condition implying that the quantity authorized was low.

d. ECOM–Europe–66 percent authorized was on hand and the 60 percent authorized was in serviceable condition.

6. Turnaround Time, 90-Day Average. (Average time to return to a serviceable condition, an item for which a float had been exchanged.)

ARRCOM reported an average of 54 hours per item. AVSCOM did not submit any data in response to this question. The range for the ECOM items was from 4.17 hours to 90 days. For the item taking 90 days, all of the time was attributed to NORS. MIRCOM's average per reporting unit varied from 5 days to 22 days. Again a substantial amount of the large TAT were attributed to NORS time. TARCOM exhibited the greatest variation with a low of 1 day and a high of 190 days. Both of these values were reported for the M551. (The 190 days was reported in CONUS with 80 days NORS and the 1 day was reported by the Pacific.) These variations of TAT again demonstrate the use of local criteria in determining float transactions.

7. Other data elements required by this portion of the questionnaire but which had only a nominal number of responses are listed below.

a. Components of End Items. (When end items listed in Column 1 also have major components which are carried as float, list these opposite the end item.)

Only ECOM and MIRCOM reported component items which are carried as float.

b. Substitute Items. (Indicate if float stock consists wholly or partially of items different than that assigned to supported TOE's but is issued as a substitute when required. An example is a gasoline powered APC which is issued in lieu of a diesel powered APC.)

AVSCOM, ECOM, MIRCOM reported only a few of these items.

c. Not Operationally Ready, Supply. (Number of float items that are NORS and average length of time NORS in days. (On date of questionnaire).)

d. Not Operationally Ready, Maintenance. (Number of float items NORM, due either to waiting for maintenance or in process of maintenance. (On date of questionnaire and average length of time NORM in days).)

Not being able to differentiate from blanks and zeros in the response to these questions made any kind of average misleading. The variation of the nonzero or nonblank responses was great. In general the NORM was much less than the NORS. A comparison of the max and min NORS/NORM times are given in the table.

	MAX	MIN
NORS	290 days (ARRCOM–Pacific)	21 days (ECOM–Europe)
NORM	187 days (TARCOM–Europe)	9 days (ECOM–Europe)

APPENDIX E

ORF DATA COLLECTION

(DISTRIBUTION REQUIREMENT)

E.1 DATA REQUIREMENTS.

As mentioned earlier in the report, sufficient quantities will be distributed as ORF stock during peacetime in order to insure that the units maintain their readiness objective. These quantities, as determined by the distribution model, are dependent on the different failure rates and downtimes experienced by the given system at the various installations. Since the distribution model may be used for both CONUS and OCONUS (OCONUS used at the discretion of the command) operations, the data requirements described herein will be applicable to both unless otherwise noted.

A major assumption made by the model which simplifies the data collection task is that the number of maintenance actions on a given system at each maintenance level for a fixed length of time are Poisson distributed. This means that the number of items in maintenance at any level depends only on the mean *turnaround time*.

Hence, the principal data necessary is the average turnaround time and average maintenance frequency experienced for each system at the various installations and maintenance levels.

In the context used above, the turnaround time is defined as the time it takes to return the system back to operational status once the decision is made to repair the system at the given maintenance level. This time can conceptually be broken down into the following components:

a. Transportation time* to the repair facility.

b. Waiting time prior to or during repair and/or transportation.

---

*Note since the item is up once the repair is completed, transportation time from the maintenance shop is not considered as part of TAT.

c. Repair time spent undergoing actual repairs.

Similarly, the maintenance frequency (MF) is defined as the number of visits a given system makes to a given maintenance shop for repairs during a fixed length of time.

With minor modifications to the current procedures, these data elements may be recorded on Forms DA-2407 and DD-314 and rolled up on DA Form 2406 which is processed at MMC. The specific details of these modifications are given in the next section.

E.2 MODIFICATION TO CURRENT PROCEDURES.

In order to assemble the necessary data, TAT's and MF's for organization and support maintenance have to be collected on each serial number in the field from every unit requiring float support for the given system (For OCONUS, support has to be further divided into DS and GS maintenance.) DD Form 314 provides a record, Figure E-1, of NORS/NORM time—both organizational and support. This form is filled out for each item of equipment by the TAMMS clerk of the unit supporting the item. The TM 38-750 instruction for recording the data are: "(6) Nonavailable days will be recorded for all items by the symbol "O" for organizational NORM and "X" for support maintenance. For items reported on DA Form 2406, Appendix C, not operationally ready, supply (NORS) at organizational level will be recorded on a daily basis by an "S" within the "0" symbol (Fig. E1). Half days will be recorded by dividing the "O" symbol; e.g., 0. All other nonavailable days organizational level will be considered as not operationally ready, maintenance (NORM)."

Currently, the TAMMS clerk uses Blocks 24 and 26 of the (Work Accomplished by Support Maintenance) DA Form 2407, Figure E-2, to get the nonavailable days due to support maintenance. This period includes the time between the date that support received the item and the date support completed the maintenance. Apparently, that period herein defined as transportation time, between the submitted date (Block 23, the date of the decision to repair the item at support) and the receipt date (Block 24) is not included in the nonavailable days. Individuals at MMC and LOGC confirmed these findings and agreed that it was due to the fact that neither organization nor support wanted to be held accountable for this time.

In order to report the total time the item is not available due to needed support maintenance, it is recommended that the current reporting procedure be changed to include the additional transportation time, i.e., support time should be considered as the time between the submitted date (Block 23) and the inspected date (Block 26) and be reported as such on the DD Form 314. The other change to the DD Form 314 reporting procedures is for OCONUS commands only and requires that the support time be identified by DS and GS indicators.

Since only averages are needed, the DD Form 314 data can be compiled in the field for each system and then submitted to DARCOM in a simplified summary report. With a few changes in the reporting format. the presently used "Materiel Readiness Report," DA Form 2406, can be used for this purpose.

The Form 2406 as shown in Figure E-3 is a monthly composite of the Form 314 data rolled up for each line item by the organizational TAMM's clerk; in turn, the Forms 2406 are rolled up at the battalion level on a quarterly basis and then submitted to MMC for processing. From this input, various management reports are produced indicating information as to the readiness status of equipment and possible reasons for short falls.

With the addition of two columns to the equipment availability portion of this form, the ORF distributional data requirements would be satisfied. The additional data would be the number of maintenance actions incurred by the reported system at organization and at support. Once this data is incorporated into the form, MMC could compute average TAT and MF's for any user level above battalion for the given system. These statistics would then be submitted to DESCOM for processing in the distributional model.

The additional requirement made of the field is that the TAMM's clerk record the number of runs of O's or X's on DD Form 314 for the month. A consecutive series of X's (runs) would count as one maintenance action at support and similarly the same for O's for organization. The total count of these runs for each line item would then be recorded on DA Form 2406 as the number of maintenance actions experienced by the system.

E.3 PROJECT UMBRELLA.

