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FIELD MANUAL

**LOGISTICS
INVENTORY
MANAGEMENT**

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HEADQUARTERS, DEPARTMENT OF THE ARMY
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DEPARTMENT OF THE ARMY
WASHINGTON, DC, 29 December 1989**LOGISTICS INVENTORY MANAGEMENT**

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CHAPTER 1

GENERAL

1-1. Purpose.

a. This manual presents Department of the Army doctrine pertaining to inventory management by prescribing the principles, policies, organizations, and techniques necessary to attain an efficient inventory management system. It furnishes guidance to commanders, staff officers, and logistics personnel who are concerned directly or indirectly with the functions of inventory management.

b. Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to the Commandant, United States Army Logistics Management College, ATTN: AMXMC-MR-MI, Fort Lee, VA 23801-6049 (see AR 25-30 for format on corrections and changes).

c. The word "he," when used in this publication, represents both the masculine and feminine genders unless otherwise specifically stated.

1-2. Scope.

a. Basic management task of the Army logistics system requires that the interlocking activities of that system provide a flexible yet adequate control of the total inventory. Requirements planning is

the fundamental function of inventory management that results in the formulation of management decisions concerning the entry, retention, consumption, or disposal of materiel in the system. Corollary functions that stem from requirements planning are: programing, budgeting, cataloging, acquisition, distribution, maintenance, and materiel reutilization and disposal.

b. This manual is primarily concerned with the comprehensive coverage of the six functions of inventory management performed at a national inventory control point (NCP), namely cataloging, requirements determination, acquisition direction, distribution direction, maintenance direction, and materiel reutilization and disposal.

c. The subject is developed in two parts:

(1) *Part One: General*—Outlines the purpose and scope of the manual. Provides a general background discussion of the functions of inventory management performed at a national inventory control point.

(2) *Part Two: Functions of Inventory Control*—Provides a comprehensive description and analysis of the concepts, programs, and techniques employed in the performance of each of the basic functions of inventory control. A separate chapter is devoted to each of these areas:

a Cataloging.

b Major Item Management.

c Secondary Item Management.

d Acquisition Direction.

e Distribution Management.

f Depot Maintenance Direction.

g Materiel Reutilization and Disposal Management.



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CHAPTER 2

THE ROLE OF INVENTORY CONTROL

Section 1. GENERAL

2-1. Introduction to Inventory Control.

The subject of inventory control is prevalent throughout all aspects of the military logistics system. Attaining the most effective and efficient inventory control is a primary objective in the materiel support mission of the Army. To fully understand the inventory control relationship to the overall logistics mission, a review of the total logistics management responsibilities is necessary. Army logistics (AR 310-25) is the science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, these aspects of military operations deal with:

- a. Design and development, acquisition, storage, movement, distribution, maintenance, evaluation, and disposition of materiel.
- b. Acquisition or furnishing of services.

2-2. The Objective of Inventory Control.

The objective of inventory control is effective, efficient, and economical supply to the military forces in their assigned missions. With the many compromises and trade-offs that are necessary in the operation of Army Logistics, this ultimate objective can become obscure, for at all levels of the supply system there are limitations or restrictions in availability of monies, transportation, facilities and labor, as well as materiel. Logisticians specify standards for materiel support that will insure an acceptable level of service to supported units, and inventory managers continually examine every function in the system in an attempt to balance available resources to reach or surpass the defined standards of performance. The standards set for any function serve as guidelines for operating personnel and control indicators for management. The ultimate criteria for evaluating the inventory management system is success in supporting the soldier in the field with what is needed, when, where, and in the condition and quantity required at minimum expenditure of resources.

2-3. Inventory Control and the Life Cycle of Materiel.

In addition to determining the relationship of inventory control to overall Army logistics, it is

also necessary to understand the position of inventory control in the life cycle of materiel. The life cycle of a system or an item of materiel begins with its conception, progressing through research and development, continuing through its production, deployment, and use, and ending with reutilization or disposal when the item becomes excess, uneconomically repairable, or obsolete. The major functions of inventory control that occur during the different phases of the life cycle are:

- a. Concept Exploration/Definition Phase.
 - (1) Development of acquisition strategy.
 - (2) Distribution/deployment variables.
 - (3) Qualitative requirements planning.
- b. Concept Demonstration/Validation Phase.
 - (1) Cataloging.
 - (2) Quantitative requirements planning.
 - (3) Acquisition direction/planning.
 - (4) Distribution planning.
 - (5) Basis of issue determination.
 - (6) Maintenance planning.
 - (7) Facility requirement planning.
- c. Full-Scale Development Phase.
 - (1) Final quantitative requirement planning.
 - (2) Acquisition direction.
 - (3) Distribution planning.
 - (4) Maintenance package requirement.
 - (5) Cataloging finalized.
 - (6) Provisioning plan.
 - (7) BOIP revised/finalized.
 - (8) Facility requirement update/deployed.
 - (9) Provisioning plan implemented.
- d. Full-Rate Production and Deployment Phase.
 - (1) Quantitative requirement computation.
 - (2) Acquisition direction.
 - (3) Distribution management.
 - (4) Maintenance management.
 - (5) Stock control.
 - (6) Reutilization and disposal.

(Although an inventory manager may become involved in any of the foregoing functions, his management effort is mainly expended in the Full-Rate Production and Deployment Phase of the life cycle of materiel.)

2-4. Inventory Control and the Materiel Pipeline

- a. To perform with maximum effectiveness, the inventory manager must understand the scope and complexity of the total materiel pipeline. Two

major responsibilities to be considered in pipeline management are: (1) the determination of when and what quantities of items are to be placed into the system; and (2) control of these items while in the system. It should be recognized, however, that separate methods operate simultaneously (e.g., general supplies, ammunition, medical supplies), and that echelons of stockage may be increased or decreased to conform with needs of the commands, proximity of user to support complexes, and other operational factors.

b. Because of the extended length of the total pipeline and the different echelons involved in its operation, control of the flow of materiel is regulated by a number of different units or activities. Each of these activities is, therefore, "in charge" of a particular segment of the pipeline and must fulfill the following basic requirements:

(1) To keep his assigned segment of the pipeline "full." That is, to insure that there are sufficient assets in movement or in storage at all times so that supply will not be interrupted; and

(2) To order sufficient supplies at the proper intervals to meet anticipated future demands upon his echelon of supply.

2-5. Approaches to Analyzing Inventory Control.

a. To understand Army inventory control, it is helpful to analyze the factors that produce management distinctions in the supply system. These distinctions sometimes resemble separate systems and can cause confusion unless the controlling factors are thoroughly understood. Four approaches to viewing the supply system are discussed by:

(1) Criticality of materiel.

(2) The environment in which supplies are to be used (including the distance from the supply source).

(3) The capability of the system to generate demand data (e.g., the ability of the user to prepare formal requisitions).

(4) Classes of supply.

b. The first approach to viewing the supply system is by degree of criticality of the materiel being managed. Ammunition, for example, is managed intensively at all levels because of its combat essentiality. Bulk petroleum is another combat-essential item, and, because of its unique movement and storage characteristics, it requires special management techniques to insure adequacy of supply.

In addition to such materiel, specific combat situations or environments may dictate the need for intensive management or special control for speci-

fied categories of materiel. For example, where air mobility of personnel and equipment is essential to mission accomplishment, it is of critical importance that aircraft be kept in a flying status. In these instances, a decision may be made to establish special control measures for support of such equipment.

c. The second approach to analyzing the supply system is by location and activity of the user. To illustrate, compare the supply of installations in the United States with those of Asia. The interval between placing an order and receiving supplies (order and shipping time) for example, may be 30 days in the United States and 82 days in Asia. Consequently, unpredicted increases in materiel consumption may have little impact in the United States whereas in Asia they can cause serious emergencies. Plans for training and combat must be anticipated in planning oversea stock levels. Air shipment, over-the-shore unloading of ships, and contractual maintenance are examples of techniques which may require emphasis.

d. The third approach to viewing the supply system is by its capability to generate demand data. In stable operations, the demand for supplies can be predicted by projecting past demand rates.

e. The fourth approach to viewing the supply system is by class of supply. There are 10 classes of supply that group all items by commodity characteristics. There are:

(1) *Class I.* Subsistence, including gratuitous health and welfare items.

(2) *Class II.* Clothing, individual equipment, tentage, tool sets and tool kits, handtools, administrative, and housekeeping supplies and equipment.

(3) *Class III.* POL: Petroleum fuels, lubricants, coal, hydraulic and insulating oils, preservatives, liquid and compressed gases, chemical products, coolants, deicing and antifreeze compounds.

(4) *Class IV.* Construction: Construction materials to include installed equipment, and all fortification/barrier materials.

(5) *Class V.* Ammunition: Ammunition of all types (including chemical, radiological, and special weapons), bombs, mines, fuzes, pyrotechnics, rockets, propellants, and other associated items.

(6) *Class VI.* Personal Demand Items (Nonmilitary Sales Items).

(7) *Class VII.* Major End Items: A final combination of end products which is ready for its intended use; e.g., launchers, tanks, mobile machine shops, and vehicles.

(8) *Class VIII.* Medical Materiel including Medical peculiar repair parts.

(9) *Class IX.* Repair Parts (Less Medical peculiar repair): All repair parts and components to

include kits, assemblies, and subassemblies, repairable and nonrepairable, required for maintenance support of all equipment.

(10) *Class X. Materiel to Support Nonmilitary Programs*; e.g., Agricultural and Economic Development, not included in Classes I through IX. The classes of supply were designed to group items of supply which have similar management characteristics. Therefore, the classes of supply provide an especially useful vehicle for analyzing major supply system deviations.

f. One or more of the above approaches to viewing the supply system may be useful in the analysis and solution of supply problems. Considerations involved in calculating requirements

for supporting personnel differ from those for supporting equipment. A mathematical technique that is highly effective for stable demand in peacetime may be worthless during the first month after an invasion. Logistics managers must continuously evaluate the effectiveness of the supply system. In searching for means to improve the system, stockage points may be consolidated or eliminated, central data banks established, or new management controls imposed: but all changes must be considered in the light of every related aspect of the system. Viewing each problem or proposed system improvement from several points of view will help insure a coordinated solution.

Section II. COMPLEXITY OF INVENTORY CONTROL

2-6. The Challenge

a. The primary purpose of inventory control, as a part of total logistics, is the provision of needed supplies to support troop operations. As the nature of warfare changes, logistics—if it is to be successful—must adapt itself to these changes. Inventory managers, at all levels, must be alert to any new product, concept, or technique developed by industry or the Government itself which can be used to improve the effectiveness or economy of Army inventories.

b. The Army's inventory system must be continually modernized and ever-increasing emphasis must be placed on the speed and efficiency of supply operations, particularly in the area of accurate and timely requirements computations. Increasing automation permits faster and more sophisticated manipulation and analysis of huge masses of data. Decisionmaking is becoming even more demanding and a premium is placed upon trained inventory managers who can quickly separate vital facts from trivial details and make accurate decisions on a basis of logical deduction.

c. Predictions within the Army are influenced by such intangibles as the ever-changing national policies relating to international politics, national budgetary limitation or restrictions, steady advancement of military technology, and current research and development of new combat concepts that require changes in force structure which dictates the logistics concepts and equipment allowance necessary. What is actually needed is an optimum wartime supply system in being at all times. However, pressures for economy prevail in peacetime and, as a result, the Army must accept a supply system which represents a compromise between what it needs and what it can afford.

These overriding considerations place emphasis on both effectiveness and cost of supply.

2-7. The Response.

a. The Army constantly strives to increase and improve its combat capability to meet the challenge of potential adversaries. In this endeavor it strives for qualitative superiority in communications, firepower, mobility, and materiel support in depth rather than attempting to match potential enemy forces man for man. Fast, efficient means of communications are being developed to provide information on a timely basis. Emphasis is being placed on air transportability of weapons, equipment, and backup support to bolster combat effectiveness. Through the use of measured modernization, it is promoting a more orderly flow of new items into the inventory.

b. To speed the decisionmaking process on higher levels and to reinforce control of funds and programs, improved and selective management techniques have been adopted. Automatic data processing programs are being used to bring under control the mass of management data the Army collects on its varied and far-flung activities. Use of mathematics models provide optimum and timely solutions to inventory problems.

2-8. Management Concepts.

a. In view of the size, variety, and changing characteristics of the Army inventory, it is apparent that it can be managed effectively only if the task is broken down into manageable segments. The basic philosophy in approaching this task is generally one of management by exception, and selectivity of management time and effort based upon the importance and dollar value of items. The inventory is broken out into segments:

(1) *By materiel readiness.* The operating commands of the U.S. Army Materiel Command (AMC) are essentially commodity organizations—national inventory control points (NICP)—at which the national level management of inventories of assigned commodities is carried out. The inventory manager at a national inventory control point is responsible for the management of specific items within the commodities assigned to him. This responsibility includes cataloging, requirements determination, acquisition, distribution, overhaul and rebuild, materiel reutilization, and disposal. As a result, all the wholesale functions of inventory management for any given group of items are centralized in one individual at one place.

(2) *By funding categories.* The inventory is divided into categories which are distinguished by the type of procurement appropriations used to obtain items. These categories are:

(a) *Major items.* Procurement Appropriation (PA); five separate Army appropriations for aircraft, missiles, weapons and tracked vehicles, ammunition, and other procurement.

(b) *Secondary items.*

1 Procurement appropriation.

2 Stock fund.

(c) Medical secondary items and repair parts, stock fund.

(3) *Project management.* While not a specific segmentation process by itself, project management is a specialized method of handling a particular weapon or equipment system by a single individual assigned as the project manager. This method provides for various techniques of planning, controlling, progress reporting, and decision-making. It establishes a basis which allows for a single authority to plan, direct, and control a weapon or equipment system. It includes all phases of research and development, acquisition, production, distribution, and logistics support to

maintain a balanced program for the acquisition of operational systems and equipment from its inception to its disposal. The designated project manager for a given item is responsible for coordinating the management of the item among and between the NICPs. In a sense, the project manager “cuts across” organizational lines to expedite the development, acquisition, and control of the item.

b. Because of strategic, economic and inventory control necessity and similarity of characteristics, the categories mentioned above are further grouped into two broad areas; major items and secondary items (including repair parts). This segregation is a valid and desirable management technique to differentiate between the methodologies applicable to the acquisition requirements planning, and distribution policies established for these items.

(1) The first grouping is major items. These items are included in requirements and authorization documents (Tables of Organization and Equipment (TOE), Modified Tables of Organization and Equipment (MTOE), Tables of Distribution and Allowances (TDA), Common Tables of Allowances, and Joint Tables of Allowances) which serve as the basis for requirements and distribution planning.

(2) The second grouping, secondary items, can be identified as being repair parts, major components, and minor type end items both consumable and reparable. Future requirements for these items are computed on the basis of past demands adjusted by plans and programs for the future. Some are exceedingly high-cost, critical items requiring comprehensive management attention while others are low cost, have a short leadtime, are easier to procure, and need less management emphasis. Some secondary items (PA) are included in authorization documents, and are also essential to combat. It is in this grouping that the application of selective management is most profitable.

Section III. PROBLEMS

2-9. General.

Although the Army had developed logical and workable solutions to the intricacies of inventory control, there are still a number of problem areas which make it difficult to accomplish the task with optimum efficiency and accuracy. For example:

a. Modernization is one of the most perplexing problems facing the Army today. To maintain an acceptable combat readiness posture in relation to rapid technological change with its attendant high rate of obsolescence, and to do it with limited funds, poses the questions as to what to buy, when to buy, and how much to buy. In addition to being

faced with the problems generated by introducing a new item into the inventory, the manager is also faced with the problem of what to do with the item that is being replaced and to be phased out of the system.

b. Reduction of items in the inventory commensurate with adequate support to troops is essential. Through Department of Defense standardization and utilization programs, the Army must maintain constant vigilance to insure that:

(1) All items of supply are items for which a real need exists, eliminating those which fall into the nice-to-have category.

(2) Maximum use of interchangeability to provide optimum utilization of assets and reduce expenditures for new acquisition.

c. Reduction of repair parts is a function of maintenance policy and practice. The greater extent of repairs permitted at forward echelon results in a higher requirement for a broader range of repair parts and larger inventories at these echelons.

d. Accumulation of asset data to be used in computing requirements poses a continuing problem for the inventory manager. It is essential that the required asset reporting be accomplished accurately and timely. Experience in the past has indicated that accurate data are difficult to obtain.

e. Demand analysis is, as it implies, an analysis of demands placed on the inventory manager. This analysis is necessary to determine the relationship between recurring demands and nonrecurring demands as identified by the requisitioner. Demands must be screened to identify the one-time initial issue, program or project demand, and the abnormal requisition. These must be analyzed as to whether they represent unusual demands caused by a particular event or circumstance that should not occur again or are a true normal demand which can be used in projecting future demands.

f. Many of the inventory manager's problems actually stem from limitations in funds and resources. It is recognized that unlimited funding and resources are not practical possibilities. When funds are limited, managers may have to delay procurement or overhaul on some items in order to use available funds to purchase or maintain items which are more urgently needed.

2-10. Magnitude of the Inventory.

a. There are few management responsibilities in the world today which parallel, in scope and complexity, that of managing the Army's inventory. Some of these problems arise from its size and diversity; others are due solely to the many echelons through which an extended materiel pipeline must reach out to support combat forces located throughout the world.

b. Of foremost concern is the size and value of the inventory itself; if it is larger than necessary to meet current and anticipated needs, the cost of maintaining the system is substantially increased. Excessive inventories also raise costs associated with obsolescence and eventual disposal. As the cost of managing the Army supply system varies

with the size of the inventory, continued emphasis is placed on the assessment of supply performance in terms of:

- (1) What is being done.
- (2) How efficiently is it being done.

2-11. Diversity of Items.

a. The management of a multibillion dollar inventory is a monumental undertaking. The task becomes even more complex when items within the inventory range from those:

(1) Which are low cost and easily obtainable, to those that are high cost, difficult to procure items with exceptionally long leadtimes.

(2) With readily identifiable demand and distribution patterns to those which are difficult to forecast because of erratic demand and eccentric distribution.

(3) Specialized items of equipment which are distributed on a geographical basis, to items distributed on a special basis to selected units and organizations.

b. Further, support of these end items with components, assemblies, subassemblies, and repair parts presents an even more complex problem to the inventory manager.

2-12. Absence of Profit Motive and Competition.

a. Competition is closely related to the profit and loss basis on which commercial industry conducts its operations. The pressure of competition acts as an incentive to better performance, resulting in higher profit-taking versus lower inventory investment.

b. The Army inventory control system, on the other hand, has competition or profitmaking desires when supplying customer demands. If supplies are not available, the customer must usually wait or do without. When foreign customers are involved, U.S. Government and U.S. Army prestige may be adversely affected. In addition, third-country purchases of major end items may result to the detriment of U.S. standardization objectives. The U.S. Army customer cannot take his business elsewhere as his civilian counterpart might do. Consequently, the Army has a far greater responsibility to its customers and must be prepared to meet legitimate demands.

c. The Army inventory control system exists to serve a military need, not an economic end. Certain supplies cannot be supplied economically; however, this does not relieve the Army of the responsibility of furnishing them.

Section IV. DESCRIPTION OF INVENTORY CONTROL FUNCTIONS

2-13. Integrated Functions.

a. Within a national inventory control point, individual inventory managers are assigned a given number of items for support of specified end items, or Federal supply classification groups or classes within a category for integrated inventory management. Each of the functions of integrated inventory control will be discussed in detail in subsequent chapters and can generally be described as follows:

(1) *Cataloging.* The inventory manager must insure that the items are properly cataloged and recorded in appropriate working file sections of the Army Master Data File (AMDF) so that the worldwide customers will know what the item is, what the item does, what stock number to use, what the unit cost is, and where to submit his request for the item. Although the Defense Logistics Agency has responsibility for maintaining the Federal Catalog System files at the Defense Logistics Services Center, the individual inventory managers have responsibility for initiation of cataloging actions into the catalog system for items they manage and for changes thereto.

(2) *Requirements determination.* The inventory manager is responsible for the planning computing of peacetime and mobilization requirements for assigned items. He is also responsible for computing Foreign Military Sales Grant Aid requirements based upon demand history and maintaining stockage levels in support of Cooperative Logistics Supply Support Arrangements. The degree of authority invested in the manager and the amount of review for approval by higher authority are related closely to the type of item involved, category of funds to be expended, and dollar value of project inventories.

(3) *Acquisition direction.* The inventory manager has the authority to direct acquisition to be accomplished, subject to limitations of approved

programs and direction from higher authority. Close coordination between the inventory manager and procurement personnel is essential.

(4) *Distribution direction.* The inventory manager controls stocks which are in storage, due in, or due out for the entire CONUS depot distribution system on both a quantitative and monetary basis.

(5) *Maintenance direction.* The inventory manager has the authority to require that items be overhauled. In computing requirements, all assets (serviceable and economically repairable unserviceable) must be considered. Close coordination between the inventory manager, equipment specialists, and maintenance personnel is necessary to consider overhaul/rebuild capacities versus related quantities and time schedules desired by the inventory manager. The users must be brought into the planning process to insure the timely return of unserviceable assets.

(6) *Materiel reutilization and disposal.* The inventory manager must insure that excess or obsolete stocks are removed from the system. He is responsible for the declaration of excesses and, when the item has been declared excess to the Federal Government, takes further action to effect disposal. He must conscientiously participate in the DOD materiel utilization Program to insure proper utilization of excess stocks prior to disposal.

b. The efficiency of the total logistics system is contingent upon an effective interrelationship among all function divisions of the system. This principle relates to the five major functional divisions of the logistics system (supply, maintenance, transportation, services, and facilities) and their related subfunctions. It emphasizes that effective and efficient logistics operations depend on the degree to which the function within the operating system either can be coordinated or, where feasible, integrated.

CHAPTER 3 CATALOGING

Section 1. THE SIGNIFICANCE OF CATALOGING.

3-1. The Problems of Identification and Classification.

a. The identification and classification of things or items of supply, has always been one of the fundamental concerns of managers. The efficient and effective manager has to know what he is managing; he must catalog, classify, and identify all elements of his operation. Similarly, the classification of items of supply in a useful, orderly, and responsive system is basic to the inventory management effort.

b. As will be seen, the earlier efforts at establishing a system for the cataloging of materiel were decentralized and, in many cases, redundant. The logistics function of today, however, requires a unified cataloging operation which is centralized in terms of management control but decentralized in most operations.

c. The inherent complexities of the present logistics system with its worldwide commitments and a materiel budget of billions of dollars a year, along with the rapid infusion of new and improved weapons systems demand that the system of identification and control of these item be continually monitored and maintained. This portion of the manual will provide a comprehensive coverage of the concept of the cataloging effort, the systems established to insure continuing efficiency, and the operations involved in producing usable data for the inventory manager. In addition, the chapter will cover the problems and operations involved in the introduction of new items into the supply system, the screening and revising processes which are necessary to maintain reliable data in catalogs, and, finally, the deletion process by which items are taken out of the catalog system.

d. The term "cataloging" as used in this manual has a much broader connotation than is usually attributed to the word. In defining the words "catalog" and "cataloging," these words mean much more than "the naming and numbering" of items. A standard dictionary states that a catalog is "a list of names, titles, or articles arranged methodically, often alphabetically, usually with descriptive details, number and price accompanying each item; a book or pamphlet containing such a list." Collectively, the cataloging function is referred to as the Federal Catalog System. The purpose of this system, which will be discussed

throughout this chapter, can be summarized as follows:

The system was established to improve supply operations and to permit greater efficiency in the managerial control of items within and between the supply systems of the Army, Navy, Air Force, Marine Corps, other Federal agencies, NATO, and friendly foreign countries. It is an information-providing service whose mission is to obtain, verify, record, and to provide to management certain item information not otherwise obtainable. The system, in the form of a "catalog":

(1) Establishes a single supply language of item identification.

(2) Provides accurate information as to the identify of an item of supply.

(3) Records the source of supply of items.

(4) Records the governmental activities (including NATO and friendly foreign countries) which manage or have an interest in each item of supply.

(5) Provides such other item management data as the user may require. Within the Army, the term cataloging encompasses both the action taken to make or change an entry in a catalog and the production of a catalog; i.e., the physical compilation of the data to be used either in the form of a "book," magnetic tape, printout, or memory unit in a computer.

3-2. The Federal Catalog System.

a. The Federal Catalog System is, first of all, a Federal system—it is Government-wide in its operations; it applies to all stocked items of supply in the Department of Defense (DOD), as well as the civil agencies of the Government, which are repetitively acquired, stocked, controlled, and subject to central inventory management. The system also serves as a control or monitoring agency to prevent duplication in procurement and distribution of new items. Cataloging serves the various supply functions and management concepts, whatever their state of uniformity. It serves as a managerial tool to influence uniformity and to establish standardization programs.

b. The unified system was developed relatively recently; however, it essentially was, and still is, an evolutionary process. During both World Wars I and II, the supply of all the Armed Forces was hampered by the lack of an adequate and unified

system of item identification. There were few critical shortages of supplies, but there were hundreds of thousands of incidents where the wrong kinds of supply items were ordered, procured, and distributed.

(1) As a result, a critical shortage of an item at one location might not be a true shortage at all because precisely the same item might be right in the same warehouse, packed and coded under a different number and description. This was not only costly duplication, but it interfered with strategic supply planning and was an actual danger to the national economy and security. This failure of communication and identification was not confined to the Army supply system: it also included all other services and Federal agencies.

(2) Various study commissions during and after World War II revealed one fundamental need—the establishment and use of a common, understandable system for the effective, efficient, and economical management of the materiel resources of the DOD. Recommendations and corrective actions taken from the later years of World War II through the postwar period gave impetus to the cataloging effort. The National Security Act of 1947, for example, established requirements for single agencies to procure certain commodities for all other services. In 1949, however, a major step was taken to centralize the cataloging functions of the services. Public Law 152 of the 81st Congress, as amended, required the General Services Administration to establish a uniform Federal Supply Catalog System in coordination with the Secretary of Defense. The act further required that each Federal agency utilize the uniform Federal Catalog System. Subsequently, Public Law 436, “The Defense Cataloging and Standardization Act,” was passed in 1952, and assigned responsibility to the Secretary of Defense to prescribe a single catalog system for the Department of Defense. Today the responsibility for the overall supervision of the Federal Cataloging Program rests with the Assistant Secretary of Defense, Production and Logistics (P&L) who has final approval authority for all of its policies and programs. The programs are coordinated with the Administrator of General Services, who is designated by public law as being responsible for carrying out the program for civil agencies of the Federal Government. The Director of the Defense Logistics Agency (DLA) administers the operation of the Federal Catalog System governed by the policies, plans, programs, and guidance provided by the Assistant Secretary of Defense (P&L). The Secretaries of the Army, Navy, and the Air Force are charged with seeing that the provisions of the program are adhered to and

carried out by the operating elements of their respective services. Responsibility for the central processing of cataloging actions and the maintenance of the central repository and automatic data processing (ADP) files is assigned to the Defense Logistics Services Center (DLSC). Although operations of the catalog system are conducted in the DOD on a decentralized basis, there is a centralized control of management policies. This is in keeping with the general policy within the DOD of centralized management—decentralized operations.

c. It is essentially the individual supply manager, however, who initiates the item of supply concept for this item of supply. The item identification for this item of supply is prepared by the cataloging subdivision of the cognizant supply center, departmental inventory manager, or by another activity serving as the cataloging agent, and is submitted to DLSC for review, screening, approval, stock, numbering, and publication in microfiche or card form. DLSC exercises overall control of the centralized operations of the system by development and publication of the rules, procedures, and tools governing the preparation of catalog data, by the approval or disapproval of data prepared by activities and by field visits to the preparing activities.

3-3. Elements of the System.

There are certain basic considerations of the cataloging system. They are item identification, classification, stock numbering, and the publication of data.

a. The first and most important element of any cataloging system is the positive establishment of a unique identification for an item of supply. Under the Federal Catalog System, the concept of an item of supply is expressed in, and fixed by an item identification. The item identification consists of the minimum data adequate to establish clearly the essential characteristics of the item, which gives the item its unique character, and make it what it is, and differentiate it from every other item of supply. Each item identification is applicable to one and only one item of supply and, conversely, each item of supply has only one item identification. The characteristics of an item of supply are basically of two kinds: physical characteristics and performance characteristics. The first element in establishing the characteristics of an item of supply is the name, which answers the question, “What is it?” Under the Federal Catalog System, a single name is established for each item of supply regardless of how many different activities use the item. This means that, under the Federal Catalog System, it is necessary to research

and agree on the selected names and definitions, when required, so that all activities in DOD can speak the same language. Industrial and commercial names are used where uniform names exist in industry or where industry has agreed to uniformity. These are called Approved Item Names and are published, together with their necessary definitions, in the Federal Item Name Directory, Cataloging Handbook H-6 (SB 708-6). This handbook is the most comprehensive dictionary of supply item names in the military supply system; it bridges a gap in item name language between Government and industry and provides the basis for greater uniformity of understanding in contractual relationships.

b. The second element in establishing the characteristics of an item of supply is the identification data which, when the item can be described, is stated directly by using words to describe the essential characteristics, including physical, mechanical, electrical, chemical, material, dimensional, and performance data (descriptive method); or which, when the item cannot be described is stated indirectly by citation of reference(s) to the item identifying number(s) and the supporting technical data, such as blueprints, specification, or one or more manufacturer's (reference method) number. The descriptive method of item identification requires the use of Approved Item Names and Federal Item Identification Guides (FIIG's). Each item name approved for use in the descriptive method is referenced to a specific FIIG which contains a series of requirements (questions) regarding the technical characteristics of the item of supply covered by the item name. Replies to these requirements result in a statement in a prescribed sequence of the characteristics of the item of supply. This is the item identification. The descriptive method is supported by the manufacturer's data (name, address, and manufacturer's number(s) for item being identified. The reference method of item identification is an indirect process of identifying items of supply, not through words, but by reference to the item-identifying number(s) and the supporting technical data of one or more manufacturers. The reference method is used to identify items when the descriptive method is not practical. The reference method if item identification is based upon reference to, and is supported by, the manufacturer's data which includes the name of the manufacturer, his address, and his identifying number or numbers for the item being identified. The manufacturer's number for the item is supported by his blueprints, specifications, and methods of manufacture and is considered to be the most authoritative identification available.

c. The Federal Supply Classification (FSC) is the basic classification system used by the DOD and the Federal Government. It was developed by joint representation from OSD and the Departments of the Army, Navy, and Air Force, with the General Services Administration. The Federal Supply Classification (FSC) allows 99 major segments called FSC groups. Each of these groups is assigned a two-digit code. As a further subdivision for management purposes, each two-digit FSC group is divided into classes. Each class is designated by an additional two digits, thus making a four-digit code classification. For example, FSC Group 31, Bearings, is divided into the following three classes:

3110—Bearings, Antifriction, Unmounted

3120—Bearings, Plain, Unmounted

3130—Bearings, Mounted

Each item in a supply system which is identified under the Federal Catalog System will have assigned to it one four-digit class code. An item is classified either by "what it is" (bolts in the bolt class, electron tubes in the electron tube class) or "where it fits" (the pedestal in the same class as the ventilating fan, the platen in the same class as the typewriter). The term "application coding" refers to the classifying of an item according to "where it fits." This takes place primarily in the machinery and equipment areas. As a rule, an application-coded item must be designed especially for the object with which it is used. Other kinds of items, treated in the same way as bearings and gears, are gaskets, various power transmission components, pumps, and valves. The classification system is an internal management tool used by DOD, GSA, and civil agencies and is governed by daily management requirements. The uniform Federal Supply Classification provides uniform management categories throughout military organizations, functions, operations, and supply pipelines. The next basic element is on the National Stock Number (NSN). Having established the uniqueness of an item of supply through a Federal Item Identification, the identity of that item is fixed and its relation to other items established through the assignment of an NSN.

d. As of 1 October 1974, a 13-digit stock number consisting entirely of numerals is being assigned to items of supply. The term NSN is to be used for identification of the US 13-digit stock number in all materiel management functions. In logistics matters involving the NATO Headquarters or individual NATO countries, the abbreviation NSN shall be interpreted to mean NATO stock number. The NSN is composed of two groups of numbers. The first four digits are the Federal Supply Classi-

fication (FSC) code assigned to the item. The last nine digits are the National Item Identification Number (NIIN) of which the first two digits (reading left to right) are the National Codification Bureau (NCB) code. The NCB is used to identify the central cataloging office of the NATO or other friendly foreign country which assigned the item identification number (e.g., United States, 00 or 01; Canada, 21 etc.). These numbers are assigned as an item identification is approved, and there is no relationship between one NIIN and the next in sequence numerically. The NIIN remains with the item as long as this item exists in a supply system, although the NSN will change if the item is changed from one FSC class to another. The NSN system provides important advantages, such as:

(1) Uniformity—In structure, composition, length, and use.

(2) Stability—The National Item Identification Number lives with the item forever.

(3) Adaptability—The NSN fits differing needs of supply management and operations and is compatible with existing and advanced mechanical, electrical, electronic data processing, and microfilm equipment.

(4) Simplicity—It is applicable without modification to all items, easily maintained, and easily recognized.

e. The final basic element of the Federal Catalog System is the publication of the Federal Item Identification, related NSN, and corresponding logistics management and reference data for each item of supply, in order that this information may be made available to using and interested military activities and civil agencies. The governing directive, DOD 4130.2, specifies that standard microfiche, reduction ratio of 48x, shall be employed through the DOD, unless otherwise justified, to minimize printing and distribution costs associated with publication of the Federal Supply Catalog. The Federal Item Identification characteristics data are published and distributed by the DLSC on microfiche in the Federal Item Logistics Data Record (FILDR). The related logistics and reference data are distributed to Federal cataloging participants, including Army national inventory control points (NICP's). DLSC also publishes the Defense Integrated Data System (DIDS) Procedures Manual (DOD 4100.39-M) which contains operating procedures for the Federal Catalog System, as well as maintaining and publishing cataloging tools such as Federal Item Identification Guides (FIIGs) and the Cataloging Handbooks. The

Defense Logistics Agency (DLA) maintains and publishes the Federal Catalog System Policy Manual (DOD 4130.2-M).

3-4. The Federal Supply Catalog.

a. The Federal Supply Catalog is not a single printed book or a bound catalog. Rather, it is a vast array of master computer records stored in computers, one for each item in the supply system, which are maintained in one central location.

b. Federal catalog data are distributed worldwide through the following publications maintained by the electronic data processing method to provide the greatest flexibility and control in operations. They are distributed to Federal and other selected activities as required to meet varying operational needs and logistics interest. A general description of each publication is as follows:

(1) The introduction to the Federal Supply Catalog, C-1(A), is an Army publication that provides an official source for information applicable to Federal Supply Catalogs for customers within the Department of the Army (DA) requiring data pertinent to the preparation of requisitions, financial inventory accounting records, and related supply documents. In addition, it provides instructions for the use and maintenance of the Federal Supply Catalogs, Change Bulletins, and Change Notices. This publication is comprised of four sections as follows:

(a) Section I—Introduction.

(b) Section II—Identification List.

(c) Section III—Management Data List.

(d) Section IV—Master Cross Reference List.

(2) The IL is published in basic editions and related change bulletins for the purpose of providing timely item identification data for use by DOD, GSA, and civil agencies. The identification section of the IL contains characteristically described and/or reference number described items as applicable in FSC sequence and within FSC by item name. Beneath each item name, characteristically described items are listed first followed by reference number described items. Reference number described items are listed in NIIN sequence and presented in NIIN to manufacturers' reference and manufacturers' code number style. Excluded from the publication are medical, Defense Nuclear Agency, subsistence, security classified items and National Security Agency managed items.

(3) Master Cross-Reference List (MCRL) is a publication that contains a master list of NSN and Logistics Reference Numbers cross-referenced to each other. Four basic elements of data are provided in the MCRL: reference number, logistics;

assigned NSN; CAGE; and Reference Number Variation Code (RNVC). Another data element, Service/Agency Designator Code, is sometimes shown in the RNVC column to explain a particular cross relationship of numbers. The MCRL also shows a cross-reference from superseded, transferred, and cancelled-replaced stock numbers to current stock numbers and vice versa.

(4) The Management Data List (ML) is a publication containing military service management data necessary for requisitioning and accounting for items of supply. The publication is arranged in NIIN sequence, preceded by the Federal Supply Class, and includes management data such as sources of supply, unit of issue, unit price, interchangeability and substitutability, etc., and is produced in military service tailored versions, composed of NSN's against which is a specific military service is recorded as a user.

(5) The DOD Ammunition Code Publication (SB 708-30) contains the DOD Ammunition Code (DODAC) numbers that are assigned by DLSC to generic descriptions submitted by activities within the DOD. The DOD Ammunition codes are published in basic editions only on standard 48.1 microfiche on a quarterly basis. The publication is divided into two parts as follows:

(a) *Part 1.* An alphabetic list of approved item names that pertain to ammunition and guided missiles, except repair parts and industrial components, to which DODAC's have been assigned. Several items of supply, each having the same item name and each being functionally interchangeable are listed beneath the common item name.

(b) *Part 2.* An alphanumeric list by FSC class, of the last four characters of the Ammunition Codes contained in Part 1.

c. The sets, kits, and outfits Components List (CL's) is an Army publication that lists the items which comprise a set, kit, or outfit. The CL's are published by the Army activity having the predominant interest in the set, kit, or outfit.

d. The publications published by the DLA through the DLSC are the basic operating manuals of the Federal Catalog System and contain the operating rules and procedures covering the development and maintenance of a uniform catalog system. The CL's are compiled by the Army activity having the predominant interest in the set, kit, or outfit and published from ACL's publications data bank.

(1) Defense Integrated Data Systems Procedures Manual, DOD 4100.39-M. This is the basic operating manual of the entire cataloging system

and consists of 14 separate volumes.

(2) Federal Supply Classification (H2 series). The FSC is a commodity classification system that utilizes a four-digit coding structure designed to serve the multiple functions of supply. The FSC system, and its published indexes, have been developed for use in grouping related items of supply in the Federal Catalog System. The four-digit FSC class also appears in the first four positions of each NSN. It is published in two parts.

(a) Part I, Groups and Classes (Cataloging Handbook H2-1) (SB 708-21). A numeric listing of the FSC structure plus the title and general coverage of each group and class in the four-digit FSC code numbering system. Main inclusions, and exclusions, which delimit the coverage of a particular class, are shown.

b Part 2, Numeric Index of Classes (Cataloging Handbook H2-2) (SB 708-22). A numeric listing of all FSC classes, with the name of items, and commodities arranged alphabetically within each FSC class. The FIND contains approved item names (AIN's) and general item names with appropriate cross-reference.

(3) Commercial and Government Entity Code (H4-series). Commercial and Government Entity Code (CAGE) is a comprehensive listing of the name and address of manufacturers which have supplied or are currently supplying items of supply used by the Federal Government, and the applicable five-digit code assigned to each. The CAGE is used in supply management, automatic data processing, and other functions within the Government where a uniform length, numerical code for the complete name and address of manufacturers is required. Published in four parts.

(a) Part A, Name to Code (United States and Canada) (Cataloging Handbook H4-1) (SB 708-41). An alphabetic listing of names of manufacturers in the United States or Canada, with each name referenced to the assigned five-digit code. Related historical and affiliation data are shown.

(b) Part B, Code to Name (United States and Canada) (Cataloging Handbook H4-2) (SB 708-42). A numeric listing of the five-digit codes, with each code referenced to the manufacturer in the United States or Canada to whom it has been assigned.

c Part C, CAGE (excluding the United States and Canada) (Cataloging Handbook H4-3) (SB 708-43). This publication, which only includes codes assigned to manufacturers with address outside of the United States and Canada.

(d) Part D, Code in numeric order. A numeric listing of the five-digit (NATO) code.

(4) Federal Item Name Directory (FIND) (H6 series). The FIND for supply cataloging contains item of supply names with definitions, item name codes, and other related data required to prepare item identifications for inclusion in the Federal Catalog System. Published in two sections.

(a) Section A, Alphabetic Index Names (SB 708-6A). Basically, this index is used as a dictionary of item names and includes definitions, item name codes, etc.

(b) Section B, Numeric Index of Federal Item Identification Guides to Item Name Codes. This index is used as a cross-reference list to determine the item name codes includes in the coverage of each FIIG.

(5) Manufacturers Part and Drawing Numbering Systems (H-7) (SB 708-70). This handbook is designated "For Official Use Only." This designation limits distribution to Government civil agencies and military activities only.

e. Although all items of supply used on a repetitive basis by all agencies of the Government are included in the catalog, items are continuously moving in and out of the catalog. Obsolete items and items no longer in demand are replaced by new or replacement items.

f. The Federal Supply Catalog, as an operating source of information, has been of great benefit to the Defense Standardization Program and the Defense Provisioning Program. The catalog system has provided the means by which both of these programs are maintained, not only for economic reasons, but also for effective utilization of materiel resources. The existence of the catalog in itself serves as a monitoring effect on the programs as discussed briefly below.

(1) Defense standardization program.

(a) Standardization is simply the process by which the DOD achieves the closest practicable cooperation among the services and defense agencies for the most efficient use of research, development, and production resources, and by which it agrees to adopt, on the broadest possible basis, the use of:

1. Common or compatible operational, administrative, or logistics procedures.
2. Common or compatible technical procedures and criteria.
3. Common, compatible, or interchangeable supplies, components, weapons, or equipment.
4. Common or compatible technical doctrine with corresponding organizational compatibility.

