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THE WAR RESERVE COMPONENT OF THE MARINE CORPS LOGISTICS SYSTEMS--ETC(U)

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The War Reserve Component of the Marine Corps Logistics System

by

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Captain, United States Marine Corps
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ABSTRACT

The War Reserve System is designed to provide the Marine Corps with materiel support in the event it is committed to combat operations. An understanding of this system is essential not only for those who operate it, but also for those Marines who will be the recipient of its output. This thesis examines the War Reserve System in its four major phases of materiel requirements determination, attainment and storage of assets, asset withdrawal and distribution, and the replenishment of supplies in the combat objective area. Problem areas within the system are analyzed and recommendations made for alleviating them.

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TABLE OF ABBREVIATIONS

ABFC	Advanced Base Functional Components
AOA	Amphibious Objective Area
AR	Automatic Resupply
BLT	Battalion Landing Team
CARF	Combat Active Replacement Factor
CMC	Commandant of the Marine Corps
CNO	Chief of Naval Operations
CONUS	Continental United States
DoD	Department of Defense
DPPG	Defense Programming and Planning Guidance
FMF	Fleet Marine Force
FSSG	Force Service Support Group
HQMC	Headquarters, Marine Corps
IMM	Integrated Materiel Manager
JCS	Joint Chiefs of Staff
LFORM	Landing Force Operational Reserve Materiel
MAB	Marine Amphibious Brigade
MAC	Military Airlift Command
MAF	Marine Amphibious Force
MAGTF	Marine Air Ground Task Force
MAU	Marine Amphibious Unit
MCI	Meal, Combat Individual
MCLSA	Marine Corps Logistics Support Activity
MCSC	Marine Corps Supply Center
MHE	Materiel Handling Equipment
MIC	Materiel Identification Code

MIMMS	Marine Corps Integrated Maintenance Management System
MO	Mount-Out
MOA	Mount-Out Augmentation
MRO	Materiel Release Order
MSC	Military Sealift Command
MTMC	Military Traffic Management Command
MUMMS	Marine Corps Unified Materiel Management System
NAD	Naval Ammunition Depot
NSN	National Stock Number
OTC	Operational Test Code
OWRMR	Other War Reserve Materiel Requirement
POE	Port of Embarkation
POL	Petroleum, Oil, and Lubricants
POR	Packaged Operational Rations
P, P & P	Preservation, Packaging, and Packing
PWR	Prepositioned War Reserve
PWRMR	PWR Materiel Requirements
PWRMS	PWR Materiel Stocks
RO	Requisitioning Objective
ROP	Reorder Point
SASSY	Supported Activities Supply System
SMU	SASSY Management Unit
SRI	Stanford Research Institute
SS-03	Inventory control system of MUMMS
SS-11	War Reserve subsystem of MUMMS
TAM	Table of Authorized Material
T/E	Table of Equipment

WMPC	War Materiel Procurement Capability
WRMR	War Reserve Materiel Requirement
WRS	War Reserve Stock
4th DWT	4th Division/Wing Team (Marine Corps Reserve)

I. INTRODUCTION

A. BACKGROUND

The opinion exists among Marines, especially those unfamiliar with the logistics system, is that in time of war vast quantities of new materiel will be available to those units assigned to combat. This opinion is correct only to the extent that the Marine Corps has a good deal of money invested in assets to be used in wartime. The misunderstanding involves the purpose of this materiel.

Often the imperfect condition of peacetime equipment is rationalized by a trusting faith that new, combat-ready equipment is being stored somewhere for use as immediate replacement items in the event of mobilization. In reality, these items exist as prepositioned assets which are to serve instead as a protection level of stock during the initial weeks of a combat operation or as the initial issue allowance for reserve units being activated.

The appropriate extent of such assets is difficult to determine. Obviously, a trade-off must be made between peacetime efficiency and wartime potential since constraints exist in any logistics system. Balanced feasible solutions must be found during peacetime since, in the event of war, the time may not exist for making corrections.

As with any program within the Marine Corps, the War Reserve System is governed by specific policies, regulations, and directives. Many are the result of guidance prescribed by higher command levels outside the Marine Corps hierarchy. By examining these guidelines, it is possible to understand the reasons behind the functioning of the war reserve concept as it applies to the Marine Corps.

An examination of the major operational processes that constitute the entire Marine Corps logistics system will provide an opportunity to identify problem areas and bottlenecks that could exist in the event of war. The concern is to recognize constraints that may affect the flow of material from the storage sites to the consumers. This will involve an examination of the various levels of stock management and how they are equipped to shift from peacetime operation to wartime mobilization. This is especially important for the Corps in light of its requirement to be a "force in readiness".

B. OBJECTIVE

Since a significant number of readers may not understand the function of war reserve stock, the objective of this thesis is to examine the Marine Corps War Reserve System and to illustrate how it functions. The desire here is to present an understanding of how wartime requirements are determined and the current attempts being made by Headquarters,

Marine Corps to ensure that these requirements are attained, positioned, and deliverable to the combat units in a timely, effective manner.

C. SCOPE

The complexity and pervasiveness of the Marine Corps War Reserve System limits the detail with which this analysis is performed. Logistics interaction with other service branches and Department of Defense agencies is acknowledged but not analyzed in detail.

The content of this thesis is limited to materiel of an unclassified nature. Much of the planning and programming of war reserve materiel requirements consists of classified material due to the nature of the contingencies involved, but this information was not considered essential to this presentation.

The disposition of the Marine Corps Reserves in time of war falls under the area of classified information and, for that reason, is not presented in detail. Requirements for mobilizing and supporting such units are discussed, but the primary emphasis is placed on the War Reserve System as it applies to active Marine Corps forces.

D. SUMMARY OF CHAPTERS

The initial chapter provides an overview of the environment of the Marine Corps with emphasis on the logistics structure and how it supports the Marine Corps in accomplishing its mission.

The chapters that follow describe and analyze the overall structure of the Marine Corps War Reserve System. Chapter III presents the process of materiel requirements determination. Once the requirements are known, a process must be implemented to acquire and maintain the corresponding assets. This phase is discussed in Chapter IV.

The subsequent two chapters deal with the operational aspect of the War Reserve System; that is, the processes that are activated in the event the Marine Corps is called to meet an emergency contingency requirement. Chapter V considers the time period from initial notification of mobilization to the delivery of materiel assets to the amphibious area. Chapter VI considers the follow-on phase during which resupply is of concern.

The final chapter contains conclusions and recommendations drawn from the analysis.

II. ENVIRONMENT

A. MISSION OF THE MARINE CORPS

The mission of the Marine Corps is highlighted by its need to provide Fleet Marine Forces (FMF) with air and ground capacity that allows for the seizure and defense of advanced naval bases [1:6].

In addition, the Marine Corps is required to provide detachments for service on armed Navy vessels, to coordinate with other services in the development of amphibious warfare techniques, to be prepared for wartime expansion as per joint mobilization plans, and to perform other missions as directed by the President [2:I-1].

To accomplish these tasks the Marine Corps has organized itself into three segments: (1) FMF, (2) Supporting Establishment and (3) Marine Corps Reserve. The emphasis of this study will not include consideration of the Supporting Establishment which includes all posts, camps and stations and is operated under separate operational, administrative and fiscal guidelines than those of the FMF [2:I-1].

The organizational structure that allows for primary mission accomplishment is shown in Figure 1. The identification of a central logistics unit at each level should be noted since this is the basis for the combat support portion of an amphibious mission. It should also be noted that the organization of the Marine Corps Reserve is patterned in the

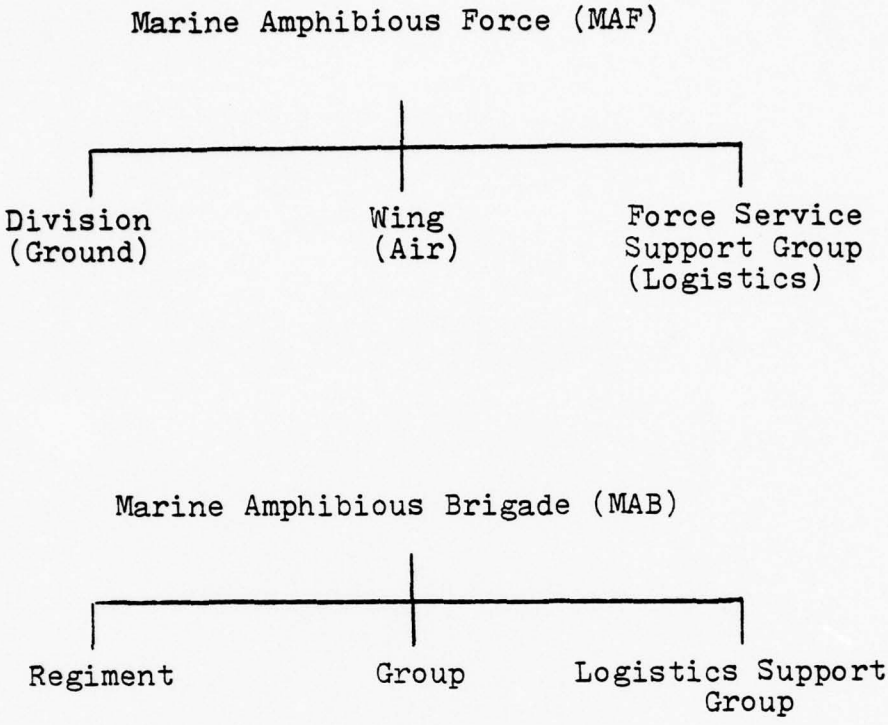
fashion as depicted in Figure 1. Since the Corps maintains three active wings and divisions, the Reserve is often referred to as the 4th DWT (Division/Wing Team).

The fact that the Marine Corps is required to accomplish amphibious missions, as assigned by the President, has created the need for the FMF to be a force in readiness. As a result, emphasis is placed on its ability to logistically support a wide variety of contingencies in numerous geographic areas. This capability is made difficult by the inherent characteristic of any highly mobile organization, that being its ability to function with minimum notification [5:1]. This applies to all echelons of Marine Air Ground Task Force (MAGTF) as pictured in Figure 1.

B. DEPARTMENT OF DEFENSE AND JOINT CHIEFS OF STAFF GUIDANCE

An essential factor in attaining a state of combat readiness is the provision for a workable war reserve materiel system to provide the logistical support for units engaged in assigned contingency missions to diverse environments. The Department of Defense has directed the establishment of such a war reserve system within each branch of the service.

The annual Defense Planning and Program Guidance (DPPG) provides the authority for the Marine Corps and the other U.S. military services to construct their WRS (War Reserve Stock) systems [2:III-14]. Although requirements are made known and policies are defined by the DPPG, each service



Three Basic Organizational Levels
Within the FMF [9:15]

Figure 1

is given the latitude to implement its own system, to develop its own computational methods and item selection criteria, and to allocate required funds.

The Commandant of the Marine Corps (CMC) assumes responsibility for determining materiel requirements as outlined by DOD/JCS directives. These directives are designed to insure that all of the military services' responsibilities for supporting forces assigned to Unified and Specified Commands are uniformly executed [2:2]. These directives recognize the importance of inter-service coordination where an overlapping of systems exists. This is an important concern of CMC in that he is reliant on other services to provide transportation of war reserve materiel.

Although each service is given authority to determine, acquire and manage its war reserve assets, DoD has made efforts to provide for a common base in order to uniformly allocate funds within DoD agencies and to insure that, once allocated, funds are utilized in a method that will provide some assurance of prioritized acquisition. Some of these efforts are further discussed in the Logistics Management Institute's report on Identification of War Reserve Stock [4].

In establishing a base, it is essential to be explicit about the purpose of those assets to be used as WRS. JCS Publication 1 provides the following definition: "War Reserve Materiel Requirement - The quantity of an item, in addition to the M-Day* force materiel requirement required

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*M-Day--the day when mobilization begins and asset withdrawal from the WRS begins.

to be in the military supply system on M-Day in order to support planned mobilization, to expand the materiel pipeline, and to sustain in training, combat, and combat support operations, as applicable, the approved U.S. force structure (active and reserve) and those Allied forces designated for U.S. materiel support, through the period described for war materiel planning purposes" [4:12].

Basically, this definition implies that the need exists to have stock on-hand during peacetime that will allow units to accomplish contingency missions as prescribed by DoD/JCS directives and includes all requirements necessary to sustain operations until resupply lines can be established and wartime production reaches a satisfactory level.

Many of the actual time frame considerations regarding required levels of supply to be maintained are classified, as are the detailed descriptions of contingency plans determined by DoD/JCS. However, the important point to make here is that DoD/JCS makes known the requirements of each service, and it is the service's responsibility to insure that materiel required to accomplish these missions is identified, acquired, positioned, and maintained. In addition, each service must develop a system that will allow for the timely withdrawal of such assets.

C. STRUCTURE AND CONCEPT OF WAR RESERVE SYSTEM

1. Marine Corps Logistics Support System (MCLSS)

The Marine Corps' logistics concept emphasizes the need for it to be readily adaptable to a wartime scenario. For that reason many procedures for materiel attainment are similar in both garrison and deployed situations. Communication lines for both materiel and information flow are basically the same for both circumstances.