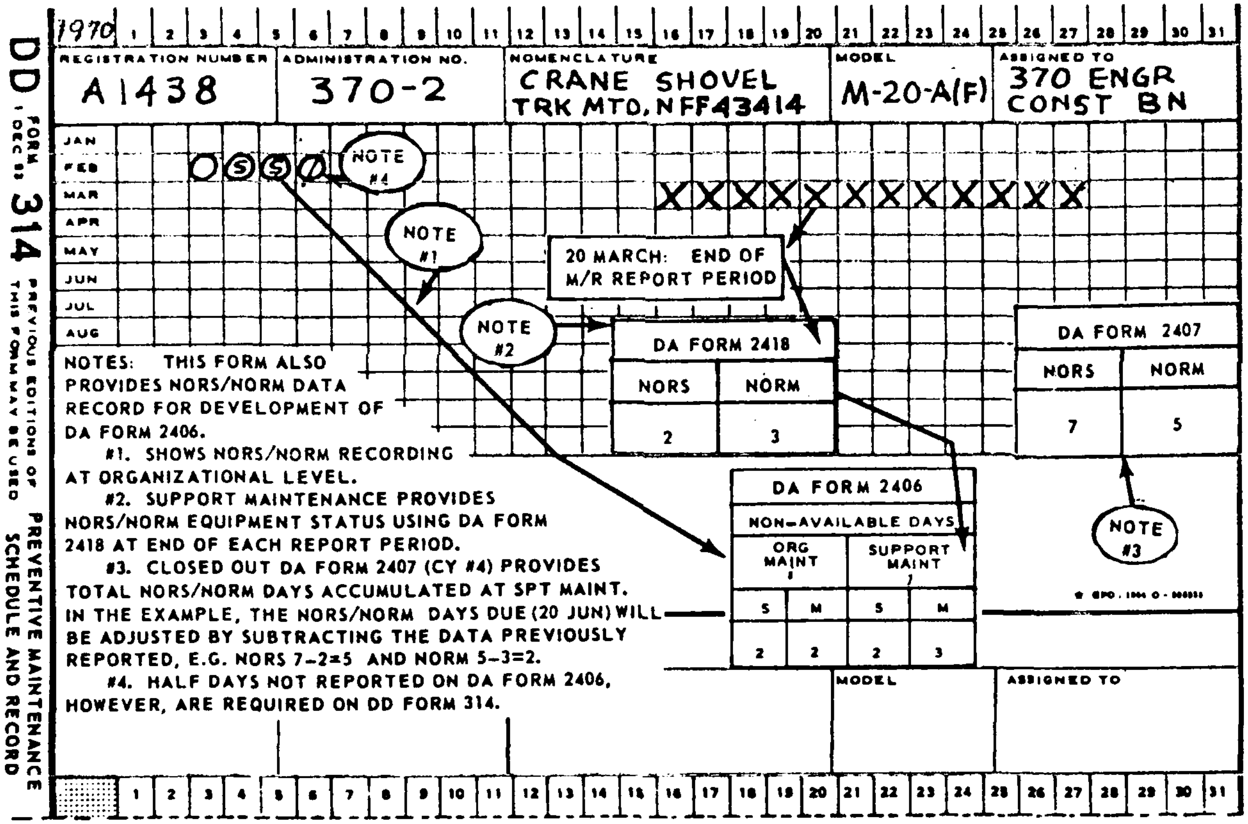
At the request of DCSLOG, a committee "Project Umbrella" was formed to look into the possibility of reducing and consolidating the number of reports required of the units in the field. As a result of the committee's recommendation, the LOGC was tasked to revise the materiel readiness reporting currently contained in TM 38-750 in a manner consistent with the reporting requirements of the new AR 220-1 for unit readiness reporting. As part of this effort, LOGC intends to produce a draft AR containing all required procedures for reporting materiel readiness on a revised DA Form 2406. This form will consolidate DA Forms 2406, 1352, the Materiel Assistance Designated Report, and the Army Missile and Rocket Report (RCS 139).

In order to give better visibility to the problem areas for the commodity commands, DOD requested that not only the readiness of the system be recorded but also that of the critical subsystems and end items which could cause a deadline. To capture this additional information in the field, LOGC intends to replace the DD Form 314 for recording the daily availability of the system with a more extensive daily record form. Figure E-4 represents this proposed form referred to as DA Form 2406-1 work form. This form is designed to be filled out on a daily basis by the maintenance technician in charge of the system and then rolled up on a monthly basis by the organizational TAMM's clerk.

The replacement of DD Form 314 impacts on the ORF data collection scheme presented in the preceding section. LOGC agreed to work with IRO in an effort to revise DA Form 2406-1 in order to record the necessary ORF data in the field.

Figure E-5 represents the proposed new DA Form 2406: LOGC agreed to change this form in accordance with the requirements cited in the preceding section referring to the currently used DA Form 2406.

A 6-month test of these new forms and reporting procedures is scheduled to commence on January 1978 and, hopefully, the ORF data collection will likewise be tested. Upon approval, implementations of these changes would then occur in the second quarter of FY 79.



DD FORM 1 DEC 55 314 PREVIOUS EDITIONS OF THIS FORM MAY BE USED

PREVENTIVE MAINTENANCE SCHEDULE AND RECORD

1970

REGISTRATION NUMBER	ADMINISTRATION NO.	NOMENCLATURE	MODEL	ASSIGNED TO
A1438	370-2	CRANE SHOVEL TRK MTD, NFF43414	M-20-A(F)	370 ENGR CONST BN

JAN FEB MAR APR MAY JUN JUL AUG

NOTE #4

NOTE #1

NOTE #2

NOTE #3

20 MARCH: END OF M/R REPORT PERIOD

DA FORM 2418	
NORS	NORM
2	3

DA FORM 2407	
NORS	NORM
7	5

DA FORM 2406			
NON-AVAILABLE DAYS			
ORG MAINT		SUPPORT MAINT	
S	M	S	M
2	2	2	3

NOTES: THIS FORM ALSO PROVIDES NORS/NORM DATA RECORD FOR DEVELOPMENT OF DA FORM 2406.

#1. SHOWS NORS/NORM RECORDING AT ORGANIZATIONAL LEVEL.

#2. SUPPORT MAINTENANCE PROVIDES NORS/NORM EQUIPMENT STATUS USING DA FORM 2418 AT END OF EACH REPORT PERIOD.

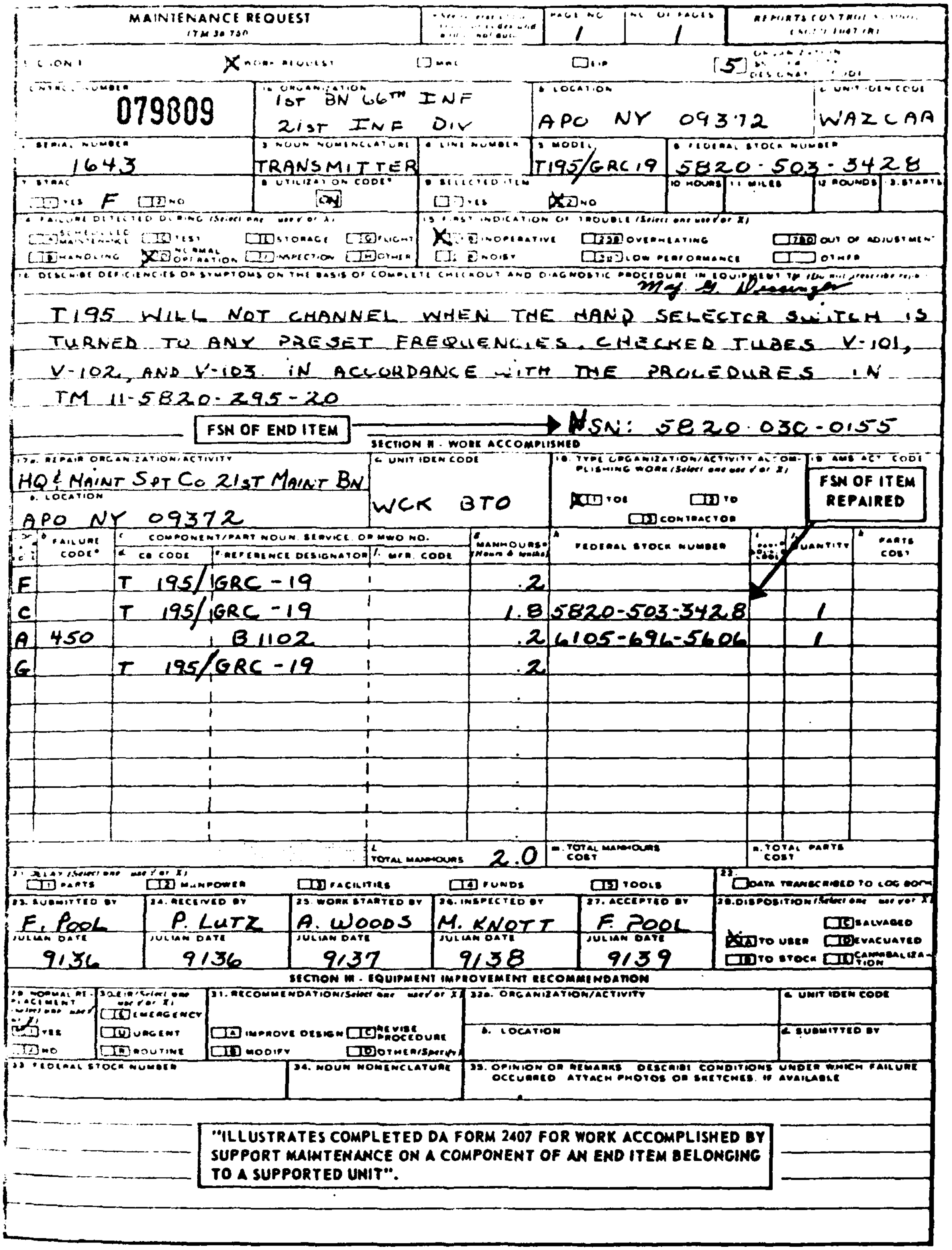
#3. CLOSED OUT DA FORM 2407 (CY #4) PROVIDES TOTAL NORS/NORM DAYS ACCUMULATED AT SPT MAINT. IN THE EXAMPLE, THE NORS/NORM DAYS DUE (20 JUN) WILL BE ADJUSTED BY SUBTRACTING THE DATA PREVIOUSLY REPORTED, E.G. NORS 7-2=5 AND NORM 5-3=2.