A product is deemed to be standardized when it conforms to specifications having the same technical requirements.

(b) The purpose of the standardization program is to reduce the number and types of items that the military services supply to their forces. Activity in attaining the objective of standardization is carried out during the research and development process and is performed continuously while items are in the supply system.

(c) The DOD Standardization Program is concerned with items of supply and with materiel, processes, and practices used in their production, acquisition, and maintenance. Its goals is an ultimate lean, strong supply inventory consisting only of items required to support operating forces at peak proficiency. Standardization also contributes to the saving of dollars by using standard items in design and engineering and by acquisition under specifications commonly used by all military departments.

(d) By the very name given to the act, Congress indicated the function of standardization to be equal in importance to cataloging in overcoming the supply ills of the past. Cataloging was to identify materiel, standardization was to increase the efficiency of material and streamline the inventory. Congress assigned the Standardization Program to the Secretary of Defense who then delegated control to the DLA. Each department of DOD has a Departmental Standardization Office the Army's being the Commander, AMC.

(e) The Defense Item Entry Program, as an adjunct to the Defense Standardization Program operated by the DLA, is designated to preclude the entrance of duplicate items into the system. This program is controlled by the DLSC and monitors, specifically, the entrance of items into high-growth FSC classes.

(2) The provisioning program.

(a) Provisioning, like standardization, has a great impact on all of the managerial functions. The Army's equipment will only travel so far or operate just so long before a repair will be needed. If the principles of initial provisioning are followed, tools, repair parts, and necessary equipment to do the job will be on hand. If not, materiel readiness, so far as the particular item is concerned, is meaningless. Basic planning for provision of sufficient materiel to support an end item during an initial period of operation is performed during the research and development phase of supply management, prior to introduction of the item into the system. Due to the wide variety and complexity of equipment entering the supply system, it became increasingly apparent that an improper balance of tools and parts could impair maintenance, supply, or mobility. A certain amount of repair parts of support of these sophisti-

cated weapons should be immediately available, but the question was "how much?" today's Army must be mobile. Two little might mean excessive deadlining of equipment; too much would require transportation of burdensome stock.

(b) In recognition of the impact of these significant factors, the Secretary of Defense directed, in 1956, that even greater emphasis be given to improving the effectiveness and economy of maintenance operations within each military department. AR 700-120 established the Secretary's "Policy and Principles Governing Provisioning of End Items of Materiel: in accordance with the objectives of earlier maintenance engineering directives and formally related provisioning and maintenance engineering to eliminate unnecessary varieties of equipments, components, and parts. Whenever an item is to be given an NSN, the NICP provides necessary information for cataloging to the DLSC. This type information, available on items in the system, is later used in the central provisioning screening process whereby items to be procured are first matched with existing standard items to preclude duplication.

(c) The fact that rapid advancements in technology require changes in components of end items even during the development stages also received Secretarial attention. Investigation resulted in directions that phased provisioning would be applied to selected high-cost items that were either new to the DOD inventory or were undergoing major modification. This refinement of the initial provisioning process permits an arrangement with manufacturers for an increased production inventory to be held by them as a buffer stock to satisfy demands on the supply system.

g. Through the use of the Total Item Record (TIR) and its attendant System Support Record (SSR), which is maintained by the DLSC and the

computer processing techniques now available at most inventory control points, an inventory manager has access to management data on any of the more than 4,500,000 NSN's in the catalog. Manufacturer's part numbers and codes can be matched to the appropriate NSN. If, in the buying process, a part number or manufacturer's code is available, it is possible to submit this information to DLSC as prescribed in DIDS procedures manual to determine if an NSN is available. If it is available, additional management data can be provided. This information, maintained and updated in the computerized Master Catalog File, includes for each item:

- (1) Federal supply class.
- (2) Manufacturer's number and code.
- (3) Item name and code.
- (4) Standardization status code.
- (5) Acquisition status (acquisition method).
- (6) Activity with inventory management responsibility.
- (7) Specification and standards data.
- (8) Acquisition sources.
- (9) Kind of match code.
- (10) Acquisition method code.
- (11) Acquisition method suffix code.
- (12) NIIN status code.

This process of "matching" and "cross-referencing" is essentially a screening process which prevents duplication of cataloged items and facilitates the control of the number of NSN's assigned.

h. All catalogs contain item intelligence utilized for effective materiel management and related functions including the requisitioning of items. They list items that are centrally managed and which may be stocked or nonstocked and centrally or locally procured. Management decisions which create changes in the item intelligence published in the catalogs result in changes being published as supplements to the basic catalog.

Section II. Introduction of New Equipment/Items

3-5. Entry of New Items.

a. Materiel Suitability

(1) The commands of AMC are engaged in the development and testing of advanced equipment. Each command is responsible for research and development of materiel in the groups it manages and all of these commands are required to coordinate with each other and with other DOD agencies in the development of materiel to insure each new item is suitable for issue. The inclusion of quality and performance characteristics is an essential element of the wholesale materiel management mission of the AMC. The entry of new items into

the system is generally the result of research and development effort in devising newer or better materiel in support of combat needs.

(2) The term "new item" for the purpose of this discussion, covers all major Procurement Appropriation Army items and all secondary (Operation and Maintenance, Army (OMA) and Stock Fund (SF) items that are newly type classified and are:

- a Being produced and introduced into the Army supply system for the first time; or
- b Are being produced by a new producer for the first time.

Procurement Appropriation funds are used primarily to procure major items, and stock fund monies generally procure secondary items. By AMC regulation, suitability must be insured on either type item that is subject to engineer or service testing during the development cycle. All test and evaluation effort must be expanded and all deficiencies must be corrected (or planned for correction by modification or post-issue action). The Test and Evaluation Command concurs in the adequacy of the testing program; the commodity commands states that the materiel has no known deficiencies that will not be corrected, and only then is authority requested of AMC to issue materiel.

b. Screening.

(1) Before a new item can be entered into the Federal Catalog, provisioning planning, documentation, and compliance with standardization and item entry principles insure, by a comprehensive screening, that each item being entered differs significantly from every other cataloged item. Item control, therefore, begins with effective identification and cataloging under the Federal Supply Cataloging System. The DLSC has developed a screening program in collaboration with the military services to match proposed new items against existing standard items already in the system.

(2) When a new end item of equipment is being developed and tested, the components or special tools required to support an end item, as well as the end item itself, receive screening for related cataloging actions. The procuring activity requires that the contractor who is producing the item submit a list of all components and tools needed for support. The listing provides the manufacturer's part number, a description, and any other management data that may assist in screening against existing Federal standard items as explained in paragraph 3-4. From this list the commodity command personnel select those items that they agree to be necessary, decide on quantities required, and make determinations to catalog those items not currently in the supply system. Descriptions are written and NSN's are secured as required. The requirement for early publication of catalogs and technical manuals is often the basis for erroneous entry of duplicate items. If a short deadline is imposed and insufficient time is allotted for a systematic search, the cataloging activity may perform only a local review of known items without referring the item to DLSC for screening. Each cataloging activity is furnished microform records and/or magnetic tapes by the DLSC of items in the classes that are managed by their agency. The portion of the catalog available within the agency is usually checked first, followed by

screening against the master data at DLSC prior to actual cataloging action. Matching of part numbers to NSN's during screening against central files prevents preparation of unnecessary item identifications and eliminates the possibility of multiple NSN assignment.

c. Commercial Items. So far we have considered item entry as occurring through the research and development (R&D) process. It often happens, however, that a commercial item is found that meets a military need. In such a case an item description is written, a stock number is secured, and steps are taken to enter the item into the catalog, into authorization documents, and into technical manuals. In fact, the DOD policy of this subject states that "whenever feasible, military operational requirements for materiel shall be satisfied through the use of existing military designs or commercial products." Each major agency having development control of materiel takes classification action on every item entering the system, recording its status from the standpoint of development and suitability for service use. Those major items which are available from commercial sources and do not require R&D action are type classified and formally entered into the system. When entry is the result of R&D action, type classification is processed by the agency having development responsibility. When a commercial item is type classified, the agency having or proposing logistics responsibility takes the action. It is impossible to stock, maintain, and issue every item that the Army needs; AR 70-61 specifies that type classification is not required for commercially available items whose sole basis of issue is a Table of Allowance or a special requirement if there is no significant quantitative Army requirement for the item. There must first be a positive requirement for an item before a request for an NSN is made. The fact that it is believed an item should be in the system is not enough.

d. Decisions influence management of an item of supply all during its life cycle. The approved technical characteristics of an item under development may well determine ease of maintenance. Changes in dates of type classification may result in another procurement of an already existing item (scheduled for replacement) to insure continued materiel readiness until the new item is finally accepted and becomes available. This may mean that logistics transfers will occur from one class to another or even from Army to DLA for management. When these actions take place, all changes in manuals must be coordinated, for they are authority for:

- (1) Entry of a new item into catalogs.

(2) Changes to cataloging data of existing related items.

(3) Entry of the new item in SB 700-20 (Army Adopted/Other Items Selected for Authorization/List of Reportable Items).

(4) Entry in authorization documents so that those having a requirement may requisition or procure the item.

(5) Entry into technical manuals (if the item type classified has application to many end items the number of technical manuals requiring change may be numerous).

e. Cataloging information can only be provided by the service that generates equipment. This information is furnished to enter an item into catalogs and manuals used by managers at Army NICP's. Army class managers in Army support commands take similar action for items of Army interest that are the integrated management responsibility of the DLA.

3-6. Army Cataloging.

a. The procedures governing operation of the Army Master Data File (AMDF) are contained in Army Regulation 708-1. The AMDF is an automated system which encompasses management data authorized for use by the Army. This file is the source for extraction of data to provide selected item data elements most commonly used and required by field activities. The data are disseminated through microform products such as the Army Master Data File Retrieval Microform System (ARMS), the Supplemental Interchangeable and Substitute Items List (SISIL), and the Master Data record (MDR). The AMC Catalog Activity (CDA) is designated as the single distribution point of current catalog and related logistical data to CONUS and overseas activities. The CDA maintains a composite AMDF from data submitted monthly on items managed by NICP's, Army class managing activities for DLA/GSA items, US Army Communications Security Logistics Activity, Electronics Materiel Readiness Activity, and US Army Medical Materiel Agency. The CDA disseminates an AMDF change notice worldwide to authorized recipients once a month.

b. The AMDF is adaptable to ADP equipment and it provides data on all principal items, major items, secondary items, and repair parts that are the logistics responsibility of each command. It is described in Chapter 7, AR 708-1.

3-7. Impact of the Cataloging Function.

a. *Magnitude of Cataloging Services.*

(1) The Federal Catalog System currently

serves the catalog needs of DLA, departmental inventory managers, and numerous other DOD managers, including the National Security Agency, and the US Coast Guard, for wholesale and retail materiel managers.

(2) The system also serves inventory managers among the civil agencies. In addition, DLSC is responsible for coordinating NATO and friendly foreign nation participation in cataloging operations. The NATO nations have adopted the US system of supply classification and manufacturers' codes as the NATO Supply Classification and the NATO Supply Code for Manufacturers. There are currently 11 NATO countries, five other friendly nations, and two NATO agencies being furnished cataloging services.

b. *Federal Items Identification Guide (FIIG).*

(1) The Federal Item Identification Guide is designed to give the catalog system increased information, more accurate data in a more expeditious manner. This increased amount of descriptive information will do much toward preventing the assignment of several stock numbers to the same item of supply.

(2) A "FIIG" is a document which contains a list of questions, plus rules and guides, that are necessary to establish adequate descriptive and supply management data for each item of supply. It is designed to collect information required for multiple logistics purposes such as cataloging, packaging, provisioning, procurement, transportation, materiel reutilization, and disposal. A FIIG is a comprehensive, self-contained document consisting of general item information, three sections of data requirements, and appendices as required.

(3) Section I is designed to contain item characteristics data which are required to differentiate items of supply for purposes of NSN assignment.

(4) Section II is designed to contain data range values for the elements listed in Section I. These values provide a manual of mechanized means for determination of item identity or interchangeability and substitutability relationships based on technical, functional, or physical characteristics.

(5) Section III is designed to contain supplementary technical data and management data which do not affect the assignment of NSN's, but which are necessary to support specific logistics functions.

(6) There are appendices to each FIIG as required to make it a self-contained document. These appendices are composed of MILSTICCS reply tables, reference drawings, and a functional and operational index. An integral part of the Federal Item Identification Guides is a system for

coding the data shown in a FIIG. It is called "MILSTICCS," a short title for Military Standard Item Characteristics Code Structure. It was developed as a uniform coding structure to solve the problem of increasing the responsiveness of the catalog system both in speed and volume, to prevent the entry of unnecessary items, and to facilitate the mechanization of logistics data.

(7) FIIG's and MILSTICCS are the tools used to collect the massive quantity of characteristics data to achieve the objectives of mechanization which has long been the goal of the Federal Catalog System.

c. *Item Manager's Responsibility.* Item managers (Primary Inventory Control Activity (PICA) and Secondary Inventory Control Activity (SICA) are responsible for the assignment and correctness of the individual data management information/codes in the AMDF. The file is broadcast at the rate of

one change per month effective the first day of the month.

d. *AMC Catalog Data Activity (CDA).* The CDA is the proponent agency for the AMDF and is responsible for the control, interface of the AMDF with DOD/DA standard systems, and dissemination of logistics data changes to all levels of the Army wholesale/retail supply activities. The CDA Central Logistics Data Bank has the capability to provide AMDF data in one of the following modes:

- (1) Data set.
- (2) Segmented data.
- (3) Management data distribution.
- (4) Automated inquiry/reply data.
- (5) File extracts/special requests.

e. *Utilization of Data.* Army activities will utilize the data provided in the AMDF change notices to facilitate logistics functions and provide the data to supported logistics operations.

CHAPTER 4 MAJOR ITEM MANAGEMENT

Section 1. GENERAL

4-1. Introduction.

All military services give primary management attention to equipment and weapon systems such as aircraft, ships, combat tanks, and armament. The final decisions concerning such items normally are made at departmental or higher levels. In the Army these items are referred to as major items.

a. Major item management vs. secondary item management. For most major items, requirements and authorization documents are approved by departmental headquarters. For secondary items, this is rarely the case. In this manner, a much higher level of control is exercised over the needs for major items. Most materiel management consists of attempting to match assets (or materiel) to needs for the assets, and, in the case of major items, all assets including those in the hands of using units are matched to total worldwide needs. For secondary items, stock levels are matched to requirements for stock levels. For example; trucks are major items and, in materiel plans, total truck needs worldwide are compared to total trucks on hand in Army units and in depots worldwide. Truck engines are important secondary

items, and truck engines on hand in direct support units (DSU's) are compared to the needs of the DSU's for replacement engines for the operating fleet. However, every truck (major item) in the fleet is assumed to contain a serviceable engine (secondary item), and the installed engines are never included in materiel studies of truck engines.

b. Funding. Major items cannot be procured from industry until funds from Congressional appropriations become available. The Office of Management and Budget (OMB) apportions these defense funds; the Office of the Secretary of Defense (OSD) releases the programs and funds; the Comptroller of the Army allocates the funds to the U.S. Army Materiel Command (AMC); and this command suballocates the funds to its major subordinate commands, which are responsible for the acquisition actions necessary to obtain major items.

c. Control and visibility. Major items are issued only to fulfill approved authorizations. Reports are made of worldwide assets, including those assets in the hands of troop units and held for maintenance float, operational projects, and war reserves.

Section II. IDENTIFICATION

4-2. Introduction.

Within the context of this manual, an item is determined to be a major item if it meets the following criteria:

a. The minimum criteria used in designating an item as a major item are as follows:

(1) The item must be an end item (a final combination of end products, components or materials which is ready for its intended use).

(2) The item supports either a combat or combat support mission requirement.

(3) The item is of such importance to Army operational readiness that review and control of inventory management functions (procurement, requirements, distribution, maintenance, disposal and asset reporting) is required at all levels of logistical management.

(4) Requirements are computed and programmed from equipment authorization and requirements documents of the approved force structure. This means the items appear on Modified Tables of

Organization and Equipment (MTOE), or Tables of Distribution and Allowance (TDA).

(5) The item has a unit cost of \$30000 or more.

(6) The item is separately type classified.

b. An item meeting all of the above criteria is assigned supply class VII and is assigned an appropriation and budget activity code of A through Q.

c. Items managed as major items without regard to the above criteria are as follows:

(1) All motorized wheeled, tracked and towed vehicles for use on highway or rough terrain.

(2) All weapon and missile end items.

(3) All ammunition.

(4) All boats and ships.

(5) All sets, assemblies, or end items having a major item as a component.

(6) Selected construction material assigned supply class IV with ABA code of A through Q.

(7) Sets, kits and outfits which are classified and authorized by a table of organization and equipment (TOE), table of distribution and allow-

ances (TDA) or joint table of distribution and allowances.

(8) Items justified at OSD or Congressional level.

d. Any item not meeting the preceding criteria may be designated a major item on an exception basis. This action may be approved by AMC if the requestor is able to demonstrate convincingly that major item management procedures will result in better overall management than secondary item procedures.

4-3. National Stock Number (NSN) Assignment.

The NSN is a unique number used to identify one specific make or model of major item. It is assigned by the Defense Logistics Services Center at the request of the managing command, which furnishes the necessary descriptive data.

4-4. Line Item Number (LIN).

The LIN is a code number used to identify the generic nomenclature which is used in requirements or authorization documents. This generic nomenclature identifies a need rather than a specific make or model, as does the NSN. Since requirements and authorizations are identified by LIN, and assets are identified by NSN, cross-reference data is needed to determine which makes or models of major item can be issued to satisfy the generic nomenclature found in the authorization documents. The needed data is published in Supply Bulletin 700-20, Army Adopted/Other Items Selected for Authorization/List of Reportable Items, NSN's may be matched to LIN's on a one-to-one basis; or, more than one NSN may be matched to only one LIN. In other words, several different makes or models of a major item may be suitable for issue to satisfy the generic nomenclature found in authorization documents.

4-5. Standard Study Number (SSN) System.

Since there are about 8,000 different LIN's used in authorization documents, it is impractical for higher level managers to review each of them. As a result, the SSN system has been designed to provide a means of summarizing data pertaining to similar LIN's. The system contains a computer program which is used to consolidate the data for items such as 5-ton trucks with winch and 5-ton trucks without winch for study purposes. The system can also be used to summarize to the budget line level; e.g., 5-ton trucks, all body types (which include truck-mounted missile launchers and other

items mounted on 5-ton truck chassis). In addition, the SSN system contain a large data base consisting of the codes and factors used in major item management, and requirements computation.

a. *Type classification code.* A one digit code identifying the life-cycle status of materiel and serves as a guide for authorization, procurement, logistical support, and asset and readiness reporting.

b. *Type item code.* The standard study number system identified major item component relationships through the application of the type item code. Items coded "G" are the larger assemblages that "generate" additional requirements for the individual components (items coded "p" for "primary").

c. *Reportable item control code.* A one digit code identifying items selected for asset reporting.

2 = reportable

0 = non reportable

d. *Logistics control code.* A one position code used to provide a basis for logistics support decisions, i.e., procurement of repair parts, overhaul, requisitioning and distribution.

e. *Operational readiness float (ORF) factor.* The ORF factor indicates the fractional quantity of the in-use mission-essential equipment needing or undergoing repair at the general or direct support level at any point in time.

f. *Repair cycle float (RCF) factor.* The RCF factor indicates the fractional quantity of the in-use mission-essential equipment needing or undergoing depot overhaul at any point in time.

g. *Unserviceable generation factor (UGF).* The UGF indicates the monthly fractional quantity of the in-use equipment which will require depot overhaul. The UGF is actually an unserviceable return factor. It cannot be used to forecast total unserviceable generations, because data concerning major items which are placed directly into property disposal channels is not captured for purposes of UGF development. The UGF can, however, be used for maintenance planning purposes as it does produce a total unserviceable generation figure available for overhaul/repair consideration.

h. *Peacetime replacement factor (PTRF).* The PTRF indicates the fractional quantity of the in-use equipment which will become uneconomically repairable in 1 month.

i. *Overhaul condemnation factor (OCF).* The OCF indicates that fractional quantity of the in-overhaul inventory which will be determined to be noneconomically repairable.

j. *Life expectancy.* This is the estimated useful life of an item. It is determined by experience with

similar items, and considers both present conditions and probable future developments.

k. *Other codes.* A complete and more detailed

listing of the codes used in the SSN system may be found in Supply Bulletin 710-1-1, Standard Study Number (SSN) Master File Cross-Reference Index.

Section III. Management at the National Level

4-6. General.

Intensive management of major items at the national level is necessary because of their high-dollar value and combat essentiality. It is also necessary because of the impact that actions taken for major items have on related secondary end items and repair parts. The level of review given major items will differ depending upon criticality and total inventory dollar value. The most important items receive a final review by the OSD. Other items receive their final review at the Department of the Army (DA) Staff Level, particularly, the Assistant Secretary of the Army for Research, Development and Acquisition, the Deputy Chief of Staff for Operations and Plans, and the Deputy Chief of Staff for Logistics. Items of lesser importance are reviewed by headquarters, AMC. Those of least importance are reviewed by the managing major subordinate command. The funds for procurement of all major items are reviewed by the Comptroller of the Army.

4-7. Office of the Secretary of Defense (OSD).

a. *Defense Guidance.* The preparation of the annual Defense Guidance is the initial action taken at the national level with respect to the determination of requirements for major items. It is issued by OSD to the Secretaries of the military departments, the Joint Chiefs of Staff, and the defense agencies. It contains guidance for force planning levels, fiscal levels, and materiel support planning.

b. *Army Program Objective Memorandum.* The Defense Guidance is also used by the military departments and defense agencies to prepare their Program Objective Memorandums (POM). The Army's Program Objective Memorandum expresses total Army program requirements, providing force levels, manpower costs, and materiel recommendations for the budget year and the following 5 years.

c. *Joint Program Assessment Memorandum.* The Joint Chiefs of Staff prepare the Joint Program Assessment Memorandum based upon the fiscal and force guidance of the Defense Guidance and a review of each service program. The Joint Program Assessment Memorandum, showing a summary of recommended forces and stating the im-

pact of funds constraints, is then forwarded to OSD for their consideration.

d. *Program Decision Memorandum.* After OSD review of the Joint Program Assessment Memorandum and the Program Objective Memorandums, the Secretary of Defense identifies alternatives to issues where OSD differs with the Services. After these issues are resolved a final Program Decision Memorandum is issued by OSD to the military services and defense agencies. It provides general program guidance in the development of the Army Force Program. After appropriate modification to conform with this guidance and with a presidential dollar target, the first two years of the Program Objective Memorandum becomes the basis for the budget.

4-8. Department of the Army.

a. *Deputy Chief of Staff for Operations and Plans.* This staff element is the proponent for the Structure and Composition System (SACS). The SACS is an automated process which matches Army units to their requirements and authorizations, thereby deriving the initial issue quantities needed by these units during mobilization and during peace.

(1) The force accounting system lists by unit identification code all of the Army Forces at the parent unit level (battalion or separate company). Included are actual units, programed units, and planned units, which are, respectively, units currently in existence, units which are programed for future existence, and units which are not programed for future existence, but which are needed when larger size forces are being studied. There are about 100 different data elements of management information associated with each unit—higher headquarters, location, readiness condition, etc.—but equipment requirements or authorizations by line item number are not included. The initial step in SACS processing is the extraction of those units in the Army Force Program, together with related management data, from the force accounting system. The SACS is the only source providing the approved Army Force structure with allowances and changes necessary to progress from the current through the budget and PCM years. This force is restricted according to policy and ceiling limitations.

(2) The Army Authorization Document Sys-

tem lists, by unit identification code, all the equipment requirements and authorizations found in MTOE and in TDA. The second step in SACS processing is to match the units in the selected force with their requirements and authorizations, as stated in the documents under which they are organized.

(3) When future activation of Army units is programed, existing authorization documents may be unsuitable for a requirements projection. If this occurs, requirements and authorizations are determined by matching the standard requirements code of the unit contemplated for activation with the appropriate (unmodified) TOE, as recorded in a computational file maintained by Headquarters, Department of the Army. This is the third step of the SACS processing.

(4) There are many new equipment items programed for introduction into the Army. However, the LIN's have not yet been incorporated into TOE's, TDA's, or MTOE's. Under these circumstances, a Basis of Issue Plan (BOIP) is developed and incorporated into the BOIP file. This file is simply a list of current LIN's and the LIN's of developmental items programed as their replacements and authorizations which have been recorded through the third step of the SACS processing with the BOIP file, the undesired LIN's are overlaid with developmental LIN's. This is step four of the SACS processing.

(5) In every automated system, there must be a means of including exception data. This is done through the shorthand notes file. It is useful for

incorporation of last minute changes to the force list and the related requirements or authorizations, for input of data for new items when BOIP information is not acceptable or available, and for programed future revisions to MTOE. Shorthand notes are made by the System Integration at DA DSCOPS.

(6) The final product of the SACS processing is the initial issue quantity (IIQ) needed by Army Forces for war (requirements) or during peace (authorizations). The data may be displayed by unit, in which case it becomes useful to commanders, or it may be displayed by LIN, in which case it is useful for national level management of requirements, authorizations, and assets.

b. Assistant Secretary of the Army for Research, Development and Acquisition. The Assistant Secretary of the Army for Research, Development, and Acquisition uses the Program Objective Memorandum and the OSD Defense Guidance to develop or revise its Army Program and Budget Guidance, which applies to the Army's Procurement Appropriations and to the development of the Army Materiel Plan (AMP). This planning guidance includes such things as program cost breakdowns; production base data; and rules to apply in requirements computations. The Army Program and Budget Guidance perpetuates the necessary portions of the OSD Defense Guidance.

c. *Deputy Chief of Staff for Logistics.* The Deputy Chief of Staff for Logistics uses the Program Objective Memorandum to develop or revise its Distribution Policy and Guidance Directive.

Section IV. The Army Acquisition Objective (AAO) and the Army Materiel Plan

4-9. Introduction.

The AAO is the target for peacetime acquisition of major items. It is that quantity of an item authorized for peacetime acquisition to equip the US Army-approved force in peacetime, and to sustain this force and specified allied forces from the start of a war through the period and at the level of support prescribed by the latest OSD Defense Guidance.

4-10. Composition of the AAO.

Following is a list of the individual elements which, when added together, constitute the AAO. The calculation of the AAO is made for a given force structure without regard to the asset position. This means that the AAO is made for a given force structure without regard to the asset position.

This means that the AAO developed in this process do not represent the acquisition requirements,

but rather they represent the total requirement for a major item to satisfy the needs of a given force level. It is necessary to consider the current assets plus the projected gains and losses in order to determine the acquisition needs.

a. *Initial issue quantity.* This is the sum of the quantities required by the units of the U.S. Army-approved force to carry out their missions continuously in a wartime environment. The actual computation is made during the SACS processing, as described in paragraph 4-8a.

(1) A requirements document, the TOE, is developed for every different type of Army unit. It states mission, personnel, and the minimum essential equipment which military planners deem necessary for successful mission completion. The TOE serves as a pattern document to aid each unit in stating its own unique needs, by way of the modification TOE. The TOE is not the authority by which major items are issued. It is a planning

document and is not used for authorizations. Proponent agencies are responsible for TOE design, change, and redesign. The TOE states equipment requirements at level 1, level 2, and level 3. The level 1 quantities represent the equipment needed by a unit to carry out its mission continuously in a wartime environment. Level 2 is approximately 90 percent of level 1, while level 3 is approximately 80 percent of level 1. The latest TOE data is incorporated into a computational TOE file maintained by Headquarters, Department of the Army, for use in SACS processing.

(2) The MTOE is an authorization document fashioned by each Army unit using the basic or unmodified TOE as a pattern. It becomes a part of TAADS, and it is the authority for issue of major items. Changes are initiated by the unit, and may be made in response to direction from higher headquarters or to locally recognized needs. When changes are approved by Headquarters, Department of the Army, the latest data is incorporated into their files for use in SACS processing. The MTOE displays a required quantity which is normally identical to the level 1 quantity of an unmodified TOE and expresses wartime needs. It also displays an authorized quantity, which represents the major items which the unit should currently have on hand or on order.

(3) The TDA is also an authorization document, which states requirements and authorizations for Army organizations which hire civilians and which are not deployable during wartime. Examples are schools, depots, AMC major subordinate commands, etc. This document is very similar in concept to the MTOE. It is created by its designers in the organization, but there is no "pattern" TDA available for guidance during the design process. Data from TDA's are also incorporated into the files of TAADS at HQDA for use in SACS processing.

b. Operational readiness float (ORF). The ORF is a mission-essential major item needed for direct exchange purposes. It is maintained and stored in a serviceable, ready-to-issue condition by the supporting maintenance activity and is available for unplanned and unprogramed exchange with the using unit. When a unit experiences an equipment failure which cannot be diagnosed and repaired within prescribed time limits, the unit exchanges the unserviceable item for the serviceable ORF, so that a good operational readiness posture is maintained. ORF factors are determined by maintenance personnel and are entered into the fields of the SSN system. The IIQ required for wartime, multiplied by the ORF factor, yields the number of major items needed for ORF during wartime.

c. Repair cycle float (RCF). The purpose of depot overhaul is to extend the useful life of equipment. The Army has equipment which must be overhauled periodically. RCF provides Army units with new or overhauled equipment, so that the items needing overhaul can be returned to the supply system, can receive the necessary maintenance, and can then be used again as RCF. Major items used as RCF are normally stored where a depot overhaul capability exists; are made serviceable prior to exchange; and are used for planned or programed exchanges. The IIQ required for wartime multiplied by the RCF factor, yields the number of major items needed for RCF during wartime. The RCF factors are determined by maintenance personnel and are entered into the files of the SSN system. The establishment and use of RCF will be controlled by HQDA and will be governed by funded end item depot maintenance programs.

d. Operational projects (OP). OPs are assignments to support specific logistical or contingency plans. If the IIQs required by Army units contain insufficient equipment to adequately support the assigned OP, Headquarters, Department of the Army, incorporates a bill of materiel into the OP, thereby, approving the necessary materiel requirements. These requirements are then entered into an OP file maintained by the Central Systems Design Activity-East (CSDA-E) located at Letterkenny Army Depot. However, not all OP's are authorized for inclusion into the AAO requirements computation. Those which can be included are identified by the Assistant Secretary of the Army for Research, Development, and Acquisition and are called "additive" operational projects.

e. War Reserve Stocks for Allies (WRSA). The DCSLOG may identify items for future transfer to friendly governments to sustain their forces in time of war. If an item is selected for War Reserve Stocks for Allies computation, it is accomplished in a fashion similar to the way US War Reserves are computed. The IIQ of the country is obtained and loss rates are applied over a specific period of time. The total is offset by the stocks on hand over the countries IIQ requirement. Currently a limited amount of WRSA are being computed for Korea.

f. Post D-day consumption. The quantity of major items anticipated to be lost in combat or worn out after the onset of war is identified as Post D-day consumption. These quantities represent requirements which must be included in the AAO computations, so that equipment will be available to replace those losses.

(1) *Combat consumption.* This is the quantity of equipment forecast to be lost under combat

conditions. It is determined by multiplying a wartime loss factor by the number, in theater days, of major items planned to be engaged in war operations. The various rates provide for the intensity computation, and there is a rate for each 15-/30-day period; i.e., 1-15, 16-30, 31-60, 61-90, 91-120, 21-150, and 151-180, in order to adjust the forecast combat losses to the rates specified in the OSD Defense Guidance. The wartime loss factors are developed by Concepts Analysis Agency, an element of the Army Staff.

(2) *Mobilization training losses.* This is the quantity of equipment forecast to be worn out after the onset of war by Army units as they undergo intensive training prior to deployment. The IIQ required for wartime, multiplied by the peacetime replacement factor, provides the requirements. This computation is made only for units which will undergo mobilization training and only for the period of time during which the training will last. The mobilization training losses are then added to the combat consumption in order to determine total Post D-day consumption. Note, however, that mobilization training losses are a part of the requirements. Major items are also brought to offset peacetime losses. Should war come, items purchased both for requirements and for normal peacetime losses would be available for the increased losses.

4-11. Army Procurement Requirements Process.

The Research, Development, and Acquisition Information Systems Agency (RDAISA), an organization under the operational control of the Assistant Secretary of the Army for Research, Development, and Acquisition, has been assigned responsibility for computing AAO requirements for Army-used major items. The sum of the required IIQ, the ORF, the RCF, additive OP's, WRSA, and Post D-day consumption equals the Army Acquisition Objective. To make these computations, three things are needed:

a. Forces and equipment needs. These are the IIQ's which are the output product of the SACS processing, and are furnished to the Research, Development, and Acquisition Information Systems Agency by DCSOPS. It indicates, by LIN and by unit identification code, the quantities required and the quantities authorized, as well as other data related to the forces.

b. Guidance. This is furnished by ASARDA's Plans and Policy Guidance, which provides instructions for relating Army units to the proper force strata, etc. It also furnishes the instructions to use in computation of Post D-day consumption, so that the computations will be in consonance with OSD's Defense Guidance.

c. A data base. The Army Materiel Command's Systems Integration and Management Activity (SIMA) is the proponent for the SSN system and its files which provide the latest factors for use in the AAO computation. The SIMA furnishes data on OP's.

4-12. The Army Materiel Plan (AMP).

a. The major subordinate commands receive the Army Acquisition Objective computations from the Research, Development, and Acquisition Information Systems Agency and, using a computer system called AMP MOD, for "Army Materiel Plan Modernization," complete the AMP. The AMP MOD concept is that all data necessary for AMP preparation, except the AAO requirements is maintained in a current status in the computer data files-asset positions, age of assets, dues-in, future acquisition, levels of research and development, production base support, etc. Upon receipt of the AAO, it is put online and a completed AMP is produced within a very short time.

b. The AMP displays for the budget year and subsequent 5 years all the data necessary to make acquisition decisions concerning a major item, thereby, providing supporting details to justify the request for Procurement Appropriations.

c. Upon completion, the results of the AMP to include the various Procurement Forms (P-Forms) are reviewed by AMC, the major subordinate commands, project managers and the Army Staff to insure the acquisition programs are executable. The P-Forms, initially submitted in June reflect the program contained in the May Five Year Defense Program (approved Army POM).

d. P-Forms are consolidated at DA and further summarized into a P-1 Budget Display. The P-1 document provides summary by project/activity for each appropriation. Only procurement lines with a value of \$2 million or more will be listed individually. Line items less than \$2 million are consolidated into a single line item for each project/activity. The P-1 and supporting P-Forms go through OSD and the Office of Management and Budget (OMB) to form the basis of the President's budget.

Section V. Distribution Requirements and Distribution Planning

4-13. Introduction.

Distribution requirements are the allowance needed by approved force to accomplish each unit's peacetime mission. The Army goal is to obtain the best defensive posture with equipment on hand or due in within a short period. Distribution requirements are different from mobilization needs or wartime needs in that they apply to forces which are presently in being or which are planned for activation during peacetime. The calculation of distribution requirements is made for a given force without regard to the asset position. The availability of assets is then determined and distribution plans prepared. The Systems Integration Management Activity (SIMA) has the responsibility for computing major item distribution requirements.

4-14. Elements of Distribution Requirements.

a. The initial issue quantity. This is the allowance authorized for current U.S. Army units for units planned for activation or reorganization during the period of distribution planning. These allowances are extracted from the SACS File described in paragraph 4-8a.

b. *Operational readiness float.* Major Army commands are authorized to stock ORF based on Department of the Army-approved ORF factors, times the density of equipment in the authorization documents of the units they support. ORF for oversea units is computed using the required quantities found in the authorization documents of the units being supported, excluding prepositioned oversea materiel configured into unit sets. ORF for units in the Continental United States is computed using the authorized quantities found in the authorization ORF support until mobilized except for aircraft and aircraft-related items. ORF for aircraft and aircraft-related items is computed using the required quantities found in the authorization documents for both active and Reserve components of the total Army Force.

c. *Repair cycle float.* RCF is an additional quantity of mission-essential, maintenance-significant items of equipment specified by the major subordinate commands for stockage at depot level. The RCF is based on the density of equipment authorized in the documents of units being supported and is put into use as replacement for equipment awaiting depot overhaul, in the depot overhaul process, or in transit to and from depot overhaul. RCF is computed on many items; however, asset

stockage is based on HQDA approved maintenance policy.

d. *War reserves.* These are stocks of materiel amassed in peacetime to meet increased materiel requirements upon an outbreak of war. War reserves provide the interim support essential to sustain operations until normal resupply can be affected. Types of war reserves include:

(1) *Decrementated stocks reserve.* That quantity of equipment necessary to bring the forward deployed Army units from their current authorized level of organization (ALO) to full strength.

(2) *Theater war reserves (TWR) stocks* of mission-essential items (expressed in days of supply) authorized each theater to replace Post D-day combat consumption until resupply from CONUS can be accomplished. These stocks are usually prepositioned in the appropriate theater unless there is a lack of facilities that causes their placement in CONUS depots.

(3) *Operational project stocks.* These are authorizations which have been approved by HQDA, for major Army commands to acquire materiel for CONUS or theater stockage to support specific operations, contingencies, or war plans.

(4) *Pre-positioned materiel configured into unit sets (POMCUS).* Materiel to re-equip specific units with the equipment listed in their authorization documents upon deployment to the theater in which the materiel is stored.

(5) *CONUS war reserves (CONUS PPWL & GM).* This is that portion of the total mobilization war reserves which are held in CONUS depots under the control of the major subordinate commands, the US Army Forces Command, or the US Army Training and Doctrine Command. They include:

(a) *Obligated war reserves (CONUS PPWR).* This portion of the total war reserves is located in the CONUS and is held for a specific force or area. Included in obligated war reserves are:

1. *Contingency support stocks.* These are war reserve stocks held for support of Post D-day combat consumption needs of the approved forces based in CONUS, but which may be deployed worldwide in case certain contingency plans are implemented.

2. *Residual theater war reserves.* That portion of the Post D-day combat consumption quantities authorized to support deployed forces. These stocks consist of equipment not authorized for prepositioning in an oversea theater and equipment remaining in CONUS until after deployment of units designated to receive POMCUS stocks.

(b) *Early mission reserve component mobilization reserves.* These are the stocks necessary for issue to support the mobilization and deployment of the Reserve component units which have been scheduled for early development. Issue will bring the equipment level of these units and any needed operational readiness float to that level required to carry out their mission continuously in a wartime environment. These stocks should be on hand in the CONUS depot system.

(c) *Full Army mobilization reserves.* These stocks must be on hand in the depot system of CONUS to support full mobilization of all remaining Reserve component units as identified in the current SACS data. These reserves are sufficient to bring all remaining Reserve component forces from their current equipment level to that required for wartime, and to supply any needed ORF quantities as well.

(d) *General War reserves.* That quantity of equipment authorized for procurement and retention by the AAO which are reserved for general war.

(e) *Computation of war reserve quantities.* These are computed in accordance with the levels specified by Army Regulation 11-11, the planned unit deployment schedules, the requirements set forth in the applicable contingency or mobilization plans, and the special policy and guidance furnished by the Deputy Chief of Staff for Operations and Plans.

(f) *Restrictions on peacetime use of war reserves.* Major items of equipment in theater war reserves, CONUS war reserves, or operational project stocks are not to be issued for peacetime use without the prior approval of HQDA.

4-15. Distribution Priorities.

a. *Department of the Army Master Priority List (DAMPL).* The Army priority system for distribution of major items consists of the DA Master Priority List (DAMPL) developed and published by DCSOPS. A specific scenario is the starting point for the two DAMPL generation and normally is described as a force or combination of forces required to support an operational requirement. This scenario is the current high-priority and high-demand scenario. The current operational plan's deployment schedule constitutes a priority listing of units. Subjective considerations of requirements other than those in the basic operation plan will be added to this listing resulting in a unique listing of units Army-wide which establishes a priority for the allocation of resources. This listing is continually updated by DCSOPS and distributed to the Major Army Commands (MACOM), DCS-

LOG, US Army Materiel Command (AMC), and AMC major subordinate commands (MSC). The DAMPL covers 2 fiscal years which are the current and budget years.

b. *Equipment Release Priority System (ERPS).* The Equipment Release Priority System is used to determine the order in which distribution requirements will be filled. The ERPS brings together all types of priority guidance from HQDA into a single source used for planning and executing equipment distribution. Included in the ERPS are the DAMPL, Equipment Readiness Code considerations and HQDA directed out-of-DAMPL decisions from the Army Order of Precedence (AOP).

(1) The DAMPL has already been discussed and normally one would assume that the higher the DAMPL priority of a unit or claimant the sooner that unit or claimant could expect to have equipment shortages filled. There are, however, many situations that call for equipment to be distributed in an out-of-DAMPL sequence.

(2) Out-of-DAMPL distributions from the AOP occur for the following special considerations or programs. These shortages are identified and filled first.

(a) Force Modernization Items and related Associated Support Items of Equipment (ASIOE).

(b) Minimum Essential Equipment for Training (MEET).

(c) Light Infantry Division force structure changes.

(d) Dedicated National Guard and Reserve Component procurements.

(e) Immediate Release (urgent requirements).