Changes have occurred over the last five years that have made the MCLSS more compatible with the overall DoD supply system. The principal change was the shift to a centralized management and decentralized distribution concept that released a large amount of retail stocks from Marine Corps control and allowed for direct requisitioning from DoD-designated integrated materiel managers (IMM). The Marine Corps maintains IMM responsibility for those items that were not under the cognizance of any other DoD agency. This concept will be discussed in subsequent paragraphs.

The structure of the MCLSS is basically organized in three levels: (1) Headquarters, Marine Corps (HQMC), (2) Marine Corps Logistics Support Activity (MCLSA) Albany, Georgia, and (3) the FMF and Supporting Establishment. The intent of this structure is that policy will be determined at the HQMC level, logicial support will be provided by MCLSA, and the using unit will receive the product of these two in order to fulfill its mission.

The MCLSA is the central management activity at the wholesale level. Its major responsibilities include (a) acting as IMM for those items unique to the Marine Corps, (b) providing the centralized accounting required for acquiring and maintaining these items, and (c) managing the Marine Corps' WRS system, including requirements determination, attainment of assets, positioning and distribution of materiel. The Marine Corps Unified Materiel Management System (MUMMS) is the tool utilized to accomplish these tasks.

MUMMS goals are "effective management, improved responsivieness to requirements, accurate and timely information for all levels of management and compatibility with standardized DoD systems and procedures [2:II-8]. This is accomplished through the implementation of sixteen integrated subsystems operated at MCLSA. The core of these is Inventory Control Subsystem 03.

The actual storage, maintenance, and distribution of materiel is accomplished at the Marine Corps Supply Centers (MCSC) at Barstow, CA, and Albany, GA. Those items held at this level are considered to be the "in-stores" element. The maintenance support for Marine Corps-managed items and WRS, including repair, testing, calibration, and packaging, is accomplished at these locations. Subsystems exist to provide management information assistance in the execution of these responsibilities.

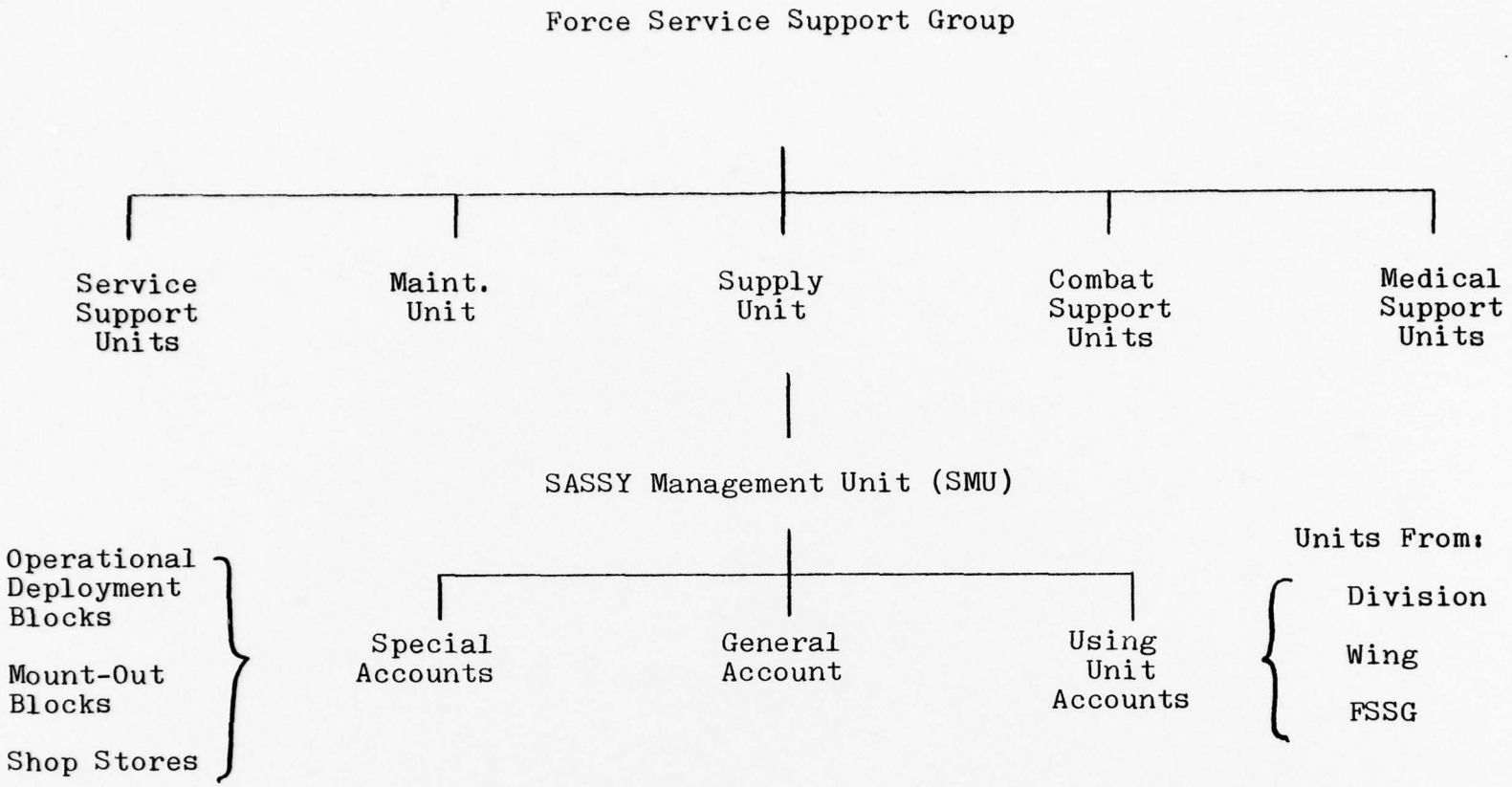
The final level of the MCLSS is the FMF component. All assets held at this level are known as the "out-of-stores"

element and are used for the direct support of using units. These units are organized in a manner that allows for a maximum amount of organic support capability where feasible.

As shown in Figure 1, each echeleon of the FMF possesses a logistics element. The primary element is the Force Service Support Group (FSSG). The FSSG serves as a connection between the using units and the DoD system of IMM's. It also provides maintenance service, supply management facilities, and other logistic needs to the using units.

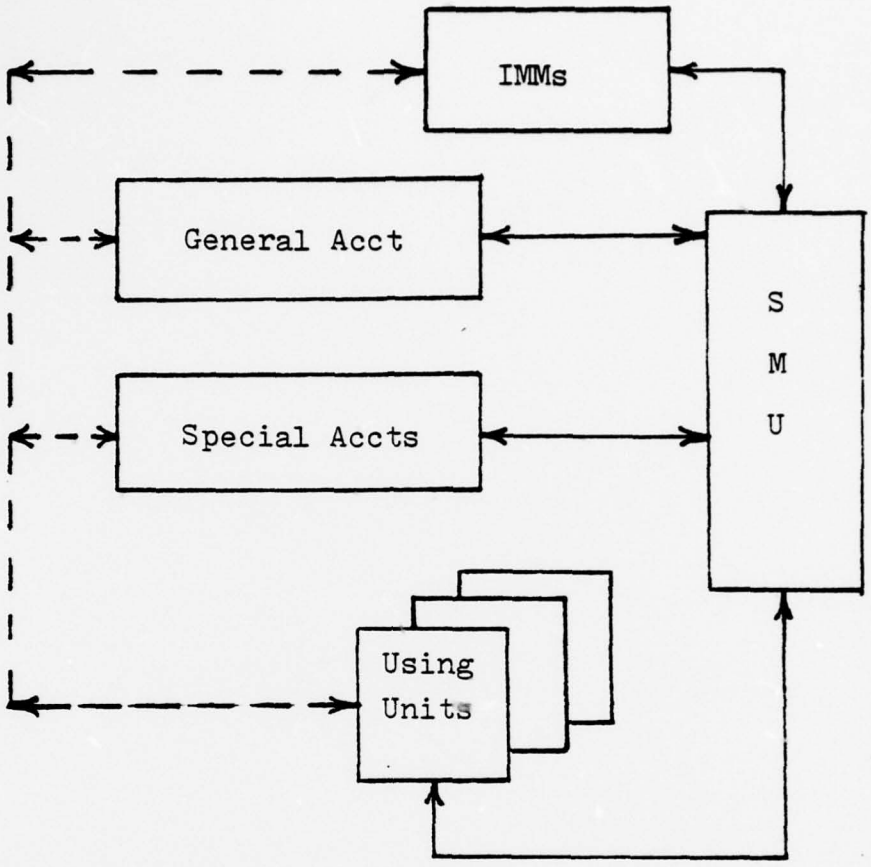
Figure 2a shows the basic structure of the FSSG with an emphasis on the supply portion. The key to supply support with the FMF is the Supported Activities Supply System (SASSY). The premise of SASSY is to relieve the burden of manual record keeping from the using unit and to have it performed in a centralized manner by the SASSY Management Unit (SMU) which supports an entire MAF. This not only insures standard accounting and requisitioning methods, but also allows for MAF-wide asset visibility and redistribution capability. Figure 2b shows a basic schematic of this relationship.

The general account is primarily the "warehouse" for stock required by the using units. While the SMU calculates operating levels of stock and reorder points based on the "days of supply" model used by the Marine Corps, this operating stock is maintained and issued by the general



Structure of MAF Supply Support

Figure 2a



——— Information Flow

— — — Materiel Flow

Interrelationships of MAF Supply Support

Figure 2b

account. In order to replenish this stock, the SMU places requisitions directly to IMM's.

Included in the special accounts shown in Figure 2a are the operational deployment stocks and the prepositioned war reserve materiel stocks (PWRMS) which are key elements of the WRS system in the Marine Corps. The operational deployment blocks contain those items that quality for stockage under the present criteria. The usage history is obtained from current peacetime operations.

2. Marine Corps War Reserve System

As was mentioned above, the function of the Marine Corps WRS is to provide enough material support to FMF units engaged in predetermined contingencies. The extent of this support will allow for continued operation until that time when resupply lines are established and functioning.

In order to understand the Marine Corps war reserve concept, it is useful to become familiar with the terms used in describing the system itself. In some cases definitions of terms used are taken from DoD/JCS sources and, in that way, allow for continuity.

The War Materiel Requirement (WMR) is calculated on an item-by-item basis for the entire period of support designated for each MAF by the Defense Planning and Programming Guidance Memorandum. The elements making up this WMR include the War Reserve Materiel Requirement (WRMR) as well as peacetime assets (e.g., normal operating stock) and the war

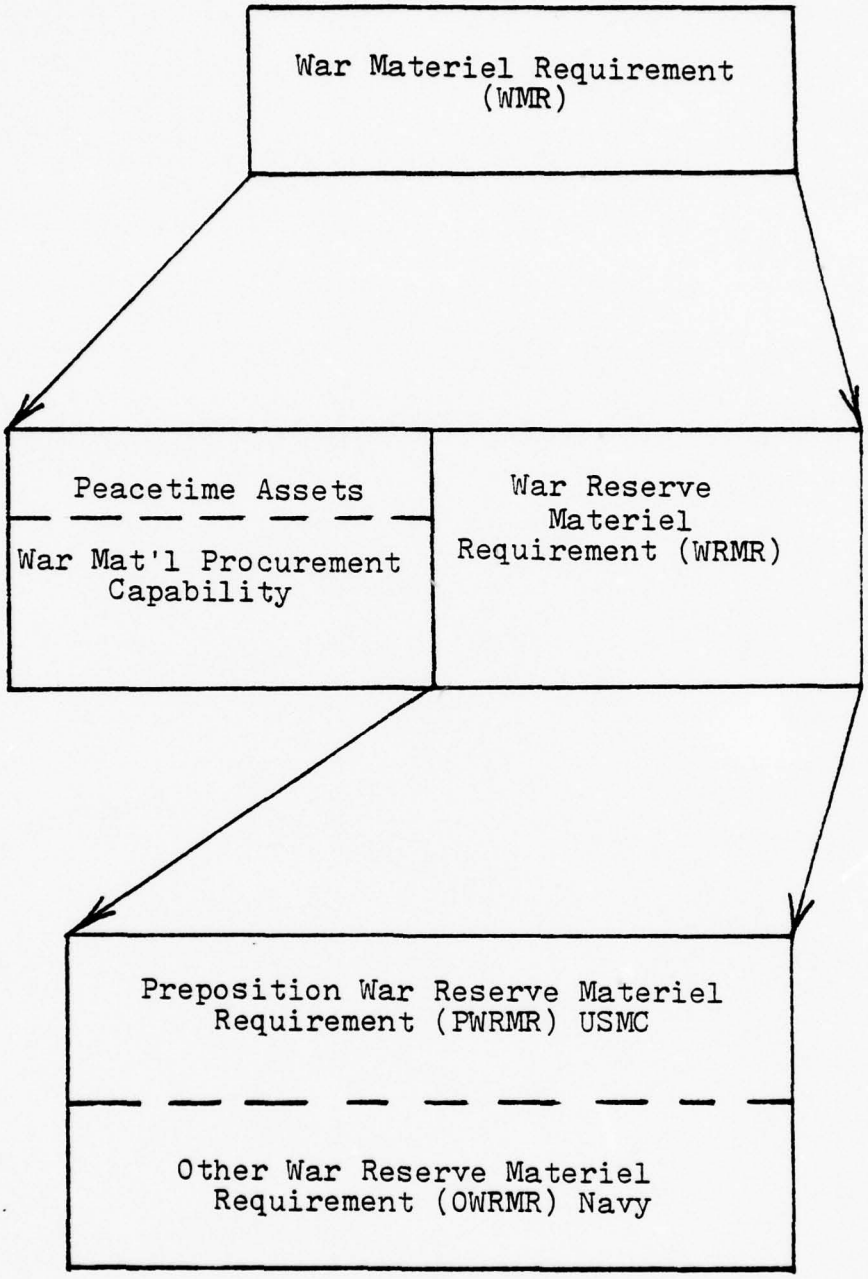
materiel procurement capability. This relationship is shown in Figure 3 [8:A-3].