#4. HALF DAYS NOT REPORTED ON DA FORM 2406, HOWEVER, ARE REQUIRED ON DD FORM 314.

MODEL

ASSIGNED TO

FIGURE E-1



MAINTENANCE REQUEST
(TM 38-750)

PAGE NO 1 NO. OF PAGES 1

REPORTS CONTROL SYMBOL

☒ WORK REQUEST ☐ MWO ☐ EIR [5] ORGANIZATION DESIGNATOR CODE

CONTROL NUMBER: 079809

ORGANIZATION: 1st BN 66th INF 21st INF DIV

LOCATION: APO NY 09372

UNIT IDEN CODE: WAZCAA

SERIAL NUMBER: 1643

NOUN NOMENCLATURE: TRANSMITTER

LINE NUMBER:

MODEL: T195/GRC19

FEDERAL STOCK NUMBER: 5820-503-3428

STRAC: ☐ YES F ☐ NO

UTILIZATION CODE: [ON]

SELECTED ITEM: ☐ YES ☒ NO

10 HOURS 11 MILES 12 ROUNDS 13 STARTS

14. FAILURE DETECTED DURING (Select one use ✓ or X): ☐ SCHEDULED MAINTENANCE ☐ TEST ☐ STORAGE ☐ FLIGHT ☐ HANDLING ☒ NORMAL OPERATION ☐ INSPECTION ☐ OTHER

15. FIRST INDICATION OF TROUBLE (Select one use ✓ or X): ☒ INOPERATIVE ☐ OVERHEATING ☐ OUT OF ADJUSTMENT ☐ NOISY ☐ LOW PERFORMANCE ☐ OTHER

16. DESCRIBE DEFICIENCIES OR SYMPTOMS ON THE BASIS OF COMPLETE CHECKOUT AND DIAGNOSTIC PROCEDURE IN EQUIPMENT TM

T195 WILL NOT CHANNEL WHEN THE HAND SELECTOR SWITCH IS TURNED TO ANY PRESET FREQUENCIES. CHECKED TUBES V-101, V-102, AND V-103 IN ACCORDANCE WITH THE PROCEDURES IN TM 11-5820-295-20

FSN OF END ITEM → NSN: 5820-030-0155

SECTION II - WORK ACCOMPLISHED

17a. REPAIR ORGANIZATION/ACTIVITY: HQ & MAINT SPT Co 21st MAINT BN

b. LOCATION: APO NY 09372

c. UNIT IDEN CODE: WCK BTO

18. TYPE ORGANIZATION/ACTIVITY ACCOMPLISHING WORK (Select one use ✓ or X): ☒ TOE ☐ TD ☐ CONTRACTOR

19. AMS ACT CODE

FSN OF ITEM REPAIRED

a	b. FAILURE CODE	c. COMPONENT/PART NOUN, SERVICE, OR MWO NO. d. CB CODE	e. REFERENCE DESIGNATOR	f. MFR. CODE	g. MANHOURS (Hours & tenths)	h. FEDERAL STOCK NUMBER	i.	j. QUANTITY	k. PARTS COST
F		T 195/	GRC-19		.2				
C		T 195/	GRC-19		1.8	5820-503-3428		1	
A	450		B 1102		.2	6105-696-5606		1	
G		T 195/	GRC-19		.2				

l. TOTAL MANHOURS 2.0 m. TOTAL MANHOURS COST n. TOTAL PARTS COST

21. DELAY (Select one use ✓ or X): ☐ PARTS ☐ MANPOWER ☐ FACILITIES ☐ FUNDS ☐ TOOLS

22. ☐ DATA TRANSCRIBED TO LOG BOOK

23. SUBMITTED BY	24. RECEIVED BY	25. WORK STARTED BY	26. INSPECTED BY	27. ACCEPTED BY
F. Pool	P. LUTZ	A. WOODS	M. KNOTT	F. POOL
JULIAN DATE 9136	JULIAN DATE 9136	JULIAN DATE 9137	JULIAN DATE 9138	JULIAN DATE 9139