(3) In addition to the AOP priorities, a readiness fixing application is made to upgrade unit priorities where those units are reporting C-4 unit status (not capable of performing a wartime mission) due to specific equipment shortages. Once those priorities have been made, remaining shortages are prioritized and filled in ERC/DAMPL sequence. Basically, this means shortages in units that have an item as ERC A will be filled in DAMPL sequence, then units that have that item as ERC B will be filled according to DAMPL and so on until ERC C shortages are filled. This distribution priority logic is incorporated into various systems that allow HQDA and AMC to plan for and execute major item equipment distribution.

4-16. Distribution Planning and Execution.

SIMA has developed a number of automated systems and processes that are used by the Army to plan and execute the distribution of major items.

a. Total Army Equipment Distribution Program (TAEDP). The TAEDP is the Army's long range planning document for equipment distribution. It brings together priorities, requirements, assets, losses and procurement and maintenance plans. Based on this information, TAEDP will project equipment distribution over a 10-year period. It is currently used by HQDA to select alternative scenarios involved with authorizations, priorities, maintenance or procurement program changes. It is the tool for developing the Force Modernization Plan (FMMP) used in the fielding of new equipment and it can also be used to develop proposed authorization changes for units scheduled to receive modernization equipment. Policy and guidance for development of the TAEDP is provided by DCSLOG. The TAEDP is produced three times a year by SIMA and over 50 different formats are available for distribution worldwide. These products are oriented for use by HQDA agencies, AMC major subordinate commands and Army Major commands.

b. Requisitioning Validation (REQ-VAL) System. AR 710-1 requires that requisitions for major items be validated by theater Materiel Management Centers (MMC) and installation Director of Logistics (DOL) supply support activities before being forwarded to the major subordinate command item manager. The Systems Integration and Management Activity (SIMA) produces monthly requisition validation (REQ-VAL) products for use in validating these requisitions.

(1) The monthly REQ-VAL products are produced from a system that compiles claimant end item data that is essential for validating requisitions. The products display two years of authorization information for unit and nonunit claimants (ORF, theater war reserves, etc.). Authorizations are extracted from The Army Authorization Document System (TAADS) files and asset information is provided from the latest monthly CBS-X balance. During system processing, the major functions taking place are a cross reference of assets to authorizations to determine where excesses and shortages exist, computation of get well dates and formatting this information for output.

(2) Installations and MMCs will determine if a supported unit's requisition is valid by locating the requestor's Department of Defense Activity Address Code (DODAAC) or project code for nonunit claimant under the LIN for the requested item on the REQ-VAL report and comparing authorizations to assets. Requisitioned quantities are valid for units with negative net positions (onhand is less than authorized quantity) displayed on REQ-VAL products. In some cases a unit requisition may be validated when the report shows the item as either not being authorized or quantities on hand are equal to authorizations. This could be done when the unit has a valid requirement for the item but the authorization or shortage may not appear on REQ-VAL products.

(3) After passing the installation or MMC validation, the requisition is passed to the inventory control point where it is automatically validated by a process of the Commodity Command Standard System (CCSS) known as MIRV (Major Item Requisition Validation). Using files depicting the latest SIMA REQ VAL data and the latest Equipment Release Priority System priorities, a decision is made to either backorder or reject the requisition. If backordered, the requisition is sequenced by ERPS priority for release when assets become available.

c. Equipment Release Priority System (ERPS). This is another SIMA system that provides MSC item managers and major commands with a tool that can be used to make equipment release decisions. Unit and non-unit shortages identified in the REQ-VAL system are prioritized on ERPS reports according to the latest Army Order of Precedence guidance. Also displayed are projected availability of assets. As the assets become available to item managers, they are released to the highest priority claimant shown on the ERPS report; providing there is a requisition on backorder for that claimant. The ERPS reports, like REQ-VAL products, are produced monthly and they have the capability of linking the shortages of various associated support items of equipment with the items they support under the Total Package Fielding Concept.

Section VI. The Assets Position

4-17. Continuing Balance System-Expanded.

Once distribution requirements are known, they must be compared with actual assets. The worldwide asset position (WWAP) is determined by the SIMA based on input from units, CONUS depots,

oversea depots, for operational projects. The Army's official asset position is produced through a computerized program called the Continuing Balance System-Expanded (CBS-X). The CBS-X is a transaction accounting system which stratifies asset data to unit level, and by purpose and condition code for depots, to produce the Army's

official asset position for reportable item control code (RICC-2) procurement appropriation major items. The SIMA maintains a central transaction file, the Army Central Data Bank, which contains a history for each major item. This file shows a history of receipts from production, shipments to major commands, receipts and losses by customers through each property book level, and returns of unserviceables of excesses. Data concerning new transactions are normally submitted automatically

by various automated systems, such as the Standard Army Intermediate Level Supply Subsystem (SAILS), although some transactions, such as lateral transfers from one unit to another, are submitted manually. The worldwide asset position is computed monthly and is used in the semiannual AMP processes, in related annual budgetary documentation, in the monthly requisition validation products and in equipment release products for major items.

CHAPTER 5 SECONDARY ITEM MANAGEMENT

Section I. GENERAL

5-1. Introduction.

a. Although major items are precisely defined and specific criteria are established for their selection, the same is not true for secondary items. Secondary items are currently defined as "end items, replacement assemblies, parts, and consumables, other than principal items."

b. Many items in the secondary items category have an annual turnover of \$1,000,000 or more, and some selected items in this category are just as essential to military effectiveness and materiel readiness as are major items. Secondary items account for the great majority of supply management effort within Army national inventory control points (NICP's) controlling the stocks of these items under AR 710-1.

5-2. Aspects of Secondary Item Management.

a. There are three principal aspects of management of secondary items which vary according to the significance of the item.

(1) The management system requires extensive item-by-item reporting of present assets and past demand history in order to make projections of future requirements.

(2) Additional data are required to support detailed requirements computation of high management intensity items. These include item applications, projections of an end item populations,

rebuild programs, dues-out included in program and demand forecasts, and other factors which may affect future demand. For items where such data are available, extensive supply control computations are performed manually or by computer, including calculation of "program factors" which may affect future demand, repair schedules, and the worldwide system of "pipeline" requirements. For other items, less information is made available and the computations are greatly simplified.

(3) Finally, the principle of selective and economic management dictates the frequent procurement of very high and high management intensity items. This is accomplished by balancing the administrative cost of review and procurement in relationship to the total inventory investment.

b. The measures taken in establishing the Army's inventory management system apply mainly to the determination of economic inventory levels and procurement frequencies, and to the regulation of workload in data reporting and computation. The Army recognizes that the principle of selective management must be measured against supply effectiveness. Cost is an important factor, but it is subsidiary to keeping troop units in maximum readiness to perform their assigned missions. The contribution of selective inventory control of supply effectiveness must, therefore, involve the prediction of demand patterns and the establishment of commensurate safety stocks in the supply system to provide effective supply under variable demand conditions.

Section II. MANAGEMENT METHODS FOR SECONDARY ITEMS

5-3. Selective Management.

a. One of the most widely used philosophies of good inventory management in use today is that of selective management (Fig 5-1). It is philosophy which provides concise control over items selected for close attention because of their high dollar value, and for elimination of all but the most necessary details in the management of low dollar or low volume materiel. Selective management policy identifies all secondary items as reparable and consumable and then arranges them further into four categories by value of next year's expected demand for the application of varying degrees of management. These are:

(1) *Very high dollar value.* The dollar value of the gross annual demand for the item is over \$1,000,000.

(2) *High dollar value.* The dollar value of the gross annual demand for the item is over \$100,000 but not more than \$1,000,000.

(3) *Medium dollar value.* The dollar value of the gross annual demand for the item is over \$25,000 but not more than \$100,000.

(4) *Low dollar value.* The dollar value of the gross annual demand for the item is \$25,000 or less or total procurements are under \$25,000.

b. Items will move from one dollar value grouping to another normally when the annual demand

SELECTIVE MANAGEMENT OF SECONDARY ITEMS

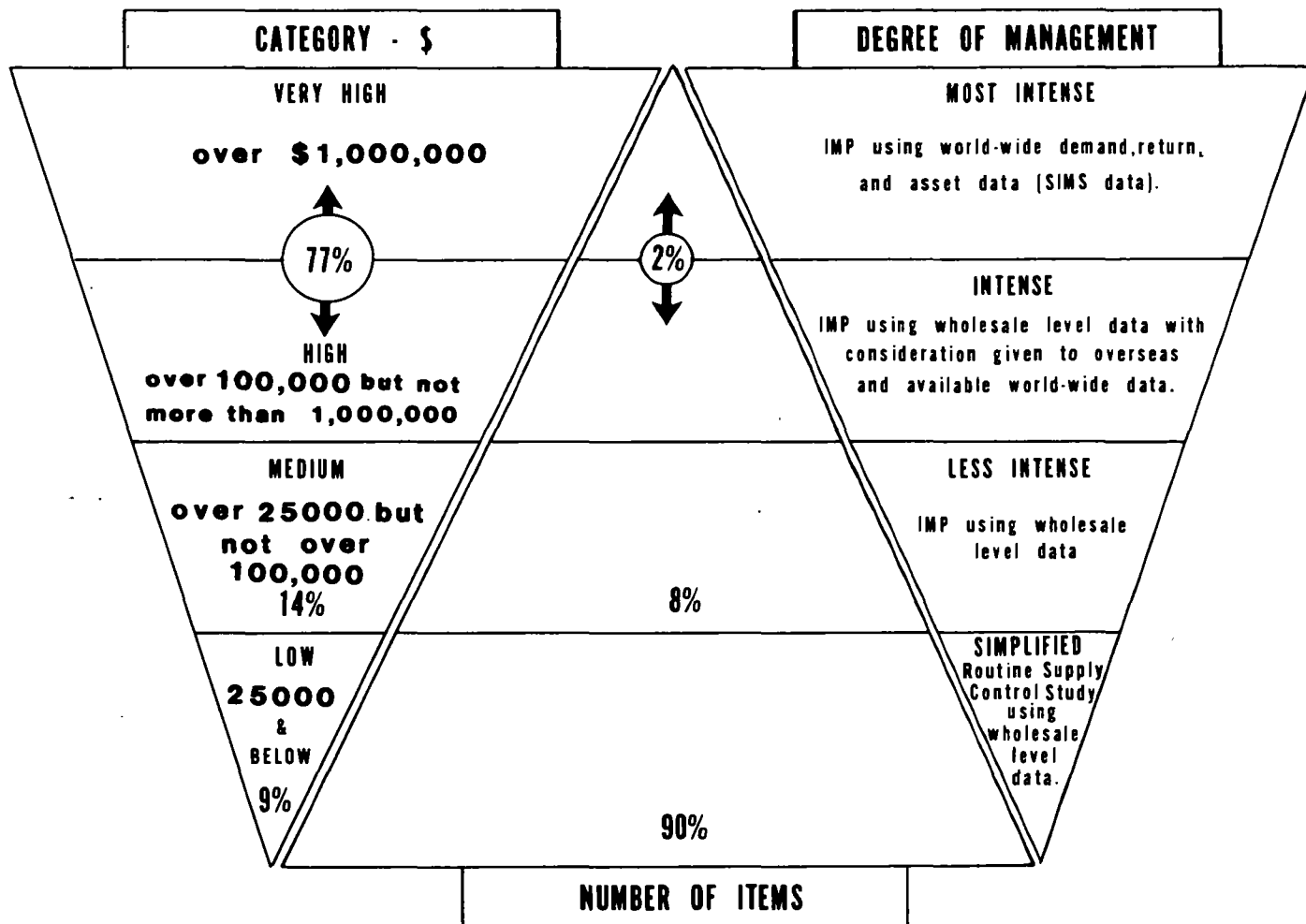


Figure 5-1. Selective management of secondary items.

or procurement value varies from the previous boundary value by 10 percent or more. However, once an item has become very high dollar value, it will remain in that grouping until the gross annual demand or procurement value falls to \$1,000,000 or below for two consecutive fiscal years.

c. The guidance furnished in AR 710-1 is based on this principle for selective management of secondary items. Items change category as demands fluctuate; however, to prevent overmanagement, the behavior of any given item should receive detailed analysis of all influencing factors to insure that the change is permanent before a shift is made.

d. The elements of selective management indicate a most intense degree of management for items of very high dollar value based on combat

essentiality, cost, and criticality, an intense degree for materials of high dollar value and a lesser degree of management for the less costly items. Simplified management of the low dollar value materiel lends itself to almost complete mechanization.

5-4. Management by Exception.

a. The principle of management by exception is applicable at all levels of supply but is ideally suited to the wholesale management of secondary items because of the categorization of materiel from low to very high management intensity. The principle is exercised whenever an item, or items, creates a special problem which warrants management by exception. One technique is to shift a critical item into another category for closer management control. In some cases, groups of items

may be placed under control of an individual manager for closer management until such time as the items no longer need the higher degree of management intensity.

b. At the inventory control point level, computer control has been effectively utilized in both selective management and management by exception. All items are reviewed by the computer to determine whether the item inventories have passed a reorder point or reached a maximum level (retention level). Item management plans are prepared by the computer when they reach their reorder point or there is an imbalance in the system. The computers are programed to reject those studies that exceed programed parameters, thus automatically bringing exception to the attention of the manager.

5-5. Automated Requirements Computations.

a. The Requirements Determination and Execution System (RD&ES) is a fully automated system for secondary items that computes requirements, compares assets to requirements, determines immediate supply management actions, and simulates future supply actions for 5 years.

b. Two routines are used in RD&ES to compute requirements.

(1) An intensive supply management review routine produces an Item Management Plan (IMP): all very high, high, and medium management intensity items (all reparable items) are processed through this routine. Items processed through this intensive routine use wholesale level data with consideration given to overseas and available worldwide data.

(2) The routine supply management review produces a supply control study for all low management intensity items (consumable items). This routine is similar to the intensive supply management review except computations are streamlined.

5-6. Selective Stockage.

a. AR 710-1 establishes variable wholesale stockage criteria that is based on demand data (frequency and quantity), desired operational readiness goals for supported weapon systems/end items, and cost-effectiveness (cost to stock versus cost to not stock) criteria. The overall objective of the wholesale stockage criteria is to identify those items that must be stocked to support readiness goals within funding and probable demand limitations.

b. AR 710-2 establishes retail stockage criteria based upon demand frequency or essentiality. This selective stockage plan results in the selection of

secondary items for stockage which gives the greatest possible return in terms of filing the need of the echelon concerned. The plan applies the principle that a small portion of secondary items accounts for a large percentage of the requirement for secondary items at the user level. By identifying items having the highest utility value, the plan insures that items most frequently used at forward echelons are stocked at, or as close to, that level as possible.

5-7. Special Management Systems.

a. Selected Item Management System—Expanded (SIMS-X).

(1) Background.

(a) On 7 August 1969, DOD published DODI 4140.37, "Asset Knowledge and Control of Secondary Items." The purpose of this instruction was to establish the authority and responsibility of the ICP's to extend asset knowledge and control over selected items to the supply and operating echelons beyond their current wholesale distribution activities.

(b) The Army implementation of DODI 4140.37 was contained in TAG letter, 2 June 1970, "Selected Item Management System (SIMS)"; SIMS is a comprehensive system addressing requirements distribution, storage policies, and procedures for approximately 7,000 items through the DSU level. Visibility for major commands and NICP actions was provided by the Availability Balance File (ABF) and the Demand History File/Return History File (DHF/RHF) reporting systems. The lack of data credibility at the NICP and the retail level and supply policy system limitations which precluded central visibility of supply and system performance, resulted in a very limited implementation of SIMS. The selected secondary items covered under SIMS represented 90 percent of the Army's dollar value of annual demands for all secondary items. However, due to a multitude of command-unique information systems and the proliferation of nonstandard data elements, the information available to the item manager was considerably out of date before any management usage of the data could be realized. The Army published in December 1970, Change 1 to AR 710.1, "Centralized Inventory Management of the Army Supply System." This regulation provides policy and procedural guidance for centralized inventory management of the Army Supply System.

(2) General description of functional area.

(a) SIMS-X is a concept of supply management which seeks to provide more prompt, cost effective field support through vertical visibility

and control of supplies at multiple levels. The basic thrust is an extension of the DSS philosophy for minimizing pipeline and intermediate level staffing requirements. In SIMS-X, the concepts of variable intensity of management (i.e., "selected items" require more intensive management), and single DOD manager (Integrated Item Management) are applied. Hence, secondary items are grouped for supply management purposes (in accordance with DODI 4140.33) and MILSTANDARD codes and procedures are prescribed to enable interservice applicability of the concept (in accordance with DODI 4140.37, MILSTRAP and MILSTRIP). SIMS-X is intended to form the nucleus for a single, standard asset information and control system for all secondary and major items within the Army.

(b) In SIMS-X, Army (and other service) wholesale managers are required to:

1. Group secondary items for management purposes and report groupings in the AMDF (Army only).

2. Distribute report requirements, via DAAS and each service "Reporting Request Distribution Activity," to customer activities. Report specifications are coded and include variable report data, frequency, and type (status or transactions) for each item (NSN).

3. Maintain worldwide stock record account and intransit visibility through nonaccountable balance and/or transaction files based upon these reports. (This does not preclude a "central accountability" option within another service.)

4. Incorporate selected secondary requirements and asset data into supply control studies.

5. Redistribute retail stocks as necessary to meet worldwide requirements. (Policies to support this capability will be established based upon the wholesale stock position, transportation costs, issue priority designator, and projected leadtimes.) The NICP is responsible for the filling of each requisition.

(c) Retail supply managers will:

1. Retain item and financial accountability.

2. Compute requisitioning objectives for and maintain limited stocks as prescribed by DA policy, and requisition replenishment requirements.

3. Issue stocks and supply status for assigned customers and upon ICP referral, and cross-level intratheater in accordance with DA policies.

4. Provide asset and/or transaction reports to the applicable NICP in accordance with specifications on the report request form for each item.

(d) Major command headquarters will be given responsibility and visibility for:

1. Monitoring the supply management performance by both subordinate and supporting (NICP) elements.

2. Influencing the distribution of critical items to and among subordinate elements.

(e) National level responsibilities and visibility requirements for SIMS-X include:

1. Performance measurement of worldwide inventory management of selected items.

2. Monitorship of visibility elements of the system.

(f) The above benefits have the overall effect of an improved logistical support system which has the ultimate objective of improved support for the soldier in the field.

b. Intransit Asset Visibility System.

- (1) The purpose of the Intransit Asset Visibility System is to provide NICP item managers with knowledge of selected Army materiel while that materiel is intransit and is not otherwise carried on the accountable records of any Army activity.

- (2) The intransit system is designed as a computerized management information system which embraces the Army's logistic network from the wholesale level down to the lowest logistics support unit that maintains a stock record account, the direct support unit. The system utilizes the Logistics Intelligence File (LIF) and a data bank and calls for an intermediate level inventory control center (ICC) intransit data bank for each theater. These data banks will collect specific documents relating to the shipment of selected items of materiel from one Army account to another or direct vendor shipment to an Army account. A monthly status report of selected items intransit will be furnished by the data banks to each NICP.

5-8. Provisioning.

a. Provisioning is defined in AR 310-25 and AR 700-18 as "a management process for determining and acquiring the range and quantity of support items necessary to operate and maintain an end item of materiel for an initial period of service." The principal objective of provisioning is to insure the timely availability of minimum initial stocks of support items at using organizations and at maintenance and supply activities to sustain the programmed operation of end items until normal replenishment can be effected, and to provide this support at the least initial investment cost.

b. There are three specific types of provisioning: Initial provisioning, the first time provisioning for a new end item; follow-on provisioning, a

subsequent provisioning of the same end item from the same contractor; and reprovisioning, a subsequent provisioning of the same end item from a different contractor. From these types of provisioning, it can be seen that provisioning is not always a one-time occurrence. AR 700-120 lists the situations that may occasion a form of provisioning. When these actions take place and provisioning is required, the range and quantity discussed in the basic definition can be described in terms of both hardware and software. This aggregation of wares includes: repair parts; special tools; test, measurement, and diagnostic equipment (TMDE), and maintenance literature, calibration standards equipment, and materiel required for onsite and offsite organization maintenance, direct support maintenance, and general support maintenance.

c. In its most formal sense, provisioning begins with the signing of the production contract for the end item. In reality, the forces that influence provisioning begin with a required operational capability and the development of reliability and maintainability requirements. The development of provisioning technical logistics data itself is principally accomplished during full-scale development in accordance with requirements imposed on the contractor by such programs as logistics support analysis (LSA) or maintenance engineering analysis (MEA). Additional data in the form of data elements may be obtained by a "Statement of Provisioning Requirements."

d. Generally, the first provisioning event after award of the production contract is the provisioning planning conference. The principal purpose of the provisioning planning conference is clarification of provisioning contractual requirements. Following the provisioning planning conference, a provisioning conference is held for the purpose of selecting repair parts, assigning or validating source, maintenance, and recoverability (SMR) codes, essentiality codes, maintenance factors, and other data of information pertinent to determining initial support requirements.

e. A complete discussion of provisioning data elements and documentation is best left to TM 38-715-1 and Commodity Command Standard System Operating Instructions (CCSSOI). For the purposes of this manual, those principal data elements used in the requirements computation process will be examined. These are:

(1) *Maintenance factor.* A factor used to indicate the number of expected failures of the item expressed in failures per 100 end items for 1 year.

(2) *Source, maintenance, and recoverability codes.* Uniform SMR codes for use throughout the DOD and DLA are reflected in a joint regulation

for which the Army Regulation number is 700-82. The following definitions apply to these codes:

(a) *Source code.* A two-position alpha code assigned to support items to indicate the manner of acquiring items for the maintenance, repair, or overhaul of end items.

(b) *Maintenance code.* A two-position alpha code assigned to support items to indicate the maintenance levels authorized to perform the required maintenance functions. The first digit, or Use Code, identifies the lowest maintenance level authorized to remove and replace the support item. The second digit, or Repair Code, identifies whether or not the item is repairable, and if so, the lowest maintenance level authorized complete repair responsibility.

(c) *Recoverability code.* A one-position code assigned to support items to indicate the disposition action of unserviceable items.

(3) *Replacement rates.* Failures expressed in percentage which will result in the discard of a repairable item.

(4) *Order ship time.* The time elapsing between the initiating of stock replenishment action for a specific activity and the receipt of that activity of materiel resulting from such action as expressed in days. Each level of supply is individually represented.

(5) *Turn around time.* The number of days from receipt of a failed item at a repair unit until the item is repaired and ready for reissue. Each level of repair is individually represented.

(6) *Density.* The total number of the item being provisioned that will be deployed worldwide. Density is considered as a total, a total for a particular geographic area, a total at the end of reorder point (ROP), and as a monthly average during ROP separate geographical areas.

(7) *Maintenance task distribution percentage.* Percentage of failures received at the various levels of maintenance (organization, direct support, and general support) within CONUS and overseas that are repaired at these levels rather than being evacuated to the next higher level.

(8) *Requirements objective period.* The sum in months of the procurement leadtime and review cycle time. The RO indicates the maximum quantity of stock to be on hand and on order to sustain current operations at any one time.

(9) *Initial issue indicator.* The number of days for initial issue quantity which is the quantity of an item required to provide support during the initial deployment of a weapon system or end item. This quantity is a nonrecurring demand.

f. In normal replenishment, demand data are recorded at various levels according to the im-

portance of the item. In provisioning, this demand must be forecast. The requirements computation model used in provisioning is a development of the formula which states that quantity is the product of a rate and time while recognizing that the quantity will vary directly with density. Essentially the computation process starts with the retail levels and computes requirements for initial issue, order and ship times, and turn around times requirements by maintenance category and by separate geographical area. Wholesale requirements are then computed and the sum of both retail and wholesale quantities minus available assets if any, are the net buy.

g. Because the basic indicator of failure is the maintenance factor, provisioning computations can have an immediacy that demand trends lack. To emphasize accuracy, the maintenance factor can be modified for environmental, wartime, and usage factors. Since the computation is basically a multi-

plication process, the law of direct proportionality applies to all data elements. For this reason validated and accurate engineering estimations are required throughout. Detailed guidance on provisioning requirements computation from both the viewpoint of policy and procedures is found in AR 700-18, TM 38-715-1, TM 38-715, and DODI 4140.42.

h. The requirements computation process is used to determine procurement quantities of the range of repair parts selected. The gaining command (user) is offered a quantity and range of support items to support operations in accordance with the number of end items that will be received in accordance with the Major Item Distribution Plan. It is this gaining command's responsibility to decide the range and quantity of support items required. This decision is based upon a review of the Master Support List prepared by the issuing activity. The distribution of support items is covered in AR 700-120 and AR 710-2.

Section III. SUPPLY MANAGEMENT TECHNIQUES

5-9. Introduction.

a. This chapter is intended to give those engaged in the practice of supply management an appreciation of the concepts underlying modern inventory control and an overview of some of the quantitative techniques that are being more and more applied in supply management in the Army. Standard texts in inventory theory, probability, and related topics are cited in the appropriate chapters. Mathematics has been avoided wherever possible but some does appear essential to the material being presented.

b. In selecting materiel to be presented, an attempt has been made to emphasize concepts and methodology currently in use in the Department of the Army or expected to come into use in the foreseeable future. Further, terminology familiar to Army personnel will be used throughout. But, terms that are perhaps new to some will appear, particularly in the discussion of probabilistic systems; these are extremely important and it is hoped that this materiel will help bring them into the vocabulary of Army supply managers.

c. The principles described in this section apply to all levels of the Army supply system. Differences in terminology at the wholesale and retail levels sometimes tend to obscure the fact that the principles and often even the methodology are the same; thus, care will be taken to define terms for universal application.

5-10. Behavior of an Inventory System.

a. In referring to the Army's supply system, it is common practice to speak of a wholesale system, comprising the national inventory control points and depots of the U.S. AMC and a retail system, which is viewed as its customers. In reality, of course, many of these customers are themselves wholesalers in that they lay in supplies in anticipation of demands from their customers.

b. This, however, is perhaps too simple a view of the Army supply system. First, many of these so-called retail organizations such as the overseas theaters and some of the large CONUS activities perform supply functions that are exactly analogous to those performed by the AMC activities and are themselves so large that it may be misleading to conceive of them as retail establishments. Second, organizations at all levels in the system are frequently both suppliers and consumers. At the AMC level, for example, the depots issue supplies to customers but, at the same time, operate rebuild shops which are themselves large consumers of parts. Similarly, the direct support units in the retail system serve as supply points to maneuver battalions but at the same time carry out repair functions that cause parts and other supplies to be consumed.

c. On the other hand, there are large customers of AMC that are known to function like wholesal-

ers to lower level supply and maintenance organizations but which, for all practical purposes, appear to AMC as if they are only consumers. Mutual Security Pact countries are like this; they manage their own logistics systems and everything issued to them by the Army is, for all intents and purposes, immediately consumed.

d. This leads to the consideration of the types of items of supply. In the Army, these are divided into two general types: consumables and repairables. The distinction seems quite natural. Food, once issued to a consumer, is eaten; gasoline, once issued to a consumer, is burned away. An aircraft engine, on the other hand, once issued to an aviation company and installed on a plane, is not consumed unless, of course, it is lost in combat or so badly damaged that it cannot be returned to useful service; when it fails, it can be repaired and used time after time.

e. The rates at which consumable items are consumed and repairable items fail can be considered as the events that trigger the supply system. The infantryman asks for a new pair of combat boots when his old ones wear out. The electronic technician asks for a new diode to replace one that has failed or for a new amplifier assembly when the installed one has to be removed for repair. These requests from the consumer to the appropriate supplier cause an item to be issued if it is in stock or causes the supplier to ask his supplier for the item if he doesn't have it.

f. Yet, it is not these requests that drive the supply system. The driving force is really the anticipation of these events, for it is the function of the supplier at every level in the supply system to forecast when these events will happen, where they will happen, and how often they will happen. And it is these forecasts of what the inventory manager expects to happen in the future that cause him to set up requirements objectives, reorder points, reorder cycles, etc., and to initiate supply actions to have the items available for the consumer before the consumption or failure events actually take place.

5-11. The Failure Process.

a. Many items used by the Army are consumed on a regular basis or are issued to meet programs that are well known in advance. As a consequence, their requirements can be forecasted rather well. This is not the case, however, on the overwhelming majority of items. The consumption rates of consumable items and the failure rates of repairable components, assemblies, and equipments are particularly troublesome and it is to these items that most attention will be directed.

b. It has been the practice to consider items that fail as belonging to one of two general classes, those that wear out and those that are subject to random failure. In truth, however, all items that fail do so because they wear out and the wear-out process is in all cases a random one. Consider an automobile tire. It definitely wears out with use. However, the exact number of miles a particular tire can go before requiring replacement is a random variable. Take a group of tires from the same manufacturing lot rated to last for 25,000 miles. Some will need to be replaced at 24,000 miles, some at 26,000; some may even blow out at lower mileage or sustain fatal road damage in their very first miles of use. But, in any event, one would expect most of them to last for somewhere around 25,000 miles, given equivalent operating environment. Their mean-time-to-failure could be expressed in terms of this expected tire life and expected replacement requirements could be determined using this rated life and expected vehicle usage. For example, if we equip a fleet of 100 trucks with new tires (four tires per truck) on a particular date and

| | |
|--------------------------|-------------------------|
| Expected tire life | = 25,000 miles |
| Expected usage per truck | = 12,500 miles per year |

we would expect to need 400 new tires in about 2 years. But, this doesn't mean that we won't need some tires during the first year. Some trucks may experience blowouts or some may travel 30,000 miles in the first year while some travel hardly at all. So there should be no surprise if some requirements pop up at random due either to random fluctuations in the quality of the tires or random fluctuations in the conditions of operation.

c. A similar situation exists with, for example, aircraft engines. Here it is customary for a requirement to exist requiring all engines to be removed for mandatory overhaul after they have logged, say, 1,000 hours of operation. Because of this, one might think that a regular pattern of removals for overhaul would be experienced. Quite the contrary is true. First, many engines experience failures and require overhaul before their mandatory time between overhaul (MTBO) is reached. Also, the number of hours flown by individual aircraft turns out to be quite variable. As a result, the removal patterns of aircraft engines generally turn out to look very much like random processes.

d. Still another situation that is encountered is this: one frequently hears of the "bathtub curve" as representing the failure pattern that one should expect to see over an item's life cycle. Failures can be expected to be frequent during the item's early

life, settling down to a relatively low but essentially constant level with random fluctuations during the middle year of life, and finally increasing rapidly towards the end of the item's life as it begins to approach its wear-out period. One frequently sees this conceptual process diagramed in this way:

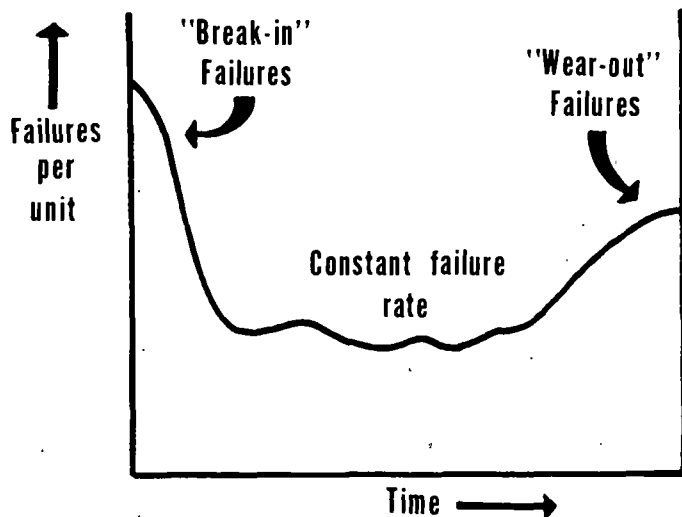


Figure 5-2. Conceptual process.

Now, this may in fact be what the failure rate of an individual piece of equipment looks like over its life cycle. Your own automobile may, in fact, show this pattern if you keep it long enough. But, few weapon system populations or fleets of military vehicles will be found on which this pattern shows up clearly; first, because entire populations are seldom deployed all at once; second, because of the mixture of component ages due to replacement; and, third, because of overhaul and rebuild programs. So the "bathtub curve" as a predictive device is not of much practical use.

e. All this discussion was given for one purpose; that is, to declare that the failure or consumption process on most military items will be found to be a random process, whether the item is thought of as a random failure item or a wear-out item. This does not mean that the expected failures in a particular time period cannot be forecasted. They can—and so can the expected variability. But it must be expected that these forecasts of failures or consumption rates will be subject to error, probably quite large error. How to make use of knowledge of the item's characteristics, its expected use, environment and other factors to reduce the prediction error and to protect the system from consequences of prediction error will be a major concern of subsequent chapters.

5-12. Types of Demand.

a. As said before, while the need for an item by a consumer serves as the initial trigger to activate the supply system, it is the anticipation of this need by the suppliers that drives the system. For it is their anticipation of need that causes suppliers to set requirements levels and to place requisitions on their supporting suppliers to insure the presence of stocks when their customers come to them. The higher one goes in the supply system, the less these requisitions tend to represent actual consumption. Unless they happen to be requisitions from an actual consumer that have been passed up the line because of the items not being available, the requisitions most frequently seen by suppliers that are at least one level away from the consumer are requisitions submitted to stock the bins of a lower level supplier who is anticipating some need on the part of his customers.

b. These requisitions placed on suppliers are commonly referred to as demands. In addition to their function as supply action triggers, they also constitute the data source that is most commonly used in military supply systems for the prediction of customers' future needs. For suppliers who are directly serving consumers, the demands are used as a basis for anticipating future consumption. For higher level suppliers, they are used as a basis for predicting what their customers are anticipating their needs to be. What causes these demands to arise is an important consideration since knowledge of the cause of demand previously experienced is frequently an aid in predicting future need. Basically two types of demand are defined—recurring and nonrecurring. The former is defined to be demand that can be expected to occur again and again in the future; the latter is defined as demand that is of a one-time nature, not expected to be experienced again in the future, or demand that is directly associated with a particular program which is presumably not expected to occur again in the future in exactly the same way.

c. From the standpoint of an item manager, the importance of these demand classifications is to enable him to identify those demands that are associated with particular events or programs that are not expected to occur again in the future. Demands for oscilloscopes, meters, etc., needed to outfit a newly activated maintenance battalion, for example, have to be identified as such, for the item manager obviously doesn't want to reorder these items unless he knows that another battalion of the same type is to be activated. Similarly, parts needed to support a rebuild program for a particular armored personnel carrier (APC) would not have to be ordered again unless

the item manager is informed that another rebuild program for the same APC is being planned. Presumably, then, all demands of this type are identified by the requisitioner as nonrecurring and are deleted from the body of demand data that will be used in the projection of future anticipated demand. All other types of demand are identified by the requisitioner as recurring, implying that the need is considered to be of a repetitive type and expected to arise again in the future. This does not mean, of course, that recurring demand is not program related. It frequently is. It is not unreasonable, for example, to expect that the anticipation of need for spark plugs is related to the number of vehicles in the field and the number of miles they are expected to travel. The main point is that it is expected to occur again, in the future exactly as it occurred in the past, except as modified by extraneous factors such as changes in level of field activity, aging of equipment, etc.

d. The requirement in AR 725-50 that the requisitioner specify in his requisition whether his demand is a recurring or nonrecurring one raises a troublesome problem. It is quite possible that the requisitioner from his vantage point sees a demand as a nonrecurring one, and quite properly so, when in fact, a collection of nonrecurring demands from a number of customers arriving at a higher level supplier may appear to be of a recurring nature. Thus, the 6655 system allows a system manager at the NICP level to change a fraction of the recurring requisitions to recurring in cases where his experience indicates to him that this sort of thing is happening. The fraction he changes is dictated by his experience.

5-13. Risk and Uncertainty.

a. One will find in some texts on decision theory a distinction made between decisions made in the face of risk and decisions made under uncertainty. In this context, risk is associated with the situation where the possible outcomes of the decision and the probabilities that each will occur are known to the decision maker. Uncertainty refers to the situation where the decision maker may know the possible outcomes but not their probabilities of occurrence or where he doesn't know the possible outcomes at all. For one thing, it is almost never possible really to know the probabilities that certain outcomes will occur. The best one can do is estimate them based on past experience and hope that the experience on which the estimate was based will be appropriate for application in the future.

b. Experience and past data are widely used to estimate the probabilities of what will happen in

the future. This, in fact, is the subject of much of this chapter. Analysis of past demand and program data enables us to estimate that a given customer's demand will be so much over a given period of time in the future. Now, we know that this estimate is subject to error but this same analysis can tell us how to estimate the amount of forecast error to expect. Knowing this, we can say that if a particular safety level is provided we can expect so many backorders; increase the safety level by so much and the expected backorders will decrease by so much. With this knowledge, the decision maker is better equipped to face the question of how much money to allow for inventory investment. Attaching probability statements to future events presupposes, however, that what happened in the past is representative of what is going to happen in the future. Unfortunately, if the future turns out to be completely different in important ways from the past, the probability statements inferred from past data may not be too useful.

c. It is important to recognize that supply management policies (aside from those dealing specifically with mobilization reserves and contingency planning) are designed mainly to deal with situations of risk rather than uncertainty—that is, policies on how to project and provide for future need are based on the assumption that meaningful probability statements can be made about the future based upon observations of the past. The inventory manager must react, and promptly, to events when they do occur, but policies formulated at the supply management level are not designed to take them into account in advance.

5-14. Substitutability of Resources.

a. When the future is not deterministic, one can usually mitigate the consequences of an unfavorable outcome by investment of additional resources. Thus, if it is known that the probability that the demand for an item during its replenishment lead time will be greater than a certain amount, the number of backorders to be experienced with a given inventory investment can be estimated; moreover, the reduction in expected backorders that will be achieved for each unit of increase in the inventory investment can be estimated.

b. If this can be done, why are backorders experienced at all? This is not an idle question. Frequently inventory managers are admonished to achieve "100 percent supply performance on this group of items" or "don't ever go out of stock on this group; they're too important!" Unfortunately, a principle everyone is familiar with, the "law of

diminishing returns," is at work in most situations and this ideal cannot be achieved. What one usually finds is that, after a certain point is reached, each additional unit of resources added brings a smaller and smaller return. One can come closer and closer to the 100 percent line—indeed, while we can't actually reach it, we can come as close as we want but every little bit of improvement requires more and more resource. And, as every inventory manager knows, resources are always limited, frequently severely constrained, so there are definite limits to what one can achieve.

c. when one thinks of resources, it is usually money that is thought of. For our purposes, however, it is more useful to think not of money itself but of what money can buy. Thus, when we discuss resources and their application in a logistic system, we think of such things as inventory (the major items, assemblies, components, repair parts) maintenance facilities, transportation and the like. And, of course, people. Since all these things can be procured, with limits, by money, it is possible to think of them as being interchangeable or substitutable for one another, again within limits.

d. The types of resources one usually thinks of as offering performance improvement potential for an inventory system as follows:

(1) *Inventory*. This is obvious. What is perhaps not so obvious is that there are all kinds of trade-offs that can be considered within the inventory itself. For example, one can consider the relative worth of buying a few extra aircraft instead of a lot of spare engines or buying assemblies instead of repair parts. Questions of this kind are of great importance when a new system is being designed and when deployment schemes are being developed, for it is sometimes possible to achieve large dollar savings or better performance of both if the right mix is chosen.

(2) *Maintenance*. This is a corollary to inventory yet all too often the closeness of the interdependence of these two resources is given insufficient attention. Most directly, maintenance effort can be applied to reduce the amount of inventory investment needed. Or, conversely, a shortage of the maintenance resource can make large increases in inventory necessary. For example, a shortage of skilled mechanics in an aircraft engine repair facility means more time required to get engines repaired; more repair time means that more engines are required to keep the same level of flying program going.

(3) *Transportation*. The faster the supplies can get the item to the point of need, the less inventory the system requires. The same applies to the return of unserviceables to the repair facility.

Until recently, however, most Army logisticians have tended to think of premium transportation (e.g., airlift) as justified only for emergency needs. The notion of deliberately paying a premium charge to move a low priority shipment was thought of as heresy. Yet it can be shown that there are many items where this additional transportation cost can be more than offset by the reductions that can be made in the inventory investment, simply because the customer's resupply time is shorter.

(4) *Reliability*. This is a resource whose substitution for inventory is perhaps not so obvious. But this is frequently the avenue that may offer the most potential for inventory investment reduction. Consider tank track, and aircraft engines, for example. Think of the amount of inventory investment that can be saved for every 100 miles added to its expected life. Large savings in spare engine requirements and in maintenance and transportation costs, too, can be made by increasing the engine's mandatory-time-between-overhaul.

(5) *Production*. The resources represented by production facilities are another type of resource that can be used to substitute for inventories. Extremely high variability in the demand for items would ordinarily necessitate enormous safety levels to keep supply performance at desired levels. But it is possible by spending somewhat more money in the procurement process to induce manufacturers to agree to requirements-type contracts under which they guarantee to provide a flexible production base that enables them to respond to monthly delivery calls of varying amounts, all within agreed upon upper and lower limits, but sufficiently broad that safety level reductions far in excess of the increased procurement cost can be achieved.