There is no prescribed mix of these three components. The WMR may be totally satisfied by peacetime assets for one itme, while another may need excessive augmentation by the WRMR to meet the needs of a wartime emergency (e.g., ammunition requirements).

The Marine Corps War Reserve Policy Manual P4400.39D defines war materiel procurement capability (WMPC) as "the quantity of an item which can be acquired by orders placed on or after the day an operation commences (D-Day) from industry or any other available source." This element becomes more important when considering the establishment of a resupply pipeline that allows for continued materiel support for an indefinite period of time.

The WRMR is the excess materiel needed to be held during peacetime that will allow for contingency requirements to be met. In nearly all cases, this materiel is not available for issue to meet peacetime requirements.

As shown in Figure 3, the WRMR is composed of two elements: (1) Prepositioned WRMR and (2) other WRMR. The PWRMR consists of all such stocks held by the Marine Corps, either in-stores or with FMF units. Those items held by the Navy (e.g., medical supplies, aviation ammunition) are considered OWRMR. Also included in this category are those Marine Corps requirements prepositioned aboard designated amphibious assault ships (Landing Force Operational Reserve Materiel) (LFORM). LFORM will be discussed in Chapter IV.



War Reserve System Concept [8:B-1]

Figure 3

In March, 1976, HQMC published a new War Reserve Policy Manual which significantly changed the procedures used for computing and managing WRMR. The salient features of the new policy include the (a) central computation of both mount-out* and resupply requirements, (b) capability for rapid withdrawal of initial issue assets needed by Reserve Units tabbled for mobilization, (c) requisition of resupply requirements by deployed units, (d) capability to conduct asset withdrawal simulations, and (e) management visibility of war reserve status for both mount-out and resupply materiel.

The basic difference between this concept and the previous system is the departure from the "push" methods of resupply. Under the latter system, FMF units maintained thirty-day mount-out increments of supply and embarked with these blocks. At prescribed intervals, the stores system would furnish identical thirty-day blocks to serve as replenishment. The initial replenishment block was referred to as mount-out augmentation (MOA), and all subsequent blocks were called automatic resupply (AR). Figure 4 shows the structure of the previous PWR system. The use of these thirty-day increments is shown.

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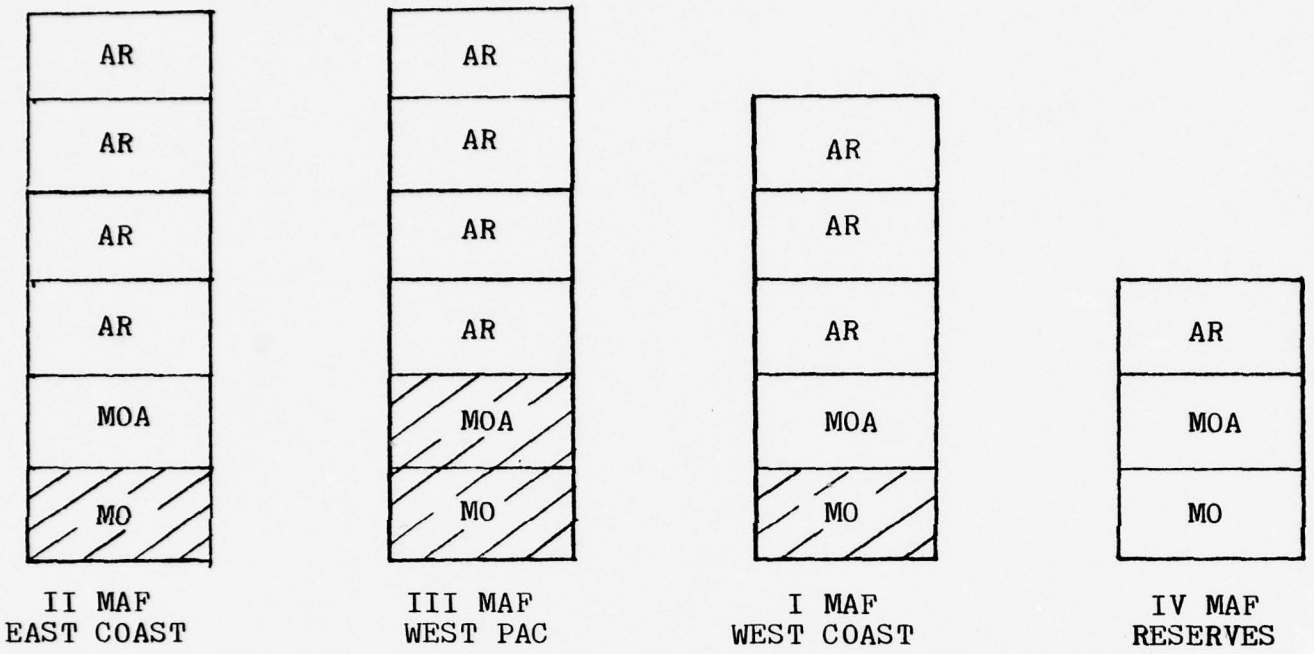
*Mount-out, as defined in the PWR Policy Manual, is the materiel level designed to support combat, combat support, and combat service support operations until resupply is established. When practicable, it is attained, prepositioned, and embarked with FMF assault or assault follow-on units. It will usually consist of sixty days of supply.



STRUCTURE OF PREVIOUS WAR RESERVE SYSTEM (2:C-1)

Figure 4

The current policy calls for units to deploy with a sixty-day mount-out and to requisition subsequent needs as they occur. Units will utilize the logistic support unit within their echelon for replenishment purposes. Requisitions not able to be satisfied will be forwarded the MCLSA which will utilize existing PWRMS to fill the deficiency. If assets are not available, the requisition is immediately passed to the corresponding IMM.

The MCLSA will insure that usage data is relayed to cognizant IMM's on that materiel issued out of PWRMS to meet resupply requests that will subsequently be provided exclusively by IMM's [8:1-7]. In this way, these DoD agencies are able to properly plan for their own materiel requirements. The resupply function of the war process is essential.

D. RESPONSIBILITY

1. HQMC

Although the Commandant of the Marine Corps assumes ultimate responsibility for the materiel readiness of the Corps, he has delegated the authority to specific staff officers at the Headquarters level to administer policies that insure a proper state of readiness. The War Reserve Manual has listed the duties required of various staff members regarding the implementation of the war reserve program.

The impetus for staff planning, coordinating, and programming of war reserve policy is provided by the Chief

of Staff, HQMC. He receives assistance from the Deputy Chiefs of Staff for Plans and Operations and for Requirements and Programs in determining objectives of the WRS system as they relate to assigned contingencies, troop strength, force structure, and means of employment (8:1-9). Budgeting constraints are also a major planning factor.

The Deputy Chief of Staff for Installations and Logistics has more specific responsibilities regarding the realization of war reserve objectives. His duties include (a) publishing policy directives, (b) developing meteriel management policies for all classes of supply, (c) monitoring procurement action, (d) overseeing acquisition and distribution of assets in conjunction with recommended allocation priorities, and (e) providing a means of observing status of war reserve program in terms of objectives realization (8:1-9).

2. Marine Corps Logistics Support Activity (MCLSA)

As was mentioned above, the actual materiel management of all PWRM held within the Marine Corps Stores System is performed by the MCLSA. This includes the computation of war reserve requirements as outlined in HQMC policy.

This management control is also extended to cover the storage, maintenance, and care for those assets held "in-stores" at Barstow and Albany. This includes the repair of serviceable end items and the rotation of assets to operating forces in order to attain full utility from on-hand inventory.

As a result of being responsible for the physical well-being of war reserve assets, the MCLA is very involved

in the status reporting function of the WRS system. As stated previously, MUMMS is utilized to accomplish these tasks.

3. FMF

The responsibilities of the Force commanders are similar to those of the Commanding General, MCLSA, in that they must insure the materiel readiness of those war reserve assets held at the FMF level. This includes maintenance, storage, and packaging. Since the FMF units generally hold their sixty-day mount-out, it is essential that these assets be maintained in a ready-for-issue and ready-for-embark mode.

The Force commanders are responsible for funding and acquiring those war reserve stocks held at this level and for reporting the status of that attainment. In acquiring assets, the FMF commander will use HQMC policy as guidance and utilize computational assistance provided by the MCLSA (6:I-10).

The FMF commander is ultimately responsible for insuring the accomplishment of those contingency missions assigned to his Force. This requires an analysis of the task and the materiel required to perform that task. If currently held PWRS does not satisfy the foreseen requirements, the FMF commander is responsible for initiating action to modify the existing war reserve requirements.

III. MATERIEL REQUIREMENTS DETERMINATION

A. CRITERIA FOR ASSET COMPOSITION

In accordance with the Marine Corps mission, the task organized forces should possess the types of materiel needed to execute assigned contingency plans. In determining what type of assets will be required to meet these needs, it is necessary to identify those items which fall into the "combat-essential" category.

The construction of war reserve assets must consider the overall scenario of a combat operation as being more than just an offensive thrust designed to destroy or incapacitate an enemy threat. Just as important are the requirements for supporting and protecting the tactical faction of the force, for establishing communications within the AOA, and for maintaining intellifence concerning the action of the enemy. For example, those units that function in the rear area of the AOA need items essential to the effective processing of incoming supplies, parts, and construction materiel (8:C-1).

The Marine Corps has identified and designated a number of major end items as being combat-essential in Marine Corps Bulletin 3000.* Those end items in this bulletin are critical

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*The purpose of this bulletin is not to list all items that are required to conduct operations, but to provide for monitoring combat readiness of Marine Corps organizations during peacetime.

for mission accomplishment; and, as a result, receive more intense maintenance and supply attention.

Not included in this bulletin are such items as individual weapons and equipment, vehicle repair kits, and field warehouse containers. There is also no categorization of these items regarding their use by tactical units with varied missions. While a machine gun is critical for an infantry unit, it may not rate the same high priority with a combat service support unit.

By examining the requirements of an assigned contingency, the commander must determine what items are essential in supporting the equipment involved and the full quota of personnel to be utilized in accomplishing the mission. This will allow for the determination of the range of stocks.

The depth of stocks must be a combination of the expected length of the operation and the individual procurement lead times for items meeting selection criteria. The lead time should be used in conjunction with the anticipated consumption rate in determining an adequate quantity required for stockage.

B. COMPUTATIONAL METHODS

The current resupply policy, as stated in Marine Corps Order P4400.39D War Reserve Policy Manual, calls for the elimination of the "push" system of replenishment via pre-calculated blocks of supply. It, therefore, becomes extremely important for the mount-out allowance to be comprehensive in range and depth. Since every item included in the mount-out block is considered to be combat-essential, a method of

computing a stockage level must be designed that carefully considers individual usage characteristics.

Since the purpose of the mount-out allowance is to provide independent support to a committed task force for a precalculated period of time, the level of stocks must be based on consumption rates. In nearly all cases these rates must be attained from peacetime usage data. This will differ, in most cases, from the attrition rate realized in combat; and, for that reason, weighting factors are required to bring the mount-out level to a point that will fit the needs of the assigned mission.

The way such usage is gathered, stored, and utilized varies for the different classes of supply and results in the need for separate computational methods. The various data collection modes also create the need for different levels of the Marine Corps hierarchy to assume responsibility for setting specific allowances of PWRMS.

Table I is used to show the classes of supply as defined by DoD. Class VI and X will not be considered in further discussion since items in these classes are not applicable for Marine Corps war reserve requirements.

In the case of Class I items (subsistence), all packaged operational rations (POR) will be considered as assets to be used against the total war reserve requirement. Force commanders will determine the actual level by utilizing troop levels quoted in contingency plans. The mount-out, held by the force commanders, will consist of enough rations to

CLASS	DESCRIPTION	EXAMPLE
I	Subsistence	Combat Rations
II	Individual Equipment	Indiv. Weapons, Clothing, Tools, Tentage, Repair Kits
III	Petroleum, Oil, Lubricants (POL)	All Fuels, Bulk Chemicals, Coolants
IV	Construction Equipment	Lumber, Barrier Material, Culvert, Landing Matting
V	Ammunition	Explosives, Missiles, Fuzes, Propellants
VI	Personal Demand Items	Goods for Military Exchanges, Clubs, Messes
VII	Major End Items	Tanks, Trucks, Crew-served Weapons
VIII	Medical Materiel	Medicine, First Aid Items, Hospital Equip.
IX	Repair Parts	Batteries, Engines (Not Medical Repair Parts
X	Materiel Support - Non-Military Programs	N/A

Classes of Supply

Table I

support troops in combat for sixty days. Considerations will be made to allow for rotation of stocks since the shelf-life of the rations is an important factor.