28. DISPOSITION (Select one use ✓ or X): ☒ TO USER ☐ TO STOCK ☐ SALVAGED ☐ EVACUATED ☐ CANNIBALIZATION

SECTION III - EQUIPMENT IMPROVEMENT RECOMMENDATION

29. NORMAL REPLACEMENT (Select one use ✓ or X): ☑ YES ☐ NO

30. EIR (Select one use ✓ or X): ☐ EMERGENCY ☐ URGENT ☐ ROUTINE

31. RECOMMENDATION (Select one use ✓ or X): ☐ IMPROVE DESIGN ☐ MODIFY ☐ REVISE PROCEDURE ☐ OTHER (Specify)

32a. ORGANIZATION/ACTIVITY

b. LOCATION

c. UNIT IDEN CODE

d. SUBMITTED BY

33. FEDERAL STOCK NUMBER

34. NOUN NOMENCLATURE

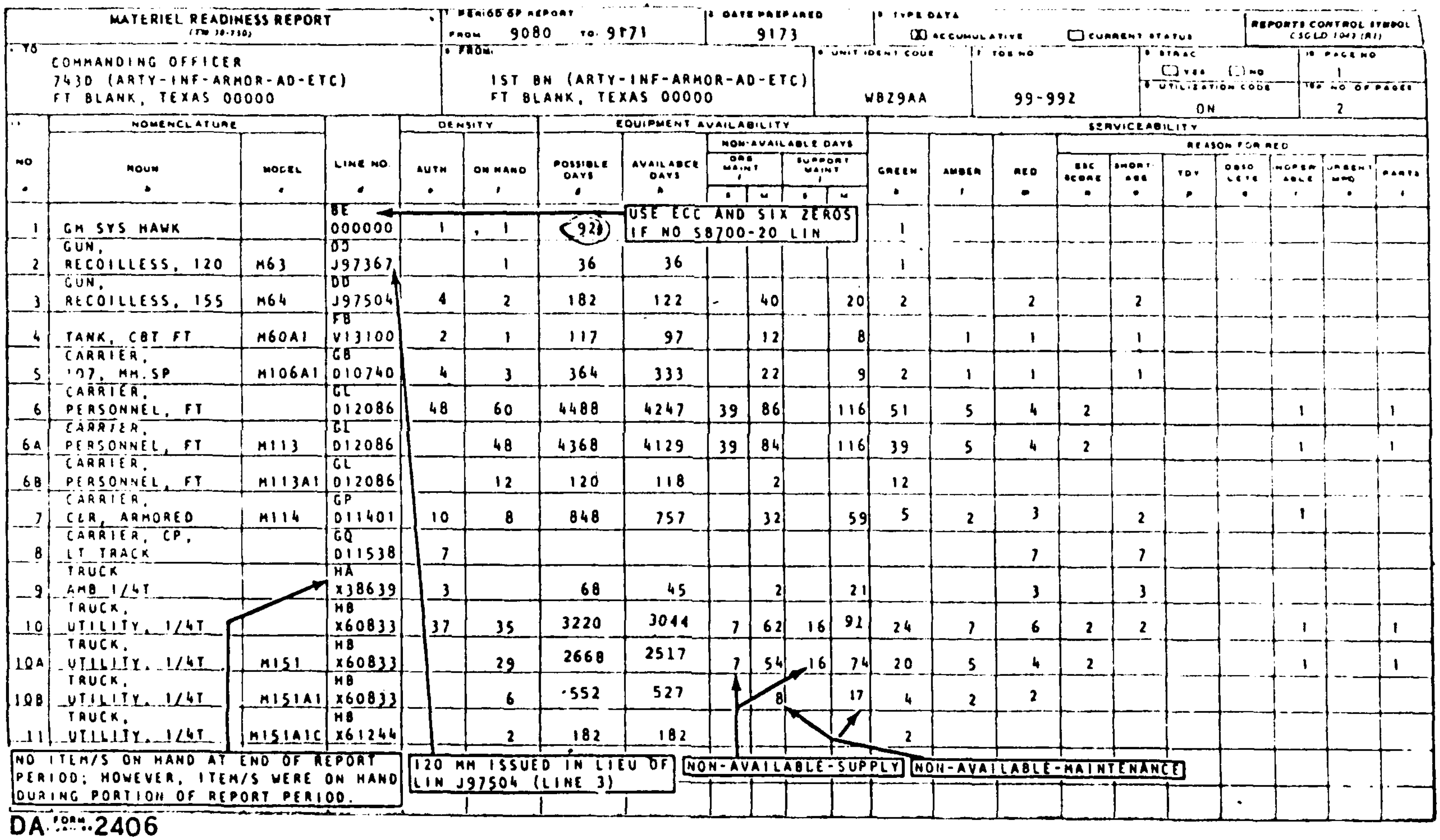
35. OPINION OR REMARKS. DESCRIBE CONDITIONS UNDER WHICH FAILURE OCCURRED. ATTACH PHOTOS OR SKETCHES, IF AVAILABLE

"ILLUSTRATES COMPLETED DA FORM 2407 FOR WORK ACCOMPLISHED BY SUPPORT MAINTENANCE ON A COMPONENT OF AN END ITEM BELONGING TO A SUPPORTED UNIT".

DA FORM 2407 CONTROL COPY 3

FIGURE E-2

Maintenance Request, Work Accomplished by Support Maintenance. (Example)



MATERIEL READINESS REPORT
(TM 38-750)

1. PERIOD OF REPORT FROM 9080 TO 9171
2. DATE PREPARED 9173
3. TYPE DATA ☒ ACCUMULATIVE ☐ CURRENT STATUS
REPORTS CONTROL SYMBOL CSGLD 1047 (R1)

4. TO
COMMANDING OFFICER
743D (ARTY-INF-ARMOR-AD-ETC)
FT BLANK, TEXAS 00000

5. FROM
1ST BN (ARTY-INF-ARMOR-AD-ETC)
FT BLANK, TEXAS 00000

6. UNIT IDENT CODE WBZ9AA
7. TOE NO 99-992
8. STRAC ☐ YES ☐ NO
9. UTILIZATION CODE ON
10. PAGE NO 1
10a. NO OF PAGES 2

NO a	NOMENCLATURE NOUN b	MODEL c	LINE NO. d	DENSITY AUTH e	ON HAND f	EQUIPMENT AVAILABILITY POSSIBLE DAYS g	AVAILABLE DAYS h	NON-AVAILABLE DAYS ORG MAINT i S	 M	 SUPPORT MAINT j S	 M	SERVICEABILITY GREEN k	AMBER l	RED m	REASON FOR RED ESC SCORE n	SHORTAGE o	TDY p	OBSOLETE q	INOPERABLE r	URGENT MWO s	PARTS t
1	GM SYS HAWK		BE 000000	1	1	92						1									
2	GUN, RECOILLESS, 120	M63	DJ J97367		1	36	36					1									
3	GUN, RECOILLESS, 155	M64	DD J97504	4	2	182	122	-	40		20	2		2		2					
4	TANK, CBT FT	M60A1	FB V13100	2	1	117	97		12		8		1	1		1					
5	CARRIER, 107, MM.SP	M106A1	GB D10740	4	3	364	333		22		9	2	1	1		1					
6	CARRIER, PERSONNEL, FT		GL D12086	48	60	4488	4247	39	86		116	51	5	4	2				1		1
6A	CARRIER, PERSONNEL, FT	M113	GL D12086		48	4368	4129	39	84		116	39	5	4	2				1		1
6B	CARRIER, PERSONNEL, FT	M113A1	GL D12086		12	120	118		2			12									
7	CARRIER, CLR, ARMORED	M114	GP D11401	10	8	848	757		32		59	5	2	3		2			1		
8	CARRIER, CP, LT TRACK		GQ D11538	7										7		7					
9	TRUCK AMB 1/4T		HA X38639	3		68	45		2		21			3		3					
10	TRUCK, UTILITY, 1/4T		HB X60833	37	35	3220	3044	7	62	16	91	24	7	6	2	2			1		1
10A	TRUCK, UTILITY, 1/4T	M151	HB X60833		29	2668	2517	7	54	16	74	20	5	4	2				1		1
10B	TRUCK, UTILITY, 1/4T	M151A1	HB X60833		6	·552	527		8		17	4	2	2							
11	TRUCK, UTILITY, 1/4T	M151A1C	HB X61244		2	182	182					2									

USE ECC AND SIX ZEROS IF NO SB700-20 LIN

NO ITEM/S ON HAND AT END OF REPORT PERIOD; HOWEVER, ITEM/S WERE ON HAND DURING PORTION OF REPORT PERIOD.