(6) *Management intensity*. Increasing the intensity of management can be done in a number of ways, such as assigning more people or people with higher skills to the management of the more expensive items, increase the amount of information available to the manager, increase the opportunities for communication between supplier and user. Intensity of management is not reserved, of course, for expensive items. The importance of the item to the military mission is always of paramount concern and, for essential items, the application of more intensive management is often more desirable than inventory investment.

e. The ways in which these different types of resources are related one to the other are usually quite complicated. The decisions as to how much of one type ought to be substituted for another in order to lower costs or to achieve better perfor-

mance without additional cost are quite difficult to make. Yet the principle is simple. It is illustrated in the following example:

(1) Suppose a particular type of aircraft engine is subject to field failures that take, on the average, 5 days to repair. Suppose also that these engines have to be removed periodically for overhaul which takes, on the average, 30 days. Now, assume that these engines are being removed at the rate of one a day and that, of these removals, 80 percent are field failures with the remaining 20 percent requiring overhaul. Suppose, now, that the repair and overhaul facility is a centralized one and that it takes 30 days to ship an unserviceable engine from the field to this facility and 30 days for the return shipment of serviceables back to the field. The number of engines required to be in the pipeline (safety level omitted to keep the example simple) is:

$$\begin{aligned} (1 \text{ removal/day for field failures} \times .8) &= 52 \\ (30 \text{ days} + 5 + 30) & \\ + (1 \text{ removal/day for overhaul} \times .2) &= 18 \\ \hline &70 \text{ engines} \end{aligned}$$

Therefore 70 engines will be required in the pipeline using surface transportation.

(2) A logistician interested in reducing the number of engines in the pipeline might decide to fly these engines to and from the field. Suppose this would reduce the shipping time each way to 5 days. Then the total number of engines required would be:

$$\begin{aligned} (1 \times .8) (5 + 5 + 5) &= 12 \\ (1 \times .2) (5 + 30 + 5) &= 8 \\ \hline &20 \text{ engines} \end{aligned}$$

Only 20 engines will be required in the pipeline using air transportation. If these engines cost \$25,000 each, a $50 \times \$25,000 = \$1,250,000$ reduction in inventory investment would thus be possible. If it costs \$200 more to ship an engine by air each way, the annual added shipping cost would be:

$$\begin{aligned} 2 \text{ shipments day (one to one from)} \times 365 \times \\ \$200 &= \$146,000 \end{aligned}$$

Now, if these engines have not yet been brought, it obviously appears desirable to use air shipment because one can pay for many, many years of air shipment as can be seen, for the cost of 50 engines worth \$25,000 each.

(3) Suppose, however, another course of action

were to be considered, namely to move the personnel, tools, and equipment needed for field repairs out of the central facility and into the field. If, by establishing the field repair facility close to the point of failure, it is possible to reduce the shipment time each way from 30 days to 5 days, the number of engines required to be in the pipeline would be (leaving overhaul as is):

$$\begin{aligned} \text{Overseas Repair} & (1 \times .8) (5 + 5 + 5) = 12 \\ \text{CONUS overhaul - surface transportation} & (1 \times .2) (30 + 30 + 30) = 18 \\ & 30 \text{ engines} \end{aligned}$$

The increase in investment between this support plan and the one involving air shipment to the central facility is:

$(30 \text{ engines} - 20) \times \$25,000 = \$250,000$ in favor of the air shipment plan. But, if it costs \$250 less per shipment to move engines to and from the field repair facility than it does to air ship them to and from the central facility, the transportation cost saving is:

$$\begin{aligned} (1 \text{ removal a day} \times .8) \times 2 \text{ shipments per removal} \times \\ \$250/365 &= \$146,000 \text{ a year} \end{aligned}$$

In addition the following savings are generated by eliminating air returns for overhaul of engines in CONUS.

$$(1 \text{ removal a day} \times .2) \times 1 \times \$200 \times 365 = \frac{29,200}{\$175,200}$$

Therefore the total savings would be:

$$\$146,000 + \$29,200 = \$175,200$$

Now the larger inventory investment reduction that is possible under air shipment doesn't look as advantageous because the difference would be offset by the higher transportation cost within 2 years. In all likelihood, the decentralized repair facility support plan would be chosen. In actuality, many other factors would enter into the decision, such as the feasibility of separating the repair function from the overhaul function without incurring additional costs for personnel, tools, and test equipment, the cost of building a field repair facility, etc. Also the actual economic analysis is really more complicated than indicated in the example because of the need to take the present value of future expenditures into account. The succeeding sections of this chapter will include discussions of techniques that can be applied to evaluate these trade-off possibilities in the inventory area.

Section IV. REQUIREMENTS DETERMINATION

5-15. The Requirements Forecast.

a. The discussion in this section on the projection of future requirements is intended to be introductory since it is limited to requirements projection in a deterministic world—a world in which all forecasts turn out to be true. Later we will see that the forecasts of a deterministic world are, for the most part, only expected values in a probabilistic world. When we say that our demand rate is 100 per year, we expect to have exactly 100 demanded next year; when we say that the procurement leadtime is 9 months, we expect that a Procurement Work Directive issued on 1 July will result in a delivery next 1 April.

b. In general, the minimum information a requirements forecast must contain is the time period in which the demand is expected to occur and the quantity. Additionally, it is often necessary to know the expected customer's identity and location so that incoming stocks may be reserved for his use so that the stocks may be geographically located so as to avoid uneconomical shipments. In the deterministic world, all these are assumed to be known. Often, however, it is necessary to express the expected future demand in distinctly different ways, even in the deterministic world. For example, the Commodity Command Standard System (CCSS) provides for expressing future requirements as a:

(1) *Rate*. This is the normal way in which recurring demand (see AR 710-11) is expressed. It can be expressed as an average monthly demand (AMD), average quarterly demand (AQD), or an average yearly demand (AYD). To get the expected demand over a future time period, this rate is merely multiplied by the appropriate time period. This rate need not remain constant over all future time, in fact, it is frequently modified by consideration of program data.

(2) *Rate with a start and stop date*. This can be used to express a special requirement such as a special troop exercise when it is expected that the items will be consumed or used at a given rate only while the exercise is in progress.

(3) *Schedule* such as is used to express the requirements for parts to support depot overhaul or a set assembly program. Here the nature of the program, both as to timing and quantity of end items to be rebuilt or sets to be assembled in each future time period are known, as are the expected parts usage per unit rebuilt or set assembled. The requirements schedule, usually quarterly is then obtained by a parts explosion, each quantitative requirement being laced in its proper time slot.

Each quarter's requirement is then deleted as its time passes.

(4) *Draw-down quantity*. In this case, a requirement may exist for a particular quantity but the exact time when the demand will occur is not known. An example might be the expected initial issue of an item to a newly fielded organization. Here, the document identifier or a project code on the incoming requisitions can be used to identify the customer so that this requirement can be decremented as the stock is issued. Usually a drop-off date is also provided so that the remaining requirement may be automatically deleted after a given terminal date.

(5) *Quantity with a drop-off date*. This can be used to express a requirement that is expected to disappear after a certain date. An emergency requirement for flood relief might be an example of such a requirement; any requirement remaining on the books after the termination of the emergency condition would be automatically wiped out.

c. Requirements may exist for any of these different types of needs. When the requirements are expressed in time-phased fashion, it is a simple enough matter to slot each requirement in its proper time period; the total requirement forecast for any period is simply the sum of the individual requirements expected to occur in that period. However, in making requirements forecasts for supply control studies, it is necessary for purposes of levels computations (e.g., safety level, procurement cycle quantity, economic retention quantity, etc.) to express a composite requirements as a demand rate. This has to be done even though the requirement may vary from time period to time period. Before we decide how to do this, however, we have to digress momentarily to discuss program data and program change factors.

d. In our perfect deterministic world, it is assumed that, in so far as recurring demand is concerned, the rate at which demand will occur in the future is exactly the same as it was in the past. By this we mean the following:

If the AMD for a part was 20 per month during the past when 100 end items were deployed, and the end item deployment in the future is going up to 150, then the expected future demand will be 30, since:

$$\begin{aligned} 20 &= .2 \text{ end item per month} \\ 100 & \\ 150 \times .2 &= 30 \text{ per month (AMD)} \end{aligned}$$

In supply control studies, of course, the same calculation is done by means of the program change factor (PCF).

$$\frac{150 \text{ end items in future period}}{100 \text{ end items in base period}} = 1.5 \text{ which is called the PCF}$$

$$\text{PCF No. 1} = \frac{25}{20} = 1.25 \times 1 \text{ 6-month period} = 1.25$$

$$\text{PCF No. 2} = \frac{30}{20} = 1.50 \times 2 \text{ 6-month periods} = 3.00$$

$$\text{PCF No. 3} = \frac{40}{20} = 2.00 \times 2 \text{ 6-month periods} = 4.00$$

$$\text{Avg PCF} = \frac{8.25}{5 \text{ periods}} = 1.65$$

The average demand rate over the entire period is, then:

$$10 \text{ demands per month} \times 1.65 = 16.5 \text{ demands per month}$$

$$\text{Expected future demand} = 20 \text{ per month} \times 1.5 = 30 \text{ per month}$$

e. For low dollar value items, when an economic order quantity may represent more than a year's worth of stock, the Commodity Command Standard System (CCSS) develops an average demand rate that is assumed to remain constant over the three fiscal years. First an average program change factor is calculated.

f. The forecast of the demand in support of rebuild is handled in much the same way. Here, the assumption in our deterministic world is that the future parts consumption will be exactly the same as in the average consumption in the part, per unit rebuilt. Thus, if 10 of a part were consumed per 100 end items rebuilt in past rebuild programs, the parts consumption rate is expected to continue as 10 per 100 end items in the future. Thus, if the quarterly program over the next 24 months calls for end item rebuild to be scheduled as follows:

100 110 110 120 80 80

the requirements forecast for each quarter would be:

$$10 + 11 + 11 + 12 + 6 + 6 + 8 + 8 = 72$$

and, for low dollar value items, CCSS would calculate an average monthly requirement to support the rebuild program of:

$$\frac{72}{24}$$

$$\frac{72}{24} \text{ month} = 3 \text{ per month}$$

g. Somewhat more complicated rebuild situations can also be handled in the CCSS. Parts consumption data are maintained separately for the different theaters and for different types of rebuild actions such as normal repair of battle or crash damage, etc. If knowledge exists as to whose items are going to be rebuilt and how many are going to be normal rebuild, battle damage, etc., a weighted-average requirement forecast can be projected.

h. Other types of requirements exist which tend for the most part to continue to occur even though their volume may change from period to period because of changes in level of activity or program. When these can be separately identified and where

their volume justifies it, separate requirements forecasts can be made for them as well. Demands associated with Supply Support Arrangements (SSAs) with foreign countries may fall in this category and, if so, would be treated separately. Those requirements forecasts which are expected to recur, even though at varying volumes, are rolled up to form a single rate for supply control study purposes. Thus, if we have the following individual rates, projected as described above:

Recurring Demand—10 per month

(Nonrecurring Demand) Rebuild Demand—5 per month

SSA Demand—1 per month

The composite demand rate is 16 per month. Thus, for the rebuild requirement, expected requirements over a 2-year horizon are included in the rate for reorder point purposes, only requirements expected in the safety level and procurement leadtime and procurement cycle period need be considered in the construction of the composite (recurring) demand rate.

i. Demand rates can be built up in much the same way for items in which the requirements forecasts are time-phased, as in medium, high, and very high dollar value items under CCSS, except that separate rates are developed for each individual time period in the forecast horizon as called for in the supply control procedure. When demand rates are needed in requirements computations for calculation of safety levels: for example, a composite average rate is arrived at over the appropriate forecast horizon, as in the case of LDV items. For other purposes, however, the requirements projections can be considered period by period and compared to the assets projected to be available during the period to determine whether supply action is required. Nonrecurring requirements expected to occur at particular points in time are added to the recurring demand rate for the appropriate period to give a composite requirement for each period. This technique is also followed in the DODI 4140.24, Budget Stratifications, to develop

requirements by month for the simulations-of-buy through the budget years.

5-16. Review Policies.

a. There are two basic reasons why reviews are made in supply management.

(1) To see whether future requirements have changed.

(2) To see whether a supply action has to be taken.

These two types of review may be done at the same point in time or with the same frequency. Indeed, the policies that are followed with respect to the way in which each is triggered and the frequency of triggering can have an important bearing on the effectiveness of the system, from both the cost and supply performance viewpoints.

b. It is customary to think of the first type of review as always done on a fixed frequency basis, called the review cycle. The frequency generally depends on the importance of the item or the dollar value of its demands or both. Review cycles, however, generally represent the maximum time that may elapse between successive requirements reviews. Requisitions, returns, inventory adjustments, etc., are transactions of the first kind that would trigger a requirements review; changes in program data, changes in special requirements, etc., are transactions of the second kind that would also trigger a requirements review.

c. The second kind of review provided for is the check of the ROP supply position. This is done to see whether any supply action has to be taken and involves the comparison of assets to predetermined action points. Most inventory management systems require that the supply position be checked immediately after a requirement review. However, it is frequently the case in modern inventory management systems that the supply position check may be done more frequently than the requirements review. In one kind of system, this check is done continuously—that is, one or more supply action trigger points may be checked each time a transaction is processed. These are termed continuous review inventory systems. A second kind of system is the periodic review inventory system in which, as the name suggests, the supply position check is done on a fixed frequency such as once a week, once a month, etc. The CCSS is to be a periodic review type of system, although its frequency of review is such that it can be thought of something close to a continuous review system.

The difference does have to be taken into account, however, as will be shown below.

d. The supply actions can be triggered when a supply position check is made are of various types. Generally speaking, they fall into the following categories:

(1) Procurement.

(2) Excess determination.

(3) Recall of excess.

(4) Cutback of procurement and/or repair.

(5) Expedite.

(6) Redistribute—either between geographic locations or between stock reservation (e.g., purpose code) accounts.

The basis for such actions is the comparison of assets, either on hand or on order or both, against predetermined requirements levels, which are the subject of the following accounts.

5-17. Requirements Levels.

a. The requirements forecast is subdivided into separate requirements levels for supply management purposes. Quite a few separate levels must be observed by the item manager. However, for our purposes here, which is the description of mathematical models that are used in the management of NICP inventory, we can limit our attention to only those levels whose values are generally computed with the aid of these models. These are:

(1) Funded war reserve requirements.

(2) Safety level.

(3) Repair cycle requirement.

(4) Procurement leadtime level.

(5) Procurement cycle level.

(6) Requirements objective.

b. It is customary to represent the behavior of an inventory system by means of a sawtooth diagram and, indeed, it is a convenient way to demonstrate the most important relationships that exist.

In a deterministic system, it is assumed, you will recall, that future requirements are known in advance and, moreover, that they are known sufficiently in advance so that replenishment actions may be initiated in time to prevent stockouts. Since this is the case, we need not consider safety levels. Further, we can, without distorting any conclusion to be drawn, represent the future requirements as taking place at a known and constant rate. We can now plot the system behavior in a sawtooth diagram. A continuous review process is assumed.

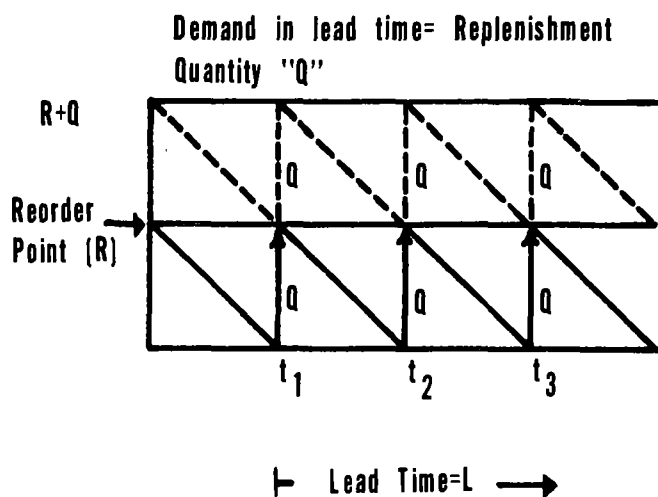


Figure 5-3. Continuous Review Sawtooth Diagram

In this diagram, we represent on-hand inventory by a solid line. The sum of on-hand and on-order inventory is represented as a dotted line. The sum of on-hand and on-order inventory is usually referred to as assets in inventory models. Here we see the assets are depleted as demands arrive until the reorder point R is reached at time t_1 . Now a replenishment order Q is initiated bringing the assets up to $R+Q$. At the same time t_1 , the replenishment quantity Q from the previous order arrives, raising the on-hand inventory back to R . The on-hand inventory is again depleted until time t_2 when assets again reach R and on-hand inventory again reaches zero, at which time the order Q that had been placed at time t_1 arrives.

If we define a demand rate: D = quantity demanded per year, and L = replenishment lead time in years, then we can see the following simple relationships— $D \times L$ = demand in lead time = R and in this instance, $D \times L = Q$ by definition; so that $R = Q$. We also observe that on-hand inventory is always moving between Q and zero, and that assets (on-hand plus on-order), between R and $R+Q$. This leads to the following important relationships:

$$\text{Average on-hand inventory} = I_q = \frac{0+Q}{2} = \frac{Q}{2}$$

$$\text{Average assets} = I_A = \frac{R+(R+Q)}{2} = R + \frac{Q}{2}$$

The term average assets is often referred to as average inventory investment since it represents funds that are tied up not only in on-hand inventory but also in pipeline inventory that has not yet arrived. One other observation can be made, and that is with respect to the frequency of replenishment. If the stock is being depleted at a rate of D units per year and we replenish in Q units each

time R is reached, then the replenishment frequency is:

$$D/Q \text{ times a year.}$$

One last observation is made—and this is important—the amount of stock issued between successive replenishments is Q .

e. One further point: we can now define the quantity called the requirement objective, which we will refer to hereafter as the RO.

$$RO = R+Q$$

This is the maximum amount of on-hand and on-order assets. In our deterministic world, when $R+DXL$, this is merely the sum of the lead-time requirement and the replenishment quantity. When a safety level is provided, it is added to R . If we denote the safety level by S , then:

$$RO = (DXL) + S + Q$$

We can also introduce another widely used term, the stockage objective, which is defined as:

$$SO = Q \text{ when no safety level is involved.}$$

$$SO = S+Q \text{ when there is a safety level.}$$

In deterministic systems on-hand would never exceed the stockage objective.

Note that we have omitted special on-hand requirements, such as mobilization reserves, from this discussion. When these exist, they are added to SO in the same manner as S .

f. Up to this point, we have been dealing with consumable items. These items, once issued, are gone (returns are omitted from consideration for a time being). Now we wish to extend the discussion to repairable items. A certain fraction of these items, once issued, are expected to return to the NICP as unserviceables. These can be repaired and returned to serviceable inventory. The kind of system we are dealing with thus has two sources of replenishment: procurement and repair, and this complicates matters to some extent. The term "repair" used throughout this discussion refers to the restoration of unserviceables to serviceable condition when the process is under NICP control (i.e., subject to NICP scheduling). As we are using it here, the term embraces overhaul and rebuild also. Some assumptions about repairable items and the policies under which they are managed will have to be made. The most important ones for our purposes are:

- (1) It costs less to repair unserviceable items (65 percent of the acquisition cost) than to buy new ones.
- (2) It takes less time to repair unserviceables than it does to buy and get new ones delivered.
- (3) Repaired items perform the same as new ones.
- (4) Repair actions are scheduled periodically and all on hand at the time are scheduled for

repair, except that the quantity scheduled for repair shall not cause the total assets to exceed the requirements objective.

(5) Repair actions are done in batches; the time required to restore a batch of unserviceables to serviceable condition is called the repair lead time. These are not the only assumptions that could have been made. They happen to be the ones underlying the policies contained in AR 710-1 and the computational procedures embodied in the IMP. Other assumptions would lead to other policies and computational procedures but we shall confine our attention to these.

g. These assumptions lead to certain relationships. First, when we state that repairs are to be initiated periodically and that all unserviceables on hand at that time are to be repaired, this established the repair cycle quantity.

h. Before stating the reorder point and requirements objective formulas for reparable items, we must define the assets that should be considered in determining the supply actions to be taken. These are:

- (1) Serviceables on hand.
- (2) Serviceables due in.
- (3) Unserviceables on hand but not yet scheduled for repair.
- (4) Unserviceables already scheduled for repair.
- (5) Unserviceables expected to be returned within the procurement leadtime that will arrive in time to be repaired before the end of the procurement lead time.

Now comes a difficult point. In the case of consumables, we defined the procurement leadtime requirement as the PROLT multiplied by the demand rate during that period. For reparable, however, the effect of unserviceables not yet on hand complicates matters considerably.

(6) The replenishment rule we will follow states that we:

(a) Initiate repair at a fixed frequency for a quantity Q_r , taking care, however, not to allow the total assets to exceed RO.

(b) Initiate a procurement action for a quantity Q_p when total assets reach R_p where total assets are defined as the sum of serviceables on hand, unserviceables on hand, due in from procurement, due in from repair, and expected returns of unserviceables that will arrive in time to be repaired before the end of the procurement lead time.

i. This is a rather complicated statement and, indeed, the management of reparable is a complicated process. Its application can perhaps be most

easily demonstrated by doing a simple example on a sawtooth diagram (Fig 5-4).

Suppose we have the following item:

D_S = Gross demand for serviceables = 10/month

D_R = Net unserviceable return rate = 5/month

L_P = Procurement lead time = 6 months

L_R = Repair lead time = 3 months

Q_R = Procurement cycle quantity = 30

T_R = Repair cycle time = 3 months

Q_R = Repair cycle quantity = 15

Using these data we see that—

$$R_P = (10 \times 6) + 15 = 75$$

$$RO = 75 + 30 = 105$$

If we start at the beginning of Month 1 and assume that a procurement has just arrived, reducing the procurement due in to zero, that a repair action has just been finished, reducing due in from repair to zero, and that we have just finished accumulating a repair cycle's worth of unserviceables, we see that—

$$\text{On hand serviceables} = 30 + 15 = 45$$

$$\text{On hand unserviceables} = 15$$

Expected unserviceables that can be repaired within

$$L_P = (L_P - L_R)D_R \\ = (6 - 3)5 = 15$$

$$\text{Total assets} = 45 + 15 + 15 = 75$$

Since total assets are at the reorder point, we initiate a procurement action for a quantity of 30. Also, since we have just concluded a repair cycle, we initiate another repair order for a quantity of 15. This raises our due in from repair to 15 and drops unserviceable on hand (but not scheduled) to zero. These actions now raise our total assets to:

$$\text{On hand serviceables} = 45$$

$$\text{On hand unserviceables} = 0$$

$$\text{Due in from procurement} = 30$$

$$\text{Due in from repair} = 15$$

$$\text{Expected gains from returns with } L_P = 15$$

$$\text{Total assets} = 105$$

and we are now back at the RO.

5-18. Levels, Cycles, Times, Rates, Quantities and Frequencies.

a. Supply management can get pretty confusing at times because things can be expressed in different ways. However, a few simple rules, if always kept in mind, will help keep relationships straight.

(1) A requirement can always be thought of as a level.

(2) A level can always be expressed either as a quantity or in time units; e.g., a procurement

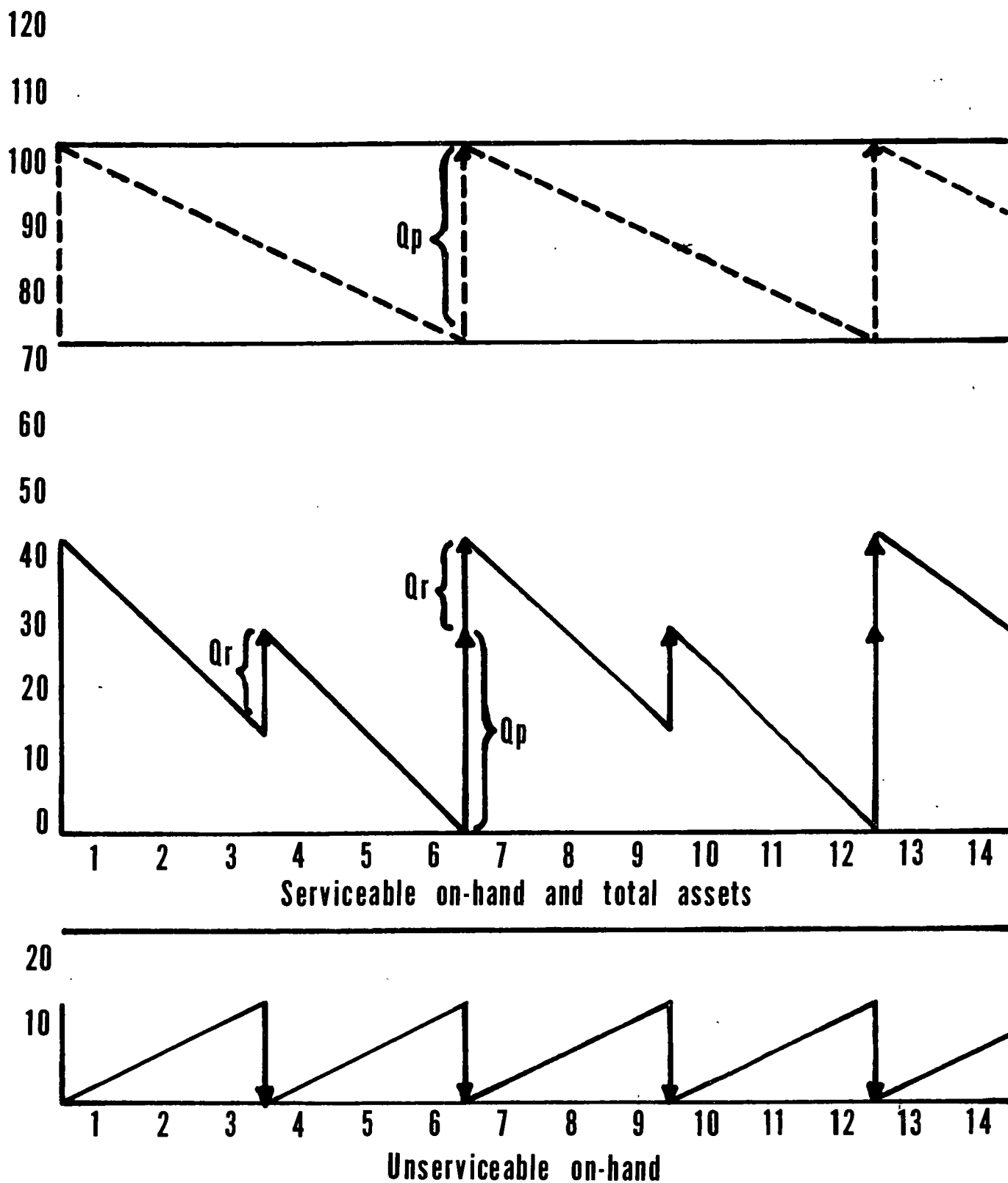


Figure 5-4. Sawtooth Diagram

leadtime requirement level may be expressed as a quantity—say 100 units, or as a time—5 months of supply.

(3) A cycle should always be thought of as a period of time; e.g., a repair cycle is the time to repair an item, from the time it is entered on accountable supply records until the repair is completed. Now it can get a little confusing. For example, what is meant by procurement cycle? To be precise, this is the period of time between the initiation of successive procurement actions. When we mean to refer to a requirement, we should say procurement cycle level. Then we should further define whether we mean this procurement cycle level to be expressed as a quantity or as a period of time. Unfortunately, usage over the years has dulled our precision of language and we tend to use the term procurement cycle to mean either, leaving it to the listener or reader to glean from the way the term is used, whether a quantity or time period is meant. The same kind of thing is done with the term level, as in safety level or economic retention level, where either a quantity or a time period may be meant.

Section V. INVENTORY SYSTEMS COSTS

5-19. General.

a. In recent years, there has been increasing emphasis within the Department of Defense on the management of activities on a cost-effective basis. Objectives are framed so as to call for the achievement of a particular performance goal at minimum cost—or, alternatively, to maximize the performance achieved for a given amount of expenditure. This emphasis is expected to carry over into the management of the inventory system and those who are responsible for policy and operation decisions affecting the Army's inventory are expected to act with these cost-effectiveness goals in mind. This section deals with the cost side—what the relevant costs are in the management of an inventory system and how they enter into policy and operating decisions.

b. The major questions to be faced in the management of an inventory system can be boiled down to the following:

- (1) What items should we stock?
- (2) How often should we buy and/or repair them and, when we do, how much should be buy and/or repair?
- (3) Which items should we keep and for how long?
- (4) How should we transport them?
- (5) How should we control them (e.g., record keeping, physical inventory, issue controls, etc.)?

b. The following rules are, therefore proposed:

(1) Level—if a requirement is expressed this way, always insist that the appendage be added to specify whether a time period or a quantity is meant; e.g., safety level quantity, safety level months, economic retention level quantity, economic retention level months.

(2) Cycle—if you intend to have this interpreted as a time period, always append time; e.g., repair cycle time (months), procurement cycle time (months). If you want it interpreted as a quantity, append accordingly; e.g., repair cycle quantity, procurement cycle quantity.

(3) Time—often, a period of time also denotes a requirements level as well, such as procurement leadtime or repair leadtime. To avoid confusion, always append quantity when you intend to use this term as a quantitative requirement level; e.g., procurement leadtime quantity. Avoid the use of terms such as procurement leadtime level or repair leadtime requirement unless you append either quantity or months to specify what you mean.

c. In deciding which costs to consider in reaching decisions on these matters, there are two basic questions involved:

(1) Do the costs in question change when the decision or policy is changed?

(2) Is the change or lack of change different in the short run from what it would be in the long run? There are questions of some consequence in the application of mathematical techniques in the field of inventory management and are discussed in some detail in the following paragraphs.

5-20. Fixed, Variable, and Semi-Fixed Costs.

a. In deriving the costs to be used in making decisions, our objective is to find the cost of one unit of the activity subject to control. Thus, if we are concerned with the question of how frequently to buy, we must know how much it costs to process one procurement action; if we are trying to decide whether to ship an item by sea or by air, we must know the cost of shipping one unit of the item a given distance by each mode. However, we have to be extremely careful when determining these unit costs, to exclude all elements of cost that do not vary with the level of activity—the costs that would remain the same, for example, whether we bought 1,000 or 5,000 times a year, or if we shipped 10,000 pounds or 50,000 pounds from

CONUS to Europe. Thus, we must try to isolate the fixed from the variable costs.

b. It is, perhaps, easiest to convey the concepts involved here by example. Suppose we consider the typists who type contractual documents associated with the procurement of replenishment supplies. Clearly, the number of documents they have to type is going to depend directly on the number of procurement actions to be processed. If a decision is made to procure more frequently, more documents will have to be typed and unless the organization was overstaffed to begin with, either overtime will have to be used or more typists will have to be hired. If, on the other hand, a decision is made to procure less frequently, fewer documents will have to be typed, and, assuming rational staffing practices, some typists can be released or assigned to other productive work that has to be done. Thus, we would be justified in considering the cost of having the contractual documents typed as a variable cost.

c. Now let's consider the technical data packages that are used to define what it is that is to be bought—the engineering drawings, the specifications, the packaging instructions, etc. Suppose the operating policies of the organization require that these data be kept up to date at all times so that no delay ensues when an item has to be bought. Then, while the technical data packages are an essential element of the procurement documentation, and while it certainly costs money to develop these packages and keep them current, this cost must not be considered at all in our decision on how often to procure under the assumptions made above. So, since this cost remains unchanged whether we buy an item once a year or 10 times a year, we are justified in considering this is a fixed cost in this particular context and thus exclude it from our procurement frequency decision.

5-21. Costs in the Short and Long Run.

a. Actually, many overhead type costs which may be considered fixed in the short run, are variable in the longer run. Consider the costs of office buildings. There are a few decisions which will affect the number of buildings used in the short run. But over the longer run, the number of buildings is adapted to the number of people, so any decision affecting personnel force size, including frequency of procurement actions, contributes to the required investment in buildings. For decisions having long run impacts, building costs should be charged based on floor space utilized per person. In the next section, we will discuss the practical techniques available for estimating quantitatively variable costs.

5-22. Methods of Estimating Costs.

a. From this discussion, we know that we cannot for decisionmaking purposes calculate the unit cost of an activity simply by dividing the total cost of its operation by the amount of activity handled. If the cost of running a procurement office is \$1,000,000 a year and the office processes 10,000 buys a year, we cannot say that it costs \$100 for procurement action if the decision under consideration is how often to buy. We must first separate the fixed costs and the fixed elements of the semi-fixed costs from the total cost of the activity. Generally there are three approaches that can be taken.

(1) *Graphical method.* If there are sufficient data points covering a wide enough spread of the activity in question, we can sometimes infer from a graph of the data points what the fixed costs are.

(2) *Activity analyses.* Very often the data available for determination of variable costs do not contain readings over a wide enough range of activities to allow us to tell how the total costs really change as the level of activity changes. If, for example, the data show costs only over the range 10,000 through 12,000 procurements a year, it is not likely that these data will be very helpful in the determination of variable costs. A technique that can often be useful in its place is activity analysis. This involves breaking down the operation into its elemental tasks, determining which tasks must be performed and which materials and services must be used, in proportionally greater amount, and those that do not, as the level of activity increases. The costs of those tasks that are activity related are counted, the others excluded. Quite a few tasks will be found to be only partially activity related (these fall in the semi-fixed category) and only the activity related tasks are then divided by the activity level to find the variable unit cost.

(3) *Time analysis.* Still another method of finding variable personnel costs, which frequently comprise the major portion of the total variable costs, is the actual timing of personnel in the tasks they have to perform. Only those tasks that contribute directly to the output being measured (e.g., requisitions per year) are counted. The variable costs of materials and services used are then determined.

b. One important point must be mentioned before going into the discussion of costs used inventory models and that is that costs determined by analysis of data covering a given range of activity levels should not be extrapolated beyond that range without a great deal of thought being given to the applicability of the data beyond that range.

This is a general principle of management analysis and it is of great importance here. One would be remiss in assuming in the voucher processing example used above that the variable cost per voucher would still be \$10.00 if 50,000 vouchers a year had to be processed. A principle called economy of scale often comes into play when an activity level crosses certain thresholds. What generally happens is that partitioning of tasks, introduction of labor saving devices, and operating efficiencies generally are resorted to when these thresholds are exceeded and the variable unit costs can suddenly change by very large amounts. The same kind of thing can, of course, happen in the other direction too. Thus, one has to be very careful in making inferences about what these variable costs might be beyond the range of actual observation.

5-23. Marginal Costs.

a. A technique that is finding more and more application in inventory management is a tool of economics called marginal analysis. We will make use of this technique in explaining the concepts underlying some of the more advanced inventory models later in the chapter. We start with the concept of marginal cost. This is defined as the additional or extra cost involved in producing one more item, in using one more unit of a resource, in holding one more item in inventory, etc.

b. A similar concept exists for marginal revenue. It is simply the increase in gross income obtained by selling an additional unit of product. If we graph the marginal cost and marginal revenue and superimpose a plot the "profit" (defined as revenue minus cost), an interesting fact turns up. It can be shown mathematically that "profit" is maximized at the level of output where marginal revenue equals marginal cost. One can reason, without the aid of mathematics, that this is so by recognizing that so long as marginal revenue is greater than marginal cost, it pays to continue to increase output; when the marginal revenue becomes less than marginal cost, then we have passed the point where increasing output is of increasing benefit. Thus, the point where "profit" is maximized must occur where marginal cost and marginal revenue are in balance.

c. This kind of analysis can be used in making decisions in the management of an inventory. For example, in a subsequent section we will develop the concept of the economic order quantity. This will first be explained graphically, then the EOQ formula will be derived mathematically. Alternatively, we could have done this by applying the principles of marginal analysis. In this situation,

as the procurement cycle quantity is increased a unit at a time, the inventory holding cost increases. Conversely, as the procurement cycle quantity increases a unit at a time, the administrative cost of procurement decreases since there are fewer procurements needed each year. If we view this decrease in procurement cost as a "revenue," we can plot this marginal "revenue" against the marginal inventory holding cost for each unit increase in the procurement cycle quantity. The point of their intersection is the economic order quantity—that quantity which, when purchased, will provide the optimal level of operation.

d. Another economic phenomenon that is often encountered—what popularly goes by the name of the law of diminishing returns. In the context of costs, it reflects the fact that fixed costs are present and that, by increasing the quantity produced, we are able to spread, or amortize, the fixed cost over a larger number of units; each additional unit can thus be produced for a cost less than its predecessor. However, this cannot be continued without end because, after a while, the point is reached where the resources provided for production become more and more inefficient for the quantities produced. We eventually reach the point, in other words, where it takes more variable cost to produce the next unit than was needed to produce its predecessor.

5-24. Discounting of Costs to Present Value.

a. The next economic principle of importance that must be considered is that which has to do with the time preference of money or discounting to present value. In order to achieve a reduction in the cost of operating an activity by introducing economy of scale, we nearly always have to make some investment of capital now in order to achieve cost benefits later. If the benefits are achieved quickly, there is no problem but, more often than not, the economy of scale improvement may not begin to pay for itself until a considerable period of time in the future. When this is the case, it is important that we consider the value of a dollar now compared to a dollar sometime later. The simplest way to think of it is this: Suppose you have an obligation to pay \$100 a year from now. It would be foolish to meet this obligation now, because you could put the dollar in a savings account earning, say, 5 percent interest so that after a year you could pay off the obligation and have \$5.00 left over. If the obligation doesn't have to be paid until 2 years from now, you could have at the end of the 2 years $\$105 + (\$105 \times .05) = \$110.25$. In our context, this tells us that an

expenditure that can be deferred until some time in the future can be made at the expenditure of fewer dollars today. The process of deciding how much a future investment will cost us in terms of today's dollars is called discounting to present value.

b. In what was said above, we related the present value of a future expenditure (or revenue, for that matter, since the discounting principle applies equally as well to the income stream except, of course, that a dollar of income a year from today is worth less than a dollar of income today) to the rate of interest we could earn by investing the money in a savings institution. It would have been possible, however, to invest the money in some other way and earn more than, say a 5 percent interest rate. A favorite example of economists is the entrepreneur who buys \$1.00 worth of grape juice, lets it ferment, and sells it as wine for \$1.50 a year later. Many commercial enterprises take the point of view, in deciding on the present value of a future expenditure or income, that the income from another source that they forego by choosing a particular investment today should govern their decision. Thus, before investing an additional dollar in inventory, they look at what this dollar might earn if put to another use. This value of a foregone opportunity, then, is what they would use as the discount rate in lieu of the interest rate.

c. This latter point of view, interestingly enough, has been adopted by the Department of Defense. In DODI 7041.3, Economic Analysis of Proposed DOD Investments, it is stated that no DOD investment should be undertaken without considering the alternative use of the funds which it absorbs or displaces and that the way to do this is to use an interest rate that reflects the private sector investment opportunities foregone. The DODI then goes on to refer to analyses that led to the adoption of a rate of 10 percent and directs that this value be used in determining the discounted financial benefits and costs that are expected to result from DOD investments.

5-25. Inventory Replenishment Costs.

a. The costs of procuring new items to replenish the inventory fall into two classes, materiel and administrative costs. The materiel cost is the purchase cost of the item itself. It is necessary, of course, to know or have an estimate of this cost to determine the amount of inventory investment required if a certain quantity of the item is bought. Further, the cost of the item will enter into the determination of the economic order quantity. In determining an item's purchase price, we

must always keep in mind that we are interested in knowing what the item will cost the next time we buy. Thus, we must be careful not to use unthinkingly what we paid for the item in the past. Only prices paid when the item was bought in replenishment quantities and under conditions that are likely to obtain when the future replenishment action is initiated should be considered.

b. The administrative cost of procurement is needed in many types of inventory models. This type of cost is defined in DODI 4140.39, Procurement Cycles and Safety Levels of Supply for Secondary Item, as including "... those variable direct labor and support costs which began with the output of the requirement notice through the mailing of the contract on order and will also include processing the physical asset into the proper warehouse location after receipt from the contractor. Average contract administration cost will also be a part of the cost to order an item of inventory." The DODI goes on to state that the cost desired is the variable cost per item (NSN) as opposed to the variable cost per contract (one contract may be for several NSN's) and stipulates that the following elements of cost must be determined:

(1) Direct labor/ADP costs per item procured at ICP level.

(a) Processing purchase request to procurement including preparation of documents, item manager review, accounting effort, establishment and maintenance of due-in records, technical coordination, etc.

(b) Purchase, including determination of procurement method, obtaining source lists, drafting and obtaining solicitation, price analysis, selection of contractor, legal review, preparation of contracts, etc.

(2) Direct labor/ADP cost per item administered at a Defense Contract Administration Services Region (DCASR).

(a) Initial file establishment.

(b) Pre-award survey.

(c) Price/cost analysis.

(d) Production follow-up.

(3) Labor benefit costs (per DODI 7041.3).

(a) Personnel benefits (health insurance, life insurance, retirement, etc.) computed at 8 percent of direct labor cost.

(b) Leave entitlements computed at 21 percent of direct labor cost.

(4) Other indirect labor/support cost (both at ICP and DCASR).

Includes costs of communications, reproduction, materials and supplies, mail, etc., and costs of

personnel support (e.g., Civilian Personnel Office support, etc.)

c. The DODI also states that a minimum of three administrative costs of procurement must be determined, as follows:

(1) For items likely to be procured using the small purchase technique contracts of \$10,000 or less.)

(2) For purchases where a call-type contract is employed.

(3) For purchases where the contract value is likely to be greater than \$10,000 and where negotiated, advertised, or other procurement methods are used.

d. In subsequent sections, the administrative cost of procurement will be used in inventory models, where it plays a direct part in the determination of the optimal level of inventory investment. In this use, the cost is assumed to be linear with the number of procurement actions processed, so that the more frequently we procure the more administrative cost we incur and where doubling the number of procurement actions means doubling this cost. While this is not always true, we will see that this kind of assumption is justifiable in many situations.