After the initial sixty-day period, fresh rations will be used in addition to the POR. These requirements will be determined by HQMC. The fresh ration requirements will not be included in the WRMR considerations [8:2-3].

Similarities between the computations used for Class II, IV, and VII materiel exist since these classes are covered by the Table of Authorized Materiel (TAM). There is guidance given here regarding the level of war reserve materiel required based on historical usage data.

All items listed in the TAM are separated into three categories: Type I, II, and III. Type I materiel is considered to be combat-essential in the sense that it meets HQMC criteria for stockage as war reserve materiel. Allowances for Type I items are assigned by HQMC and are listed on each unit's Table of Equipment (T/E). Only HQMC can authorize modifications to these allowances, although Force commanders can recommend additions, deletions, or changes to their T/E's.

Allowances for Type II items, also provided by HQMC, appear in the individual unit's T/E but serve merely as a guideline for final approval by the Force commander. Type II materiel is to be carried with a unit on an "as required" basis, since much of this type material is also suited for garrison use. For example, both field desks and executive-type desks are

considered Type II materiel. The latter would not be appropriate in a combat scenario, while the field desk would be an essential item for a combat service support unit operating a field warehouse.

Type III items do not appear on unit T/E's since this type materiel is used strictly for special contingencies or conditions. Climatic type equipment, such as cold weather clothing, is typical. Allowance levels are calculated for war reserve requirements of units assigned contingencies requiring such special equipment. During peacetime such equipment is drawn from a Training Allowance Pool on a temporary basis.

The computation methods for Classes II and IV are fairly straightforward. Class II consists of individual weapons and equipment, organizational clothing, tool kits, test sets and similar items used by the individual Marine. Class IV is comprised of field fortification and basic construction materiel to be used primarily in a combat environment.

Materiel that is deemed suitable for inclusion in the war reserve assets by HQMC is assigned a Combat Active Replacement Factor (CARF). This is used in conjunction with the unit's T/E and predetermined manning levels required for various contingencies.

Since most of these items are relatively low cost, there is a good deal of latitude given to the force commanders in determing requirements that may differ from those cited by the TAM and T/E. In many cases the commander is well versed

on the combat requirements of a specific unit and recommendations based on such valuable experience would be highly desirable. It should not be assumed that this is the case at all levels of command. Since it is required that such modification be justified in writing, it is not infeasible to consider making such justifications available to commanders of similar organizations. This would provide some means of standardizing the assets held by similar units without doing away with the advantages to be gained by someone's personal judgement or expertise. "Past experience has proven that requirements determined on any basis other than valid usage or proven consumption rates result in either feast or famine when realistically applied to need" [1:39].

Major end item (Class VII) requirements are computed in a similar fashion to that used for Class II materiel. The main difference is that manning levels are no longer significant in the determination of war reserve allowances. Instead, the CARF is used in conjunction with the T/E allowance for a given unit. A significant problem arises from the seemingly harmless mathematical technique of "rounding-off" fractions when the allowance of an entire major command (Wing or Division) is calculated. The resulting figure may not coincide with the aggregate sum of allowances if each subordinate organization were to calculate its own requirements. This is a key problem since different contingencies may call for the utilization of lower echelon forces rather than an entire MAF. A regiment of six battalions may require 5.4 vehicles

to support a certain operation. Rounding-off would reduce the allowance to 5. If the battalions are allowed .9 or 1 vehicle, the aggregate total would result in 6 vehicles. With only 5 held as an allowance, one battalion would be short-changed. This varied density would also effect the equipment used to support these major end items if the requirements were based on item density. It is apparent that the possible contingency that a unit could be tasked with should be the determining factor. If a smaller than MAF-level unit can be deployed independently, then it must hold war reserve assets that will allow it to perform its mission.

The determination of mount-out requirements of Class IX (repair parts) materiel is perhaps the most complex. Approximately 90 percent of all line items held in PWRMS fall into the Class IX category. At the same time, it must be realized that these low value items and, for a large part, bin-type items. This latter feature eases the transportation problem of getting these items to the AOA.

The problem is basically twofold: (1) determining proper criteria for stocking parts in the mount-out assets and (2) insuring that these selected levels will be adequate for the required time frame (in this case, 60 days). Furthermore, it has been determined that a single policy for all Class IX items is not feasible and that items such as dry cell batteries, secondary reparables, and minimum stockage level (MSL) items need special consideration [8:2-15].

The implementation of the Marine Corps Integrated Maintenance Management System (MIMMS) has provided the means for central computation of repair parts usage at various levels of the Marine Corps hierarchy. Naturally, the system is only as good as the input it receives, so it is necessary for the using units to insure accuracy and timeliness of maintenance reporting. This is an area that has received a great deal of command attention since the MIMMS inception in 1975.

MIMMS has provided a means for digesting the various end item applications, supply lead times, number of applications per end item, repair cycle times, and mean time between failure for the vast span of Class IX parts. All these parameters are required in computing a suitable sixty-day mount-out block for use by a contingency unit. It allows for the computing of a replacement factor for each part. The resulting factor decks are prepared for end items and contain the components and parts, along with the number of applications of each part and the corresponding repair part factor. For the most part, these factor decks are in a tape format.

The "factor" calculations, performed by the MCLSA, are sent to the FMF commanders for review in order to assist in the determination of Class IX mount-out requirements at the FMF level. The responses of cognizant personnel are analyzed by MCLSA weapons systems managers for integration into existing computations.

A usual response from the FMF is for the including of "insurance" type items that may not have the usage to justify

being carried in mount-out but whose operational failure would lead to the deadlining of a mission-essential weapons system. Under the previous war reserve system, the addition of such an item in the mount-out block would also mean it would be carried in those subsequent blocks to be used for automatic resupply. The current system amends this problem and allows for more flexibility, thus such items that are deemed to be necessary insurance should receive a good deal of consideration.

C. U.S. NAVY INTERFACE

The Chief of Naval Materiel is responsible to the Commandant of the Marine Corps for providing total aviation materiel support, medical and dental supplies, and various other types of materiel. This support is critical for the Marine Corps' "air-ground team" concept for amphibious warfare. Since there exists a dependence of the Navy for such support, it is essential that the Marine Corps realize its responsibilities as a recipient.

The component materiel provided by the Navy is known as advanced base functional components (ABFC) and is used for combat operations and overseas base facilities development. The Marine Corps is primarily concerned with the former use and forwards its requirements via CMC to the Chief of Naval Operations (CNO). They are based on initial and direct support to the mission of the FMF in the amphibious assault, assault follow-on, and forward objective area as necessary to increase the force's own capability [8:3-13].

The input for those ABFC requirements regarding overseas base developments are made by FMF commanders directly to the CNO.

Class III items (POL), as well as the classes to be discussed ahead, are non-component materiel used for combat support. All bulk POL requirements for both ground and aviation items are provided by the Navy.

The ground POL requirements are determined by HQMC and are forewarded to the Navy. These requirements must include the sixty-day requirements to be carried as PWRMR. Information must be supplied regarding the rate of consumption to include type of equipment, average fuel consumption per hour, and average daily operating time in a combat environment. This information is available in the TAM. Consideration must be given to the fact that not all support vehicles will be in the AOA in the early days of an amphibious operation (8:3-7).

The aviation POL requirements are calculated by the Navy and include bulk POL, packaged POL, and other aviation-related Class III needs. Requirements are based on flight hour consumption and the anticipated number of flight hours planned for specific contingencies.

Some Class III items will be carried as Landing Force Operational Reserve Materiel (LFORM)* and will be prepositioned

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*LFORM--selected items of supply, such as rations, field fortification materiel, and fuel that are pre-loaded onboard amphibious ships. Quantity is based on requirements of a MAU-sized force and is only a fraction of the 60-day MO requirement for that force.

aboard designated assault ships as part of the mount-out. The FMF units will carry their own packaged ground POL where feasible. If storage capability does not exist, these items will be held in the Stores System.

The policy for providing medical support to FMF units is described in BUMEDINST 6700.19 and includes war reserve policy. The Navy computes requirements for mount-out blocks based historical usage. Each block is designed to support 3,000 men for 30 days. Augmentation blocks will support 3,000 for 15 days and are provided on an as-needed basis since the combat resupply system takes affect after 60 days. The CMC is responsible for coordination FMF requirements with the Navy.

Similar procedures are used in providing for the wartime support of Marine units with aviation ordnance items (Class V (A)). The onus is on the Marine Corps to insure that its needs are known and to establish the necessary lines of communication and coordination. It must ascertain whether the Navy's computational methods will provide support for the required time frame in conjunction with the resupply system established for Marine Corps-furnished items.

D. CONTINGENCY CONSIDERATION

The uncertainty of operating in a hostile environment creates problems for those who must devise a war reserve system that will be dependable when called upon. The decision must be made as to whether stocks should be force-fed into an AOA of if it is more cost-effective to adapt a responsive system

that will supply requested items in a satisfactory period of time in order to insure the steady execution of some unit's assigned combat mission.

The combat-essentiality of each item is a consideration that must be undertaken. In conjunction with this it is necessary to judge the essentiality of the contingency itself. The mission of the Marine Corps has been stated. However, the question remains as to what tasks are likely to be assigned to which forces and under what kind of conditions. If, for example, JCS only has requirements for MAF-sized forces, then it is unnecessary to compute war reserve levels for small-sized organizations. This is not the case since MAU-sized units are continuously deployed in a combat-ready status. Although they are performing primarily a training mission, a MAU-type force structure is capable of operating independently in a combat scenario.

The mount-out stock must be structured so as to allow for as much flexibility as possible. If MAU-sized units are included in contingency plans, then the stocks necessary to output and sustain such a unit until resupply can be established must be readily available.

The scenario of a contingency must be realistically established in order to examine the characteristics that may affect the ability to resupply, the potential of the enemy force, the expected duration of the encounter, the climate, and the lead time. Not only should expected time frames be considered, but also the effect of the contingency being undertaken in "worst case" conditions.

Requirements must be specifically determined for each unit to be considered and not just obtained by applying a fractional allowance level that relates to an arbitrary ratio of the subordinate unit to the major command. The failure to calculate requirements by specific unit could result in short-changing an organization of material required for a specific task. For example, although a MAB may be approximately 1/3 the size of the MAF, 1/3 of the MAF allowance for tanks may be inadequate for a tank-oriented contingency assigned to a MAB-sized unit. If this is the only feasible method of calculating such allowance levels, then exception codes must be developed for implementation in a contingency involving extraordinary requirements [6:IX-8]. This problem will be addressed again when withdrawal procedures are presented.

For some contingencies it will be necessary to activate reserve units. The determination must be made as to which units should receive their materiel in a more expeditious manner, active or reserve. Which type unit can produce the greatest utility upon receipt of its precalculated reserve stock?

In the case of the reserve units, initial issue as well as mount-out must be stored and made ready for issue. The sooner initial issue is transpired, the sooner training and organizational assembly of these Marines can be implemented.

A test was performed by the Standard Research Institute (SRI) [6], to determine how far available assets could go to

fill existing deficiencies as well as provide for required mount-out. The results showed an excellent level of attainment. Upon closer investigation it was discovered that requirements for outfitting cadre units had been omitted. This was no small omission since it required about 5,000 line items to outfit all MAF cadre units with initial issue and mount-out. This is not to suggest that the withdrawal system is lacking, but merely to indicate the care that must be taken in assigning and structuring existing assets to cover all assigned contingencies, regardless of the size of the force required.

Finally, as stated previously, funding is a serious constraint. For this reason a priority system must be established to ensure that those tasks that are most likely to occur receive top consideration when procurement is made.

IV. ASSET ACQUISITION AND POSITIONING

A. ACQUISITION

The responsibility for acquiring war reserve requirements is closely tied with the responsibilities assigned for determining those requirements. The result is that a variety of agencies become involved with the attainment of the predetermined requirements of the Marine Corps.

Since the Marine Corps has shifted to the DoD IMM system of supply support, the acquisition procedure is based on the submission of PWRM requests to the cognizant IMM. One consequence of this is that the Marine Corps wholesale system does not stock the entire range of items required to support the FMF. As a result, the Marine Corps has very little control over the procurement lead time. Since this will have a great deal of impact on the replenishment of materiel in the AOA, it is essential that mount-out assets be constructed with consideration for the entire replenishment process.

As was noted earlier, the FMF commander is responsible for the developing war reserve requirements and is also responsible for funding and acquiring that materiel to be held at the FMF level. For those items that are held by other agencies, the FMF is not involved in the attainment process. The majority of these items will be acquired by the MCLSA and be positioned at the corresponding Supply Center.

The Navy is required to fund and manage the OWRMR held at Naval facilities or onboard amphibious vessels (LFORM) [1:49].

Because of fiscal constraints it is not possible to attain war reserve assets at a hundred percent level. Even if funds were available, it would be extremely difficult to acquire stocks that would account for deficiencies created by shelf-life expirations, changes to contingency plans, allowance modifications, and replacements due to obsolescent materiel.