120 MM ISSUED IN LIEU OF LIN J97504 (LINE 3)

NON-AVAILABLE-SUPPLY

NON-AVAILABLE-MAINTENANCE

DA FORM 2406

FIGURE E-3

ORGANIZATION

	7.EQUIP SYS CD	8.A&I & CD	9.EQUIPMENT a.GAIN CD ○ b.LOSS CD ○	e.VERIFIED

	11.MODEL-M (a)	12.EQUIP SYS CD (a)	13.SERIAL/REG NUMBER (a)	14. IF MRS - LAST OVH
	(b)	(b)	(b)	(b)
	(c)	(c)	(c)	(c)
	(d)	(d)	(d)	(d)
	(e)	(e)	(e)	(e)
	(f)	(f)	(f)	(f)
	(g)	(g)	(g)	(g)
	(h)	(h)	(h)	(h)

STATUS CODES

II = IN PROCESS OF ISSUE; NOT ACTUALLY ON HAND
RC = RECEIVED
TI = TURNED IN
OM = NORM(ORG/AVUM)
OS = NORS(ORG/AVUM)
SM = NORM(SPT/AVIM)
SS = NORS(SPT/AVIM)
DM = NORM(DEPOT)
DS = NORS(DEPOT)
RC = REDUCED MATERIEL CONDITION
OR = FULLY OPERATIONALLY READY
AN = EQUIP IN ADMIN STORAGE; NOT RETURNABLE WITHIN 24 HOURS
TN = EQUIP ON TDY; NOT RETURNABLE WITHIN 24 HOURS

II - SUBSYSTEM STATUS

III - SYSTEM STATUS

IV - SUBSYSTEM DATA SUMMARY

	29.FULLY OP	30. RC	31. ORG NORM	32. ORG NORS	33. SPT NORM	34. SPT NORS	35. DEP NORM	36. DEP NORS	37. NOR SUM	38.AD STG	

SYSTEM DATA SUMMARY

		42. RC	43. ORG NORM	44. ORG NORS	45. SPT NORM	46. SPT NORS	47. DEP NORM	48. DEP NORS	49. AD STG	50. TDY	

STATUS DETAILS

	54.SPT UNIT	55.SPT PHONE NO.	56. RCN NO.	57.SPT DOC NO.	58.ROUTING ID CD	59.STA & DATE	60.FOLLOW-UP DATE	61. REMARKS

MATERIEL READINESS REPORT WORKSHEET

FIGURE E-4

98

SECTION VII END ITEM STATUS

[illegible]	
STATUS	
[illegible]	
DATE	
STATUS	
[illegible]	
DATE	
STATUS	
NOLP	
DATE	
[illegible]	
STATUS	
NOLP	
DATE	

SECTION VIII - END ITEM DATA SUMMARY

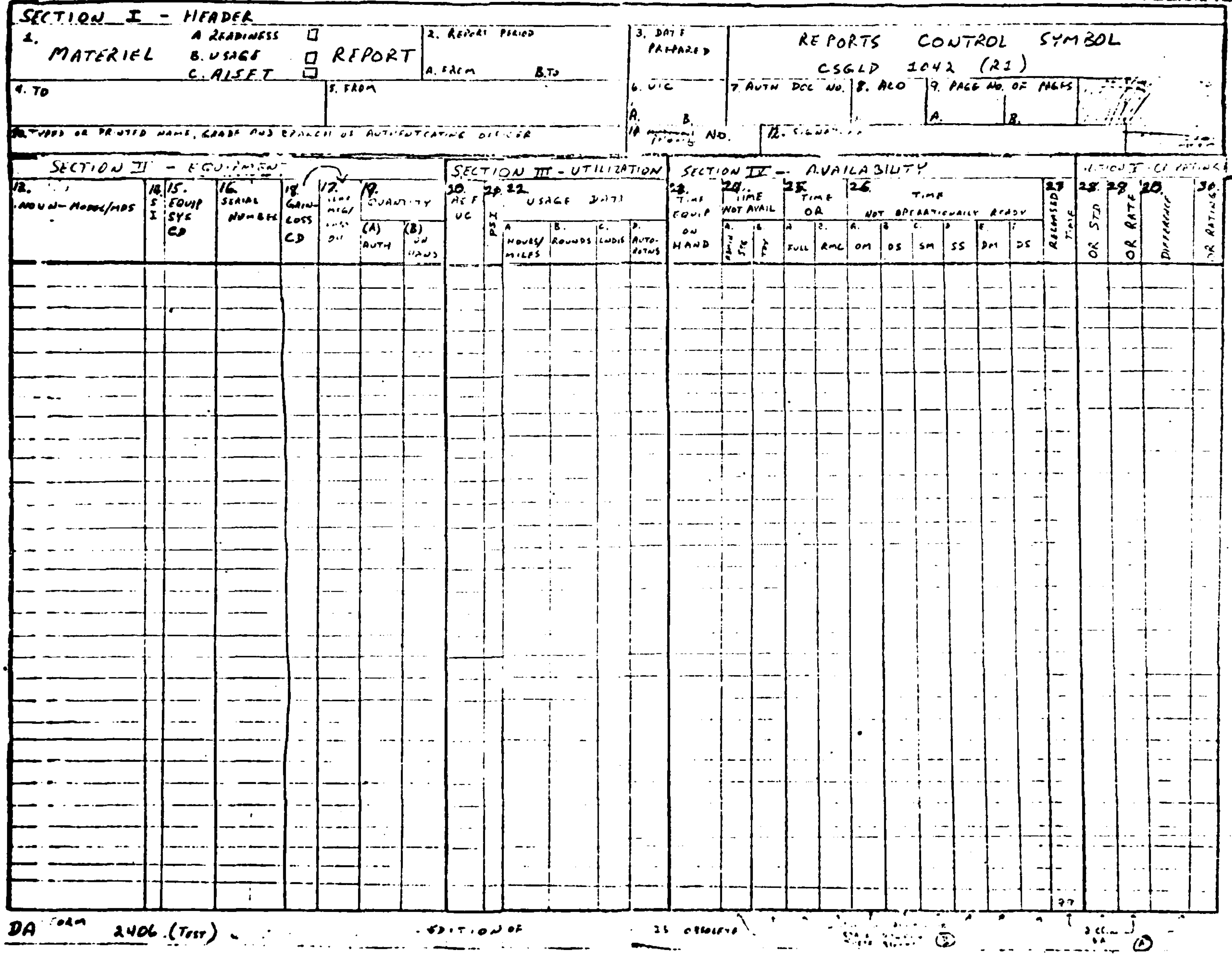
3. [illegible]	64. ON HAND	65. FULLY OR	66. ORG NORM	67. ORG NORS	68. SPT NORM	69. SPT NORS	70. DEP NORM	71. DEP NORS	72. AS SSG	73. TOT

SECTION IX - USAGE DATE

4. DAY	21	22	23	24	25	26	27	28	29	30	31	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	[illegible]
[illegible]																																
[illegible]																																
[illegible]																																
[illegible]																																
[illegible]																																
[illegible]																																
[illegible]																																
[illegible]																																

NOTES:

Figure E-4–Continued:



SECTION I - HEADER

1. MATERIEL A READINESS ☐ B. USAGE ☐ C. ALSET ☐ REPORT

2. REPORT PERIOD A. FROM B. TO

3. DATE PREPARED

REPORTS CONTROL SYMBOL
CSGLD 1042 (R1)

4. TO

5. FROM

6. UIC A. B.

7. AUTH DOC NO.

8. ALO

9. PAGE NO. OF PAGES A. B.

10. TYPED OR PRINTED NAME, GRADE AND BRANCH OF AUTHENTICATING OFFICER

11. ~~[illegible]~~ [illegible] NO.