5-26. Cost to Hold Inventory.

a. *General.* This type of cost is also defined in DODI 4140.39 and the DODI also stipulates how its value should be determined. The DODI defines it as "... the monetary penalty attached to keeping inventory in anticipation of future use." The DODI then says that this cost is assumed to be linear to the average dollar value of on-hand inventory and that its main elements are investment cost, cost of losses due to obsolescence other losses, and storage costs. These are now defined and their manner of determination specified.

b. *Investment Cost.* There are two schools of thought about this element of cost: one thinks of it as the interest the Government has to pay when it borrows money in the short term to invest in inventory; the other view is that the Government investment in inventory is paid for by withdrawing money from the private sector where it could be earning money and that the Government, therefore, should charge itself for the loss of this opportunity at the rate these funds could earn if invested in the private sector. Economic Analysis of Proposed DOD Investments, takes this latter view and states, in turn, that this is the manner in which inventory investment costs will be treated in inventory models. Both DODI cite the cost as 10 percent per year of the dollar value of

the average investment as the cost that should be used. DODI 4140.39 closes this section by stating "... Since most order quantity decisions are of a relatively short range nature, this cost need not be discounted." This is a very important statement in recognition of the fact that costs in the short and in the long run have to be treated very differently. This is especially important in the case of holding costs and will be discussed in more detail in a later paragraph.

c. *Costs of Losses Due to Obsolescence.* Losses due to obsolescence of materiel come about mainly for two reasons: technological advances that make the inventory useless and overforecasting of requirements that results in materiel that is superfluous to needs. When either of these occurs, the materiel is ultimately disposed of at a small fraction of its acquisition cost and a loss is thus incurred. DODI 4140.39 takes the view that both types of situations must be covered in determining what we should charge ourselves for inventory being held because of the expectation that some of it will become superfluous to needs before it is used. Further, the DODI authorizes computation of different rates for different classes of commodities in recognition of the fact that some may be subject to much higher rates of technological obsolescence than others.

d. *Costs Due to Other Losses.* This element of the holding cost represents losses due to pilferage, shrinkage, inventory adjustments, etc. It is an expected rate of loss expressed as the percent of average onhand inventory that is expected to be lost per year due to causes of the kind given above. DODI 4140.39 expects each NICP to forecast this expected percent of loss based on past experience. Smoothing, again, is recommended in estimating this rate to avoid undue influence by unusual circumstances. Experience within AMC indicates that this loss rate is quite low, being on the order of 1 percent or less of the average onhand inventory.

e. *Storage Costs.* These, as the name suggests, are the costs involved in keeping items in inventory. DODI 4140.39 defines this cost element as including not only the out-of-pocket costs incurred in keeping the inventory (warehousing, taking of physical inventories, maintenance in storage, etc.) but also the amortized cost of the storage facilities themselves.

Nevertheless AMC has found this cost element to be quite low, again in the neighborhood of 1 percent of the average value of the onhand inventory. The DODI prescribes that a 1-percent figure should be used. To recapitulate, the elements of holding cost and their values are as follows:

| | Prescribed by DODI 4140.39 | AMC Values |
|-------------------------|-------------------------------|------------------|
| Investment Cost _____ | 10 percent _____ | 10 percent _____ |
| Obsolescence Cost _____ | Variable (10%) _____ | Variable. _____ |
| Storage Cost _____ | 1 percent _____ | 1 percent _____ |
| Other Losses _____ | Variable _____ | Variable. _____ |

In models for treating decision with long-term cost implications, special treatment of the obsolescence, deterioration, loss, etc., elements of the holding cost term is necessary. Examples of such models are those dealing with economic retention, procurement termination or cutback and economic airlift; in these models a one-time benefit that can be obtained now (e.g., deobligating contract funds, disposing of stock not needed now, reducing current inventory investment) has to be traded off against costs that would then be incurred year after year into the indefinite future. The modifications that then have to be made to the holding cost term and the reasons for them must be considered.

5-27. Backorder Costs.

a. Backorder costs fall into two categories. Those of an administrative nature (extra correspondence with customers, data research, expediting, etc.) and those that are performance related. Performance related costs involve intangibles that are extremely difficult to evaluate in a quantitative sense. In the commercial world, for example, the performance related cost of a backorder lies in lost sales. Thus, in commercial life, it is not only the revenue that is potentially lost on a given backorder but also the potential loss of future revenue that concerns the profit center.

b. In the military services, however, the intangible portion of the backorder cost is even more difficult to deal with. We must face the "for the want of a nail" possibility—the possibility that a repair part on backorder may deadline a tank, that the lack of the tank may affect the course of a battle, and so on. Even so, some attempts have been made in the military to link the cost of a backorder to the consequences felt because of the backorder.

c. Military specifications of inventory models seek to avoid having to deal with the backorder cost explicitly. First, the assumption is made that the performance related portion of the backorder cost far outweighs the administrative portion, so that if we deal with the former, we can ignore the latter. Second, and more important, it is possible to bypass the need to quantify the backorder cost if one is willing to specify what kind of supply performance he wants to achieve. When this is done in inventory models, it then becomes possible, by application of appropriate optimizing tech-

niques, to achieve this performance at minimum operating cost.

d. Even though backorder costs may be imputed rather than explicit, we may want to distinguish one kind of backorder from another. Thus, in DODI 4140.39, imputed backorder costs for an NSN may be weighted by the NSN's essentiality. When this is done, NSN's of a higher essentiality are assessed a higher penalty cost for backorders incurred, the penalty being proportional to the difference in the essentiality rating.

e. The need to distinguish between different backorders also arises in another context. Take the case of requisitions coming into the NICP bearing different priority designation. Even on the same NSN, we would like to distinguish between backorders for high priority requisitions and backorders for low priority requisitions. This can be done by assuming that a higher penalty cost prevails for high priority requisitions that are backordered.

f. Finally, backorder costs, even though imputed and whether or not they are weighted, may be measured in somewhat different ways. The most commonly encountered distinctions are:

Backorder cost per unit backordered

Backorder cost per requisition backordered

Backorder cost per unit backordered per unit time

Backorder cost per requisition backordered per unit time

The method of counting backorder costs has a significant effect on requirements levels computed by means of optimizing inventory models.

5-28. Other Inventory System Costs.

Costs to replenish and hold inventory and the cost of backorders, real and/or implied, are extensively used in inventory management models applied particularly to decision on what items to buy, when, and in what quantities. These, of course, are not the only decisions an inventory manager has to make. Others involving questions of which items to stock or not to stock, which items to repair, when and in what quantities, which items to keep in which depots, which items to ration, and many others, are frequently complex, and are equally amenable to quantitative analysis in many cases provided the most pertinent costs can be identified and estimated. Some of these decision models will be described in subsequent sections of

this chapter and in each case the types of cost needed for rational decision-making will be mentioned. The same principles as were just described apply in each case. All will contain fixed, semi-fixed, and variable elements; all will be found to behave in accordance with the law of diminishing returns and to lend themselves to economy of scale; and all will require discounting to present value when used in decision models having long

run consequences. Those who use these models should bear these facts in mind and consider, as well, the precision to which these costs can be estimated. Although it will frequently be found that fairly sizable amounts of error in estimation of costs can be tolerated in many decision models, it is well for the manager to know how much error the costs he is using contain and what effects these errors can have on his final decision.

Section VI. THE ECONOMIC ORDER QUANTITY CONCEPT

5-29. Equivalence of Costs.

The notion of equivalence of cost is fundamental to all that follows. By equivalence of costs, we mean that one dollar's worth of cost is worth one dollar, no matter which activity incurs the cost. This may seem like a self-evident statement but, in fact, it is not. It means, for example, that one dollar's worth of procurement activity has the same value as one dollar's worth of inventory holding costs, even though procurement activity costs, which are largely personnel-related, are paid for by OMA funds and inventory holding costs, which depend on the dollar value of the inventory, entail the use of Army Stock Fund or Procurement Appropriation funds. While it is not within the purview of an item manager to make use of more or less of one kind of money in place of the other, the inventory models we are about to discuss make the assumption that this can be freely done. If the amount of resource usage can be expressed in terms of dollar costs, then the models, under the cost equivalence assumption, can examine the sum of the costs of all the resources that are being varied to find that set of resource costs whose sum is a minimum. This process of varying the amounts of resource usage to see how the total costs change is generally called trade-off analysis. When the search for the set of resource utilization values that minimizes total costs is done by formal mathematical manipulation, the process is generally called optimization. It is important to observe that both processes depend on the notion of cost equivalence, for without this there is no basis for comparing the relative worth of each type of resource whose use is under consideration. This holds true not only for those activities whose costs can be estimated, but also for those components of the total costs (such as backorder costs, for example) whose values may only be imputed.

5-30. The Economic Order Quantity Model.

a. We are now ready to develop the first of our inventory models, the economic order quantity (EOQ) model. Remember that we are still in our deterministic world where everything that is to happen in the future is known. Among the things known about the future are the costs of managing our inventory system and how these costs change as we vary our decisions. The assumptions we must make in order to develop the simplest EOQ model (in addition to the one about our knowledge of the future) are:

(1) The variable administrative cost of procurement is linear in the number of procurement actions process (i.e., the variable administrative cost is the product of the number actions processed and the cost per action).

(2) The cost of holding inventory is proportional to the dollar value of the average on-hand inventory.

(3) The costs we are concerned with are stationary; that is, they remained at a constant level in the future. Let us assume the following values of our parameters of interest:

U = Unit Cost of the item = \$10 each

C = Administrative Cost of Procurement = \$100 per action

H = Inventory Holding Cost = 20% per year of the dollar value of the on-hand inventory

Y = Demand Rate = 100 units per year

We want to find the economic order quantity to purchase; that is, the quantity we should buy in order to incur the minimum total variable cost per year. The total variable cost per year (we will denote this as TVC) is defined as follows:

TVC = Cost of the item + administrative cost of procurement + cost of holding the inventory (1)
If we call the purchase or order quantity Q , we can particularize equation

$$\begin{aligned} \text{TVC/year} = & \text{Unit cost of the item} \times \text{demand} \\ & \text{rate per year} \\ & + \text{cost per procurement action} \times \\ & \text{no. of actions per year} \\ & + \text{cost of hold} \times \text{dollar value of} \\ & \text{average on-hand inventory} \end{aligned}$$

or

$$\text{TVC/year} = y \times U + (Y/Q \times C) + \frac{Q}{2} \times U \times H \quad (2)$$

Now we observe that the first term of equation (2) does not have a Q in it; in other words, the dollar value of the total inventory used per year does not depend on how frequently we buy. This being the case, we may ignore this cost in finding the optimum.

b. Before going into any mathematical development, let us first tabulate the TVC if we were to buy in lots of 50, 75, 100, 125, 150, and 200, and graph the results (fig 5-5).

Note that the TVC curve is formed by adding the administrative procurement cost per year to the inventory holding cost per year. We can see that the procurement quantity Q that causes the TVC per year to be a minimum is in the vicinity of 100. Note that the TVC is a minimum when the inventory holding cost equals the procurement cost; this is always the case for our simple EOQ model as we will see from its mathematical derivation.

c. The differential calculus is used to find the point on the TVC curve where TVC curve is a

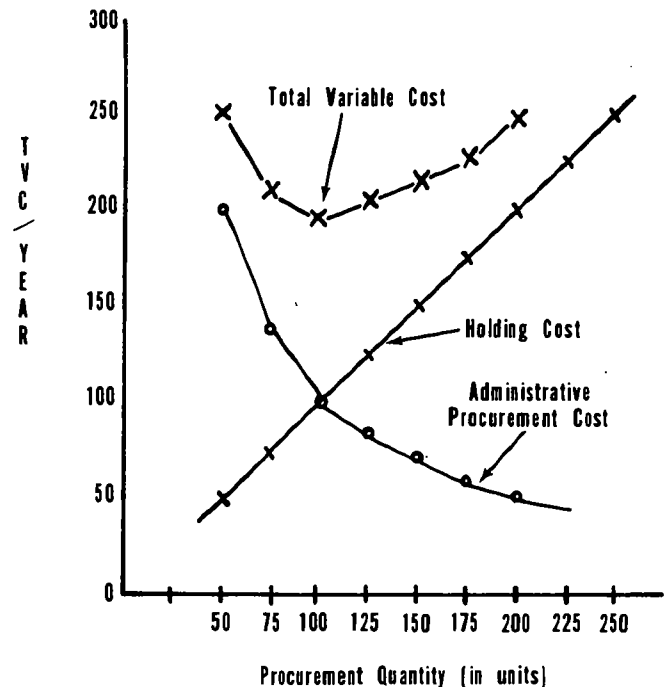


Figure 5-5. Procurement quantity (in units).

minimum. This is the point on the TVC curve where the first derivative of the TVC equation is equal to zero. Restating equation (2)

This is the classic economic order quantity formula, which is also called the economic lot size or Wilson formula. Now, going back to our original parameter values, we can solve directly for the procurement quantity that minimizes our TVC. Using equation:

$$Q = \sqrt{\frac{(2)(100)(100)}{(10)(.2)}} = \sqrt{10,000} = 100 \text{ units}$$

*Going back to paragraphs 5-15 through 5-18 we see that:

$$\text{Procurement frequency} = \frac{Y}{Q} = \frac{100}{100} = \text{once a year}$$

If we call the Q in units our Procurement Cycle Quantity, the Procurement Cycle Time is:

$$\frac{\text{Quantity}}{\text{Demand Rate}} = \frac{100 \text{ units}}{100 \text{ units/year}} = 1 \text{ year (of supply)}$$

5-31. Upper and Lower Limits on the EOQ.

a. Now, however, we must begin to introduce complications that are present in the real inventory system which, unfortunately, complicate the simple EOQ formula we have just derived. First, let us suppose that the item for which we want the EOQ costs only \$.10 instead of \$10.00 then

$$Q = \sqrt{\frac{(2)(100)(100)}{(.10)(.20)}} = \sqrt{1,000,000} = 1000 \text{ units}$$

This is fine, except that when one translates this quantity into years of supply, we see that 1,000 units represents 10 years of supply. This should give us pause, for 10 years is along time. Remem-

ber the assumptions that underlie the simple EOQ model; do we expect the demand to remain unchanged, do we expect the procurement costs, the holding cost, the item's unit price to remain

stationary over such a long period of time? Prudence says perhaps not, but as will be seen later in this section, arbitrary reductions of EOQ can lead to surprising results.

b. There is another reason, however, that could cause us to buy less than the EOQ and this is an item's shelf life. One way to handle this situation is to increase the item's obsolescence risk, which would cause the EOQ to decrease. A simpler way is to merely constrain the EOQ so that the months of supply does not exceed the shelf life limitation. If, for example, an item's demand rate is 100 units

$$Q = \sqrt{\frac{(2 \times 100 \times 10,000)}{(1,000 \times .2)}} = \sqrt{10,000} = 100 \text{ units}$$

Now, however, 100 units represent only 1/100 or a year's supply of 3.65 days. Do we want to buy any item that frequently? Probably not. Again, it is common practice in industry and Government to place a constraint on the low side of the EOQ as well.

d. It is interesting at this point to digress for a moment to comment on the procurement frequency and what it depends on when the EOQ principle is applied. Recall that the procurement frequency is defined as Y/Q . Starting with equation (7), it is easy to show (we leave the algebra to the reader) that:

$$\frac{U \times Y \times H}{2C} \quad (8)$$

Note that $U \times Y$ is the dollar value of demand per year so that as $U \times Y$ goes up, procurement frequency increases and as $U \times Y$ goes down, procurement frequency decreases. Thus, we see that the items with large EOQs in terms of months of supply are the low dollar value demand items; those with small EOQs in terms of months of supply are the high dollar value demand items. Note also that EOQ and "big buy" are not synonymous. We sometimes hear item managers assert that EOQ principles cannot be applied on their items because they "cannot afford it." In actual fact, the procurement cycle investment for a given catalog of items may be less when EOQ principles are applied than when fixed procurement cycles are used.

e. Now let us return to the item whose EOQ calls for a procurement every 3.65 days. There is another point to be made here. While it seems obviously wrong to buy this item so often, the lower limit may not always be the best course of action either. Since items affected by this lower constraint are the high dollar items, it is possible that many of these items might lend themselves to "requirements type" contracts, under which vari-

per year and its shelf life is 6 months, we would never want to buy more than 50 units. We must be careful, however, that we understand what the shelf life limitation really means. If the item is going to be issued by the NICP to a customer who is going to keep it on his shelf, then the expected time on his shelf must be considered.

c. Next, let us look at an example which takes us in the other direction. Suppose the item we are interested in has an annual demand rate of 10,000 units and that its price is \$1,000 (C and H) unchanged;

able delivery quantities could be called for monthly, geared to the month's requirements. Since contractual obligations need cover only the immediate future, the inventory investment and on-hand inventory can be kept low, and the frequent incidence of administrative procurement cost can be avoided. As a general rule, every item whose EOQ calculation results in a 3-month minimum constraint being reached should be considered a prime candidate for special contractual action.

5-32. Quantity Discounts.

a. Sometimes a manufacturer will sell an item at a lower price if a large quantity is bought. This usually reflects the fact that there is some amount of fixed cost incurred by the manufacturer; the larger the quantity he sells, the lower the fixed cost per unit sold and thus the lower his selling price can be. The fact that he is willing to offer a price discount if we increase our purchase quantity has to be taken into account in our EOQ calculation when this fact is known.

5-33. Effects of Suspect Data on EOQ Results.

a. From earlier sections, we see that the estimation of the costs used in EOQ calculations is not an exact science and that it is possible that the costs we use may be erroneous. If this is the case, we have reason to be concerned about the effects of using erroneous cost data in the TVC incurred when we buy under EOQ policies. Also, the fact that our estimates of demand rate may be erroneous is a further cause for concern.

b. Item managers frequently express concern about buying EOQ because of possible obsolescence. The EOQ does, of course, provide for obsolescence in the holding cost.

c. The effect of errors in forecasting the demand rate on the EOQ is a much more difficult topic. If we are concerned with EOQ's that would last for a relatively short period of time we could apply the previously used error effect formula with confidence. The fact of the matter, however, is that EOQ may represent 3, 4, or more years of demand and item managers justifiably are concerned about their ability to project a demand rate that far into the future, not so much because the forecast error may be large but because the item may become completely obsolete before the EOQ is used up. The problem with the EOQ formula is that it assumes repetitive procurements into the indefinite future. We could help matters, perhaps, by applying the long-term holding cost concept in calculating the EOQ but the fact still remains that, if there is a strong possibility that the item may not be procured again, we are probably better off to place an arbitrary upper limit on the procurement quantity.

5-34. Inventory Turnover Rates.

a. An inventory turnover rate is defined as the number of times a year the inventory is sold. More precisely, we define it as the average on-hand inventory divided into the annual sales.

Y when no safety level is used or
Turnover rate = $\bar{Q}/2$

Y when a safety level is present
 $\frac{S + \bar{Q}}{2}$

Now we are faced with an anomaly. We often hear of business men and military logisticians striving for high turnover or rapid turnover of their inventory. Is this goal consistent with our EOQ objectives? The answer, of course, is frequently no! If we are following rational inventory policies, the turnover rates we seek to achieve should be dictated by our EOQ's. Anything different from that would involve operating at a higher cost.

b. This raises another interesting point—the question of whether standard inventory turnover rate should be set as a target for all NICPs or for large classes of commodities. The answer is clearly no unless the items are homogeneous; a catalog

with a high proportion of low dollar, value demand items will have lower turnover rates than one with more high dollar value items, and rightly so. Turnover rates, if used as performance targets, must then be tailored to the characteristics of the catalog being managed.

c. Care must also be exercised in using inventory turnover rates as performance targets to distinguish what can be attained in the short versus the long run. A catalog with a high proportion of items in a long supply condition will experience low turnover rates until its on-hand inventory depletes through attrition to the desired level. Of course, one could decide to get rid of the long supply and try to operate at the long run optimal turnover rates immediately but, as will be seen in the next section, this is often not a desirable course of action.

5-35. Economic Retention Model.

a. Even in a deterministic world it sometimes happens that stock on hand is greater than our anticipated short or midrange requirements, greater than the requirements objective. In the probabilistic world this often happens.

It seems obvious, certainly after we have become aware of the costs involved in managing an inventory, that disposing of stock because it is excess in the short run might not be a wise thing to do. With a background in the elements of cost involved and how the cost elements are related to one another, it should be possible to consider the question of how much of the stock ought to be retained on economic grounds.

b. The basic model for making this decision consists of the following:

(1) Consider how much we would get for the stock if we were to dispose of it today.

(2) How much would this stock, whose value if it could be used now is known, be worth years from now?

(3) How much would the total storage cost be for stock that is held for years? Or, in words, its disposal value is less than or equal to the stock's discounted value years from now, less what it cost us to store it for that length of time.

Section VII. PROBABILISTIC INVENTORY MODELS

5-36. DODI 4140.39 Model.

a. The Department of Defense has published a regulation, DODI 4140.39, Procurement Cycles and Safety Levels of Supply for Secondary Items, which prescribes an objective function to be

used in determining safety levels and order quantities.

b. The performance constraint is now expressed in terms of "time weighted requisition short" or "averaged customer wait" instead of item availability. The following illustrates these terms:

| Item | Example No. Requisitions | Day wait (due to no stock) |
|------|-----------------------------|-------------------------------|
| 1 | 20 | 0 |
| 1 | 10 | 1 |
| 2 | 10 | 0 |
| 2 | 5 | 3 |
| 2 | 1 | 10 |

c. The example says that 20 requisitions for item 1 were satisfied without delay, while on 10 others, there was a delay of 1 day per requisition because of lack of stock. Total requisitions received are 46 (20+10+10+5+1). Total time weighted requisition short is found by multiplying number of requisitions \times number of days = wait per requisition.

Time Weighted Requisitions

$$\begin{aligned}\text{Short (TWRS)} &= 20 \times 0 + 10 \\ &\times 1 + 10 \times 0 + 5 \times 3 + 1 \times 10 = 35\end{aligned}$$

d. Average days wait is the average number of days wait experienced by the inventory control point's customers because the inventory control point had no stock on hand when requisitions were received. Included in the average are requisitions for which there was no (zero) wait. The following is the days wait:

Average Days Wait = Time Weighted Requisition Short divided by Total Requisitions Received.

Thus, in our example

$$\text{Average Days Wait} = 35 \div 46 = .76$$

Any performance target given in terms of maximum time weighted requisitions short can easily be translated into a target maximum average days delay, and vice versa.

e. Under DODI 4140.39, the performance constraint is expressed for a catalog of items rather than on an item basis.

f. Intuitively it is clear that minimizing operating costs (procurement and holding costs) on an item by item basis is not much different than minimizing total operating costs over a catalog of items. But a catalog performance constraint is much different than a constraint which has to be met by each item's performance.

5-37. Insurance Item Model.

a. Insurance items are defined by these characteristics:

(1) No maintenance factor is computed. This means that the design and maintenance engineers through testing and previous experience come to the conclusion that this particular item will have no expected failures due to wearout.

(2) It is highly essential to end item performance.

(3) Typically, procurement lead times are

long. Although insurance items have no expected failures due to wearout, spares are desired for emergencies. Even though the usual failure reasons do not apply to insurance items, accidents do occur. It also happens on occasion that a maintenance factor which is small but not zero is incorrectly estimated to be zero. Since the loss of one of these items will make the end item inoperative, it is very desirable to have a spare available before a demand occurs rather than to buy as needed, as we might for other low demand items.

b. Demand forecasting for "normal" items is described in chapter 4, AR 710-1. Unique to insurance items is use of the "catalog" approach. Under this approach, the average demand experienced is computed for all items which have previously been classified as insurance, these items constituting the "catalog." If there were 1,000 insurance items, and if over a period of 2 years the sum of the demand for all these items were 2,000 then a catalog demand rate of 1 per year would be computed; i.e.,

$$1 = \frac{2,000}{2} = 1000$$

In other words, since demand history is particularly unreliable as a means of forecasting future demand for insurance items, the forecast is based on a weighted average of catalog rate and item historical rate. In general, the mathematics are such that the forecast will not be dominated by only one time surge in demand. If demand is consistently larger than would be expected for an insurance type item, the model contains criteria for reclassifying the item as not insurance, so that the demand forecast is no longer influenced by the catalog demand rate.

5-38. Stockage Criteria Models.

a. The cost differential model determines the minimum expected requisition rate (number of requisitions received per year) an item should have before it can be stocked. This is the decision variable. For example, if the minimum is 6, and an item is expected to have only 5 demands a year, it would be purchased on demand and direct shipped from manufacturer to the customer, rather than kept in stock at the wholesale level.

b. The objective function of the DOD stockage criteria model is similar to that of DODI 4140.39.

The idea is basically to minimize the sum of holding cost, procurement cost, and backorder cost. If the item is not stocked, there are no holding costs, but procurement costs are higher, because you have to buy more often (each time there is a demand). In addition, every time there is a demand, the customer's requisition must be backordered for a procurement leadtime. Thus, as the expected requisition rate increases, the cost comparison begins to favor stocking an item versus buying on demand. The stockage criteria is the minimum requisition rate at which the cost comparison turns favorable to stockage.

c. The DOD model is probabilistic because it takes account of the fact that the true requisition rate for an item may be unequal to that forecasted. Since the model will be applied to slow moving items, and initially in a provisioning context only, this is a particular problem. The impact on the stockage criteria found is to make them higher than if a deterministic model were used; i.e., the DOD model leads to fewer items being stocked than a deterministic model would. The DOD model would not be used where there is a good alternative to either stockage or buying on demand—such as cannibalization. Also, insurance items could be stocked regardless of their low expected demand rate.

e. The Army is using a stockage criteria model at the retail level, but this model does not directly attempt to minimize costs. Rather it attempts to achieve specified demand accommodation levels with as few stocked items and as little turbulence as possible. Demand accommodation is defined as the percent of all demands received which are for items being stocked. Turbulence relates to how often an item is placed on a stockage list, only to be removed when expected demands do not materialize.

f. A sophisticated economic stockage criteria model has been developed for retail level stockage, but while it minimizes cost, the criteria it produces are suspect in terms of their potential impact on operational readiness.

5-30. Stock Distribution Models.

a. Three models will be discussed which were developed to aid in decision making in the area of stock control. Their current status varies from routine use, to authorized for use, to implementation deferred.

b. *The MRQ (Maximum Release Quantity) model* computes maximum release quantities for an NSN. If a requisition is received requesting more

than the MRQ, only an amount equal to the MRQ is shipped. The idea is that a few large requisitions can cause demand variability much larger than is allowed for in the determination of the safety level. At the same time, at least some of these unusually large requisitions may be simple errors. The MRQ model determines what is a reasonable requisition quantity for an NSN based on its demand and price characteristics.

c. *The "inter-depot transfer model"* computes when an inter-depot transfer can be economically made by the national inventory control point, and how much to transfer. For example, suppose there are a group of items with significant demand activity expected both in the Pacific and in Europe. Such items would be stocked in both West Coast and East Coast depots. However, it sometimes happens that all the assets at a given time are at one depot, the West Coast depot for example. Possibly the European demand was new, or the assets represent retrograde. A transfer of some West Coast assets to the East Coast can save transportation money and give better customer support. Transportation money is saved because inter-depot transfer can often take advantage of bulk movement freight rates. In computing how much to transfer, the expected value of savings is maximized. Suppose the transfer is from West to East. The model computes and takes into account the probability that the transferred assets may actually have to be backshipped to satisfy West Coast customers as well as the probability that the transfer will save money. Back shipment can happen if demand forecasts are greatly in error. In other words, savings is a random variable because it depends on how the transferred assets are used, and this depends on future demand which is a random variable. The inter-depot transfer model does not apply to transfers made to consolidate storage.

d. *The stock rationing model* computes the size of a reserve for high priority requisitions. The concept is that if on-hand stocks are running low, it may be better to backorder low priority requisitions in order to keep stock (the high priority reserve) available for high priority requisitions.

e. The stock rationing model was first developed as an optimizing analytic model. The size of the reserve depends on the high priority demand rate, and length of the protection horizon. The protection horizon is the period until new stock is due in, at which time all demands can be satisfied. Since the reserve level depends on the protection horizon, it is changed dynamically as time passes.

5-40. Physical Inventory Scheduling Model.

a. A physical inventory is a process for finding and correcting errors in the assets balance records of the inventory control point. Uncorrected errors lead to what are termed penalty costs; extra holding and backorder costs incurred by the supply system because of decisions based on incorrect asset information.

b. More frequent scheduling of inventories reduces errors and hence penalty costs, but the inventory process itself is costly. The scheduling model attempts to minimize the sum of the costs of taking inventories and the penalty costs. Alternatively, if the number of inventories is fixed, the model determines for which items an inventory will produce the biggest decrease in penalty cost on an expected value basis. It thus directs the inventory taking resources where they will do more good.

c. The estimates of penalty costs to be saved are based on:

(1) A model which estimates the probability of having an error and the expected size, if one exists, as a function of such item characteristics as number of demands received since the last inventory was taken.

(2) An analytic model which determines for any given asset record error, the expected value of the increase in holding and backorder costs due to this error.

d. The mode is implemented by tables. These tables specify inventory frequencies and priorities as a function of an item's annual dollar value of demand, quantity of demand, and frequency of demand. The frequencies are modified by special considerations. Pilferable, sensitive, and classified items are inventoried at least once a year. Items in long supply (items with assets greater than short to midrange requirements) are inventoried only once every 3 years. It turns out that even if items in long supply have asset record errors, these will not lead to penalty costs. This conclusion followed from a review of the dynamics of how error leads to penalty cost.

Section VIII. DEMAND FORECASTING

5-41. Introduction.

a. Basic to most aspects of logistics management is the demand forecast. Ideally, we would like to base our demand forecast on a model of the demand process, using our knowledge of why demand is generated as part of the forecast technique. Failing this, we may at least identify one or more variables on which demand depends, such as projected aircraft flying hours, and utilize statistical methods to take advantage of this insight.

b. The simplest approach is to treat demand as a pure "time dependent" random variable. Demand is plotted against time; i.e., time series. Using statistical methods a forecast is made, and this forecast depends solely on the numbers plotted and the statistical method chosen.

c. In paragraph 5-44 various characterizations of demand as a time dependent process are discussed, and in paragraph 5-45 the most common statistical techniques for dealing with such a process are presented. Choice of technique is based in part on which characterization one accepts—is the demand cyclic, does it have a trend, etc.

d. Increasingly, choice of statistical technique is determined by simulation experiments. Real demand history is used; forecasts are made based on a part of this history, while another part is used to verify how good the forecast was. This is repeated using alternative forecasting techniques, and the technique which works best over a large sample of

items is chosen and built into computer systems for logistics management.

5-42. Demand as a Time Dependent Process.

a. *Classical Demand Patterns.* Demand patterns frequently discussed in the literature of forecasting techniques are:

(1) *Constant.* This pattern is illustrated in figure 5-6. Its characteristic is the tendency of demand to remain at a given level. Demand for any given month may deviate quite a bit from this constant level, but the deviation is random and does not change the basic pattern.

(2) *Step.* This pattern is a composite of two constant patterns. In this pattern, demand has a tendency to remain at a given level and then suddenly step up or down to a new level and remain at the level. The step represents an increase or decrease in the demand volume caused by a corresponding increase or decrease in activity that precipitates demand. An upward step pattern is illustrated in figure 5-7.

(3) *Ramp (linear trend).* Two ramp patterns are illustrated in figure 5-8. In this pattern, the tendency of demand is to continuously change its level in the same direction: i.e., up or down. As is illustrated in the figure, the incremental change may be very small or quite large, but it can be plotted by a straight diagonal line as in the future, hence the name "linear trend."

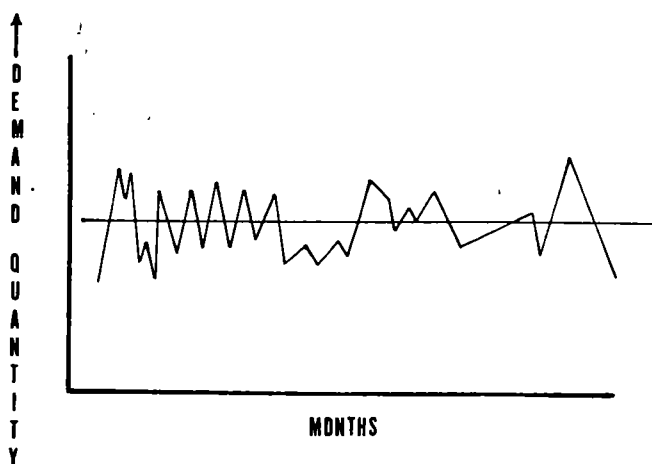


Figure 5-6. Constant demand pattern.

(4) *Nonlinear trend.* Two nonlinear trends are illustrated in figure 5-9. The lower one is more complex than the upper and still more complex patterns are possible. Give a mathematician enough rope, and he can come up with a nonlinear trend to fit almost any data. The questions then becomes, "do we really have a trend at all?" "Trend" can be an ambiguous word, but one way to rephrase the question is: Is demand changing level as time passes in accordance with some predictable pattern?

(5) *Cyclical.* This pattern is characterized by a number of peaks and valleys that tend to occur at regular intervals as in figure 5-10. If the same pattern occurs from year to year, the pattern is called seasonal. Antifreeze is an example of an item that would have a seasonal pattern.

(6) *Impulse.* Figure 5-11, shows a pattern with an impulse.

This pattern is characterized by a tendency of demand to remain at a constant level; usually very low, except for occasional periods in which demand is extremely large. This might be due to special

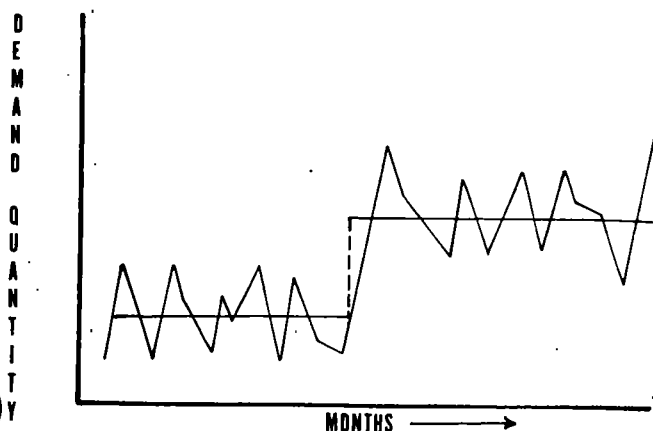


Figure 5-7. Demand pattern with a step.

maneuvers, special inspections, irregular ordering, or it might be due to a requisitioner's error.

b. *Army Demand patterns.* Few repair parts in the Army have demand patterns as simple as those discussed above. Most of the patterns are composites of step, ramp, and impulse patterns that are further disguised by a large amount of noise; i.e., random fluctuations. One reason sometimes proposed for the amount of noise in repair part demand patterns is the multi-echelon nature of the supply system. According to this hypothesis, as you move upward in the supply system, toward echelons further removed from the user, demand variability increases.

5-43. Forecasting for Pure Time Dependent Processes.

a. There are two basic approaches to forecasting pure time dependent process; "least squares" and "exponential smoothing." Many studies have been expended on the subject of which approach gives more accurate forecasts. The results of these studies indicate that there is little if any difference in accuracy. As a matter of fact, exponential smoothing, which was introduced after least squares, was not developed to make forecasts more accurate, but to achieve the same accuracy in a simpler manner. It is such secondary consideration as simplicity which may reasonably dictate the choice between approaches. Of course, even the question of which approach is simpler is a subject of dispute.

b. There are various forms of least squares or exponential smoothing which can be used depending on which of the classic demand patterns you think best fits your data. We will discuss least squares and exponential smoothing for constant and ramp (linear trend) patterns, and then discuss some refinements to handle other patterns.

c. For a constant pattern, the least squares approach reduces to the familiar moving average. For example, total demand over the last 12 months was 96, the demand forecast would be $96/12$ or 8 per month. The demand equals the "average" historical demand over a base period which "moves" every month, so that it always includes the latest months. Of course, moving averages can just as easily be defined in terms of quarters or some other period as in months.

d. Choice of a base period (should it be 6 months? 12 months?) may be limited by how much data can be kept. Otherwise, it is currently chosen by simulation experiments of the type described in the introduction to this chapter: moving averages using different base periods are simulated and the one which works best is chosen. The tradeoff is this: if demand really does have a constant pat-

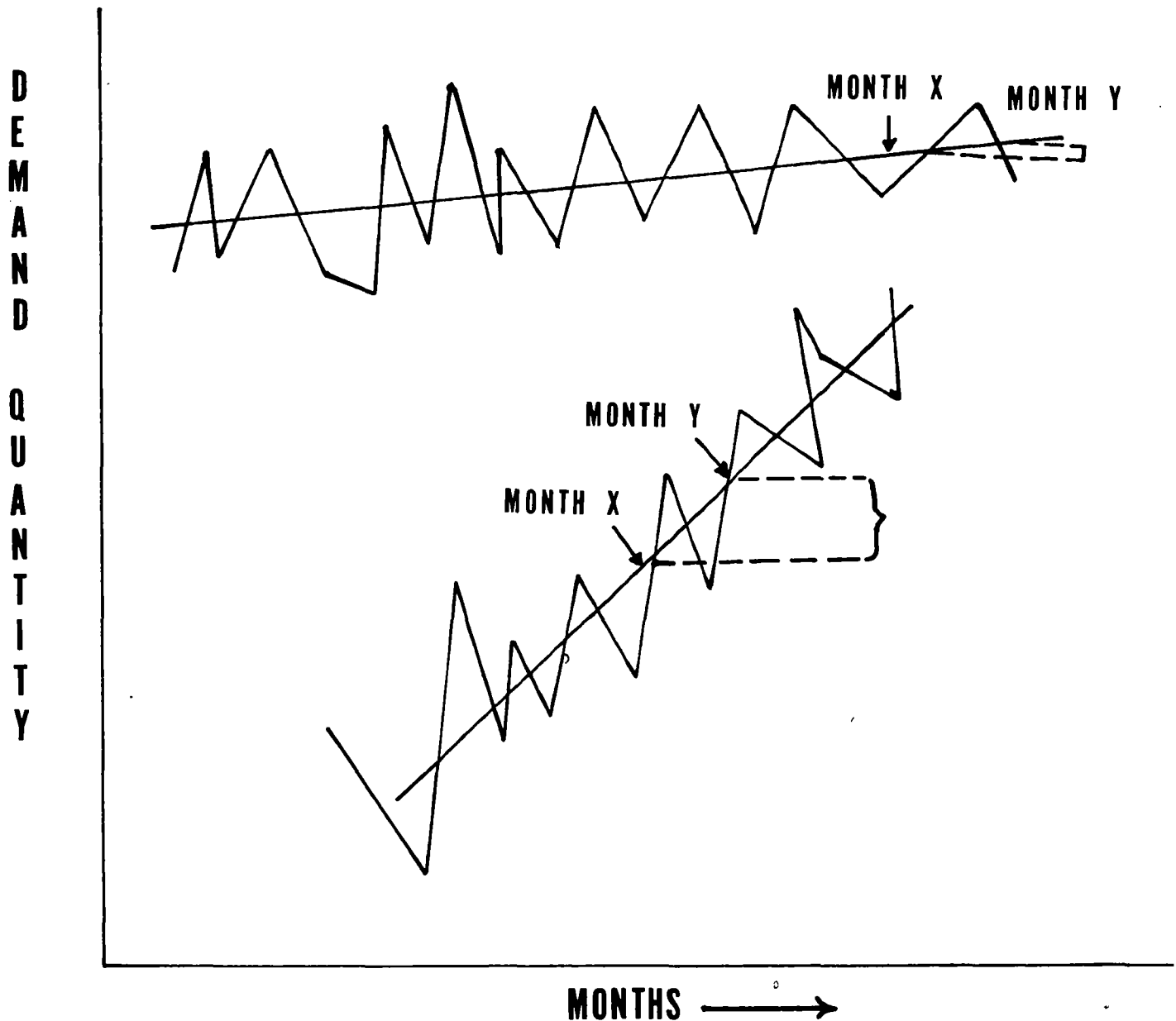


Figure 5-8. Ramp pattern (linear trend).

tern, the larger the base the better; e.g., 24-36 months; with a long base the moving average will focus in on the true mean and not be sensitive to noise. On the other hand, if a step or ramp may occur, a moving average with a long base will be slow to react to the change in general demand level, since it includes in the base period old data, many months in the past.

e. If demand is believed to definitely have a linear trend, the least square approach leads to a technique called "linear regression." In figure 5-12 a solid linear trend line is drawn through some data which does appear to have a linear

trend. The dotted extension of the line represents what the demand forecast is (e.g., forecast for month 15 is 49) Linear regression forecasting is simply an algebraic technique equivalent to drawing a line through data and then extending it.

f. Algebraically, any line can be represented by the general equation

$$Y_t = a + B \times t$$

where in our case

Y = demand corresponding to the trend line
t is the month (1, 2, 3, . . .)

a, b are "coefficients," or numbers which define what the line looks like

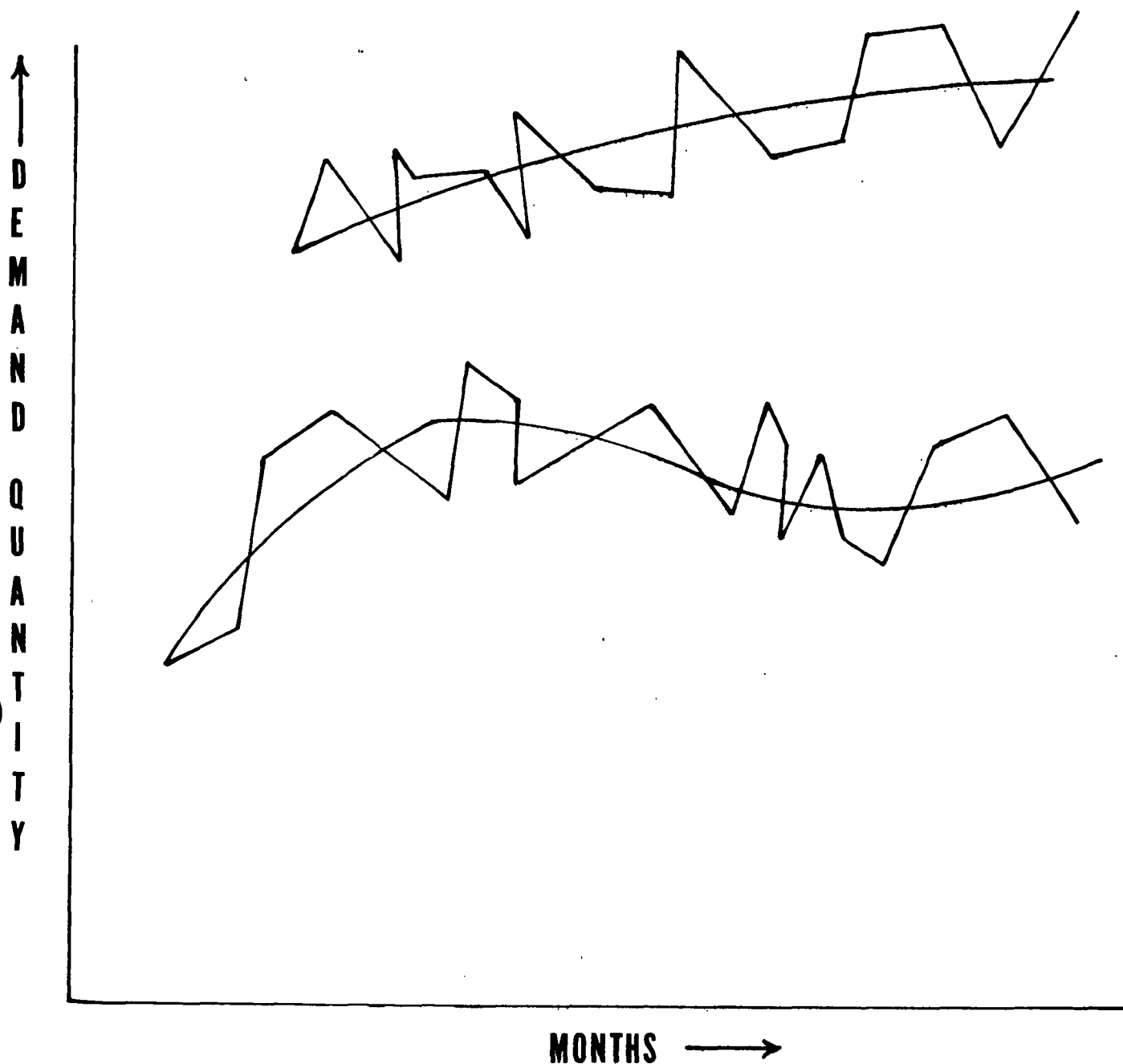


Figure 5-9. Nonlinear Trend.