Since funds available do not allow for full attainment, HQMC provides guidance for acquisition by specifying priorities of contingency missions in the annual planning and programming package [8:I-5].

The primary problem is that there is no Marine Corps-wide policy for determining the priority of acquisition on an item-by-item basis. Although the attainment level for mount-out stock held on the FMF level is above ninety percent, there still exist major deficiencies at MCLSA level regarding the requirements of the 4th DWT [1:51,53].

B. FISCAL CONSTRAINTS

To attempt to solve the problem of filling all known requirements within allotted funds is an impossibility. As a consequence, it is important to apply existing funds in a manner that optimizes the potential output of the war reserve system regarding its capability to meet the most important contingency demands. Contingencies must be considered not only by tactical importance but by probability of occurrence.

The notion also exists that if forces are able to satisfactorily execute contingency requirements with existing assets, then perhaps those requirements that remain in the status of being "unfunded deficiencies" are not really necessary. Since the uncertainty of war remains, it is foolish to underestimate what materiel may be required even if timely acquisition seems out of the question. Naturally, more effort should be expended on effectively utilizing available funds; but it is essential that all requirements be made known since funds may become available in a wartime situation.

Not only must decisions be made regarding allocation of funds within the war reserve system, but also consideration must be given to the effective operation of the peacetime logistical system. It has been noted that existing operating stocks are an important component of the total war reserve structure. There is a trade-off between the disposition of funds to active forces for immediate utilization and the investment of the same funds to prepositioned stockpiles of assets whose use is restricted to an emergency situation. It was noted in the Logistics Management Institute report [4] that, in 1972, the Army had provided funds for only 47 percent of its calculated war reserve requirements. No doubt this could be improved at the expense of the readiness state of its operating forces, but whether this would improve the overall ability of a designated task force to meet its objective in combat is debatable. The key is providing a system that allows the funded percentage of war reserve stocks to meet the most likely contingency in the most effective manner.

C. UTILITY OF INVENTORY

1. Stock Rotation

With increasing technology, rapid changes have been made throughout the Marine Corps. The scope of change from complex weapons systems to the individual equipment worn by a Marine in combat. Each end of this spectrum presents a different problem for the Corps in its effort to operate an effective war reserve system. Often equipment becomes obsolete and must be removed from PWRMS before it has ever received use. In the case of a new weapons system, not only is the end item obsolete but also the collateral equipment and repair parts.

It has been mentioned previously that it is generally desirable to maintain PWRMS separately from operating stocks and in a ready-for-issue state. Since both the PWRMS and the peacetime stock are in many cases similar by type, the War Reserve Policy Manual has instructed that such stocks should be combined and that rotation be instituted in order to gain satisfactory utility from all assets procured [8:C-2].

Discussions with cognizant logistics personnel have indicated that steps have been taken to implement the WR Policy Manual instruction. For example, peacetime stock deficiencies in Class VII end items are being filled with mount-out assets. This results in a requisition for a mount-out replacement vice a T/E replacement. As a consequence, since most end items held in mount-out are considered to be combat-essential by Marine Corps Bulletin 3000, the peacetime readiness status of the operating forces is at a higher

level. By having the assets in the hands of the operating forces, training can be maintained at a steady pace. Overall readiness is not affected since the total war requirement is a combination of operating stocks and prepositioned assets.

This process is facilitated by the system utilized for the combined storing of like assets at the MCSC's. The materiel is classified into three major categories or "purpose" codes, (1) operating stock (Purpose Code-A), (2) allowance items (Purpose Code-C), and (3) mount-out items (Purpose Code-D). The operating stock is used to replace FMF deficiencies. The Purpose Code-C items are for the initial allowance issue of inactive units. The system allows for asset visibility and eases the problem of stock rotation.

2. Maintenance and Storage

The previous section discussed the relative ease in accomplishing stock rotation for major end items. This is not the case with other classes of supply that require elaborate preservation, packaging, and packaging (P, P and P) requirements.

As stated previously, the Marine Corps is tasked with being a force in readiness and, as a result, is very conscious of embarkation requirements. In the chapter to follow, emphasis will be given to the importance of attaining a high level of packaging prior to the call for mobilization in order to decrease the workload of embarkation preparation. As a result, items are packaged in watertight containers,

equipment is individually packed to prevent rust, mildew, and similar problems. The cost of such P, P and P is insignificant.

For this reason, most mount-out held at the FMF level is going to be inaccessible. This proves to be advantageous when considering that mount-out is not meant to be issued except in emergency conditions. By storing accurate inventories of combat-essential items in sealed and secured embarkation containers, the assurance of availability is maintained.

The drawback of having to store a mount-out in such a fashion is that the range and depth of these stocks is subject to change, since current policy requires at least an annual review of war reserve requirements. In addition, as new equipment is developed the obsolete materiel must be replaced. As usage calculations for Class IX items are updated, the structure of that particular class of supply is modified for war reserve purposes. If the mount-out is not kept current with regard to the state of the art, then it may not be sufficient in meeting the combat needs of a deployed unit.

Additional storage problems are faced at the wholesale level where greater quantities of PWRMS must be held for the purpose of providing initial issue and mount-out assets for the 4th DWT units. Accomodations must be made

for shelf-life* items that require special storage conditions. Reference 1 identified the results of an analysis of items with a shelf-life code that are maintained "in-stores". Table II shows the breakdown of those items.

Type Items	Line Items	Dollar Value
Clothing	118	$5,000,000
Dry Cell Batteries	34	2,100,000
Parachutes	3	134,000
Chemicals	6	80,000
Hardware	228	1,400
Other	220	304,000
TOTAL	609	$7,620,000

WAR RESERVE SHELF-LIFE ITEMS
FOUND IN STORES SYSTEM (1:67)

TABLE II

In order to protect these items, especially clothing and batteries, special warehouses having controlled temperature and humidity must be provided.

D. ASSET POSITIONING

Once assets have been acquired and designated to be war reserve stocks, the problem remains as to where these assets should be physically stored until the time comes when mobilization is necessary. Whenever possible, the unit involved should have ready access to all mount-out assigned to it for use in a predetermined mission. This would minimize transportation requirements in the event of mobilization, and it would allow the deploying unit to know exactly the status of its assets.

*Shelf-life - a term used to describe items that will need to be replaced after a predicted period of time due to deterioration, decaying, or loss of potency (medicines).

Naturally, this capability does not guarantee that assets will be in the necessary state of readiness. Many items held in sixty-day mount-out require the kind of warehousing protection and care that cannot be supplied by a using unit supply account.

In many cases the expertise is not available at this level to ensure that requirements are met, that funds are judiciously allocated, and that proper care-in-storage programs are implemented. For this reason the centralization theory of management is utilized and mount-out stocks for using units are maintained in a central location at the corresponding FSSG. This not only allows for a pooling of talents required to effectively maintain mount-out stocks, but also puts the storage site in close proximity with the General Account, thus allowing for rapid replenishment of obsolete stocks and for quick delivery of assets filling existing deficiencies. For the most part, this procedure only applies to Class II and IX materiel, much of which is maintained in standard sized containers and is easily stored. Class VII items maintained as part of the sixty-day mount-out are found basically in two locations: (1) with the FMF at the corresponding FSSG and (2) at either of the two supply centers at Barstow, CA and Albany, GA.

It was noted that although the FSSG is aware of the status of the using units segment of the mount-out, they do not furnish the units with any type of status report regarding the mount-out materiel to be used by them for specific

contingencies. The need to have some sort of feedback to the unit commanders is essential.

The following table gives samples of several of the items which are not readily accessible to contingency organizations operating from Fleet Marine Force Atlantic bases:

TABLE III

Activities Holding II MAF Mount-Out Assets (1:78)

Type Materiel	Responsible Agency	Geographic Location
MCI Rations (less LFORM)	HQMC	Camp Lejeune, NC Albany, GA
"B" Rations (less LFORM)	Navy	Norfolk, VA Albany, GA
Field Fortification (less LFORM)	MCLSA	Albany, GA
Individual Clothing	MCLSA	Albany, GA Barstow, CA
Extreme Weather Clothing/ Equipment	MCLSA	Albany, GA Barstow, CA
Lumber	MCLSA	Portland, OR
Fuel (less LFORM)	Navy	Norfolk, VA Charleston, SC

Class V requirements present additional problems since prepositioned war reserve assets are maintained at Naval facilities. Despite this fact, the Marine Corps maintains responsibility for the physical transport of conventional ammunition to the AOA and for insuring coordination with other services regarding the inventory accounting and maintenance support for this class of materiel (8:2-8). For

the II MAF allowances along, three locations, Naval Ammunition Depot (NAD) Crane, NAD Hawthorne, and NAD McAlester, hold a portion of the requirements.

Another significant problem regarding asset positioning arises when considering the requirements necessary to effect a mobilization of the 4th DWT. Current policies allow for fifty percent of required T/E allowances (initial issue) and sixty-day mount-out stocks to be positioned at each of the supply centers (Barstow and Albany). This is not an actuality since a greater proportion (70 percent) is currently resident on the West Coast [6:IX-7].

The cause of this leads back to the extensive build-up of stocks at Barstow to support the Vietnam conflict and then the sudden evacuations of materiel from that region which led to the subsequent storage of those assets at Barstow again. Fiscal constraints currently preclude the transshipment of the excess percentage to Albany; and, as a result, it has been left to the process of attrition to bring about the balance.

In the event of a European scenario, a great burden would be placed on Barstow to arrange for the withdrawal of assets for not only I MAF, but also for a lion's share of the 4th SWT requirements. The attendant manpower, materiel handling, transportation, and equipment testing requirements would be substantial.*

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*In the simulation run by Stanford Research Institue, it was found that about 22 percent of the Materiel Release Orders (MRO) processed were for stocks located on the opposite coast of the one designated for support by a unit of the 4th DWT [6:IX-7].

The final asset positioning consideration involves the materiel that is preloaded on amphibious ships as part of the Landing Force Operational Reserve Materiel (LFORM) Program. The purpose for preloading this materiel is threefold: (1) reduce embarkation time for MAGTF's, (2) prevent repetitious cargo handling of heavy, bulky items, and (3) preposition items in AOA that would be hard to expedite if it was necessary to build up from the usual Battalion Landing Team (BLT) afloat to a full MAB [5:222]. Assets involved include Classes III, IV, and V but are limited in their support capability. The Class III stocks are all drummed and include two days' supply of gasoline and four days' supply of diesel fuel. The field fortifications and ammunition constitute fifteen days of supply for a BLT. All materiel is considered as part of the sixty-day mount-out, with the remainder to arrive by other means.

Since the LFORM is not designated for use by one specific unit, it is difficult to establish control procedures to insure serviceability, especially since rotation of stock is not accomplished. The tendency is to take the availability of such assets for granted; and, as a result, timely verification is not performed. Since it is nearly impossible to predict which units would be embarked on amphibious ships, it is difficult to attempt to fashion the LFORM blocks in other than a standard battalion landing team (BLT) form. The utility of these assets needs to be determined by some means since they are competing for valuable cargo space aboard the Navy's vessels.

V. WITHDRAWAL AND DISTRIBUTION OF ASSETS

A. GENERAL

The withdrawal (issue) of assets from PWRMS is the critical process for the success of the War Reserve System. Assuming that requirements have been properly determined and that attainment has reached a satisfactory level, the system is entirely dependent on the capability to provide materiel in a ready-for-issue condition in a prescribed time frame.

A great deal of uncertainty is involved with the requirements determination phase since contingencies can only be planned using estimation as a basis. There can never be absolute confidence as to whom the enemy might be and what it will take to defeat him.

When considering what is required to successfully complete a withdrawal of prepositioned assets, the problem is somewhat changed. The constraints are more concrete since the quantity of materiel available is known. The factors that may not be known include (a) how much manpower will be required, (b) how long will it take to prepare equipment for issue, (c) how much materiel handling equipment is necessary, (d) how long will it take to package the materiel to be shipped, and (e) what types of transportation are available to get the materiel to its required destination. These are just several of the factors that must be considered in order to maintain a system that can deliver the materiel to activated forces.

The withdrawal process begins with a notification message to the MCLSA at Albany by the FMF commander. The request for the release of war reserve assets is usually initiated by the Commander-in-Chief of one of the Naval fleets [1:86] and is approved by the CNO and CMC. Once they are apprised of this approval, the FMF commanders notify those activities holding their prepositioned war reserve assets and provide the data required by the holding activity.

The data elements provide information regarding the contingency in effect, the size of the unit involved, what type of materiel is required, shipping instructions, the port of embarkation to be used, funding data, packing instructions and several other key items required by personnel at the supply source.

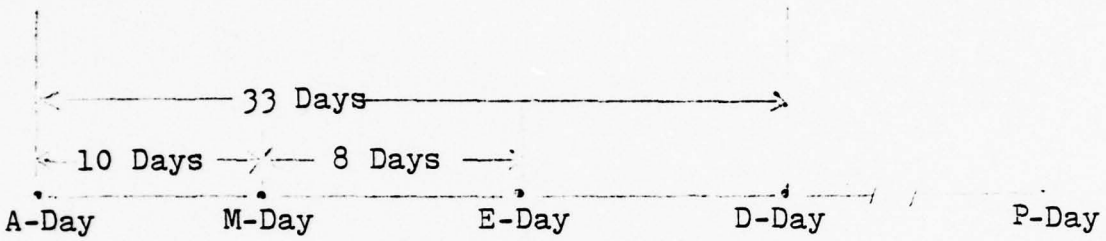
This notification message with its contained data elements activates the MUMMS system of inventory packages that interprets requirements, identifies assets, processes release orders, and allows for the physical preparation of materiel for shipment.