12. SIGNA[illegible]

SECTION II - EQUIPMENT								SECTION III - UTILIZATION						SECTION IV - AVAILABILITY												SECTION V - CI RATINGS			
12. NOUN-MODEL/MDS	14. SI	15. EQUIP SYS CD	16. SERIAL NUMBER	18. GAIN-LOSS CD	17. [illegible]	19. QUANTITY		20. REF UC	21. PSI	22. USAGE DATA				23. TIME EQUIP ON HAND	24. TIME NOT AVAIL		25. TIME OR		26. TIME NOT OPERATIONALLY READY						27 RELEASED TIME	28. OR STD	28 OR RATE	20. DIFFERENCE	30. OR RATING
						(A) AUTH	(B) ON HAND			A HOURS/MILES	B. ROUNDS	C. LNDGS	D. AUTO-ROTNS		A. [illegible]	B. [illegible]	A FULL	2. RMC	A. OM	B DS	C. SM	D SS	E. DM	F DS					

DA FORM 2406 (Test) EDITION OF [illegible] IS OBSOLETE

FIGURE E-5

SECTION VI - EQUIPMENT STATUS

[illegible] 1.3 CD	[illegible] WORK ORDER NO.	[illegible] SPT LOC	35. SPT PHONE NO.	[illegible] REQ'N NUMBER	[illegible]. SPT DOC NO.	[illegible] NATIONAL STOCK NO.	[illegible] QTY REQ	[illegible] — RIC	[illegible] STATUS & DATE	42 DATE FOLLOWUP	43 REMARKS

SECTION VII - EQUIPMENT ON HAND

44 PROJECT CODE

45 EOH RATING

A TOTAL LIN REQ	B. PI % FILL	C. NO. LIN WITH LESS THAN 95% ALO	D. LIN 1	E. LIN 2	F LIN 3	G. LIN 4	H EOH RATING

46 EOH SHORT

A. RQD FOR ALO	B. PI	C. RIC	D. LINE ITEM NO.	E. NATIONAL STOCK NUMBER	F. NOUN	G. RQD QTY	H. ALO QTY	I. RQN QTY	J. MILSTRIP RQN NO. & DODAAC	K. IPD	L. STATUS & DATE	M. DATE LAST FOLLOW-UP	N. REMARKS

Figure E-5—Continued:

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APPENDIX F

ORF PEACETIME DISTRIBUTION MODEL

F.1 GENERAL.

Paragraph 3.2.6 stated that the overall availability of equipment in an area and not necessarily each unit's equipment availability is what most matters to deployment and training readiness. Clearly, this is true with sufficient warning time or preparation time and the proper control of equipment allocation in an area. In CONUS this means that all float stocks at an installation are available to any unit in need of equipment when deploying or training. In OCONUS theatres it means that all float stocks in the corps are similarly available. The model to be described below is constructed around this concept. Specifically, for a given area (e.g., installation in CONUS, or corps in OCONUS) if the target for equipment availability is A_r, and the number of supported equipment is N, then the number of float equipments, S_f is selected such that the expected number up, $N_{up} = N + S_f -$ expected number in repair pipeline $= N \times A_r$. This approach has an implicit interpretation of AR 220-1 availability goals. The Army philosophy on readiness, specifically equipment readiness, is that equipment availability equal to or above the targets reflects a ready unit. From a statistical sense, though unit equipment readiness may be controlled through ORF, the availability targets cannot be met all of the time. Naturally, the more the ORF the more frequently the availability targets can be met. But AR 220-1 provides only the availability targets; it says nothing at all about an acceptable frequency for achieving these targets although, of course, all of the time is desired. The above approach assumes that a satisfactory equipment readiness may be maintained by achieving the targets on an average basis. This, in fact, is consistent with the current method of collecting readiness statistics. So, if an installations' equipment readiness posture were observed and measured over a long time, the average of the measurements would be $A_r \times N$. Clearly the burden of the model is to determine the expected number of equipments in the repair pipeline as a function of the equipment failure characteristics, the repair time, and the amount of float, which has a sort of secondary effect on the number in repair since it primarily increases the number up and able to fail.

In developing the model it is assumed that authorized TOE quantities are necessary to enable the units to perform their missions. Consequently, when computing the expected number down it is assumed that float is used to keep as many TOE equipments up as possible. Float stock, then, is computed so that it has the potential to provide the target availability even if it were to be drawn for every failure of the equipment. However, as discussed in 3.2.6 and 3.2.7, this is not to be taken as a requirement that float be drawn everytime in the actual operating environment.

F.2 CONUS DISTRIBUTION MODEL.

Definitions:

S_f = amount of float stock

λ = failure rate for a given fielded equipment

M = number of units authorized the item.

N_i = authorized quantity of the item for unit i

N = number of equipments to be supported by float

$$= \sum_{i=1}^{M} N_i$$

A_r = availability requirement at the installation level.

$$\sum_{i=1}^{M} N_i A_i \qquad \sum_{i=1}^{M} N_i$$

T_o = average repair time at organization

T_o = average support turnaround time to include time to ship the item to support maintenance and the in-shop time

P_{org} = probability that a failure will be repaired at the organization level

When a failure occurs, the equipment is sent to organizational repair and with probability P_{org} is repaired there. With probability $(1-P_{org})$ the equipment requires support maintenance. Turnaround times at both organization and support level are independent of one another and are taken to be realizations generated from exponential distributions of means T_o, and T_s, respectively. The assumption of exponentially distributed times is not critical to the model itself, but greatly simplifies the collection of repair time data. See Appendix E.

To model this system we make use of an analogous system, the infinite server Markov queue with state dependent arrival rates. Sherbrooke [22] treats this in sufficient detail for our purposes.

If $\phi(k)$ = probability that k units are in the repair pipeline, then

$$\phi(o) = C$$

$$\phi(k) = C \quad \frac{(\lambda_o)(\lambda_1)(\lambda_2)---(\lambda_{k-1})}{k!} \cdot (T)^k$$

where $\lambda_i = \lambda N \text{ if } i \leq S_f$

$$\lambda_i = \lambda(N - i + S_f) \text{ if } S_f < i \leq N + S_f$$

$$T = (P_{org})(T_o) + (1 - P_{org})T_s$$

C is a normalizing constant chosen such that

$$\sum_{k=o}^{N+S_f} \phi(k) = 1$$

The expected number in the repair pipeline is

$$E(D) = \sum_{k=o}^{N+S_f} k\,\phi(k)$$

and consequently the expected number up is $E(U) = N + S_f - E(D)$

Then E(U)/N is the expected percent of fielded equipments available. Note that because of the emphasis on area availability, it is possible with large float quantities, to get a result greater than 100 percent. This only means that on the average there are more than enough up equipments at support level to compensate for those in the repair pipelines.

F.3 OVERSEAS DISTRIBUTION MODEL.

Paragraph 3.4.2 stated that overseas commands may requisition their full wartime ORF requirement for distribution to their units as they see fit. It also stated that the CONUS model would be made available to assist with the distribution problem. The quantity provided by the model is the minimum amount of ORF the commands should requisition.

The CONUS distribution model can also assist the commands in determining how many of the float assets to put in the field and consequently how many to retain in controlled storage. Naturally, it does so based upon the AR 220-1 availability targets. However, in an overseas theatre the issues are more complex than at a CONUS installation.

With the concept of area availability, it does not much matter whether assets are fielded or in controlled storage as long as sufficient warning time exists to get the stored item in the field where it is needed. With restructured general support, this certainly seems to be the case since GSU's will serve as storage locations for major items in the corps. Even though the model will show how much float should be available to the field during peacetime to maintain the readiness standards, it does not necessarily follow that this amount must be put in the field provided the amounts in storage are able to be easily drawn in case of need. Another implication of the availability concept is that the GSU should be the primary holder of ORF since this eases the problems of making assets available to units when needed.

F.4 EXAMPLE:

Application of Model to M551

The following failure and repair time estimates were obtained through analysis of SDC data for the M551.

λ = .0369 failures/end item/day

N = 116 supported equipments

T_o = 6.5 days (based on NORS and NORM figures)

T_s = 18 days

P_{org} = .7245

Float Stock	Expected Equipment Avail.
0	.737
1	.743
3	.756
10	.801
20	.864
30	.928

If 80 percent were the availability target, then 10 float items would be required to support the 116 M551 equipments. Were the target 85 percent, then 18 float equipments would be required.

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APPENDIX G

FLOAT EFFECTIVENESS REPORT

G.1 INDICATORS.