The line plotted in the figure has

$$a=4$$

$$b=3$$

Thus, for month 5 ($t=5$) the point $4+3 \times 5$ or 19 falls on the line.

h. A moving average forecast corresponds to a linear least squares regression in which b is set to 0, not calculated. Ideally, if there were truly no trend in data to which you tried to fit a linear regression line, you would find that b was 0. In fact, because of noise, you would calculate a b

other than 0, and would erroneously project a trend.

i. Exponential Smoothing. Under (single) exponential smoothing, the forecast of monthly demand rate is:

$$S_t = \alpha (X_t) + (1 - \alpha) (S_t - 1)$$

where

S_t = the exponentially smoothed forecast—the “new” forecast

t = the time frame

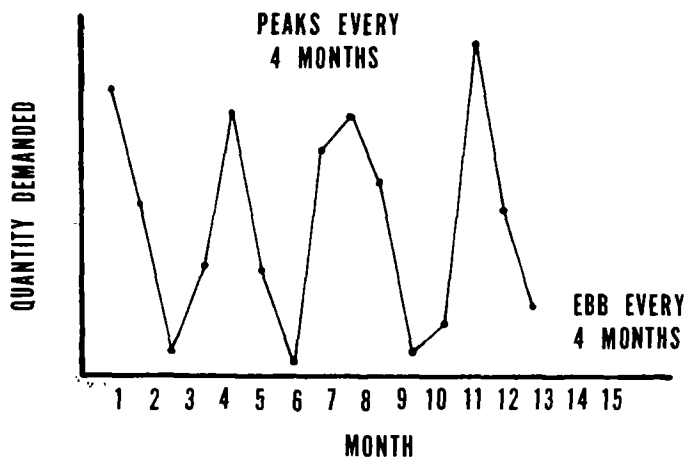


Figure 5-10. Cyclical pattern.

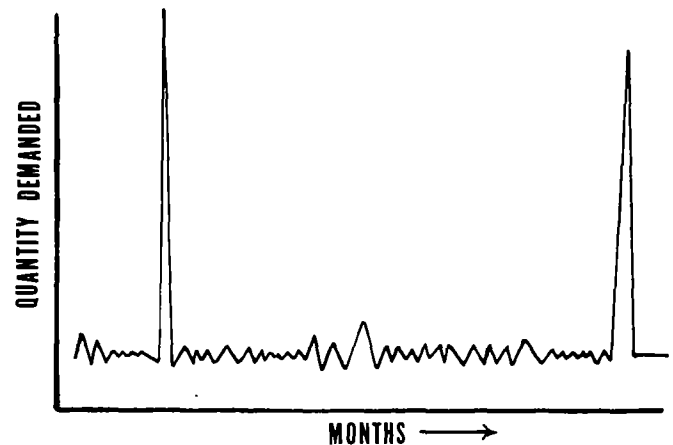


Figure 5-11. Impulse pattern.

X_t = Actual Demand at a time frame

α = weighting factor—given in the problem; between 0 and 1.

S_{t-1} = the smoothed forecast of the previous time frame — the "old" forecast

In other words, the new forecast is based on the old forecast, tempered by what happened last month. If we have:

| | |
|-----------|---------|
| S_{t-1} | (X_t) |
| .210 | 20 |

then, the new forecast is $.8 \times 10 + 2 \times 20 = 12$

j. In words, S_t is equal to a weighted average of past observations, where the oldest gets least weight and the newest the most weight.

k. What value of α to use in exponential smoothing is analogous to what length base period to use for a moving average? Higher values of α give more weight to the most recent observations, hence permit better adaptation to changes in demand levels, but more sensitivity to noise. It is

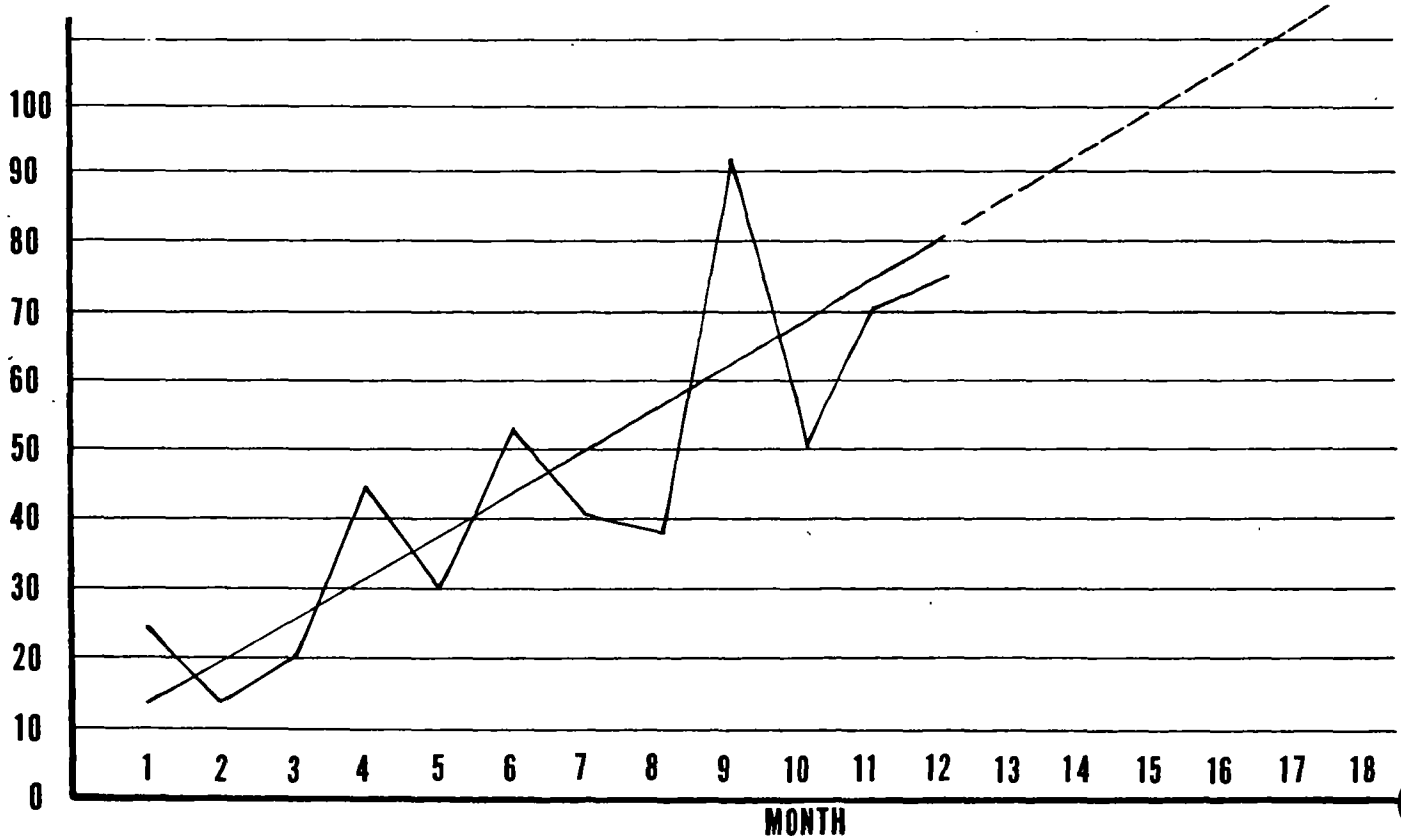


Figure 5-12. Fixed linear trend.

sometimes recommended that a low value of α be used, and then if there is reason to believe a change in demand level is occurring, switch to higher values of α . Statistical schemes have been devised for automatically changing α or the base period length in moving average forecasting.

l. Exponential smoothing of the kind described, is sometimes referred to as "single" exponential smoothing. Single exponential smoothing does no better in forecasting if there is an underlying linear trend than does moving average. However, there is "double" exponential smoothing which is comparable to linear regression. In fact, just as there is non-linear or polynomial regression, there is triple exponential smoothing, etc. Details will not be discussed here.

m. Studies have not found seasonality in most Army parts. Moreover, if a 12- or 24-month moving average is used, the base period always has all seasons equally represented, so there is little need for seasonally adjusted input for forecasting. This is not true of exponential smoothing which weights each month in the base period differently. It is likely that in the future some use will be made of seasonal indices—for higher dollar value, seasonally demanded items where the procurement cycle time is only a few months, so what they buy should depend on the season.

5-44. Demand as a Program Dependent Process.

a. Program data refers to usage data such as aircraft flying hours, or tank miles traveled; to density data such as number of fielded trucks; to workload data (such as number of overhauls scheduled). In using program data, we are usually relating future demand to future program. If our estimates of future program are poor, there is little value in doing this because we are trading in one problem, forecasting demand; for another problem, forecasting program. In fact, however, most program data are at least to some extent, controllable variables rather than random variables; i.e., number of fielded trucks or flying hours flown are DA/DOD planning variables, with effort being made to live up to plan.

b. The program factor approach is the predominant method by which the Army has implemented use of program data in the past.

c. It often happens that one part has several applications. For example, a spark plug may be used on several kinds of trucks. Demand data do not indicate which part of the demand was due to each truck, so we cannot make separate forecasts for each truck type. For every weapon system on which a part is used, there is an engineering

estimate of use. These estimates are developed prior to provisioning, and in fact serve as the only basis for demand forecasting before demand experience accumulates. Now suppose the engineering estimated rates of usage for a part in truck type 1 are 10 per 100 trucks per year and on truck type 2, 5 per 100 trucks per year. This suggests a weight of 2 (i.e., 10/5) for truck type 1, and a weight of 1 for truck type 2. Even though the values furnished by the engineers (10, 5) are usually not used directly once a forecast can be based on actual demand experience, they can still have some merit as relative weights of consumption on different type end items.

d. It is quite possible that the program/demand relationship will depend on geographical area or mission (e.g., combat versus noncombat versus Reserve Forces). The current method for dealing with this is to make separate forecasts by area or by customer (i.e., Reserve Forces might constitute one Customer).

e. If the correct program/demand relationship works, it is easy to understand why the program factor approach might do more harm than good in some cases by overstating the short term effects of program changes. With more complex forecasting equations, there is increasing danger that noise can cause poor estimates of the equation coefficients and lead to bad forecasts. There is always the problem of correctly projecting program data. For all these reasons, use of program/demand relationship must be done with care.

5-45. Actuarial Forecasting.

a. For some types of items, particularly those that are very expensive, we are willing to venture into even more expensive and sophisticated methods of forecasting because of the large benefits that can be obtained from increased forecasting precision. Aircraft engines are a good example of such an item. The reduction in investment for spare aircraft engines that can be obtained even for relatively modest improvement in the forecasts of failure rates justifies the use of more exotic procedures such as the actuarial procedure now to be described.

b. Suppose we are asked to estimate the mean-time-to-failure for a given type of aircraft engine by observing the flight hours logged on each engine that has failed. Would we obtain an accurate estimate by averaging these observed times? The answer might well be no, because in doing so, we have ignored the engines that are still in service and that have not yet failed. This is a mistake that is often made in the early years of an aircraft's deployment when the times to failure of

those engines that have failed are used to estimate the mean-time-to-failure, leading frequently to overestimates of the number of failures to be expected during future time periods.

c. The actuarial method can be used to advantage in forecasting the expected number of failures of items whose failure process is age dependent. From engineering analysis or from study of failure data, we can estimate the probability that a brand new engine will survive without failure in its first 50 hours of use, the probability that an engine that has logged 50 hours of use will survive without failure until 100 hours of use, etc. Then if we know the age of each installed engine and the number of hours expected to be flown by the aircraft during the forecast period, the expected number of failures during that period can be readily calculated. The calculation itself is somewhat tedious for each failure results in the re-

placement of the aged engine with a new one so that the distribution of ages of the installed engine with a new one is constantly changing. The calculation is something like a simulation in that the aircraft are "flown," hours of use are logged on the installed engines, a certain fraction of the engines "die" and we "fly" from one age interval to the next and are replaced by new engines, and so on until we reach the end of the forecast horizon.

d. The actuarial procedure can be adapted to handle a variety of special situations encountered in military logistics just as it is applied to all sorts of special insurance situations. One can, for example, forecast separately the expected removals requiring minor repair as distinguished from those requiring major overhaul, or one can adjust survival probabilities to maintenance policies that are changing over time. The procedure has been successfully applied in the Army in the management of certain of their most expensive aircraft engines.

Section IX. MOBILIZATION REQUIREMENTS

5-46. Introduction.

The basic objective of the Department of Defense is to be prepared to support national policies and to successfully defend the Nation. A primary element of military readiness is the sound and careful establishment and management of adequate war reserves. Accordingly, the Army has established and maintains a positive and continuing War Reserve Materiel Program.

5-47. Computation of Mobilization Requirements.

a. War reserve quantities are computed in accordance with the levels contained in AR 11-11, planned unit deployment schedules to a combat area, the requirements set forth in applicable contingency or mobilization plans, and special guidance and policy provided by HQDA.

b. The War Reserve Materiel Requirement (WRMR) is that portion of the war materiel requirement (WMR) required to be on hand on D-Day. This represents the stocks of equipment that must be acquired in peacetime to meet the increased military consumption which would result from an outbreak of war. These stocks are intended to sustain combat operations until resupply to the combat area can be established. The War Reserve Materiel Requirement can be further categorized as follows:

(1) Theater war reserves.

(a) Theater war reserves are those quantities of combat essential equipment (war reserve

stockage list (WARSL) SB 700-10) which are authorized each theater in days of supply as prescribed in AR 11-11 to support post D-day combat consumption until resupply from CONUS can be established. For tactical, logistical, and economical reasons, the quantity of equipment in the theater war reserve stocks should be maintained at a minimum level consistent with the combat mission and CONUS resupply capability.

(b) Approved DA operational project stocks which are stored by overseas command, AMC, and FORSCOM. This includes pre-positioned materiel configured to unit sets (POMCUS) to reequip specific TOE type units upon initial deployment. POMCUS will be based on approved pre-positioning requirements. This materiel will be authorized and accounted for as an approved DA operational project additional to the theater war reserves discussed above.

(2) *CONUS war reserves.* These include that portion of the War Reserve Materiel Requirement held in CONUS depots. CONUS war reserves are categorized and explained in Chapter 7.

5-48. Composition of the War Reserve Stockage List (WARSL).

a. A WARSL is a listing of major and secondary end items, POL, operational rations, clothing and expendable items authorized for stockage in war reserves for use by U.S. Forces. Although not listed, functional components, repair parts, etc.,

necessary for mobilization support of WARSL end items, are also authorized for stockage.

b. The following criteria are used for the selection of items for the WARSL:

(1) Items essential for combat forces.

(2) Items essential for the operational effectiveness of combat support and combat service support forces in support of combat forces.

(3) Items the lack of which would render inoperative or seriously impair the operational effectiveness of essential equipment or weapon systems.

(4) Items essential for the sudden expansion of forces, including the callup of Reserve Program forces.

(5) Items which are specially managed for security classification reasons, to include items controlled by the Department of Energy (DOE) or National Security Agency.

(6) Items required for survival and protection of personnel.

(7) Items designated as operational rations.

(8) Items necessary for the maintenance of personal hygiene or health.

c. Criteria for selection of war reserve materiel is contained in AR 710-1.

(1) Items contained in the WARSL will be recommended by MACOM's as essential for operational effectiveness of combat, combat support, and/or combat service support forces. All Reportable Item Control Code 2 (RICC 2) items (contained in SB 700-20), selection of strategic communications items and associated communications security materiel to be maintained in the war reserve are based on recommendations made by the Commander, U.S. Army Communications-Electronics Command, subject to approval by HQDA. Selection of tactical communication security materiel to be maintained in war reserve is based on recommendations made by the Commander, CECOM, in coordination with the Commander, FORSCOM, and oversea commander subject to HQDA approval. The Surgeon General reviews and approves medical items contained in all war reserves. HQ AMC performs the necessary review and editing of the WARSL and submits the WARSL to HQDA for approval.

(2) Temporary use of war reserves to include operational project stocks is as follows: Major items contained in purpose code C, D, E, S, and T (AR 725-50) will not be issued permanently or temporarily for peacetime use without prior approval of DCSLOG. Requests for temporary use should indicate the date the item is expected to be replaced. The FORSCOM and oversea commanders may use Class II secondary items, Class III pack-

aged POL, Class IV and Class VIII materiel, and Class IX repair parts from theater PWMRS, less pre-positioned materiel configured to unit sets, in their respective commands to meet peacetime operational requirements provided that the stocks can be replaced within sufficient time to meet the requirement for which the stocks were intended. However, oversea commanders may use such assets, without assurance of timely replacement, for high priority units whose equipment is deadlined for parts. Replacement action will be initiated immediately on all such withdrawals. The Commander, AMC, may release PWRMS of secondary items to fill peacetime operational requirements provided peacetime funds are available to purchase an equal dollar amount of replacement stocks, and can be obligated for that purpose, or for which peacetime stocks due in are sufficient to make replacement.

(3) War reserve stocks may be used for any Army or international logistics urgent peacetime requirement. CONUS war reserve stock may be used for peacetime MAP emergencies only. Normally, such issues will be limited to requisitions with issue priority designators 01 through 08 (AR 725-50). Extension to lower issue priority designators to improve supply to troops engaged in combat operations short of general war may be temporarily authorized by DCSLOG.

(4) War reserve stocks are not segregated from peacetime operating stocks but are combined with them to achieve rotation, as a safeguard against deterioration. However, war reserve materiel is accounted for separately from peacetime stocks in accordance with AR 725-50.

d. Industrial Preparedness Planning (IPP).

(1) The Army selects items for war reserves which will sustain, in wartime, all necessary combat and combat support operations and the expanded logistics system required to maintain the operations. Not all required quantities of selected items may be acquired or stocked due to economic constraints beyond control of HQDA. Awareness of the funding situation should not, however, inhibit the selection of items vital to the approved wartime missions. It is imperative that all commands insure that only those items vital to the initial support of the wartime mission are selected as war reserve items. Only urgent military considerations may serve as justification for making exceptions to the established criteria.

(2) Procurement of reserve stocks is closely related to the capacity of the production base. An optimum balance must be achieved for each primary item or group between end item stocks on hand and the readiness status of the production

base. The Industrial Preparedness Planning (IPP) Program (AR 700-90) deals primarily with the peacetime development and maintenance of a mobilization base which can be rapidly activated or expanded to support the mobilization materiel requirement of approved U.S. Forces. Facilities in the production base must be ready for expeditious reactivation or expansion after M-Day to permit maximum acceleration of output to the required level.

(3) The Army supports the basic principle that free competitive enterprise should be fostered by the Government. Planning with private industry under the IPP Program will be accomplished as necessary to insure a continuous capability by designated suppliers to meet the mobilization materiel requirements they have agreed to produce. Private industry is encouraged to provide the facilities required to meet both peacetime and mobilization production schedules. Industrial preparedness planning includes planning agreements with industry for both procurement and depot maintenance. Preferences in selection of planned mobilization suppliers will be given to firms will-

ing to supply such facilities.

(4) Shortages of mobilization stocks may be balanced by management through the drawdown of other mobilization items which are in a very favorable stock position. As stocks in long supply are issued to requisitioners, they are paid for from funds which the requisitioner has available. Funds retrieved by this method may then be used for procurement of the items whose stocks are below desired levels.

(5) Provision is made by the Production Base Support Program for the continuing establishment and maintenance of Government-owned capacity to meet peacetime and mobilization production requirements for materiel not available from, or not considered appropriate for production by, commercial sources. The capability is designed so that mobilization production schedules computed on the basis of planning guidance from the Secretary of Defense may be met.

(6) Provision is made for developing manufacturing data essential to production of mobilization items not currently being procured.

Section X. SECURITY ASSISTANCE

5-49. General.

a. Within the Department of the Army, the provision of logistics support to friendly foreign nations under the Foreign Assistance Act of 1961 and the Arms Export Control Act, 1971 is called Security Assistance (SA) support. A variety of means are employed in planning, developing, and administering SA support to eligible countries. Current legislation continues to grant to the President the general authority for providing military assistance. It authorizes him to acquire defense articles and services from any source and to provide this support by grant, loan, exchange, sale, lease, or any other means. Whatever the method, there is an impact on the Army logistics system. All pending commitments must be evaluated to be sure that they have been carefully coordinated with U.S. requirements and can be met within the proposed time.

b. In matters of SA, the DA, like other military departments, participates in the development, negotiation, and execution of agreements with foreign governments. The degree of direct participation of the various activities of the Army depends upon the particular nature and circumstances of the program being developed.

5-50. Responsibilities.

a. The Assistant Deputy Chief of Staff for Logistics (Security Assistance) provides the Army with SA policy and guidance and monitors the various SA programs within the Army.

b. The Army Materiel Command (AMC) is the Army's Executive Agent for SA program implementation, administration and management. The U.S. Army Security Affairs Command (USASAC), a major subordinate command of AMC, assumes this operational responsibility that includes initial long range planning, development of requirements for materiel, central case management and coordination of the logistical and financial aspects of SA support. The USASAC provides control for all requisitions prepared by, and in support of, the SA customer. Thus, through this activity, the execution of the programs for the support of friendly foreign forces is centrally monitored and the necessary elements of supply and financial data may be accumulated and prepared for analysis and reviewed by AMC, Headquarters, Department of the Army; and the Office of the Assistant Secretary of Defense (I&L).

c. Within each of the AMC commodity commands, as well as other Army commands and

activities, there is an element charged with specific international logistics responsibilities. This element plans, administers, and coordinates SA activities within their respective command. For

example, within the Training and Doctrine Command (TRADOC) these are offices responsible for coordinating the various resident and exportable training programs for SA customer.

Section XI. WEAPON SYSTEM MANAGEMENT

5-51. General.

a. In 1983 the Office of the Assistant Secretary of Defense established a joint working group to develop a plan to transition from a secondary item inventory management system based on a commodity orientation to systems based on weapon system availability and readiness. The Secondary Item Weapon System Management Concept was synthesized and published under the cover of a Secretary of Defense memorandum on 26 June 1985. The concept was forwarded to the Services and DLS on 17 August 1986 with the requirement to develop plans to implement the Secondary Item Weapon System Management Concept.

b. The Army has been in a weapon system management framework for major items for several years and is currently in the process of converting to a weapon system orientation for secondary items, focusing on high dollar value spares first. Managing inventories of secondary items on a weapon system basis will provide the means to enhance end item readiness by focusing management attention and resources on those items that directly affect the operational availability of weapon systems. Such an approach will provide an improved capability to determine the funding required to achieve a prescribed readiness objective for a given weapon system and to project the readiness impact of alternative funding levels. It will also provide an improved capability to justify and defend spares and repair parts budget submissions during Congressional reviews. In addition to improving investment decisions, weapon system management will provide the capability to utilize personnel and inventory more effectively to achieve end item readiness objectives. Weapon systems management will also provide tools for measuring performance against specific weapon system support goals.

c. The Army plan for implementation of weapon system management is based upon a three phased approach. Two phases are near term and one phase is long term. The first two phases "umbrella" current major and secondary item weapon system management initiatives and seek to enhance them. Some of these initiatives are in place and others are in the development stage. The third phase, will be the total integration of developed data bases, models, and ADP processes into a

cohesive Army system that supports a total weapon system management process.

The concept is divided into five key areas:

(1) *Item identification* allows the Army to relate secondary items to higher assemblies and weapon systems. Stockage decisions will be based on weapon systems operational readiness considerations. Linkages will be developed among items, application data will be used in requirements determination and a capability to automatically update other Services/DLA files will be developed.

(2) *Requirements determination* will allow segments of requirements to be displayed by weapon systems. This gives visibility of the impact of policy and management decisions on each weapon system. Item requirement segment will be identified by weapon system, multi-echelon requirements model will be developed and initial provisioning and replenishment requirements will be computed in an integrated fashion.

(3) *Information systems* will provide the Army the information and data necessary to support weapon system management and optimize weapons system operational availability. Military standard procedures and standard DOD information systems will be developed to pass, receive and store weapon system data worldwide. Reports to capture performance by weapon system will be established.

(4) *Materiel management* practices and systems will be geared to support weapon system management. Systems and procedures to forecast and tract demand patterns by weapon system will be developed. Weapon system management will play a role in determining distribution facility requirements. Systems to redistribute inventory to support weapon system operational availability goals will be enhanced.

(5) *Resource development/allocation* initiatives necessary to develop and allocate resource requirements to achieve weapons system operational availability rates will be identified. Requirement computation models and assessment systems are to be designed to optimally select investment decisions. The budget stratification process will be revised and a model to project POM requirements and provide weapon system breakouts in financial management documentation will be developed.

(6) This action plan describes efforts currently in being, to be implemented, and planned for the 1990's and beyond. The futuristic planning going into the Army Materiel Command's Logistics Modernization design effort will result in an Army

weapon system management concept in which inventory management decisions, policies, practices and budgets can be directly related to the readiness of those weapon systems vital to the mission of our combat units.

CHAPTER 6

ACQUISITION DIRECTIONS

Section I. FUNCTIONS OF ACQUISITION DIRECTION

6-1. Delivery Schedules.

a. Army acquisition is a function that fulfills a need for equipment or to replenish stocks. The amount of materiel to be acquired is based on studies performed by inventory managers working for a commodity command. These studies result in the issuance of directives to purchase materiel and are called purchase requests or procurement work directives. The basic mission of those engaged in contracting is to timely acquire materiel or services in the open market at fair and reasonable prices from responsible sources. The inventory manager is the coordinator of all supply management data relating to proposed acquisitions. The decision to buy and the issuance of the purchase request is his responsibility.

b. The Contracting Officer first learns what is required when he receives and reviews a purchase request. Discussion of contracting problems and interchange of information between personnel of the requiring activity and purchasing office prior to that time will contribute to an efficient contracting operation. Planning and coordination for a contract action should begin far in advance of preparing a purchase request as timely, prompt coordination can help identify and resolve contracting problems at an early stage in the process.

(1) *Time of delivery.* Time of delivery depends on the time required to process the documents, produce the materiel, and secure delivery. A considerable portion of acquisition time is consumed in administration and production, and a long leadtime means that stocks must be ordered well in advance of expected receipt and that greater amounts of stock must be on hand to provide support during the acquisition period. The desired time of delivery governs the date on which a purchase request should be issued. Inventory and acquisition managers must work together to establish a realistic leadtime for the proposed acquisition. An unrealistically short leadtime places the Contracting Officer in a difficult position.

(a) If leadtime is unrealistically short, the contractor may be able to command a premium price because he may have to add on more staff or work overtime to meet the delivery date.

(b) The Government risks marginal or delinquent performance by forcing the contractor to perform in a less than adequate leadtime.

(c) Lack of advance planning to meet a

required delivery date is not an acceptable reason for justifying a sole source acquisition or making an urgent purchase. However, if the circumstances warrant either one, then inventory managers must furnish Contracting Officers with a sound basis for justifying a sole source or an urgent purchase. Such reasons must be convincing and detailed. A statement such as, "In my professional opinion it is necessary to procure from a sole source," is neither adequate or valid.

(2) *Rate of delivery.* Reasonable demands in the delivery schedule will often help the contracting officer to secure a lower price while concurrently increasing competition. Both the number of orders and the quantity of material stocked may be reduced by ordering a large quantity of stock to be delivered in increments. The Contracting Officer, with his knowledge of the production capabilities of manufacturers, based on their input, can divide a proposed acquisition into economic production runs, meanwhile inviting the participation of small business concerns by means of setting aside a portion of the requirement for exclusive participation by small businesses and disadvantaged contractors. Regular replenishments can be effected within short periods by requiring delivery in increments, eliminating the necessity for maintenance of a large operating stock.

(3) *Other factors.* In addition to urgency of need, other factors to be considered in establishing delivery schedules are as follows:

(a) The production leadtime considering quantities, complexity of design, and prior experience with similar articles.

(b) The acquisition administration leadtime including the time necessary to issue solicitations, evaluate offers, and source selection.

(c) The time required for the contractor to comply with any other conditions of performance; i.e., submitting design data or preproduction models.

(d) The capabilities of small business concerns and the effect the stipulated delivery rate will have on their participation in the procurement.

(e) The time the Government needs to perform its obligations under the contract; i.e., approving plans or preproduction models, furnishing Government property, and performing tests and inspections.

(f) Industry practices.

(g) Market conditions and current capability of known suppliers.

(h) Transportation time and whether slight delivery adjustments will permit shipments to be consolidated to decrease costs.

6-2. Destination

a. The points to which supplies are to be delivered are generally stated in the purchase request and become part of the resultant contract. Effective management requires that stocks be positioned in storage depots in such a way as to conserve transportation funds, be responsive to contingency plan actions, and allow prompt supply to users. The destination has an important bearing on the Contracting Officer's selection of suppliers because he must select a responsive, responsible source whose price, including shipment to the destination cited, will be the lowest consistent with the requirement. The experience and knowledge of the transportation specialist, acting as a member of the Contracting Officer's team, contributes to the selection of contractors. Alterations in destinations may be required because of fluctuations in demand so that a proper stock position may be maintained. Knowledge of the cost of rescheduling shipments permits the inventory manager and the Contracting Officer to select the most economical course of action.

b. Full carload or truckload lots are often less costly when shipped on a Government bill of lading, since special rates may be available to the Government that are not available to contractors. To determine whether use of a Government bill of lading is more economical, solicitations should generally request prices for both origin and destination delivery. When received, the contracting officer compares the transportation costs which the offerors submit with the cost of shipment on a Government bill of lading. Origin delivery is then specified if Government transportation is cheaper; otherwise, destination delivery is normally required. Origin delivery will also be used when the ultimate destination is not known or is likely to be changed or when supplies are destined for ultimate delivery outside the United States.

c. There are other ways of keeping transportation costs low. These include the following:

(1) Consolidating small shipments to the same destination into carload or truckload lots.

(2) Consolidating deliveries to different destinations enroute under single applicable tariffs and obtaining stop-off privileges for partial unloading or processing.

(3) *Avoiding crosshauling and backhauling.*

(Crosshauling is transporting the same types of items in opposite directions between areas; backhauling is transporting the same items back and forth.)

(4) Shipping goods in a manner consistent with the physical characteristics of the materiel.

(5) Reviewing packaging specifications to see if they allow choice of less costly packaging or shipping methods. Thus, inventory managers should insure that packaging and delivery point requirements do not exceed the standards necessary to secure prompt delivery of the items. Extra distance, unusual packaging requirements, and nonstandard lots increase the cost of procurements.

6-3. Storage Requirements.

It is Army policy that maximum use be made of depot facilities. At any given time some depots may be overstocked and some depots may be understocked. Stockage at depots is normally based on an established stock distribution pattern. National inventory control points prepare and forward storage space forecasts to higher headquarters and receive allocation of depot storage space. The storage capability of a depot being considered for a diverted shipment must first be taken into account before shipment because it may already be overstocked. In addition, consideration must be given to the physical characteristics of the supplies, the distance from a terminal of stock pre-positioned in support of contingency plans and the availability of transportation to that point. Contracting Officers must consider the geographic location of the point of production in relation to the point of consumption and the cost of transportation. Whenever it is possible and economically feasible, maximum use is made of direct delivery from contractor to customer.

6-4. Fund Availability.

a. The availability of funds is a basic consideration in every decision to buy. In the area of principal items the manager concentrates his studies on the provision of materiel in support of plans. Congressional appropriation acts provide the necessary financial resources. When secondary items and repair parts are purchased, the manager must constantly consider the balancing of stocks, adjustments in safety levels, and the ratio of sales to inventory, as money in a stock fund is limited to obligation authority available. Every acquisition directive must cite the funds from which the purchase will be made.

b. The difference between the commitment and obligation of funds should be understood. A com-

mitment is an administrative reservation of funds. An obligation is a legal reservation or a governmental liability resulting from an agreement to acquire supplies or services under a contract, purchase order, or other document.

c. Appropriations ordinarily are categorized as either 1-year, multiple-year, or continuing. These time limits define only the period for which the appropriations are available for obligation; the Government's appropriation structure rests on an obligation rather than an expenditure basis. By regulation, the funds provided in the annual appropriation acts are 1-year appropriations unless the act specifically provides otherwise. Thus, funds appropriated for 1 year cannot be obligated for expenditure in another fiscal year unless a

multiple-year or continuing appropriation is involved.

d. The Anti-Deficiency Act (Title 31, U.S.C. 1341) prohibits any officer or employee of the Government from making or authorizing an obligation in excess of the amount available in a fund or in advance of an appropriation. The act further states that the purchase must be for an item for which there is a bonafide need during the year. An activity's comptroller or finance officer is usually in charge of the funds, to certify in advance of an acquisition that funds are available and to keep a running total of authorizations made. The Contracting Officer is responsible for assuring that the authorization has been made prior to executing a contract.

Section II. ACQUISITION, AUTHORITY, ORGANIZATION, POLICIES AND CONTRACT ADMINISTRATION

6-5. Acquisition Authority.

a. *Contracting Authority.* Authority to contract is based on Article I, Section 8 of the U.S. Constitution. Authority and responsibility to contract for authorized supplies and services is vested in the "head of the Agency," i.e., the Secretary of Defense and the military departments. The agency head may establish contracting activities and delegate to the heads of these activities broad authority to manage the agency's contracting functions. Contracts may be entered into and signed on behalf of the Government *only* by Contracting Officers. Contracting Officers below the head of the activity must be selected and appointed by the head of the activity following regulatory guidance. The Contracting Officer's role is separate from supply and disbursing functions so that he may exercise independent judgment in contracting actions. He is the focal point of contact with business and industry in contracting for supplies and services; therefore, the contractor looks to him for all decisions affecting the acquisition. Review of Contracting Officer's decisions in specific circumstances is outlined in applicable regulations.

b. *Regulatory Guidance.*

(1) *The Federal Acquisition Regulation (FAR)* is the primary regulation for use by all Federal Executive Agencies for their acquisition of supplies and services with appropriated funds. The FAR system has been developed IAW the requirements of the Office of Federal Procurement Policy Act of 1974, as amended by Public Law 96-83. The FAR is issued as Chapter 1 of Title 48, CFR, within applicable laws under the joint authorities of the Administrator of Gen-

eral Services, the Secretary of Defense and the Administrator for the National Aeronautics and Space Administration, under the broad policy guidelines of the Administrator for Federal Procurement Policy.

(2) The FAR authorizes agency heads to issue regulations that implement and/or supplement the FAR and incorporate all that is necessary to govern the contracting process or otherwise control the relationship between the agency, including any of its suborganizations, and contractors or prospective contractors. The Department of Defense FAR Supplement is commonly known as DFARS. It is not a stand-alone document and must be read in conjunction with the FAR.

(3) The third level of regulatory guidance to which Department of the Army personnel shall refer is the *Army Federal Acquisition Regulation Supplement (AFARS)*. The AFARS implements the FAR, DFARS, and other DOD publications and establishes for DA uniform policies and procedures for the acquisition of supplies and services.

(4) In addition to the above, activities may publish further implementing and activity peculiar supplementing guidance. These are commonly referred to as procedures or instructions.

6-6. Acquisition Organization.

a. *Department of the Army Organizations.*

(1) The Assistant Secretary of Defense (Production and Logistics), exercises contracting authority for Defense agencies. The Senior Procurement Executive for the Department of the Army is the Assistant Secretary of the Army (Research, Development and Acquisition).

- (2) Contracting activities for the Army include:

U.S. Army Contract Support Agency
Office of the Deputy Chief of Staff Procurement, Headquarters, U.S. Army Materiel Command
U.S. Army Armament, Munitions and Chemical Command
U.S. Army Missile Command
U.S. Army Laboratory Command
U.S. Army Communications-Electronics Command
U.S. Army Troop Support Agency
U.S. Army Troop Support Command
U.S. Army Tank-Automotive Command
U.S. Army Aviation Systems Command
U.S. Army Training and Doctrine Command
U.S. Army Test and Evaluation Command
U.S. Army Forces Command
U.S. Army Health Services Command
Military District of Washington, U.S. Army
U.S. Army, Europe
National Guard Bureau
U.S. Army Corps of Engineers
U.S. Army Information Systems Command
U.S. Army Medical Research and Development Command
U.S. Army Western Command
Military Traffic Management Command
U.S. Army Strategic Defense Command
Eighth U.S. Army
U.S. Army Depot Systems Command
U.S. Army Intelligence and Security Command
U.S. Army, South.

(3) The Judge Advocate General of the Army provides legal counsel to the Secretary of the Army on matters relating to the legality of action in the acquisition program, legislative affairs, and incident thereto publishes opinions relating to acquisition contracting.

(4) The Inspector General studies contract awards, performance, administration, and terminations to insure compliance with the Army directives.

b. Other organizations.

- (1) Other DOD agencies with contracting authority and their Senior Procurement Executive are:

Navy, The Assistant Secretary of the Navy (Shipbuilding and Logistics)

Air Force, The Assistant Secretary of the Air Force (Acquisition)

Defense Logistics Agency (DLA), The Deputy Director (Acquisition Management)

Defense Communications Agency, The Director, Defense Communications Agency

Defense Mapping Agency, The Director of Acquisition

Defense Nuclear Agency, The Director, Acquisition Management

National Security Agency, The Deputy Director, National Security Agency

(2) The Defense Acquisition Regulatory (DAR) Council is comprised of one member from each of the services and the DLA plus a legal advisor. Its function is to develop and implement new and revised policy and procedures for the effective and efficient management of the DOD's business and contractual activities.

(3) The Armed Services Board of Contract Appeals (ASBCA), comprised of qualified attorneys, is the authorized representative of the Secretary of Defense and the Secretaries of the Army, Navy, and the Air Force in deciding disputes arising under Government contracts.