A more detailed discussion of this operation and the inherent constraints of the system follows.

B. TYPICAL SCENARIO

The scenario to be described is the one that was used by the Stanford Research Institute in its 1977 study of the Marine Corps' Materiel Throughput Distribution System [6]. As stated there, the situation presented is not meant to relate to strategic thinking by higher headquarters or to

suggest any political implications of DoD planning. It is merely a possible scenario and will be used as a reference point for considering reasonable timeframes for the mobilization of the FMF and the activation of the War Reserve System. Figure 5 shows a timetable of the events associated with this scenario.



SCHEMATIC OF KEY EVENTS

FIGURE 5

A-Day represents the day when FMF Headquarters first receives warning orders regarding the mobilization of units within those commands. M-Day has been defined previously as the day when withdrawal of materiel actually begins at Barstow and Albany. E-Day is considered to be the day when embarkation of the first MAF units begins. Ideally, materiel is withdrawn with the proper priority of need in mind, and those units who need their stock first should receive it first. D-Day represents the day when MAF units begin operations in the Amphibious Objective Area (AOA). The final specified event is P-Day and is described by DoD publications as the point in time at which production, procurement, and delivery of materiel equals the rate of wartime consumption.

The scenario involves all three MAF's plus the requirement for mobilization of the 4th DWT. Assignments for these reserve units are not specified since this information is of a classified nature. Location for the wings, divisions, and support groups of the three active MAFs are as follows:

I MAF - Camp Pendleton (main division and FSSG elements); Marine Corps Air Station (MCAS) El Toro (main wing elements); Marine Corps Base Twenty-nine Palms and MCAS Tustin (other ground and air units). All bases located in California.

II MAF - Camp Lejeune (main division and FSSG elements); MCAS Cherry Point (main wing elements); MCAS New River and MCAS Beaufort (other ground and air units). All bases located in North Carolina except Beaufort, SC.

III MAF - Okinawa (main division and FSSG elements) and MCAS Iwakuni, Japan (main wing elements). Several Marine Corps bases are located on the Japanese island of Okinawa.

The possible Ports of Embarkation (POE) that would be used by deploying forces include, on the East Coast, Wilmington, NC; Norfolk, VA; Charleston, SC; Jacksonville, FL; Gulf Port, MS; and the facilities used by the Marine Corps at Camp Lejeune and Moorehead City, NC. On the West Coast, the POEs are San Diego, Long Beach, Los Angeles, Port Hueneme and Camp Pendleton, CA.

The scenario calls for the transportation of II MAF, as the assault force, to an amphibious objective in Denmark. The landing would take place in conjunction with NATO forces. The forces of I MAF would constitute the follow-on element. III MAF would deploy to a WESTPAC objective in the Straits of Malacca in Indonesia.

The assignment of PWR materiel to support FMF forces is done on a priority basis in the following order: II MAF, I MAF, III MAF, and the 4th DWT.

C. OPERATION DESCRIPTION

MUMMS is designed to allow for an interface of the War Reserve Subsystem (SS-11) and the Inventory Control Subsystem (SS-03).

Subsystem-11 is comprised of files that contain the mobilization requirements for all planned contingencies. The files have the capability to store information regarding equipment densities, replacement factors, force configurations, and withdrawal plans. This information allows for the calculation of quantitative requirements for various items.

For example, the file that contains equipment density information on items that require repair parts support shows the density of a combat-essential item at the division, wing, and force troops level. When this file is used in conjunction with the replacement factors file, it can compute repair parts requirements, by NSN, for a specific end item as deployed in a certain size force.

Subsystem-11 allows for assets to be withdrawn through four designations: (1) withdrawal plan, (2) force strata code, (3) edit code, and (4) materiel identification code (MIC).

The withdrawal plans are limited to three and are concerned with the size of the force to be supplied. Plan 1 designates requirements for an MAF, Plan 2 for an MAB and Plan 3 for an

MAU. There is no device available that allows for any variations on an MAF-sized force, such as the deletion of a certain battalion-sized support element for employment elsewhere.

The MAB and MAU requirements are computed as one-third and one-ninth respectively, of the total MAF requirements. With a method such as this, the means used for "rounding-off" become very critical, especially at the MAU level, for low density items.

Force strata codes identify a certain type of mobilization materiel. These include mount-out and resupply requirements for active and inactive forces and initial issue requirements for inactive units. These initial issue assets would be used to fill T/E deficiencies for reserve units of the 4th DWT.

Edit codes identify specific types of unit organizations (e.g., infantry battalion, combat engineer battalion, helicopter squadron) and are used only with the inactive force requirements. This means that active forces cannot have requirements calculated any more precisely than by division, wing, or force troop within a MAF, MAF, or MAU (6:IX-9). For example, if an active MAU required augmentation in the form of a single infantry company, the requirements for that company could not be calculated since edit codes do not exist for active organizational units.

The identification of specific types of materiel is accomplished by the use of an MIC. Table IV lists the

various categories of materiel that can be withdrawn by Subsystem-11 using an MIC.

These elements are included in the notification message and are processed in order to obtain the materiel requirements by item and quantity for a specific force structure. These requirements are the input for the Inventory Control Subsystem-03.

Subsystem-03 locates the materiel in the "stores system" and forwards Materiel Release Orders (MRO) to the appropriate Supply Center. Since a greater portion of the assets are located at Barstow, it is difficult to predict the number of MRO's that will be produced for either of the storage locations.

The location and selection of items is followed by a preparation process that will vary depending on the type of item. The most time-consuming involves those items with operational test codes (OTC) and range from OTC-1 through OTC-3. The table below depicts each category:

CODE	REQUIREMENT	EXAMPLE
OTC-1	test/inspect	trucks, engineer equipment
OTC-2	inspect & calibrate	communication equipment
OTC-3	calibrate	measuring devices, test equipment

Currently, there are no allowances in the withdrawal system to give such equipment any preference in selection priority. Some equipment can require nearly one hundred hours of labor if tests show it to be in a not-ready condition [6:IX-12].

WAR RESERVE MANUAL

Materiel Identification Codes

Code	Title	Class
A	End Item	II, IV, VII
B	Repair Parts	IX
C	Miscellaneous General Articles	II
D	Dry Cells	IX
F	Field Fortification	IV
G	Type 3 General Articles	II, IV, VII
H	Parts Peculiar to Critical Low Density	IX
I	Individual Clothing	II
J	Type 3 Cold Weather Items	II, IV, VII
K	Common Selected Items with Three or More Applications, Other than Those Included in MIC's B and H	II, IX
L	Lumber	IV
M	Airlift Materiel	II, IV, VII, IX
N	Special Managed Items	IX
O	Provisioning Materiels	II, IV
P	Arctic Materiel	II, IV, VII, IX
Q	Desert Materiel	II, IV, VII, IX
S	Maintenance Float (D) Float Allowance Items Other Than Those Included in MIC H	IX
U	Organizational Clothing and Individual Equipment	II
V	Chemical Warfare Items	II, VII
W	Preservation, Packing, and Packaging	II, IV

TABLE IV [7]

This problem will be discussed further when manpower requirements are considered.

Additional workload requirements are realized when MRO's find items to be not in stock (NIS) or not ready for issue. This requires the initiation of procurement action if stocks are not available at the other Supply Center. In many cases, it may be more efficient to procure deficiencies from an IMM than to request delivery from the opposite coast Supply Center. Transportation considerations are essential, especially since the transportation system would be under strain during a wartime mobilization.

The SRI study on the Throughput Distribution System cited several deficiencies in the MUMMS operation. The main area of concern dealt with the priority of processing requirements. The system is unable to distinquish which units are deployed first or which units are initially prepared to accept their war reserve assets. In addition, there is no allowance made for deciding which unit is to wait for procurement action in the case of item deficiencies. A system for prioritizing the withdrawal sequence is recommended [6:IX-13].

This would prove to be a difficult task since it would have to be considered from both the operational and logistical viewpoint. Those items that require special handling and preparation may not be as critical in a combat situation as another item. If no coordination is undertaken, the process of preparing the assets for distribution will be performed in a manner deemed feasible by the logistics faction.

The activation of the MUMMS subsystems is the most complex part of the withdrawal phase and deals only with those classes of supply maintained in the Marine Corps Stores system (i.e., II, IV, VII and IX).

The remainder of prepositioned stock held by outside agencies is requested by the FMF commander. This predetermined quantity is based on the size of the force used for a specific contingency. This materiel includes rations, ammunition, bulk fuel, medical supplies and other materiel managed outside of the Marine Corps.

This author could not determine if a formal communication link exists or can be arranged that would allow for confirmation to the FMF commander of his war reserve withdrawal requests. This drawback is of the same nature as the lack of status reporting on these same assets. Thus, the FMF commander apparently has no way of knowing what the state of his mount-out will be upon arrival at the port of embarkation (POE) for those items that are not held at FMF locations.

D. SUPPLY CENTER FUNCTIONS

Subsequent to determining the on-hand availability of assets and citing the corresponding location through the use of an MRO, the materiel must go through a series of stations to prepare it for shipment to the staging area or POE.

The major parameters affecting this portion of the operation include manpower and materiel handling equipment (MME) availability, and the amount of packaging required.

The SRI devised a model [6] that could be used to conduct sensitivity analyses regarding the length of time required for asset withdrawal as a function of these parameters. This Logistics Support Base (LSB) Model is capable of simulating the mobilization process based on work standards and flow rates provided by personnel at the two Supply Centers. The results of that analysis are described below.

1. Manpower Requirements

It is necessary for each Supply Center to be aware of the workload requirements for each contingency prior to any actual withdrawal being undertaken. The LSB Model, or a similar simulation model, can allow for such information to be made available and can help to insure that the system will function as designed.

The availability of manpower is a key element in the analysis of the time required for physical processing once the assets are located. This processing time will, of course, vary depending on the issue area from which the item was selected. These issue areas include bin, bulk, sets, kits, and chests, OTC-1, and OTC-2 and -3.

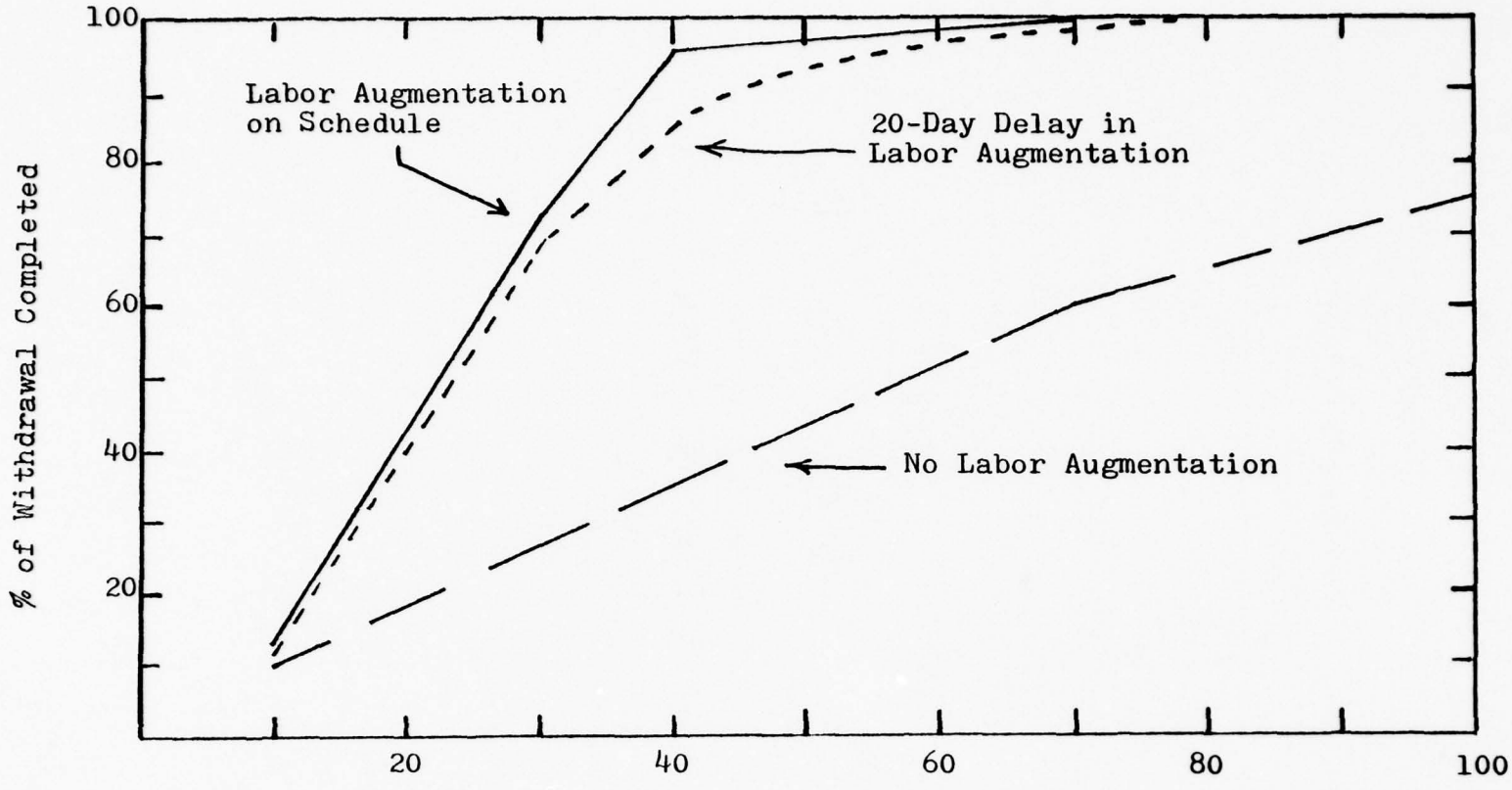
The manpower requirements for each issue item are different and require various levels of skill. The assembly required for sets, kits, and chests is time-consuming but not as technically demanding as the performance of operational tests on OTC equipment. In addition, many major end items require collateral equipment to be included with the item itself prior to its being sent to the shipment preparation phase.