As stated in paragraph 3.2.6 and in Appendix F, it is the overall availability of the equipment in an area (installation, corps) which is critical in distributing ORF assets. This means that the combined availability of both the float and fielded assets should be considered in determining the adequate use and/or distribution of float to the given area. It is recommended that the statistics "Available Days" (including float) vs. "Required Days" be used as a management comparison for reviewing float effectiveness. Required days is the number of equipments which needs to be operational in order for materiel units to achieve their target availability as cited in paragraph 3.4.3 and Available Days is the materiel availability actually experienced by the units.

G.2 USE.

In practical use, this comparison for a given area is only an initial indicator of problems in the field. Low available days may be caused by:

(1) Not sufficient float assets distributed to the area to support the necessary maintenance actions.

(2) Abuse of float assets such as uncontrolled cannibalization, resulting in a low float availability.

(3) An increase in failure rates and/or maintenance times (higher than those used in determining the float distribution quantities).

On the other hand, high available days compared with required days may indicate, especially to OCONUS, that too much float is in the field and portions of it should be returned to storage.

G.3 DATA REQUIREMENTS AND CALCULATIONS.

For illustration purposes, the calculations and data sources for the "Available Days" and "Required Days" indicators will be limited to the battalion level. Higher levels (installation, command) may be calculated by rolling up the battalion values and lower levels (support, unit) which probably wouldn't be required, can be calculated in the same manner as battalion but with a lower level of input data. Reporting for several levels gives management the visibility of the interactions of the lower levels and their net effect on the total availability of the installation or command. As in the case of the ORF Data Requirements, Appendix E, the vehicle for capturing this necessary data is the Materiel Readiness Report, DA Form 2406. This form as shown in Figure G-1 is filled out monthly at the unit level and quarterly at the battalion level. The two statistics may be calculated and compared from the quarterly report in the following.

G.3.1 Available Days: The overall availability of the item at battalion level is the total available days of both the float and fielded requirements reported by each unit in column h of Form 2406; i.e.,

$$D_B = \sum_{i=1}^{M} D_i + \sum_{j=1}^{N} D_j'$$

where D_B = the number of Available Days of the item for the battalion.

M = number of units in battalion

D_i = the number of available days of the item for the unit per column h (excluding float items)

N = number of units holding float equipments for the item (usually a maintenance support unit).

D_j' = the number of available days of the float equipment for the unit per column h.

G.3.2 Required Days: Based on the total possible days (column g, Form 2406) excluding float equipment, the required days is the total number of days the battalion is required to have equipment available in accordance with the units availability target (ref. par. 3.4.3), i.e.,

$$R_B = \sum_{i=1}^{M} A_i R_i$$

where

R_B = required number of available days of the items for the battalion

M = number of units in the battalion

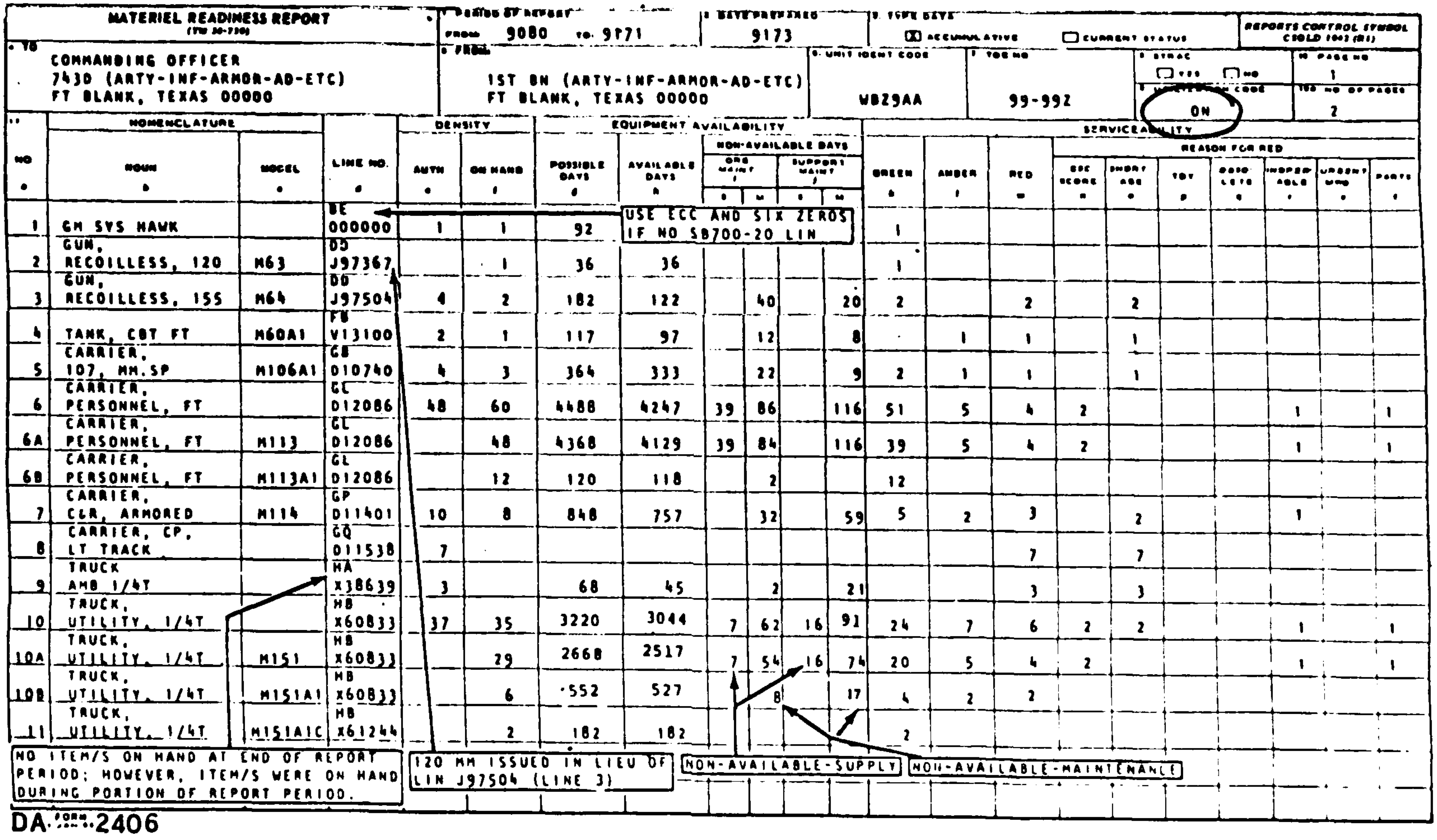
R_i = the number of possible available days (column g) of the item for the unit

A_i = availability target for the item, depending upon the ALO of each unit.

G.3.3 Comparisons: The results from subtracting the available days from the required days and dividing by the number of days in the period (($R_B - D_B$) ÷ 90 days]) gives a rough estimate as to the number of additional float items needed to achieve the battalion's target availability. As stated in the preceding section, this comparison is only an initial indicator and other problem areas should be explored before requesting additional float stock.

Note: In order to identify the availability of float assets, the support units with float items on their property book must report the availability of these items on a separate DA Form 2406 with utilization code 4 (indicating float stock). Based on the number of float items currently being reported on DA Form 2406, this requirement is not being satisfied.