(4) The Defense Contract Administration Service (DCAS) and the Defense Contract Audit Agency (DCAA) are a part of the DLA organization. The purpose of DCAS is to centralize contract administration activities of DOD, achieve efficiencies, and improve management and operations, by implementing uniform policies, procedures, and organization. To accomplish its basic mission, which is generally defined as "technical and administrative services in support of buying organizations performed at or near contractor establishments and to facilitate contract performance and insure compliance with the terms and conditions of Government contracts," DCAS has been organized with a headquarters and a field organization comprised of nine geographic regions which, in turn, are divided into management areas and offices. DCAA performs contract and internal audits, some of which are required by law and others are discretionary.

6-7. Acquisition Policies

a. Required sources of supplies and services (FAR, Part 8). In accordance with federal regulations (41 CFR 101-26.10 7), agencies *shall* (unless otherwise provided by law) satisfy requirements for supplies and services from or through the following sources or publications in descending order of priority:

- (1) Supplies.

(a) Agency inventories

(b) Excess from other agencies

(c) Federal Prison Industries, Inc. (FPI)

(d) Committee for Purchase from the Blind and Other Severely Handicapped (NIB/NISH)

(e) Wholesale supply sources (i.e., DLA, General Services Administration, Veterans Administration, and military inventory control points)

(f) Mandatory Federal Supply Schedules

(g) Optional use Federal Supply Schedules

(h) Commercial sources.

(2) Services.

(a) Committee for Purchase from the Blind and Other Severely Handicapped (NIB/NISH)

(b) Mandatory Federal Supply Schedules

(c) Optional use Federal Supply Schedules

(d) Federal Prison Industries

In addition, there are specified sources for such items as jewel bearings, printing, and leased vehicles. In most cases items or services acquired from these sources (with the exception of commercial sources) would be handled as a supply function. Needs that cannot be met through supply channels would be forwarded to the cognizant purchasing activity for processing.

b. Competition (FAR Part 6). The Competition in Contracting Act (CICA) was enacted on 18 July 1984. The most significant provisions of CICA were to require the use of competitive procedures to obtain full and open competition; limit the use of other than competitive procedures to seven specific circumstances; require the use of advanced procurement planning and market research; permit the use of competitive procedures that allow only small business to compete; and eliminate the prior strict preference for sealed bidding and place primary emphasis on trying to obtain full and open competition.

(1) *Full and open competition.* Full and open competition means that all responsible sources are permitted to compete. With certain limited exceptions, Contracting Officers are required by law (10 U.S.C. 2304) to promote and provide for full and open competition in soliciting offers and awarding Government contracts through the use of the competitive procedure or a combination of competitive procedures best suited to the circumstances of the contract action. Competitive procedures available are:

(a) *Sealed Bids.* Contracting Officers shall solicit sealed bids if:

1. Time permits the solicitation, submission, and evaluation of sealed bids;

2. The award will be made on the basis of price and other price-related factors.

3. It is not necessary to conduct discussions with the responding officers about their bids; and,

4. There is a reasonable expectation of receiving more than one sealed bid.

(b) *Competitive proposals.* Competitive proposals are used in those instances where it might be appropriate to conduct discussions with offerors relative to proposed contracts. Evaluation of offers can be made on other than price and price related factors; i.e., quality, personnel, prior experience, etc.

(c) *Combination of competitive procedures.* If sealed bids are not appropriate, the two-step sealed bidding procedure may be used. This is especially useful when adequate specifications are not available. Step one consists of the request for submission, evaluation and discussion if necessary, of a technical proposal. Step two involves the submission of sealed priced bids by those who submitted acceptable technical proposals in step one.

(2) Full and open competition after exclusion of sources.

(a) *Establishing or maintaining alternate sources.* Agencies may exclude one or more sources from a particular contract action in order to establish and maintain an alternate source or sources for the supplies or services. This is normally used when the agency head determines it would result in an overall reduction of the cost of such supplies or services or is necessary to expand or maintain an industrial base essential to national defense in the event of a national emergency.

(b) Set-asides for small business and labor surplus area concerns. Contracting Officers may set aside solicitations to allow only such firms to compete in acquisitions. This allows for fulfilling statutory requirements and meeting established goals.

(3) Other than full and open competition.

(a) 10 USC 2304(c) provides exceptions applicable to DOD for contracting without full and open competition. Contracting without providing for full and open competition shall not be justified on the basis of:

1. Lack of advanced planning by the requiring activity, or

2. Concerns related to the amount of funds available (e.g., funds will expire) to the agency or activity. Contracting officers must still solicit offers from as many sources as practicable.

(b) The seven circumstances (statutory authority) permitting other than full and open competition are:

1. Only one responsible source and no other supplies or services will satisfy agency requirements.

2. Unusual and compelling urgency.

3. Industrial mobilization; or engineering, developmental, or research capability.
4. International agreement.
5. Authorized or required by statute.
6. National security.
7. Public interest.

Justifications and approvals for applying one of the exceptions must be in accordance with the FAR requirements for each acquisition.

c. Types of contracts (FAR, Part 16).

(1) There is a wide selection of contract types available to use in order to provide needed flexibility in acquiring the large variety and volume of supplies and services required by agencies. Contract type vary according to:

(a) The degree and timing of the responsibility assumed by the contractor for cost of performance, and

(b) The amount and nature of profit incentive offered to the contractor for achieving or exceeding specified standards or goals.

(2) Contract types are grouped into two broad categories: fixed-price and cost-reimbursement. In between are various incentive contract types.

(a) Fixed price types of contracts provide for a firm price or, in appropriate cases, an adjustable price (ceiling price, target price/target cost, or both). The contractor has full responsibility for the performance cost and the resulting profit or loss.

(b) Cost reimbursement type contracts provide for payment of allowable incurred costs. An estimate of total cost is made to obligate funds and establish a ceiling the contractors cannot exceed (except at his own risk) without the approval of the Contracting Officer. Contractors have minimum responsibility for performance cost; therefore, Government surveillance is required to give reasonable assurance that efficient methods and effective cost controls are used.

(c) Incentive contracts relate the amount of profit or fee payable to the contractor's performance. Incentive increases or decreases are applied to performance targets rather than minimum performance requirements. The contractor's responsibility for performance is tailored to the uncertainties involved in performing the contract.

(d) Contracts resulting from sealed bidding shall be firm-fixed price or fixed price with economic price adjustment. Negotiated contracts may be any type that will promote the Government's best interest, unless otherwise restricted. The cost-plus-a-percentage-of-cost system of contracting shall not be used. Selecting the contract type is generally a matter of negotiation and should be considered in conjunction with price negotiation. The objective is to negotiate a contract type and

price (or estimated cost and fee) that will result in reasonable risk for the contractor and the Government and provide the contractor with the greatest incentive for efficient and economical performance.

d. Small business and small disadvantaged business concerns/labor surplus area concerns (FAR, Parts 19 and 20). Socioeconomic program goals of federal acquisition are partially met through the following procedures:

(1) A fair portion of Government acquisitions (including contracts and subcontracts) are to be placed with small business and small disadvantaged business (SDB) concerns. Utilization program goals are established for each activity that the head of the contracting activity is responsible for implementing. Requirements are then "set-aside, either wholly or partially for participation by firms meeting the size criteria established on an industry-by-industry basis. DOD order of precedence is:

- (a) Total SDB set-aside
- (b) Combined small business/labor surplus area (LSA) set-aside
- (c) Partial set-aside for LSA firms
- (d) Total set-aside for small business firms
- (e) Partial set-asides for small business firms with preferential consideration for SDBs
- (f) Partial set-aside for small business.

(2) LSA concerns are those that operate in a geographic area identified by the Department of Labor as an area of concentrated unemployment or an area of labor surplus. It is Government policy to encourage placing contracts and facilities in labor surplus areas and to assist such areas in making the best use of their available resources. It is DOD policy that in no case will price differentials be paid for the purpose of carrying out this policy. Preference is given in the following priority:

- (a) LSA concerns which are also small business concerns,
- (b) Other LSA concerns,
- (c) Small business concerns which are not LSA concerns.

6-8 Contract Administration.

Contract administration is the managing of a contract. It begins after an award and includes such things as assuring delivery and quality of a supply or service, modifying existing agreements, enforcing other terms and conditions of the contract, or terminating contracts. The individual exercising authority for the Government is the Administrative Contracting Officer:

a. Changes or modifications to a contract are authorized by specific clauses. There are two types of modifications (FAR Part 43).

(1) Unilateral modifications are issued by the Contracting Officer and are used to:

- (a) Make administrative changes;
- (b) Issue change orders;
- (c) Make changes authorized by other clauses; e.g., property, options, suspension of work, etc.
- (d) Issue termination notices.

(2) Bilateral modifications or supplemental agreements are used to:

- (a) Make negotiated equitable adjustments resulting from the issuance of a change order;
- (b) Definitize letter contracts. A letter contract is a binding commitment so that a contractor can begin work immediately with the agreement that a definite price will be negotiated iaw a predetermined schedule; and
- (c) Reflect other agreements of the parties modifying the terms of contracts.

b. The Charges Clause is the most frequently invoked clause in a Government contract. It serves the vital purpose of enabling the Government to make necessary changes during performance to insure that the end result will be fully in accord with the needs of the Government. The Government has the right to make changes in drawings, designs, or specifications if an item is being specially manufactured for the Government and the change is within the general scope of the contract. In addition, the Government may unilaterally change the method of shipment or packing or the place of delivery in the contract.

c. The majority of performance problems which the Government encounters are either the technical requirements of the contract or the time of performance. Much of the difficulty in the technical area is in the interpretation of specifications. To insure that the Government receives a quality

product for a fair price, it conducts testing and inspection of the supplies against the requirements as prescribed in the drawings and specifications. The inspection or test will vary from relatively simple methods to complex procedures.

d. If the contractor unexcusably fails to perform in the manner specified in the contract, the Government, by contract clause, has the right to terminate for default the whole contract or any portion of it. In such cases, the contractor may be responsible for excess costs of reprocurement. Likewise, if all or a portion of the materiel is no longer required, the Government has the right to terminate for convenience. In such cases, the contractor must be paid for items already accepted and for work in progress on the terminated portion of the contract. He also may be allowed reasonable profit.

e. A very important area in contract administration is the settlement of disputes which arise between the Government and the contractor. The standard Disputes Clause states in part "except as otherwise provided in this contract, any dispute concerning a question of fact arising under this contract which is not disposed of by agreement shall be decided by the contracting officer. . . ." Some examples of controversies which come under the Disputes Clause are: The amount of equitable adjustments under the Changes Clause or the Government-Furnished Property Clause; the amount of a termination settlement; whether a contract was properly terminated for default or whether the costs assessed were reasonable, and almost any other matter involving the interpretation of contract requirements. In such situations the duty of the contracting officer is similar to that of a judge deciding questions of fact. He provides, in writing to the contractor, his final decision on the dispute. The contractor, of course, may appeal this decision within the subsequent 90 days to the Armed Services Board of Contract Appeals, or within the following 12 months, directly to the Court of Claims.



CHAPTER 7 DISTRIBUTION MANAGEMENT

Section I. OBJECTIVES AND CONCEPTS

7-1. General.

This chapter will be devoted to a discussion of distribution management. Distribution management is concerned with the physical movement of items through the Army supply and distribution system. While primarily concerned with physical distribution, this chapter will also discuss flow of requisitioning documents, and the standard systems used to control, regulate, and evaluate the distribution system. This chapter will also address the functions of storage as an element of the distribution system and will also discuss the distribution of each of the 10 classes of supply.

7-2. Objectives of Distribution Management.

a. Once quantitative materiel requirements have been determined, and supplies have been procured, supplies are the responsibility of the distribution system until issued to the ultimate user. The functions of the distribution system are:

(1) *Receipt.* The process of accepting supplies into the military supply system.

(2) *Storage.* The process of holding and caring for supplies prior to the issue.

(3) *Transportation.* The movement of supplies within the distribution system.

(4) *Issue.* The releasing of supplies to consuming or using activities.

b. Supplies ordinarily remain in the hands of users until they are consumed, become unserviceable, or become obsolete. Unserviceable supplies may be restored to serviceable condition by maintenance activities and returned either to the user or to the distribution system.

c. The purpose of the distribution system is to move supplies from the manufacturer to the user. This should be accomplished in as nearly a straight line as possible with a minimum number of stops. The goals of the distribution system are to be responsive to the user, to be sufficiently flexible to adapt to rapidly changing conditions, to be economical in terms of use of physical and manpower resources, and to be resistant to disruption by either the forces of nature or enemy action.

7-3. Systems Concept of Materiel Distribution.

a. The purpose of the distribution system is to move supplies from the producer to the consumer in as straight a line as possible. The ideal system would have an item placed on a transportation mode at origin and shipped directly to the ultimate consumer. This system would eliminate all intermediate distribution echelons, thereby saving valuable resources for application elsewhere in the military system.

b. In reality, however, sophisticated systems have not yet been developed to support the ideal system. The forecasting of requirements, supply rates, and consumer locations is still an imprecise science as is the forecasting of production rates and raw material availability. This all necessitates stockpiling of supplies at some intermediate point to compensate for fluctuation of production or demand and to allow for the procurement of economical order quantities.

c. The benefits of intermediate stockpiling points have been briefly discussed. This benefit is not without cost as each point where supplies are diverted causes an expenditure of resources. It, therefore, follows that the minimization of resources expenditures can be accomplished by maximizing the throughput of supplies. This is the basic premise for the Direct Support System (DSS) and the Airline of Communication (ALOC) Subsystem, both of which will be discussed later in this chapter.

d. Depots in the Continental United States are established primarily to collect supplies from manufacturers. However, materiel may be delivered by a manufacturer directly to a user or to any other point in the distribution system where it is needed. If this were always feasible, depots in the United States would be needed only for reserves and would not enter into the normal distribution process. This is, in fact, the case for distribution of most bulk petroleum products. The Army maintains insignificant bulk petroleum storage in the United States. However, for most other materiel, the Army finds that, in order to overcome the uncertainties of production time, to compensate for fluctuations in demand, to permit procurement of economical order quantities, and to develop reserves for contingencies, depots in the United

States are necessary. Nevertheless, whenever feasible, materiel is shipped directly from producer to requisitioner. Although some overseas stockage is retained (war reserve, safety level, and operational project stocks) most supply requirements are met by direct delivery from CONUS depots, bypassing CONUS installations or overseas general support units and break bulk points when possible.

e. For overseas theaters, shipping time becomes the major factor in determining the need for stockage points. When air shipment is used, supplies may be delivered to an overseas theater in a matter of a few days. On the other hand, shipment by sea may require a month or more, including loading and unloading time. If the requirements for items are not predictable over a long term and if the consequences of shortages are serious, a fast mode of delivery must be employed or stockage points must be established in which sufficient quantities are maintained to give commanders a reasonable assurance that items will be available when needed. If the requirements for items are predictable or shortages are not of great consequence, minimum or zero stockage, together with sea delivery, might be acceptable.

f. Each combat unit carries its basic load and prescribed load list, which consists of enough supplies and repair parts to enable a unit to sustain itself for a limited time until it can be resupplied. Combat units normally draw their supplies from direct support units that maintain stocks of items most essential to continue operations of the combat units. These stocks are kept to a minimum, according to authorized stockage lists, to enable direct support units to maintain the same level of mobility as the units which they support. Since direct support units cannot carry all items required by combat units, another source, called general support, may be established. They will maintain a somewhat lesser degree of mobility but will respond rapidly to requisitions for items not stocked by (or out of stock in) direct support units.

g. A number of other considerations govern establishment of sources of supply, one or more of which may take precedence over the others. Some of these considerations are associated with U.S. relationships with the country in which (or from which) operations are conducted. It may be neither desirable nor feasible to maintain large stocks of supplies in a friendly country. The host country may refuse to furnish specific real estate or facilities, as one example; or it may be determined that, for short-duration operations, offshore stockage will give our forces greater flexibility. Other considerations are security, suitable storage areas,

transportation networks, and the possibility of long-range offensive operations.

h. Another major consideration is the need for providing well-trained combat service support troops. To insure adequate training of combat service direct and general support troops, it is frequently necessary to authorize these support units stationed at installations in the Continental United States to stock supplies and repair parts, and to furnish this support to other units dependent on the installation for support.

i. A final consideration is that organizations for combat service support units are kept viable by using a building block principle. Basic tables of organization and equipment units can be combined in a variety of organizational patterns to meet the specific need of the theater.

j. The preceding discussion suggests a flexible and highly adaptable conceptual model of the distribution system in which the source of supply and the user are the only constants. Yet, even the source of supply may vary; it may be a Continental U.S. producer or an overseas U.S. national or foreign producer. The source may also be rebuild operations or the cannibalization of unserviceable equipment. Nonetheless, the logistician's attention should focus on the objectives of the distribution system, rather than on a stylized organization for achieving these objectives. In this way, the logistician can concentrate on the advances in management techniques, the increase in numbers and complexity of items in the system, and the rapidly changing patterns and conditions of warfare.

7-4. The "Pipeline" Concept of Materiel Distribution.

a. The administrative and physical structure through which demands for materiel are expressed and goods flow to the point of ultimate use is known as the distribution pipeline of supply.

b. The magnitude of the overseas pipelines may be envisioned from the fact that one quarter to one third of the stocks committed for specific overseas areas of operations are generally contained in the pipeline. Pipeline stocks for overseas operations have, at times, amounted to over \$10 billion; thus, the importance of accelerating the flow of goods to reduce investment, obsolescence, and administrative costs is readily understandable.

c. Some provision for storage is necessary to insure dependable supply. Along a military supply route, there must be reservoirs where quantities of goods are temporarily held. The accumulation at each of these reservoirs may be considered insurance against failures in prompt and adequate transmission of supplies from points in the rear.

These reservoirs and carriers (ships, barges, trains, motor vehicles, planes, or oil pipelines) loaded with cargo constitute the logistics pipeline. Interpreted in a broader sense, the word pipeline might be considered as including all depots and depot operations worldwide. In this sense, the pipeline would include the stocks held as reserves for future contingencies, such as mobilization reserves or stocks accumulated for future military exercises, as well as material stored for early or immediate issue in support of the current activities of the military services at home and abroad.

d. The pipeline is both physical (with storage locations and transportation facilities) and administrative (requiring processing of documents). The physical structure of the pipeline makes possible the flow of materiel through the military distribution system from the point of receipt from procurement of production to the point of final use. Every physical element of the pipeline has a corresponding administrative element, because every movement of supplies requires processing of documents. Document processing time may exceed the time for the physical movement of supplies; thus, is an area for constant management attention.

7-5. Mobile and Responsive Support.

a. Supply organizations must be sufficiently mobile to insure continuity of support, regardless of the speed with which the supported units are moving or the intensity of combat. The rapid movement of combat troops to achieve surprise or to concentrate power can only be effective if troops have sufficient supplies to achieve and hold their objectives. The capability of mobile and responsive support is the product of careful planning and disciplined training.

b. In order to develop and maintain a capability for mobile support, combat service support units must be trained to operate with minimum inventories. The key to success in this objective lies in substituting responsive supply action for stockage. Among the techniques under continuing development to increase the responsiveness of supply action are unitization of supplies and scheduled supply, together with improved transportation. Unitization of supply is the assembling of a number of items so that they can be handled as a unit. These units may range in size from pallets to standard 40-foot containers. Scheduled supply is the system by which the supplier calculates quantities of supplies for using organizations and ships them forward without requisitions on schedules agreeable to the user. AR 11-8, indicates that it is Army policy that shipments of supplies for initial support for deploying forces of a contingency oper-

ation will not be accomplished by "push shipments." The support shipments must be preplanned with the recipient participating in item selection, fully knowledgeable of shipment content and what will be called forward. The speed of computation and communication inherent in automated processes makes it feasible to adapt principles of scheduled supply to subsistence, petroleum, and general supplies having uniform recurring demand or to those for which requirements are predictable with reasonable accuracy. In addition to unitization and scheduled supply, a responsive system should also be adaptable to direct delivery (throughput). Generally speaking, the communications zone transportation brings supplies into the combat zone and, wherever possible, into the areas where the supplies will be consumed. It can be anticipated that, as an attainable objective, a large percentage of all supply shipments will bypass the next lower echelon.

7-6. Environment of Support Operations.

a. The tactical and physical environments in which combat service support operations are performed are important considerations in the analysis of the materiel distribution system. The tactical environment ranges from peacetime training to major warfare. The physical environment includes the configuration and conditions of the terrain, the weather, and the influence of the economic and technological development of the people native to the theater of operations.

b. In limited warfare, many of the difficulties of peacetime operations prevail in the face of a continuing responsibility to provide maximum support to tactical units engaging the enemy; however, in a major war, whether nuclear or nonnuclear, quantities of supplies are moved by every available means of transportation.

c. For contingency planning purposes, it must be assumed that the United States could some day be in a nuclear war. Survival and eventual victory after a nuclear holocaust may depend upon foresight in storing in protected facilities the materiel essential to survival, including the basic weapons of war.

d. The characteristics of the terrain strongly affect the configuration of the distribution system. Major stocks for an island campaign may be placed on ships or on other islands; whereas, in a campaign conducted deep into enemy territory, a succession of stockage points and a complex transportation system may be required. Some other possible environments are:

(1) Operations on the North American conti-

nent with overland distribution capabilities from the supply to the combat troops.

(2) Operations in long but narrow terrain (e.g., Vietnam).

(3) Operations well within the perimeter of a large land mass (e.g., Central Africa). The distribution system in mountainous terrain will vary significantly from a system on flat terrain. Distribution in subarctic regions in the winter is vastly more complicated than in temperate areas, and each involves a set of problems different from those encountered in desert regions.

e. Finally, the level of technological development within the area of operations plays a vital role in design of the distribution system. A country with high-speed rail and highway routes, pipelines, and having numerous heavy duty landing fields poses far fewer distribution problems than an underdeveloped nation. Furthermore, the skilled people of a highly developed nation may often be recruited to supplement military personnel in performing the technical functions of the distribution system, whereas the local nationals of an underdeveloped country require intensive training and closer supervision.

7-7. Distribution Management Analysis.

a. Specific approaches, using techniques similar to those developed for inventory systems analysis, can be developed for the analysis of the distribution system by:

(1) The activity for which materiel is being managed.

(2) Criticality of materiel.

(3) The environment in which supplies are being used (including the distance from the supply source).

(4) Classes of supply.

b. In the first approach, the distribution system is viewed in terms of the use of the materiel. Materiel is used for the:

(1) Support of personnel.

(2) Repair of equipment.

(3) Support of operations.

(4) Development and support of facilities.

The timing of distribution of materiel for the use of personnel is usually more critical than for the other elements. Personnel must have food daily and clothing and individual equipment when needed, while equipment and facilities may be idled for lack of repairs for a period of time without equivalent consequences. Even a shortage of supplies required for operations (e.g., fuel and ammunition), while serious, is not usually as catastrophic as starving troops. Therefore, food

will normally be distributed by scheduled supply, that is, without requisition; but repair parts are normally supplied on presentation of a requisition. Stockage lists are based on the frequency of requests and essentiality, while stock levels are a function of the quantity requested. Materiel distributed in support of operations, however, must be delivered at times and in quantities dictated by the activities of the operations. Therefore, timing and density of deliveries will vary, but delivery as needed is essential. Consequently, these supplies, like food, are often distributed automatically rather than by requisition. The fourth category, materiel for development and support of facilities, poses special distribution problems. This materiel is usually bulky and required in large quantities. Extensive amounts of construction materiel are required in the early stages of an operation, the time when distribution resources are taxed to the breaking point. For that matter, throughout the conduct of an operation, construction materials must compete for distribution resources with supplies destined for combat troops.

c. The second approach to viewing the distribution system is by degree of criticality of the materiel being distributed. If difficulty is experienced in maintaining specific combat-essential equipment (e.g., helicopters), management emphasis may be placed on this aspect of the distribution system. This management emphasis may go so far as to separate the management of repair parts for the critical items into an essentially separate distribution system. In such a special system, transportation might be dedicated specifically to delivery of the materiel, warehouse space segregated for storage, and specialists organized to control issue of the materiel. Several types of materiel are always critical in combat operations and, therefore, their distribution may also have unique characteristics. All materiel considered essential to moving, shooting, and communicating comes under this category.

d. The third approach to viewing the distribution system (by the environment in which suppliers are being used) was discussed in paragraph 7-6. The distance of the supported activity from the source of supply and the environment in which support must be accomplished are among the factors which account for the unique characteristics of distribution systems within each theater of operations. In planning for establishing supply systems in new areas of operations and for subsequent reevaluation of these supply systems, each system may be considered, in a sense, a separate subsystem of the worldwide supply system, with as

many aspects as practical designed to conform to a generalized model of the worldwide supply system.

e. In the fourth approach to viewing the distribution system, the 10 classes of supply are each viewed as subsystems. Each class has certain peculiarities which, in turn, influence its distribution pattern. Some perishable items, for example, may generally be procured overseas from the best available sources without concern for the procurement constraints inflicted on most other materiel. Meat, regardless of where it is procured, must undergo veterinarian inspections before it is fi-

nally served. Another example is bulk petroleum products which are distributed whenever practicable by pipeline. They are purchased from commercial storage facilities and delivered by commercial carriers to installations in the United States, or shipped overseas to commercial or military tank farms. While the classes of supply are often managed by the same activities, stored in the same general areas, and delivered by the same transportation, there are enough significant differences to make their separate consideration a useful analytical tool for understanding the distribution system.

Section II. THE DEFENSE LOGISTICS STANDARD SYSTEMS

7-8. Introduction.

The use of automatic data processing equipment and digital communications networks requires a common language of machine-sensible codes and formats. Such a common language must be recognizable not only to the machine and communications equipment but also to the human operator. Standardization and integration of data systems permit the output of one data system to be communicated and used as the input to other related data systems. A prime example of this standardization and integration of data systems is to be found in the Defense Logistics Standard Systems (DLSS). Currently, there are 13 standard systems that cover nearly all of the functional areas of the materiel life cycle. Each system was designed to standardize and automate the paper processes concerned with its area of responsibility, viz, requisitioning and issue of supplies, accounting for inventory, transportation and movement of inventory, performance reporting of supply and transportation phases and others. As the need for increased communication continues and as new systems are developed, new languages will be required and new DLSS will be established. Several of the DLSS relevant to distribution management are described below.

a. *The Military Standard Requisitioning and Issue Procedures (MILSTRIP)* was the first DLSS and led to the growth of the other standard logistics systems. MILSTRIP prescribes uniform procedures for requisitioning and issue of materiel commodities between requisitioners and supply control/distribution systems and utilizes standard single line item format documentation. The requisition documents consist of conventional 80-column punch cards. The cards may be punched and transmitted by transceiver communications or may be completed manually and mailed. The manner in which the form is completed and sub-

mitted is dictated by the punch card format and communications capability of the requisitioner. Teletype and telephone communications also are authorized for, in which case identical data in the columnar sequence of the punch cards are transmitted to permit rapid transcription to a punch card. Although the form and format are fixed, certain of the data may be manipulated and other data added to produce a variety of card documents essential to processing. Some common documents thus produced are requisitions, cancellations, passing orders, referral orders, supply status, follow-up answers, materiel release orders, shipments status, materiel release confirmation, materiel release denials, notice of availability, requisition modifiers, and reconciliation requests. The implementing publication is AR 725-50.

b. *The Military Supply Transaction Reporting and Accounting Procedures (MILSTRAP)* prescribes and standardizes machine sensible codes, formats, uniform procedures and time standards for recording inventory management data passed between elements of a single distribution system or transmitted between various DOD distribution systems, i.e., inventory control and stock control activities, depot storage sites and post, camp, base, or stations. MILSTRAP documentation is utilized to record demand data for the establishment of requirements levels, accounting for receipt and issue of DOD assets, performing inventories and processing of adjustment to accountable records, effecting logistics reassignments, and processing of special program requirements. MILSTRAP also provides for the small arms serial number registration and reporting between the DOD Central Registry and the Military Departments/Defense Logistics Agency Component Registries. The implementing publication is AR 725-50.

c. *The Military Standard Transportation and Movement Procedures (MILSTAMP)* provides standard transportation movement procedures, codes,

and formats which control the movement of cargo into and through all segments of the Defense Transportation System. In doing so it interfaces with the supply procedures in MILSTRIP. MILSTAMP also prescribes the preparation of intranet data cards (IDC's) at the shipping activity and their subsequent completion by the receiving activity, plus port receipt and lift data for export shipments. These data are essential to measure actual performance against transportation time segments prescribed in the Uniform Materiel Movement and Issue Priority System (UMMIPS) and to support the performance evaluation requirements of the Military Supply and Transportation Evaluation Procedures (MILSTEP). The implementing publication is DOD 4500.32-R.

d. *The Military Supply and Transportation Evaluation Procedures (MILSTEP)* is the system that evaluates the MILSTRIP supply requisitioning performance data and the MILSTAMP transportation performance data against the time standards of UMMIPS. These input data are mechanically manipulated to produce standard output reports by military department and by distribution system to reflect, by issue priority, the elapsed time for requisition submission, supply source processing, cargo handling time, and intransit time by each segment of the transportation pipeline by point-to-point and carrier performance. MILSTEP also assists in the evaluation and maintenance of UMMIP's time standards, as well as determining supply systems workload and materiel availability. The implementing publication is AR 725-50.

e. *The Standard Contract Administration Procedures (MILSCAP)* provides the standardized uniform procedures, record formats, data elements, and response times utilized in the interchange of automated contractual data between contract administration activities, buying offices, contractors, inventory control points, and other user activities. It is essentially a procedure to automate the various phases of contract administration to include contract abstracting, contract payment notification, shipment performance notification, destination acceptance reporting, plus other segments for future implementation. The implementing publication is DOD 4000.25-5-M.

f. *The Military Standard Petroleum System (MILSPETS)* has been established to provide automated standard procedures, forms, formats, data elements, codes and methods for interservice/agency use relative to the management of petroleum products. Unlike the other DLSS, MILSPETS is commodity rather than functionally oriented. To the maximum extent practical, standard data elements, codes, and formats of other DLSS are used

in MILSPETS procedures. This includes the applicable provisions of UMMIPS. The implementing publication is DOD 4140.25-M.

g. *The Military Standard Billing System (MILSBILLS)* is the system that prescribes standard automated procedures and formats for billing and collecting for direct delivery from contractors, for reimbursable sales of DOD stock fund materiel, for appropriation financed materiel and reimbursable sales from the General Services Administration. The implementing publication is AR 37-12.

h. *The Department of Defense Activity Address Directory (DODAAD)* is the standard system designed to provide identification codes, clear text addresses, and selected data characteristics of organizational activities needed for materiel requisitioning, marking, shipping document preparation, billing and similar applications. This system is used by the military down to unit level and by General Services Administration and other civil agencies. The Directory, DOD 4000.25-6-M, is maintained at the Defense Automatic Addressing System (DAASO), at Dayton, Ohio and is published on microfiche in two parts: code to clear text address and Zip Code sequence. The implementing publication is AR 725-50.

i. *The Military Assistance Program Address Directory (MAPAD)* is a standard system designed to provide the addresses of country representatives, freight forwarders, and customers-within-country required for releasing Foreign Military Sales (FMS) and Military Assistance Program (MAP) and grant aid shipments. The addresses are also required for distribution of related documentation. The MAPAD addresses are provided by representatives of foreign governments for use in receipt of materiel purchased under the FMS Program and by US military assistance advisory groups for receipt of materiel under the MAP Grant Aid Program. The master automated file is maintained by the Defense Automatic Addressing System Office (DAASO), Dayton, Ohio. The implementing publication is the MAPAD Directory DOD 5105.38-D.

j. *The Defense Automatic Addressing System (DAAS)* is a real time, random access digital computer system linked to the automatic digital network (AUTODIN). Its basic purpose is to automatically route or pass supply transactions to the correct recipients. This system embodies the integration of logistics and telecommunications into a single data processing system. The DAAS is operated by the DAASO and has two automatic switching centers, one each at Dayton, OH and Defense Depot, Tracy, CA. Each is capable of full operation when the other is down. The system is in continu-

ous operation 24 hours per day 7 days per week. The implementing publication is AR 725-50.

k. *The Uniform Materiel Movement and Issue Priority System (UMMIPS)* is that system established for use in the requisitioning and movement of materiel from and within the DOD distribution system. In itself the UMMIPS is not a separate DLSS. It is the DOD time accounting or measuring system that establishes common or uniform time standards, priorities, and language for use in those DLSS such as MILSTRIP, MILSTRAP, MILSTAMP, MILSTEP, and MILSPETS. As a time measuring procedure it is an integral part of each of these systems, measuring and evaluating each segment of the order-ship time. The overall objective of the UMMIPS time standards is to provide guidance in satisfying a customer's demand within the cumulative time prescribed for the assigned designator. It tells the customers within his urgency of need when he can expect to receive the requisitioned item. At the same time it tells the supplying logistician how fast his response must be.

7-9. Establishing Priorities for Processing Requisitions and Shipping Materiel Under UMMIPS.

a. The Uniform Materiel Movement and Issue Priority System is applicable to the requisitioning and issue processing of all items under the management of military departments, defense agencies, and, by agreement the General Services Administration, for items in their depot program. The time standards prescribed cover interservice supply support operations for items normally stocked. Standards prescribed assume that the items required are in stock and available for issue; consequently, the standards do not reflect procurement lead time. In the movement and issue of materiel, it is necessary to identify the relative importance of competing demands for the logistics

system resources, i.e., transportation, warehousing, paperwork processing, and inventories. UMMIPS provides a ready basis for expressing the relative importance on requisitions and other materiel movement transactions through a series of two-digit codes known as priority designators. The increasing use of automatic data processing systems in handling supply and transportation documents makes this concise codification of precedents essential to the operation of the DOD distribution system. Placed in the proper data field of the supply and transportation documents, the priority designator insures appropriate handling of competing demands.

b. In the requisitioning and issuing of materiel, the priority designator is based upon a combination of factors which relate the mission of the requisitioner (force/activity designator) and the urgency of need or the end use (as indicated by the urgency of need designator). The force/activity designator (a Roman numeral) is assigned by the Joint Chiefs of Staff or by each military service. The urgency of need designator (an alphabetical letter) is determined by the requisitioning activity. With certain exceptions, these two factors will enable the requisitioning activity to determine the priority designator (Arabic numeral). In addition to using the priority designator for the requisitioning and issuing of materiel, it may also be used for retrograde movement of reparable, the return of excess, and other special circumstances. The 15 priority designators provided in the UMMIPS have been placed into three priority groups. Each priority group qualifies for different processing time standards as shown in Figure 7-1. These priority groups are compatible with the transportation priorities described in the Military Standard Transportation and Movement Procedures.

c. A priority designator of 03 may be used by all activities regardless of force activity designator for

Standard Deliver Dates

| PRIORITY GROUP | PRIORITY DESIGNATOR | CONUS OR* INTRATHEATER. | OVERSEA* |
|----------------|---------------------|----------------------------|------------|
| One | 01 thru 03 | 7 days | 11-12 days |
| Two | 04 thru 08 | 11 days | 15-16 days |
| Three | 09 thru 15 | 28 days | 66-81 days |

*From date of requisition to receipt of materiel.

medical or disaster supplies or equipment required immediately for prolonging life, relieving suffering, or expediting recovery in case of injury, illness or disease, or avoiding or reducing the impact of epidemics or similar potential mass

illness or diseases. A priority designator of 03 may also be used by all activities regardless of force activity designator for emergency supplies or equipment required immediately for controlling civil disturbances, disorder, or rioting. A priority

designator of Ø6 may be used by all activities regardless of force activity designator for emergency supplies of individual and organization clothing to active duty military personnel who are actually without the clothing required.

d. The commander or, in his absence, the acting commanding officer will authenticate the assignment of priorities for each request submitted containing priority designators Ø1 through Ø8.

e. The required delivery date is the calendar date when materiel is required by the requisitioner. Delivery date standards are established based on priority designators. Requisitioning activities determine if the priority delivery date standards will meet their requirements. If so, no required delivery date is placed on the requisition. The requisitioner can assume, unless requisition status information indicates otherwise, that delivery will be made not later than the priority delivery date established. However, dates other than those established by the priority delivery date may sometimes be used under certain specified conditions. In the case of Foreign Military Sales, where the US commitment requires delivery to the customer at point of origin, a required availability date, which does not include a transportation element, is used.

f. Requisition documents indicating priority designators Ø1 to Ø8 will be transmitted under priority communications precedence. Documents with priority designators Ø1 through Ø3 will be trans-

mitted under communications precedence "operational immediate" if the commander on the scene determines that the situation so warrants. Documents indicating priority designators Ø9 through 15 may be transmitted by transceiver, courier (when appropriate), or US mail, consistent with military service policy, geographical considerations, priority designators, and required delivery date. To evaluate the total performance under this priority system, the date placed on the requisition is the date of transmittal from the requisitioning activity concerned to the appropriate supply source.

g. Conditions will exist in which available assets cannot satisfy all current demands and due-outs for a specific item. Inventory managers establish procedures for release of assets in short supply in accordance with the following criteria:

(1) Automatic procedures will sequence demand by priority designator, and by requisition document number date within equal priority designators.

(2) Manual review will be made when release of assets may result in failure to satisfy a firm commitment for deliver of materiel to a military assistance recipient or failure to satisfy a requisition reflecting a Joint Chiefs of Staff assigned project code. Decisions on the selection of demands to be satisfied will be based on schedule due-in significance of Joint Chiefs of Staff assigned project codes, and acceptability of substitute items.

Section III. REQUISITIONING AND STORAGE

7-10. The Flow of Requisitioning.

a. The operation of the distribution system is normally initiated by the submission of requests by using units or supply points. A Department of the Army Form 2765 (Request for Issue or Turn-In) is the request prepared by using units at the supply points. Department of Defense Form 1348 (DOD Single Line Item Requisition System Document) is the manually prepared requisition and 1348M consists of four copies. This form is used as a manual requisition, manual followup, and manual cancellation. DD Form 1348M is used for the followup answer, supply status, notice of shipment from supplier to customer, rerouting the requisition, direction of a shipment to a customer, redistribution of supplies between storage sites and between users, and the notification of action taken in response to the directive to ship from a storage point.

b. The frequency of submitting requisitions is the prerogative of the requisitioner; except for subsistence items, the distribution system does not

normally prescribe scheduling of submission. Requisitions are submitted when required to meet stockage objectives or to meet specific priority requirements other than stockage. Requisitions for subsistence items, however, are submitted in accordance with schedules established by the Defense Personnel Support Center in the Continental United States. Overseas, the Materiel Management Centers (MMC's) of the applicable support activities submit schedules for Class I in accordance with existing and anticipated strength requirements. The supporting depot or inventory control point within CONUS is required to maintain liaison with the installations they actively support. Overseas, the MMC and general support storage activities maintain customer assistance officers to provide this contact. Under normal circumstances, the support depot or inventory control point maintains a contact folder for each activity or installation it supports. Overseas, this folder is maintained at the MMC and general support storage activity.

c. Requisitions usually move back through the distribution system from the direct support unit toward the inventory control point. The first stockage point which the requisition reaches that is authorized to carry the materiel in stock should be able to fill the requisition. At each stockage point not authorized to carry the materiel, the requisition is recorded as a demand (a prescribed number of demands in a given time period authorizes the stockage point to stock the item of materiel) and a new requisition is automatically punched duplicating most of the information on the requisition. However, when the materiel requisitioned is not in stock but should be, then the supply point will either establish a due-out (meaning that the requisition will be held on file until a shipment is received at a stockage point) and so notify the requisitioner; or it will refer the requisition to another source by preparing a new requisition (referral order) duplicating most of the information on the requisition it received except for the address. The requisitioner will be notified of the referral of the passed requisition so that followup actions can be taken with the proper source.