Since most Marine Corps-controlled mount-out stock is located with the FMF units, a withdrawal of any active forces would require a relatively minimal amount of effort by the Supply Center. The major effort for such a commitment would involve supplying assets for existing T/E deficiencies of active units and assets required for the initial outfitting of any cadre units being activated.

In the case of full mobilization of the 4th DWT, the workload would be substantially increased. Not only would sixty-day mount-outs be required, but, more importantly, a complete initial issue of T/E assets would be required.

For this reason contingency plans have been developed with local and state labor resource boards to allow for the required labor augmentation to be available in order to meet such demands. The effect of the timeliness, quantity, and quality of such a task force must be considered since the Supply Center is constrained by classified timeframes that must be satisfied in withdrawal of assets.

The sensitivity of the labor augmentation is displayed in Figure 6. It can be seen that with a twenty-day delay in labor augmentation the workload lag is not as critical as it would seem. After forty days, the base case has processed ninety-five percent, while the labor-delayed case has attained an eight-five percent level. Over the next twenty days both cases have processed enough materiel to attain nearly a ninety-eight percent level.



Effect of Labor Augmentation on Processing Time
for 4th DWT Asset Withdrawal [6;VIII]

Figure 6

The figure reveals that it takes at least one month for the augmentation cases to process the final five percent. This can be attributed to a need for major repairs on end items, procurement requirements for completion of sets, kits, and chests, or high procurement lead time for deficiencies due to warehouse denials.

Since the processing of bulk items and OTC items is very labor intensive, the case where labor is delayed for twenty days is not able to keep pace with the full augmentation case.

2. Prepackaging Requirements

Research performed by SRI (6) revealed the importance of maintaining a high level of prepackaging. In that study simulations were performed to determine the amount of time required to prepare individual line items for shipment. A spectrum of items was used since the packaging and preparation requirements will vary depending on the characteristics of the items.

By analyzing the different procedures, the study was to provide feedback to the Supply Centers regarding recommended groupings of line items to accomodate the P, P & P processes. The simulation was performed several times after incorporating recommended modifications in order to find an optimal time for a specific withdrawal requirement.

Sensitivity analyses were performed using various levels of prepackaging in order to determine the effect on total time required to complete withdrawal. In particular, the study provided information regarding such an analysis testing

the time of withdrawal for the assets of the 4th DWT as shown in Figure 7.

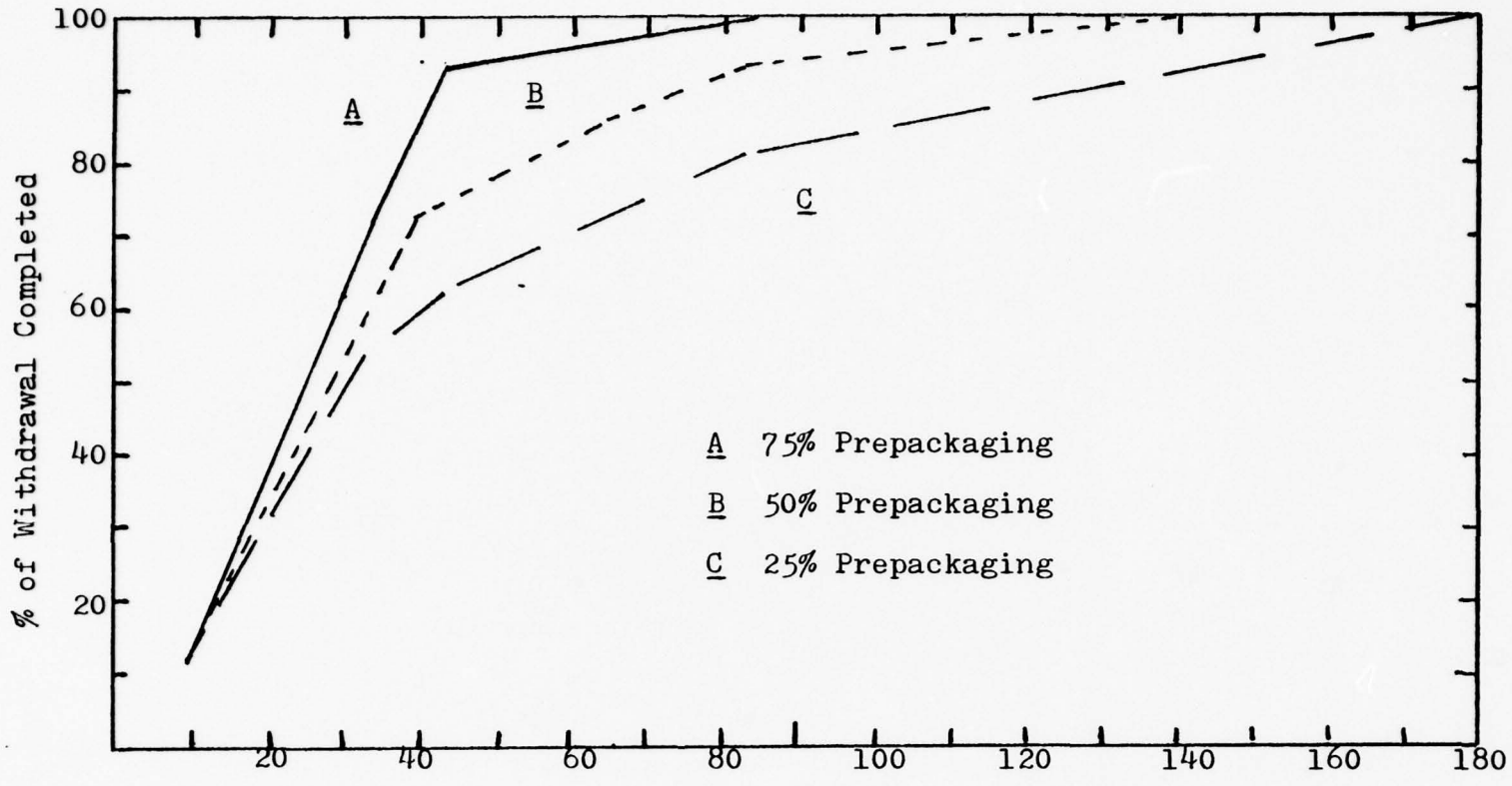
The seventy-five percent level is currently maintained at the Supply Centers and exceeds the minimum requirement of seventy percent recommended by SRI [6:VIII-8]. Once the level falls below that, the time delay becomes significant in order to attain similar stages of withdrawal completion.

E. TRANSPORTATION COORDINATION

1. General

The withdrawal and distribution of assets is not complete until delivery has been made to the AOA. Once the preparation and packaging phases has been completed at the Supply Centers, the FMF units, and those DoD agencies holding mount-out for Marine Corps units, the problem of transporting the materiel must be solved.

Basically, the Marine Corps is dependent on three DoD organizations for providing ample transportation support for wartime cargo. The three are: (1) Military Transportation Management Command (MTMC), (2) Military Airlift Command (MAC) and (3) Military Sealift Command (MSC). Certain Marine commands have the authority to apply to those organizations for transportation from supply sources to staging areas or ports of embarkation (POE). In addition, the requirements must be made known by the Marine Corps for transportation to the AOA [6:V-2]. The coordination between the Corps and these three commands is critical.



Effect of Prepackaging on Processing Time for 4th DWT Asset Withdrawal [6:VIII]

Figure 7

The scenario presented in a previous paragraph in this chapter suggested a European theater of action for II MAF and I MAF. This would call for a movement of assets to Camp Lejeune, NC, for staging, a transportation of materiel to designated POE's on the East Coast, and a trans-Atlantic air- or sealift to the AOA.

2. Continental United States (CONUS) Movement

When feasible, the Marine Corps would use its own assets to effect transportation from Supply Centers to the staging area or to the POE. Accommodations for materiel unable to be provided through the MTMC since the MTMC is responsible for coordinating CONUS transportation. Contracted highway, rail and air carriers would be used.

A significant problem for the Marine Corps is providing resources for loading and unloading materiel at the nodes. Not only will personnel be required, but materiel handling equipment as well. The personnel available at the logistics activities would have to be augmented by Marines, possibly combat organizations, in order to expedite the process. This would no doubt cause confusion since certain operational requirements would exist for these Marines. The heavy use of tactical MHE would have a negative effect on its performance once materiel was offloaded in the AOA. The use of such equipment would be necessary, though, for accelerating the loading process.

In the simulation performed by SRI [6], the cargo handling capability, and not the actual movement of materiel,

was determined to be the major constraint in meeting prescribed timeframes for asset distribution.

A national mobilization would place the Marine Corps. in competition for existing transportation resources and could cause delays in the movement time between nodes. For example, if two MAF's are involved in a European theater, the need arises for a cross-country movement of I MAF. This creates a need to consider available air and ground transportation.

In addition to the movement requirements for materiel from the MSCS's and FMF units, the need exists for Class V materiel (ammunition) to be transported from the various depots to the POE at Earle, N.J. Coordination is essential for ensuring that these assets will be available to units as they arrive in the AOA.

3. Movement from the POE to the AOA

The Military Sealift Command (MSC) is responsible for providing its own ships or commercial vessels to allow for the shipment of cargo across the ocean. If air transportation is feasible (i.e., there exists a secure place to land), the Military Airlift Command can be utilized for cargo transportation. The coordination for such movements is provided by the MTMC (6:V-2).

Risk are inherent with both modes in a wartime situation, and it is not the purpose here to analyze what measures would have to be taken to allow for reliable delivery of required materiel to the AOA. It is known that the Marine Corps is

not the sole user of these resources. The JCS is responsible for assigning priorities for available transportation to the services in accordance with applicable contingency plans [6:v-5].

The characteristics of the materiel to be shipped is an important factor for consideration. Since cargo space is at a premium, embarkation must be performed efficiently regarding the size and shape of the cargo. As a consequence, the Marine Corps should be well-versed on the current status of service-wide efforts regarding containerization, materiel weight and cube control, and packaging. They must ensure that its materiel handling equipment is adaptable to existing modes of transoceanic transportation.

VI. RESUPPLY

A. GENERAL

A properly developed system of prepositioned war reserve materiel will provide logistical support during the initial stages of an amphibious operation. Subsequent logistical support is dependent on resupply. The essential considerations in resupply are the determination of requirements, acquisition of assets, development of a systematic means of withdrawing and distributing assets, and, finally, the development of an orderly system of inventory management and control in the AOA.

The stock held in the general account and in the operational deployment blocks is designed to provide a source of replenishment, while the mount-out stocks are designed to support contingency operations during the first sixty days of combat. While FMF commanders are authorized to mix this mount-out with operational stock, resupply capability would be adversely affected if mount-out proved to be inadequate and operational stocks were needed prematurely.

The Marine Corps no longer "pushes" its replenishment materiel to the AOA in the form of precalculated blocks (identical to the initial mount-out package). The consumer must now request his needs as they surface or as they are anticipated (e.g., preventive maintenance requirements). This new response system design calls for deployed forces to place requisitions to the MCLSA at Albany, GA, using

SASSY. Requests will be filled from any remaining PWRMS at the Supply Centers. These will primarily be those items over which the Marine Corps is the IMM. In the event of nonavailability, requisitions will be passed to the appropriate IMM outside the Marine Corps.

The capability to effect a resupply of stock during mobilization is an integral part of the war reserve requirement of these outside agencies. Currently, the Marine Corps does not receive status reports from these IMMs, and no guarantee exists that offers assurance as to the availability of war reserve assets to be used for replenishment. These IMM's are under similar fiscal constraints to those in the Corps and maximum attainment is usually difficult. For this reason some requirements may not be satisfied in the event of mobilization. It is not known where the Marine Corps would fall in a priority list for asset distribution or if priority of contingencies will even be a consideration [1:48-50].

The MTMC will be involved with the transportation of these goods to the appropriate POE and then to the AOA. In the event of a service-wide involvement, the time required to transport replenishment supplied could be lengthy. This lead time should, therefore, be considered a critical element in the responsiveness of the resupply pipeline.