RM 2406



MATERIEL READINESS REPORT (TM 38-750)

TO: COMMANDING OFFICER
743D (ARTY-INF-ARMOR-AD-ETC)
FT BLANK, TEXAS 00000

PERIOD OF REPORT: FROM 9080 TO 9171

DATE PREPARED: 9173

TYPE DAYS: ☒ ACCUMULATIVE ☐ CURRENT STATUS

REPORTS CONTROL SYMBOL CSGLD 1043 (R1)

FROM: 1ST BN (ARTY-INF-ARMOR-AD-ETC)
FT BLANK, TEXAS 00000

UNIT IDENT CODE: WBZ9AA

TOE NO: 99-992

STRAC: ☐ YES ☐ NO

[illegible] CODE: ON

PAGE NO: 1

NO OF PAGES: 2

	NOMENCLATURE			DENSITY		EQUIPMENT AVAILABILITY						SERVICEABILITY									
								NON-AVAILABLE DAYS							REASON FOR RED						
								ORG MAINT i		SUPPORT MAINT j											
NO a	NOUN b	MODEL c	LINE NO. d	AUTH e	ON HAND f	POSSIBLE DAYS g	AVAILABLE DAYS h	S	M	S	M	GREEN k	AMBER l	RED m	ESC SCORE n	SHORTAGE o	TDY p	OBSOLETE q	INOPERABLE r	URGENT MWO s	PARTS t
1	GM SYS HAWK		BE 000000	1	1	92						1									
2	GUN, RECOILLESS, 120	M63	DD J97367		1	36	36					1									
3	GUN, RECOILLESS, 155	M64	DD J97504	4	2	182	122		40		20	2		2		2					
4	TANK, CBT FT	M60A1	FB V13100	2	1	117	97		12		8		1	1		1					
5	CARRIER, 107, MM.SP	M106A1	GB D10740	4	3	364	333		22		9	2	1	1		1					
6	CARRIER, PERSONNEL, FT		GL D12086	48	60	4488	4247	39	86		116	51	5	4	2				1		1
6A	CARRIER, PERSONNEL, FT	M113	GL D12086		48	4368	4129	39	84		116	39	5	4	2				1		1
6B	CARRIER, PERSONNEL, FT	M113A1	GL D12086		12	120	118		2			12									
7	CARRIER, C&R, ARMORED	M114	GP D11401	10	8	848	757		32		59	5	2	3		2			1		
8	CARRIER, CP, LT TRACK		GQ D11538	7										7		7					
9	TRUCK AMB 1/4T		HA X38639	3		68	45		2		21			3		3					
10	TRUCK, UTILITY, 1/4T		HB X60833	37	35	3220	3044	7	62	16	91	24	7	6	2	2			1		1
10A	TRUCK, UTILITY, 1/4T	M151	HB X60833		29	2668	2517	7	54	16	74	20	5	4	2				1		1
10B	TRUCK, UTILITY, 1/4T	M151A1	HB X60833		6	·552	527		8		17	4	2	2							
11	TRUCK, UTILITY, 1/4T	M151A1C	HB X61244		2	182	182					2									

USE ECC AND SIX ZEROS IF NO SB700-20 LIN

NO ITEM/S ON HAND AT END OF REPORT PERIOD; HOWEVER, ITEM/S WERE ON HAND DURING PORTION OF REPORT PERIOD.

120 MM ISSUED IN LIEU OF LIN J97504 (LINE 3)

NON-AVAILABLE-SUPPLY

NON-AVAILABLE-MAINTENANCE

DA FORM 2406

Figure G-1. Materiel Readiness Report
(Example)

109

The changes in DA Form 2406 being recommended by the LOGC should not affect the methods of data collection and calculation mentioned above. IRO will keep abreast of any activities in this area that might impact the availability of the required data.

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APPENDIX H

H.1 Example 1.

The following example illustrates the application of the proposed wartime RCF method to a hypothetical item.

EXAMPLE

A. Assume the following input data.

1. Length of war = 8 months.

2. Average in-theatre densities, by month after D-Day.

Month	Average Density
1	500
2	700
3	800
4	850
5	875
6	900
7	900
8	900

3. Unserviceable generations, by month.

This includes generations due to equipment usage and due to combat damage requiring depot-level repair.

Month	Unserviceable Generations
1	20
2	28
3	32
4	34
5	17
6	18
7	18
8	18

Note: These unserviceable generations reflect a 4-month "intense" period and a 4-month "sustaining" period; hence, the decrease between months 4 and 5.

4. Unserviceables on-hand at the depot on D-Day = 20.

5. Maximum depot induction rate, by month, based on a given allocation of depot capacity.

Month	Maximum Induction Rate
1	10
2	15
3	20
4	25
5	25
6	25
7	25
8	25

6. Transportation Times

Theatre-To-Depot = 1 month

Depot-To-Theatre = 1 month

7. Depot Repair Time = 1 month

B. Float Determination.

1. First, adjust the depot induction rate for the D-Day unserviceables. In this example, the 20 items on hand at D-Day require all of the capacity of Month 1 and reduces the Month 2 capacity for inducting new returns to five items.

Thus, the depot capacity available for processing new inductions would be as follows:

Month	Maximum Induction Rate for New Returns
1	0
2	5
3	20
4	25
5	25
6	25
7	25
8	25

2. Second, calculate the arrivals of new generations to the depots. This is the schedule of generations, delayed by the threatre-to-depot transportation time (in this example, 1 month).

Month	Arrivals At Depot
1	0
2	20
3	28
4	32
5	34
6	17
7	18
8	18

3. Next, calculate depot inductions during each month.

Let I_i = inductions during month i

$IMAX_i$ = max. inductions during month i

A_i = arrivals at depot in month i

E_i = unserviceable item inventory at the end of month i

$$I_i = \text{Min} \left\{ E_{i-1} + A_i, IMAX_i \right\}$$

$$E_i = E_{i-1} + A_i - I_i$$

$$E_o = 0$$

Month	E_{i-1}	A_i	$(E_{i-1}+A_i)$	$IMAX_i$	I_i	E_i
1	0	0	0	0	0	0
2	0	20	20	5	5	15
3	15	28	43	20	20	23
4	23	32	55	25	25	30
5	30	34	64	25	25	39
6	39	17	56	25	25	31
7	31	18	49	25	25	24
8	24	18	42	25	25	17

4. Next, calculate the depot output, which is the induction schedule delayed by the depot repair time (in this example, 1 month).

Month	Depot Output During Month
1	0
2	0
3	5
4	20
5	25
6	25
7	25
8	25

5. Next, calculate the returns to the theatre, which is the depot output delayed by the depot-to-theatre transportation time.

Month	Returns to Theatre During Month
1	0
2	0
3	0
4	5
5	20
6	25
7	25
8	25

6. Calculate the cumulative generations, the cumulative returns to the theatre, and the difference between the two (which is the RCF requirement).

Month	Cum. Generations	Cum. Returns	RCF Requirement
1	20	0	20
2	48	0	48
3	80	0	80
4	114	5	109
5	131	25	106
6	149	50	99
7	167	75	92
8	185	100	85

In this example, the maximum of 109 occurs during month 4.

H.2 Example 2.

This example illustrates the method for jointly determining the RCF and combat consumption requirements.

Assume that in the first 4 months, that the combat loss is 20 percent per month, and that in the last 4 months, it is 10 percent per month. Based on the deployment schedule given in Example 1, the following table shows the monthly and cumulative losses.

Month	Avg. Deployed Density	Loss Factor	Losses	Cum. Losses
1	500	.2	100	100
2	700	.2	140	240
3	800	.2	160	400
4	850	.2	170	570
5	875	.1	88	658
6	900	.1	90	748
7	900	.1	90	928

The combat consumption requirement is 928. The RCF requirement previously calculated was 109, for a total of 1,037.

The following table shows what happens if the requirements are computed jointly.

Month	Cum. Combat Cons.	Cum. Uns. Gen.	Total	Ret. From Depot	= Total Requirement
1	100	20	120	0	120
2	240	48	288	0	288
3	400	80	480	0	480
4	570	114	684	5	679
5	658	131	789	25	764
6	748	149	897	50	847
7	838	167	1005	75	930
8	928	185	1113	100	1013

The joint calculation yields a maximum requirement for combat consumption and RCF of 1013, occurring for the eighth month which is a 2.3 percent less than the sum of the separate calculations.

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