A major transportation problem will occur during the transition from peacetime operations to combat operations. For those items due to the general account, the expected lead time will be based on peacetime delivery to a CONUS location.

The need to redirect these ships to an overseas AOA would create an additional time delay. The length of delay will be dependent on the capability of MTMC to effectively redirect such shipment to the proper POE.

It should not be interpreted that using units will route their requests directly to the MCLSA; SASSY is designed to function in the deployed mode. If the logistics element at the MAF, MAB, or MAU level does not have the assets to fill a unit's demands, then it passes that request to the MCLSA via the SMU. However, the intent is that the stock will be on hand; and because of this, the logistics element should be concerned with its performance

B. LEVELS SETTING

The way that SASSY establishes the resupply flow is to designate items for stockage as they meet a prescribed level of usage history. For an item to be held at the General Account it must receive four demands in the previous twelve-month period. Data is obtained from all units supported by SASSY within the MAF.

The depth of stock maintained is based on a "days of supply" model. This policy requires the computation of the average demand per day. The quantity of an item authorized to be stocked is comprised of an operating level, safety level, and the stock required to accomodate lead time (order and ship time) demand. Table V shows the breakdown of these levels within the FMF. The figures shown for lead times are estimates used when

actual data does not exist or is considered to be unreliable. Actual order and ship time parameters are to be used when possible.

	CONUS	WESTPAC
OPERATING LEVEL	30 DAYS	60 DAYS
SAFETY LEVEL	30 DAYS	30 DAYS
LEAD TIME	30 DAYS	75 DAYS
TOTAL	90 DAYS	165 DAYS

DEPTH OF STOCK FOR FMF GENERAL ACCOUNTS (3)

TABLE V

For example, suppose the demand for an item is cited as being four per month for a CONUS unit with no accurate history on the lead time for this particular item. As a result, ninety days (three months) or supply would be required. Combining this level with the demand rate, it follows that a quantity of twelve should be stocked. This quantity will be known as the requisitioning objective (RO)*.

The reorder point (ROP) for items held in the general account is defined to be the sum of the safety level and the lead time demand. Continuing with the data used in the previous example, the safety level and lead time would require sixty days (two months) of supply. This would equate to a ROP of eight for this particular item. When the inventory is

*In calculating the depth of those stocks to be available for supporting a resupply pipeline, efforts should be made to eximate actual average lead times from requisition initiation to final receipt by the customer during a national mobilization.

reduced to this quantity, action is taken to bring the level back to the RO by ordering the quantity necessary to reach RO level. This action is automatically performed by SASSY.

Since consumption of materiel in combat is increased, it is necessary to somehow anticipate this usage and to augment the required materiel support by a corresponding factor. The Marine Corps currently uses a factor of 1.75 which is applied to expected peacetime usage data prior to RO/ROP calculation [6:VII-12]. The result is a substantial increase in the number of items that qualify for stockage (and a reduction of the percentage of requisitions for non-RO items). In addition, the depth of stock is also affected by the increased estimate of combat usage. The example above would result in a forecasted demand rate of seven per month when multiplied by the factor. A three-month supply requirement would create an RO of twenty-one and an ROP of fourteen.

C. OPTIMAL STOCKAGE POLICIES

The function of SASSY in the peacetime environment is greatly constrained by fiscal considerations; and, as a result, efforts are still being made to find the constrained optimal stockage policy which will be the most responsive to mobilization needs. Such an optimal policy must balance fiscal constraints against the cost of not having assets on hand for a demand. This implicit backorder cost will be much larger during combat operations than during peacetime for combat-essential items. Currently, non-optimal methods

are available for obtaining high priority backorders expeditiously in the event of war.

Efforts are also being made to determine how the existing SASSY concept would function in a wartime scenario (6). The SRI models allow for testing of various possible stockage policies using existing range and depth criteria as well as augmented levels that utilized combat usage factors. In addition, variations can be made involving demand forecasting methods, economic order quantity (EOQ) models, and lead time consideration.

An additional concern is for the fiscal constraints of a chosen stockage policy. The SRI models allow for parameters involving ordering costs, holding costs, and shortage costs to be analyzed. This provides a means for comparing the effectiveness with the cost of maintaining a certain policy.

D. CARGO MOVEMENT CONSIDERATIONS

Transportation requirements for the movement of war reserve materiel were discussed in the previous chapter. While a detailed analysis of the related problems involved with cargo movement is beyond the scope of this presentation, a few of the important considerations of the resupply process are worth mentioning.

One of the most critical constraints involved with the transport of resupply materiel will be cargo space aboard vessels and aircraft. For this reason it will be imperative to coordinate loading procedures to ensure the full loads are utilized and that high priority requests receive the special consideration required.

One means of maximizing the use of cargo space is the utilization of standard containers. This allows for rapid loading of cargo at both the POE and the AOA. At present a standard container system does not exist DoD-wide. However, studies are being conducted to allow for adaptation of such a system by the Marine Corps [6]. The drawback to using containers is that supply sources must hold requested items until a container can be completely filled [6:VII-46]. The locations for central container sites are being considered by the Marine Corps to resolve this problem since most IMM's do not have enough requests on a daily basis to fill one another. For example, of eighteen IMM's utilized by the Marine Corps, only three anticipated enough daily transactions to fill a standard container [6:VII-45].

In addition, the characteristics of the standard container (9'x9'x20') require special materiel handling considerations to be taken at both CONUS and AOA loading sites. The containers also create restrictions on the type of vehicle that can be used to transport materiel. This will be a major concern for the Marine Corps in the AOA.

E. RECEIPT OF MATERIEL IN THE AOA

A rapid movement of the materiel is required once it reaches the logistics activity at the AOA. The materiel cited to replenish warehouse stock must be inducted into a locator system, and those items ordered to fill backorders must be routed to the customer.

A large percentage of the materiel received will be relatively easy to process. Included in this category is Class V materiel, rations, fuel, and medical supplies, which accounts for approximately 75 percent of the replenishment by weight (6:VII-39). The management of these items falls under the control of specific units within the logistics activity (e.g., Ammunition Company, Rations Company, Bulk Fuel Company, and medical units with elements of the FSSG). While Classes II, VII and IX make up only 11 percent of the anticipated daily MAF replenishment requirements [6:VII-39], these are the items that are managed by the SMU and constitute the greater portion of the range of resupply items.

Because of the great number of line items to be processed in a contingency, manual receipt processes are impractical. Even the keypunch requirements for acknowledging receipt of materiel would be too time-consuming. The possibilities for improving the field warehousing procedures by using automated techniques are endless. The need exists for the Marine Corps to examine the feasibility of incorporating some of them into its existing system in order to keep pace with a CONUS resupply system that is becoming more sophisticated.

VII. CONCLUSIONS AND RECOMMENDATIONS

A. PROPER IDENTIFICATION OF MATERIEL REQUIREMENTS

It is very difficult for the Marine Corps to develop a uniform system of computing war reserve requirements since it dependent on various outside agencies for materiel support. Since this dependency is not likely to be remedied, the Marine Corps must ensure that its requirements are made known to these agencies and that formal lines are established that will allow for communication and coordination.

The Marine Corps' problems with requirements determination are not limited to its dependency on outside agencies. Within the Corps, various echelons of command are involved with this process. HQMC is responsible for setting levels for some classes of supply, MCLSA is tasked with computing other requirements, and the FMF commanders have considerable input to the process as well. In order for such a varied system to function, all echelons must understand the purpose of the system.

Since the purpose involves the Marine Corps capability to accomplish assigned contingency missions, a process should be developed that allows operational and logistical communities to jointly analyze such contingencies and to determine a coordinated materiel requirement based on the environment of the mission. This should be initiated and coordinated at the HQMC level.

By developing such a process the valuable personal combat experience of FMF commanders can be utilized. Such recommendations should be shared among all commanders so that an interaction process can take place. This is important since not all commanding officers have first-hand knowledge of how certain type units operate in a combat situation. The Marine Corps is small enough to make this feasible.

B. PROBLEMS RELATING TO ASSET WITHDRAWAL

Just as the requirements must be determined with the characteristics of the contingency in mind, so must the methods for withdrawing these assets be designed. For example, at present the Supply Centers do not have the means to withdraw assets for individual active organizations. Assets can be withdrawn only by MAF, MAB, or MAU where force size is the criteria. If a detachment from one of these force levels needs supplies, assets have to be extracted by a separate process once the materiel reaches the FMF staging area. The excess materiel is then either stored or rerouted depending on the deployment requirements of the remainder of the force.

If contingency plans are to require force structures that call for detached units to be assigned, then it is recommended that edit codes, similar to those used for withdrawing reserve unit's materiel, be incorporated in the withdrawal design of the Supply Centers. If this is not feasible, then some mechanism should be developed that would permit assets to be separated out at the Supply Center prior to being shipped to a staging area. This would prevent, for example

the entire Class VII (major end items) requirements for the ground element of a MAU from being shipped when only the matériel for one rifle company is needed.

The problem of asset positioning during peacetime also needs to be considered in more detail by the Marine Corps. The current status of asset allocation is not in keeping with the desire "50-50" split between Barstow and Albany. It must be determined what affect this would have on an emergency withdrawal for a European contingency. The worst possible case should be examined to determine how the time period from withdrawal activation to embarkation at the POEs would be affected. If the commitments could not be met, then it is recommended that funds be programmed for the transshipment of excess materiel from Barstow to Albany.

C. STOCKAGE POLICIES

The stockage policies employed by the Marine Corps will be a critical element in the success of both the initial and resupply phases of the war reserve process. These policies should provide the means for supplying materiel to deployed units in an adequate and timely manner.

The criteria for determining range and depth of stock is an essential consideration. Such criteria must consider the trade-off between the impact on operational performance of such a policy and the corresponding costs involved (e.g. holding costs, ordering costs, implicit backorder costs). In a wartime scenario these backorder costs will be greatly increased by the fact that transportation considerations are

paramount, cargo space aboard vessels is a critical commodity, and the needs of the forces are vital.

The current "days of supply" stockage policy places a great deal of emphasis on the lead time. However, it has been shown by SRI that SASSY has difficulty determining an actual average lead time for individual items of supply. If this lead time is consistently underestimated, the safety level provided will be severely tested. The problem is amplified if the uncertainty of demand is taken into account since the safety level is designed to provide protection against that occurrence as well.

The results of the SRI simulation of stockage policy performance (6:VII) are of great important to the Marine Corps. The test utilized six different policies and recorded performance and cost data for each policy. The policies that utilized more sophisticated methods for demand forecasting, lead time computation, and economic order quantity calculations were very much superior to current policies being used. The tests were run in both a peacetime and combat scenario (increased demand rate) and measured such parameters as fill rate, average duration of shortages, requisition response time, and the various costs mentioned previously.

It is recommended that studies be continued by the Marine Corps to determine an optimal stockage policy that could function under existing fiscal constraints. In addition, it is recommended that consideration be given to utilizing such simulation packages as those developed by SRI to provide

a means for continuous testing of the SASSY concept. This would allow it to be refined to a degree suitable for transition to a potential combat situation.

D. CARGO MOVEMENT PROBLEMS

Although, in most cases, the Marine Corps is not responsible for the actual transportation of materiel from the supply sources to the AOA, it must still be aware of the procedures required to ensure that its cargo movement needs will be satisfied. In addition the Marine Corps must understand its regarding the loading and unloading of materiel at the various nodes of the transportation system. Requirements for manpower and materiel handling equipment need to be determined, especially if organic equipment is to be utilized.

Simulations of asset withdrawal provide reasonable estimations of the volume and tonnage of materiel requiring transportation. The Corps should use this information in developing procedures such that requirements will be handled in a timely manner. It must know under what conditions it might be required to use its own organic vehicles. Since both Barstow and Albany are reasonably close to designated POEs, the use of Marine Corps vehicles is a definite possibility. The fact that these same vehicles are later to be used in the AOA should be considered. Allowances should therefore be made for maintenance problems that could occur. The impact of such problems on the success of the contingency mission is very important.

E. USE OF SIMULATION AND MOBILIZATION EXERCISES

Although it is difficult to simulate all combat conditions on a computer, it is still possible to program typical scenarios to form the basis for testing contingency plans and the War Reserve System.

Simulations are increasingly important since the actual physical withdrawal of materiel for the purpose of testing capabilities would be too costly. This would definitely be the case if a large scale mobilization exercise were performed. The Marine Corps needs to determine if simulations can provide the information necessary to evaluate the potential performance of the system. If it is not suitable, then the feasibility of small scale mobilization exercises should be examined.

An extensive number of simulations have already been used in the SRI study [6]. They have been used to test the CONUS transportation system, the work flow in the Supply Centers, the inventory control system, the allocation of materiel handling equipment at various nodes in the process, and the flow of equipment to the AOA, among other things.

In addition to simulating Marine Corps procedures under a mobilization scenario, programs should be devised by DoD that simulate phases of a nationwide activation. In this way, interaction between the services and the logistics agencies could be observed and steps could be taken to correct those areas where communications may break down. This is important since the Marine Corps is unable to operate independently in an amphibious scenario.

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