7-11. Storage.

a. An essential element of national defense is the ability to apply military power where and when needed. Supply is an integral part of that ability and storage is a vital link in the chain of supply from producer to consumer. Storage is the instrument by which the fluctuating rate of consumption is kept in balance with the more uniform rate of production. It cushions the effect of interruption in production upon the availability of materiel, and by proper timing and placement, insures effective logistical support of the military force.

b. Supplies in storage must be cared for and protected to insure that they will be available in serviceable condition when needed. Storage should be planned so that supplies are always accessible, even during rapid expansion and contraction, and that space is used efficiently. Storage should be designed for efficient receiving, storing, care in storage, issuing, and accounting for supplies. Physical security from theft, sabotage, and overt enemy attack are also considerations. In addition, fire protection is a constant concern, and protection from contamination by chemical, radiological, and biological agents may become an important consideration. There are two general classifications of storage space—covered and open.

c. Covered storage space is storage space within any roofed structure. The general-purpose warehouse constructed with roof sidewalls and end-

walls, provides excellent storage for many kinds of items. The single-story warehouse with a floor at railroad car floor and truckbed level has become the standard type of warehouse because of its low operating cost. Truckloading platforms may be on one side of the general-purpose warehouse and carloading platforms may be the length of the other side. The dimensions of the platforms and the aisles of the warehouse should afford maximum convenience for use of mechanical handling equipment commensurate with efficient use of storage space. Refrigerated warehouses usually are divided into two distinct areas: chill space in which the temperature can be controlled between 32 degrees and 50 degrees F and freeze space in which the temperature can be controlled below 32 degrees F. Flammable storage warehouses are used for storing highly combustible materials such as paint and oils. Explosives are generally stored in above-ground magazines or in igloos. The igloo is a type of magazine that is generally constructed of masonry with an arch-type of roof covered with dirt.

d. Other types of closed storage are controlled-humidity warehouses, transit sheds, dry tanks, and sheds. Transit sheds are basically roofed sheds placed beside or immediately adjacent to docking facilities to protect supplies from the weather during loading and unloading. Actually, most transit sheds are not open-sided as the name implies but are buildings with closed sides and ends and are generally used on wharves and piers. Dry tanks are used for long-term storage and are constructed entirely of steel except for a concrete floor. Such items as automotive parts that are not intended for use for a number of years are kept in dry tanks. A shed is a roofed structure without complete sidewalls and endwalls. A shed is used for storage of materials that require maximum ventilation or materials that do not require complete protection from the weather.

e. Improved open storage space is an open area that has been graded and hardsurfaced or prepared with a topping of some suitable material to permit effective materials handling operations. In addition to the hard surface, the open storage space must have adequate drainage to afford protection from wet ground conditions. It may sometimes become necessary to use unimproved open storage space. This practice often results in the waste of many man-hours when stocks have to be moved and sorted when earth surfaces erode or become muddy. When operational conditions make the use of unimproved open storage necessary, care should be taken to provide drainage, to mark

aisles clearly, and to block up and maintain stacks of supplies frequently.

f. The Department of Defense specifies certain policies regarding uniformity in the development of storage layout plans. Aisle widths are limited to the size required for the operation of materials handling equipment needed to handle the unit loads in storage. In general, items are stored by Federal supply class (the first four digits of the National Stock Number). Relative activity or turnover is a primary consideration in determining storage locations for materiel. Stock moving daily and retail bin stock should be stacked near the shipping or breakout area. The size of an individual item affects not only the amount of storage space allocated to a Federal supply class but it is also considered in the location of that class within the storage area.

g. Most items of general supply do not require special handling or storage methods, although similarity, popularity, and size of the item must be considered. Others, however, require special handling. For instance, some materials are handled in bulk; hard fuels require special storage areas and handling equipment; and liquids handled in bulk require pumps, pipelines, and special storage tanks. Consideration is given to the special handling and storage of all such materials in planning the storage areas. When the materials have a limited storage life, care must be taken to insure that the oldest stock is issued first. Many foods must be kept in refrigerated areas or in temperature-controlled areas. Many items have a high resale value and are subject to pilferage. This materiel is located in areas where security control can be established and the entire storage operation rigidly controlled.

h. The rapid selection of stocks for shipment, efficient handling of receipts, and the maximum use of storage space depend upon the effective use of an adequate stock locator system. The basic element of a good locator system is the record card for each stock item. Record cards contain the stock number, the unit of issue, nomenclature, and location of the lot for each item stocked. Since storage areas are laid out and marked in rows, stacks, and levels, a floor plan enables the stock picker to match the location shown on the location card with the floor plan and then proceed directly to stored item. When stock in any one location is exhausted that listing is lined out on the locator card. Normally, only one location should be maintained in bin storage. Proper selection of locations for issues and consolidations of receipts aid materially in keeping the number of locations to a minimum. Periodic location surveys verify re-

corded locations against actual locations. Also, stock locations are verified at the time normal stock inventories are taken as a part of the regular inventory procedure. Inefficiencies in use of storage space may result from an attempt to minimize numbers of locations for items by such practices as specifying warehouse locations for one time and only one, thus producing wasted space when the particular items are in short supply. A better practice is to concentrate on maximum use of storage space, depending on locator cards for efficient selection of needed items for shipment.

i. One of the most important functions of the storage operations is receiving. Receiving operations concern the manner in which supplies are brought into the storage operation. Prompt and accurate processing of receipts is, therefore, a prime requisite of an effective storage operation. The details of receiving operations are, for the most part, dependent upon types of supplies to be handled, distance supplies must be moved, types of materials handling equipment available, and physical characteristics of the storage installation. Planning is necessary in all receiving operations. Planning begins when the first information is received that identifies a shipment. The central control office of storage operations establishes overall priorities based on receiving workload as indicated by shipment arrival notices, initiates action to obtain unusual equipment and labor requirements, assigns available vacant space to meet demand brought about by incoming stocks, and insures the dissemination of advance receiving information to warehouse personnel and other personnel concerned. Because of many factors over which storage officials have little control, day-to-day receiving operations fluctuate more than any other activity. As a consequence, a high degree of coordination among the separate receiving operations is necessary. Incoming shipments also must be checked carefully to include the tallying and inspection of the supplies, and the checking of documents. The transportation officer must be notified of all over, short, or damaged shipments which are received. The unloading, checking, and storing of security or sensitive items, such as alcohol, narcotics, and strategic and critical materiel, require special handling and, in most cases, special methods of documentation.

j. The issue process of the storage operation is heavily dependent upon the efficiency in which the receiving function is accomplished. Issue operations deal with the selecting of stocks in storage and readying them for shipment. The accuracy and timeliness in which the supplies are received and placed in storage determine the ease with which

the issue function can be performed. As was the case in receiving, planning plays an all-important role. Beginning with the receipt of notification for issue, commonly called a materiel release order, through the selection of stocks and the physical packaging and packing to final marking and unitizing, priorities are established by the production control element. Outgoing shipments must also be checked cautiously to insure proper selection, accurate documentation, adequate packaging, and correct labeling.

7-12. Materials Handling.

a. Materials handling involves the movement of materiels and supplies from one place of operation to another without affecting their value. The basic principles of materials handling require that:

(1) Packing techniques such as palletization and containerization must be standardized and coordinated with the design and procurement of materiels handling equipment so equipment at a storage location can handle all supplies delivered. Furthermore, the design of aisles and stacks in all types of storage facilities must be coordinated with types to be procured. Platforms, ramps, and intransit storage facilities must be compatible with both the materiels handling equipment and the unloading characteristics of the transportation media.

(2) The flow patterns of movement of supplies should be designed and periodically reevaluated to allow for maximum utilization of materiels handling equipment. A straight line between pickup and delivery points is the shortest distance between the points, a consideration which is sometimes overlooked. Loading, unloading, and turn-around space is required. One of the basic objectives of materiels handling is to organize handling so that the number and distances of moves are minimized.

(3) Each piece of equipment should do a variety of jobs. However, with the many sizes, weights, and types of packaging, there must be a number of types of equipment available in each installation. Consequently, careful management is required to optimize their use. Materiels handling must be planned and organized so that the most efficient piece of equipment is available for each moving or stacking operation.

(4) Advance planning of materiels handling methods and equipment is performed concurrently with other planning activities and undertakings. Some of the factors requiring advance planning include the need for protection against weather and breakage, the possibility of using unitized loads, the opportunities for standardizing equipment and methods, and the possibility of combin-

ing materials handling methods. Safety is always a prime planning consideration.

b. The use of physical labor in the handling of materials in storage must be kept to a minimum. While a certain amount of troop labor is necessary, this labor is by no means free; in fact, the long-term cost to the Army of using troops for labor makes it imperative that logistics managers exhaust other alternatives before turning to troop labor. One of the intangible costs of troop labor is the disruption of unit training; and in wartime, when manpower is always short, the use of large numbers of troops to handle supplies manually in storage installations must be avoided. Consequently, the planning for procurement, operation, and maintenance of materiels handling equipment is important.

c. The automation of warehouse operations is not often practicable in the Army except in major depots. Nevertheless, a brief review of some of the principles of automation of warehouses will be useful since most of these principles govern any type of system and are, therefore, useful in analyzing and improving manual and mechanical as well as automated warehouse operations. The automated warehouse employs mechanical devices to supply the power and control of movement of goods under general human guidance. These categories of equipment are employed: Materiels handling equipment such as belts, towlines, tractors, and roller conveyors; mechanized storage and dispensing systems, or static storage combined with retrieval equipment; and information processing equipment to maintain status records on item location, inventory levels, to process orders, and to issue picking, marshalling, and dispatching instructions. Neither mechanization nor automation need be applied totally and uniformly to a warehouse. The state-of-the-art is still sufficiently limited so that complete automation must be confined within fairly tight limits of item or container size and weight. The principles of automation which can be applied to both mechanized and manual systems require:

(1) Location of fast-moving items near the control center and marshalling and shipping operations.

(2) Arrangements of belts, conveyors, and other devices so that items or crates can be moved directly and in one continuous operation from the receiving point to the storage location, or from the storage location to the shipping point.

(3) Control devices to signal when a decision is needed. When one element of the system has reached full capacity, a decision is needed to shift operations to another element of the system. When

there is a malfunction in the system, that portion of the system affected must be stopped until the malfunction can be corrected.

7-13. Care of Supplies in Storage (COSIS) or Materiel Readiness.

a. Any program for the care of supplies in storage is an important responsibility of the storage and quality control managers. The program is concerned with determining through a systematic quality control procedure the type of storage best suited to the item, the methods of inspecting the stock's condition, and the application of all required preservation, packaging, packing, and marking to insure that the item is maintained in a ready-for-use condition. The degree of activity involved in each phase of the program depends upon the type of item, type of storage, the military level of packaging and packing afforded, anticipated length of storage, probable end use, and other governing factors.

b. Serviceable and economically repairable unserviceable supplies will be stored in warehouses as space is available. Controlled humidity space will be utilized to the maximum practicable extent, giving priority to items for which controlled humidity affords the greater degree of protection. When warehouse space is unavailable, items may be placed in shed storage, and, as a last priority, in open storage.

c. Modern storage aids (platforms, pallets, bin storage and materials handling equipment) should be employed to insure optimum use of storage

space. All supplies shall be properly identified, classified by condition code, and properly marked for storage. Good housekeeping practices are essential to morale and safety.

d. All supplies, materiel, and equipment entering or in the Army supply system, including movement in or between oversea theaters, must be afforded the degree of preservation, packaging, and packing required to prevent deterioration and damage during shipment, handling, and storage. If possible, preservation, packaging, packing, and marking, including minor repair, are performed during inspection of mission stocks.

e. Unserviceable stock is recorded in appropriate accounts and held at the activity until disposition instructions are received; or it is shipped to an activity having a maintenance facility. The disposition instructions may be:

(1) Recondition and repair at the reporting depot, or ship to a depot having a depot maintenance facility.

(2) Obtain repair by commercial contract.

(3) Release the stock to the reutilization and marketing officer after it has been declared excess.

f. Modernization of storage and materials handling operations must be accomplished where improved supply response and/or reduced operating costs are possible. Processes recommended in TM 743-200-2 were conceived with the objective of minimizing handling. The ultimate objective is the mechanized movement of materiel from time of receipt until it reaches the shipment consolidation point, over the most direct route possible, and with the fewest practicable en route handlings.

Section IV. DISTRIBUTION OF ALL CLASSES OF SUPPLY

7-14. Pattern of Distribution of General Supplies.

a. The previous sections of this chapter have covered the principles of distribution which are applicable to all classes of supply. In this section and the following sections, each class of supply will be discussed in order to illustrate the peculiarities in the distribution of the classes of supply which have management significance. This section and Section V deal with the bulk of supplies for which the distribution patterns are similar.

b. Except for items authorized for local procurement, general supplies are centrally procured and stored in Continental US depots. Items which have been coded for central management by the Defense Logistics Agency are procured by that agency and stored in depot space allocated in the agency. Army-managed items are also procured and stored in allocated space in Continental US depots. In-

stallations in the United States requisition these centrally managed supplies from the depots for delivery to installation storage points or directly to using units. When possible, general supplies are shipped from the wholesale CONUS depot system to the requisitioner. The process of shipping directly from the CONUS depot to the requisitioner, thus bypassing the CONUS installation, is referred to as the Direct Support System (DSS) and is explained in detail in Section V.

c. For overseas theaters, materiel is shipped from Continental US depots to major overseas stockage points or directly to the general support or direct support unit. The process of bypassing the intermediate supply echelons is again referred to as the Direct Support System and is being utilized to provide classes of supply II; III (Packaged); IV; Selected; V (Missile System Components only) VII; and IX, Materiel.

d. For those items which are authorized for

local procurement, action is accomplished by the local procurement agency. The materiel so purchased is normally delivered directly to the requiring organization.

e. Depending on the urgency of a requirement, the most economical mode of shipment available is selected. However, to meet the processing time standards, which are based on priorities, modes of transportation other than the most economical are often selected.

7-15. Distribution of Class I Supplies—Subsistence.

a. The Defense Personnel Support Center of the Defense Logistics Agency procures food, clothing, textiles, footwear, individual equipment, and medical and dental supplies for the Army. The center manages about 1,200 food items cataloged for use by the military services. These cover the range of foods comprising the American diet, as well as special or operational-type rations required for military use. The Center also provides survival-type food for the Civil Defense Program and has initiated Direct Supply Support to commissaries overseas. It is much like the Army Direct Support System in concept but is a separate system under DLA. The Center procures food through four regional headquarters and 21 permanent or seasonally operated field buying offices. Each region operates storage and distribution facilities for perishable foods and procures nonperishable subsistence for delivery to depots or installations.

b. For installations in the United States, nonperishable food items are stored at designated distribution points. Perishable subsistence supplies are usually obtained from regional marketing centers operated by the Defense Personnel Support Center. Local procurement is authorized in emergencies. The distribution activities at installations include warehouses for nonperishable subsistence, cold-storage facilities (including freezers, chill rooms, and vegetable storage), ration distribution activities, issue commissaries, and commissary storage. The chief of the veterinary activity is responsible for procurement and surveillance inspection services for subsistence, encompassing acceptability for quality and wholesomeness, and for determining potential aspects of chemical, biological, and radiological hazards pertaining to subsistence items and household supplies for sale to authorized customers.

c. Class I supply in the theater of operations is primarily a problem of bulk and tonnage. It is also a refrigeration problem for some items. Class I supplies move through supply channels at a fairly uniform rate. To minimize supply administration

and physical handling of supplies, the system uses as few intermediate echelons as possible. Experience data at each supply echelon permit virtually automatic issue of rations based on unit strength. Related items, such as salt tablets, soap, insecticides, and toilet tissue are also issued through Class I channels.

d. Perishable subsistence may be obtained overseas from local sources through local procurement techniques. Whenever practicable, these supplies are procured by bartering techniques, using surplus agricultural commodities from the United States as a medium. The use of local procurement of perishables adds to the menus offered to troops, but it increases the health hazard. As a result, the functions of the Military Veterinary Services in inspecting foodstuffs becomes particularly significant. When feasible, perishables are delivered directly to organizational breakdown points. Nonperishables are distributed through the normal general support-direct support system.

7-16. Distribution of Class II Supplies—Secondary Item of Equipment.

a. As mentioned in paragraph f(2)(a), the Defense Personnel Support Center procures and manages most clothing and individual equipment used by the Army.

b. Personal clothing in the Continental United States is usually distributed through clothing sales stores and issue points. The clothing sales store provides an economical method of issuing and selling personal clothing to military personnel. Personal clothing includes dress uniforms, fatigues, boots, and headgear which must be in serviceable condition and in the possession of personnel. The clothing sales stores are direct support system customers; therefore, they requisition directly on the wholesale depot system.

c. Clothing is distributed overseas through the DSS to the general support stockage point and the direct support unit, except that overseas installations may establish and operate clothing sales stores in accordance with the same regulations used in the Continental United States.

d. In the case of Class II items other than clothing, they will be provided both in CONUS and overseas through either the self-service sales stores (source of expendable items) or the supporting direct support unit (nonexpendable TOE items) both of which are DSS customers.

7-17. Distribution of Class IV Supplies—Construction Materials.

Construction materials present a special problem

because of their intrinsic weight, large quantities required, the extraordinarily wide variety of hardware, and the vulnerability to pilferage. Most construction supplies are procured by the DLA's Defense Construction Supply Center. Since commercial-type construction materials are readily available, need for storage of these supplies is not extensive in the United States. However, the requirement for the storage and shipment of Class IV items to overseas areas is extensive. Distribution both overseas and in CONUS of this class of supply is through the DSS.

7-18. Distribution of Class VI Supplies—Personal Support Items.

Distribution of personal demand items (e.g., cameras, watches) in the Continental United States is managed outside the logistics system using nonappropriated funds. Distribution overseas, however, involves the distribution system and poses a major problem of pilferage. The items are easily converted to cash, making them an attractive target for thieves. Therefore, security measures are intensive throughout the distribution process. Locked and guarded containers and warehouses are provided at terminals and major overseas storage points. Personal demand items are usually controlled separately within major overseas depots and distributed to sales points (e.g., post exchanges) directly from the distribution centers.

7-19. Distribution of Class VII Supplies—Major End Items of Equipment Authorized in Allowance Tables.

The significant difference between distribution of major items and secondary items is that major items are controlled by line item and distributed in accordance with carefully developed distribution plans, whereas secondary items are, in general, distributed on demand. Certain major items are selected for stockage as an operational readiness float used for replacement of lost, destroyed, or uneconomically repairable items on one hand, or for immediate replacement of items to be repaired (repair cycle float) on the other. The physical distribution of these items both in CONUS and overseas is through the DSS.

7-20. Distribution of Class VIII Supplies—Medical Materiel and Repair Parts.

a. The Defense Personnel Support Center procures and manages medical, dental, and veterinary supplies and equipment that are common to the three military departments. In CONUS, deliveries

of medical materiel are made directly from DLA depots to medical units, usually hospitals, located at CONUS installations. In overseas areas, medical materiel is shipped to installation medical supply activities and medical supply, optical, and maintenance (MEDSOM) units for further distribution to medical units.

b. The medical supply system operates separately from the rest of the Army logistics system, though the distribution patterns are similar. The reasons for separating medical logistics from Army logistics generally revolve around the criticality of the mission of the Army Medical Department, the catastrophic effects of shortages of medical supplies, and the fact that medical supplies are used almost exclusively by professional personnel of the Army Medical Department. The Army Medical Department plays an important role in maintaining the combat effectiveness of units. The value of a combat-hardened soldier cannot be equated to the given number of raw replacements; therefore, the medical treatment of wounded soldiers and those incapacitated by disease to return them to combat duties takes on great significance. These important and humane considerations account for the separation of medical supply from normal Army supply.

7-21. Distribution of Class IX Supplies—Repair Parts (Less Medical) Repair parts are provided through the DSS and the Airline of Communication (ALOC).

The users draw their supplies from direct support maintenance units. Frequently, repair parts for combat-essential equipment are required to return deadlined equipment to operation. The expedient supply of repair parts to meet these requirements has often resulted in special support systems. Highly expedited administrative techniques and rapid transportation are employed to insure the shortest possible response time to requisitions for urgently needed parts. For some items of equipment which must stay operational (e.g., helicopters for air assault units), the entire repair parts system is intensively managed.

7-22. Distribution of Class X Supplies—Nonmilitary Support Materiel.

The distribution system for items of supply to support nonmilitary programs (e.g., agricultural and economic developmental) depends on agreement with the foreign countries supported and with elements of the other departments of the Government (primarily the State Department). Usually, delivery of these items follows the same

channels as general supplies for the Army except that they are normally distributed to the foreign government directly from a terminal or major oversea depot. The significance of Class X supplies is that they use resources that would otherwise be available for the distribution of Army requirements. Nevertheless, the supply of these items is

often important enough to take precedence over some of the less essential Army items. When the Army undertakes to cooperate in international programs, it thereby commits itself to supplying the agreed-upon materiel even at the expense of its own distribution system, provided that critical operations are not seriously impaired.

Section V. THE DIRECT SUPPORT SYSTEM/AIR LINE OF COMMUNICATION

7-23. Introduction.

a. The Direct Support System facilitates the movement of supplies from the Continental United States wholesale supply base directly to the consumer; e.g., direct support unit, bypassing the oversea storage activities or the CONUS installation supply division (ISD).

b. An integral part of the system is a logistics intelligence file (LIF) which provides intransit visibility of pipeline assets. The LIF interfaces supply and transportation documentation to provide logistics managers an independent source of performance data and a complete overview of the total logistics pipeline. This integrated technique permits managers to precisely identify problem areas and to determine the most effective methods and procedures to support the Army in the field.

c. The Direct Support System has resulted in major improvements to the supply distribution/transportation system by providing:

- (1) Visibility of the supply/transportation pipeline.
- (2) Intransit data reporting to accommodate source to user containerized shipments.
- (3) Physical distribution system that maximizes source to user containerization techniques.
- (4) National distribution of stocks positioned at designated depots to best support geographically oriented customers.
- (5) Improved customer support by reducing order ship time for PD 09-15 requisitions (Fig 7-1).
- (6) Interface of supply and transportation documentation.
- (7) The elimination of intermediate level operating stocks.

7-24. Concept.

a. DSS is a concept of supplying classes of supply II, III bulk, IV, selected V (missile system components only), VII, VIII, and IX materiel direct to supply support activities (SSA's from CONUS area-oriented distribution depots). To accommodate reduced response time to customer requirements, stock distribution policies must insure availability from the distribution depot for those items applica-

ble to the appropriate theater/geographic area being supported. Classified/protected/sensitive items requiring signature service and materiel requiring refrigeration will be shipped in accordance with current directives. The Eastern United States, The Middle East, Africa, the Caribbean, South America, and the European theater of operations will be supported by the secondary item distribution depot at New Cumberland. Red River Army Depot is the distribution depot supporting the Central United States. Sharpe Army Depot will be the distribution depot supporting Western United States, Alaska, and the Pacific theater of operations. The CONUS support concept follows state line boundaries. This will facilitate distribution of stock based on actual demands as accumulated under the requisition activity address code. The distribution pattern for DSS is shown in Figure 7-2 and 7-3. Materiel stored and stockage levels maintained at the distribution depot will be managed by the item manager. The method used to determine the range of items and the stockage quantities for the distribution depot will be based on customer demands at the National Inventory Control Point (NICP) level as determined in supply control studies.

b. Figure 7-2 and 7-3 graphic depiction of the manner by which DSS requisitions and materiel flow in CONUS. CONUS requisitions flow from the supply support activity to the installation supply division for editing the validity of supply data, funding, and fill in accordance with prescribed fill/pass logic. The requisitions are then transceived to the Defense Activity Address System (DAAS) for routing and gathering of logistics intelligence file information. Upon arriving at the activity managing the item, release will be directed from a depot or depots. The materiel release orders will be passed through the DAAS where image copies of all transactions will again go to the LIF. Shipments to CONUS customers from the distribution depot/DLA/GSA will be forwarded to the installation central receiving point (CRP) and will not be directed through the consolidation/containerization point (CCP). The CRP will receive all shipments of DSS materiel from commercial

DSS OST OBJECTIVES
(Priority Designators 09-15)

| CYCLE SEGMENT | EUROPE* | | CANAL ZONE | KOREA | OKINAWA | ITALY | HAWAII | ALASKA | CONUS |
|--|---------|----|------------|-------|---------|-------|--------|--------|-------|
| REQUISITIONING AND PASSING ACTIONS | (3) | 5 | 5 | 5 | 7 | 5 | 7 | 5 | 4 |
| NICP PROCESSING | (2) | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| DEPOT PROCESSING | (3) | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| INTRANSIT TO CCP | (1) | 2 | 2 | 3 | 2 | 2 | 2 | 2 | NA |
| INTRANSIT TO CRP | NA | NA | NA | NA | NA | NA | NA | NA | 2 |
| CCP PROCESSING, INTRANSIT TO POE, POE PROCESSING | (5) | 10 | 10 | 15 | 14 | 10 | 11 | 13 | NA |
| INTRANSIT POE TO POD | (1) | 10 | 7 | 18 | 18 | 10 | 5 | 4 | NA |
| POD PROCESSING | (1) | 2 | 2 | 2 | 1 | 2 | 1 | 2 | NA |
| INTRANSIT TO SSA | (1) | 3 | 1 | 2 | 1 | 3 | 1 | 3 | NA |
| CRP RECEIPT TO DELIVERY (CONUS) | NA | NA | NA | NA | NA | NA | NA | NA | 1 |
| SSA PROCESSING | (3) | 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 |
| TOTAL OST (CALENDAR DAYS) | (20) | 45 | 40 | 59 | 56 | 45 | 40 | 42 | 20 |

NOTE: PD 01 THRU 08 WILL BE MEASURED AGAINST UNIFORM MATERIEL MOVEMENT AND ISSUE PRIORITY SYSTEM (UMMIPS STANDARDS)

*ALOC STANDARDS FOR EUROPE ARE IDENTIFIED IN PARENTHESIS.

Figure 7-1. DSS Order ship time for overseas commands priority designator 09 through 15.

sources (vendors), parcel post, mixed cargo shipments of DSS and the non-DSS materiel and mixed cargo shipments for DSS participating and nonparticipating units. In those cases where all of the supplies on a particular truck (most CONUS shipments will be by commercial truck) are for one or a few customers, the truck will deliver the supplies directly to the customer after being checked through the CRP.

c. Figure 7-4 is a schematic diagram showing the requisition and supply flow for overseas areas under the DSS. Oversea requisitions will flow from the SSA to the in-country installation supply activity/materiel management center (ISA/MMC) for editing the validity of supply data, funding, fill in accordance with the prescribed DSS fill/pass logic. Requisitions will flow in the manner ex-

plained in the preceding paragraph for CONUS requisitions. To provide maximum container utilization and through-container service, east, and west, coast consolidation/containerization points located at the distribution depots are used to support overseas customers. Materiel destined for overseas shipment will be consolidated in SEAVAN or 463L pallet loads. The CCP for the east and Gulf Coast is located at New Cumberland Army Depot. The CCP for the west coast is Sharpe Army Depot. Oversea shipments (less than VAN/463L pallet loads) will be forwarded to the appropriate CCP for consolidation/containerization. Nondistribution depot shippers may ship full SEAVAN/464L pallet loads direct to one consignee provided sufficient cargo is accumulated in 1 day to justify a shipment at point of origin. Less than full

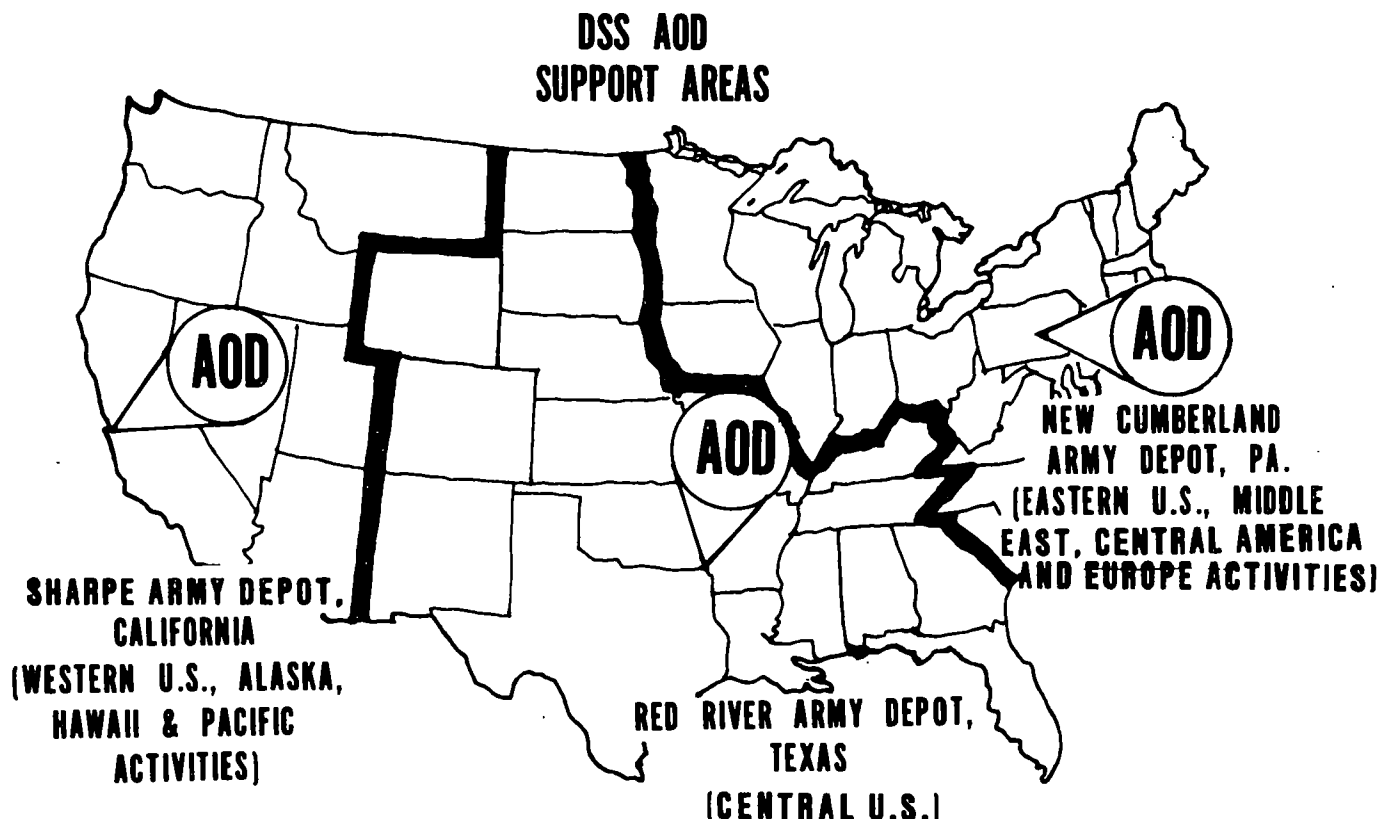


Figure 7-2. DSS AOD Support Areas

SEAVAN/463L pallet loads of DLA/GSA materiel for overseas shipment will be directed to the CCP for consolidation with Army-managed materiel. The containerized shipments will bypass the break bulk points/overseas storage activities and move directly to DSU's/drop points (exception: ISA MMC safety level replenishment requisitions). Shipment unit integrity by consignee will be maintained throughout the process. Not all units will have sufficient volume for economical utilization of direct container shipments. To provide the benefits of DSS to these units and attain maximum through-container service, logistics support plans will be designed to take advantage of clustering units for delivery service. Full-container loads may continue to be shipped to single consignees; however, to achieve full-container utilization, sequential loading or drop-point loading of a single container for delivery to multiple consignees will be used. The integrity of each SSA's shipment and associated documentation will be maintained in the containerized shipments. The container will be delivered in accordance with the in-country DSS distribution plan. High-priority requisitions PD 01-08 for air shipments will be loaded on minipallets (standard 40" x 48" pallets with plastic shrink film securing materiel to the pallet) when materiel is forwarded to a single supply support

activity or drop point. Materiel from more than one SSA or drop point is loaded on a 463L pallet with a divider between each SSA's or drop point's materiel.

d. The Logistics Control Activity is responsible for maintaining the logistics intelligence file for all Army requisitions. This file provides the management information necessary to monitor system performance and gain intransit visibility of supplies in the pipeline. Additional information relative to the data available in the file and the method of gaining access to this information may be obtained from the Logistics Control Activity or DA PAM 700-30.

e. Stockage at the overseas storage activities (Fig 7-4) is limited to war reserve and project stocks or an essentiality based safety level for those items not included in the reserve or project stocks that qualify for storage. The essentiality based safety level or war reserve and project stocks provide a surge tank to meet PD 01-03 and NMCS or to accommodate pipeline interruptions caused by acts of God, labor disputes, or interdiction in time of war. In CONUS the installation supply division's stockage will be limited to contingency stocks and those required to support non-DSS customers satellited on the ISD for support. Peacetime operating

DSS - CONUS FLOW OF REQUISITIONS AND MATERIEL

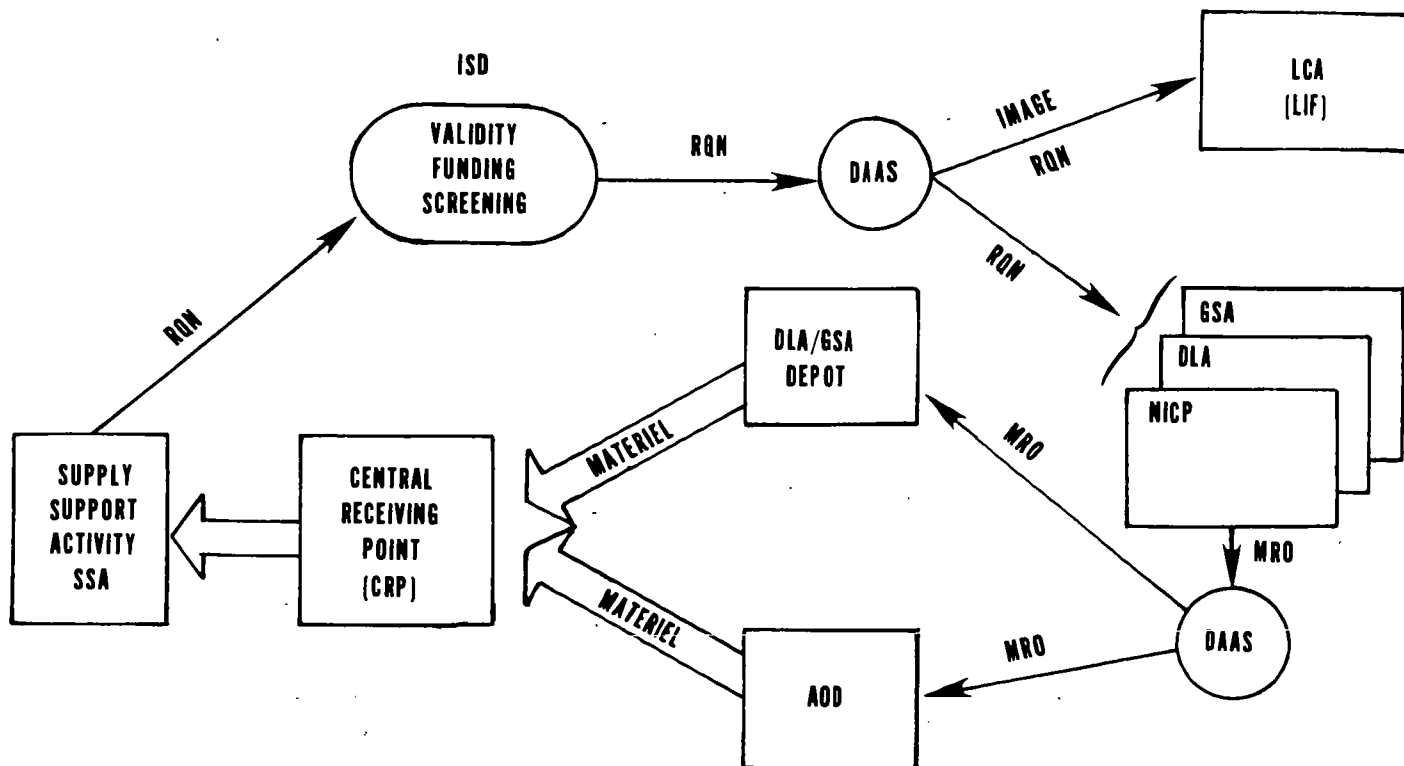


Figure 7-3. DSS-Conus Flow of Requisitions and Materiel

stocks for installations are authorized only to support non-DSS customers.

7-25. Airline of Communications (ALOC):

a. ALOC capitalizes on and is a further refinement in Direct Support procedures designed for Class IX repair parts. The goal of the ALOC is to provide medical and repair parts, in a 20-day order ship time (OST) items cycle, regardless of the priority designator on the requisition.

b. The flow of requisitions and material under ALOC is basically the same as under DSS. ALOC cargo is consolidated by unit at selected distribution depots on Air Force cargo pallets and moved by Military Airlift Command aircraft to the over-sea Aerial Port of Debarkation (APOD). The

APOD is given 1 day to deliver to the general/direct support level. This system is designed to operate on a 7-day week delivery cycle.

c. Transportation Priority 4 (TP 4), the use of airspace available transportation, reimbursed at surface rates becomes an integral part of the ALOC concept. The increased use of airlift will result in an increased allocation of airspace available transportation for retrograde cargo to CONUS. Priority on the use of retrograde air is to be given reparable items being returned to CONUS for overhaul/repair. Second priority is to be given excess reparable items being returned to CONUS stock.

d. Employing ALOC will make the medical items and repair parts distribution system much more responsive, thereby, enhancing the combat readiness of US Army elements overseas.

OVERSEA DSS SYSTEM

CONUS

OVERSEA
MMC

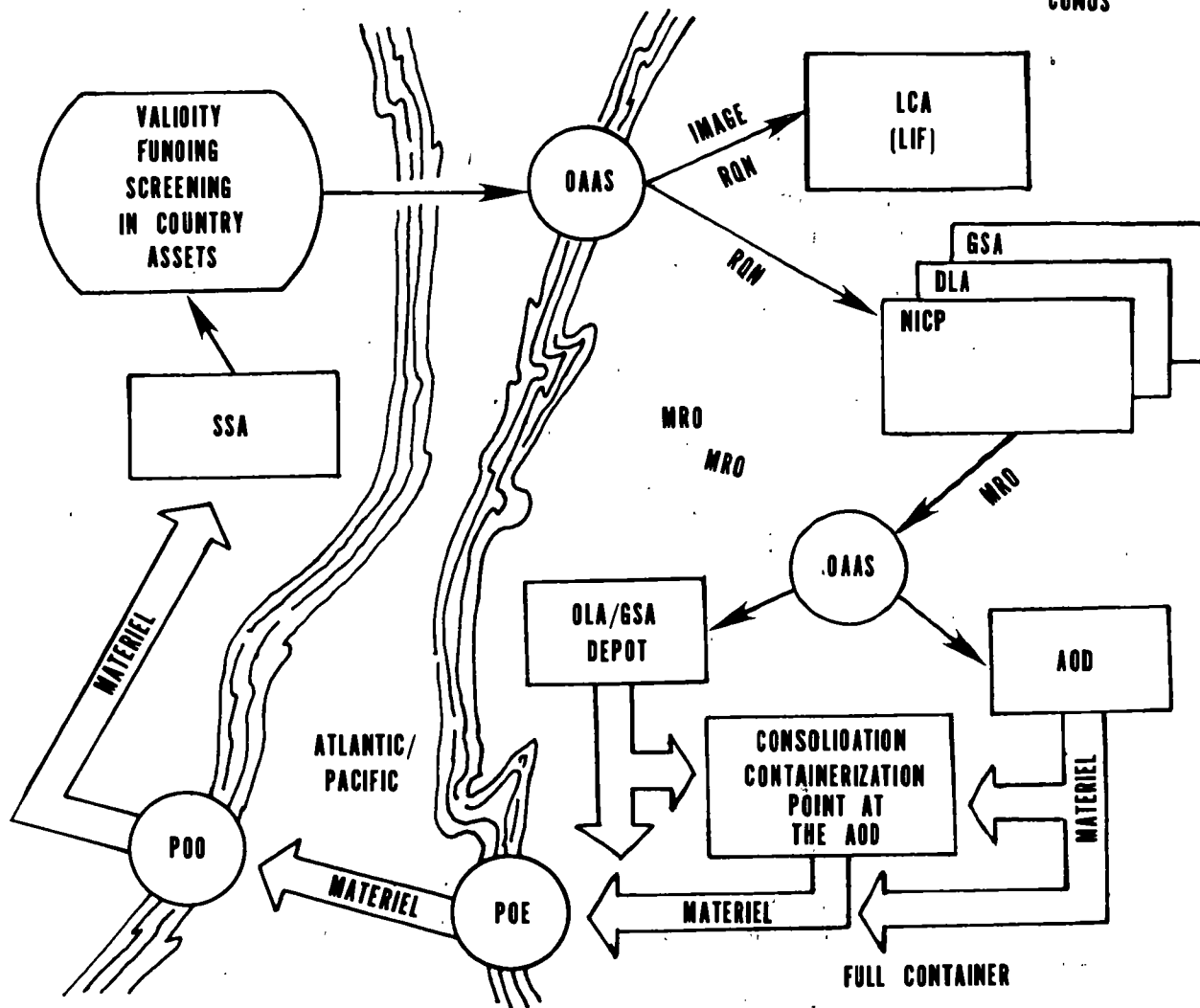


Figure 7-4. Oversea DSS System



CHAPTER 8

DEPOT MAINTENANCE MANAGEMENT

Section I. INTRODUCTION TO THE ARMY MAINTENANCE SYSTEM

8-1. Significance of Depot Maintenance Management in the Logistics System.

a. The maintenance function within the DA consists of servicing, repairing, overhauling, and modifying weapons and equipment. It is the largest of the functions embraced by the general term "logistics," and it is the largest consumer of resources. Shop facilities in which maintenance functions are performed range in size from as little as 1,000 square feet to more than 3,000,000 square feet. Maintenance activities are found wherever the forces of the United States are located.

b. Within the Department of the Army, the US Army Materiel Command (AMC) is assigned the responsibility for Budget Program (BP7M), Depot Materiel Maintenance and Support Activities. Nearly 42,000 persons are presently engaged in BP7M activities, worldwide. The depot maintenance program is often referred to as the "wholesale level" of maintenance logistics and is the area to which ensuing discussions apply.

c. The contributions of the maintenance program relative to supporting a desired level of unit and materiel readiness, is the prime reason why this area of logistics is significant and important. The fundamental purpose of logistics is to increase the combat effectiveness of the Army in the field. In this respect, the absence of a maintenance program or the existence of one that is ineffective, would result in an excess amount of inoperable equipment; an increase in equipment downtime; and the loss of essential firepower, transportation, and communications capabilities. When these conditions exist, the combat effectiveness of the item, the unit, or the organization is lost; and the responsible commander is unable to perform his assigned mission effectively.

8-2. Relationship of Maintenance Management to Inventory Management.

a. Inventory management, as explained in chapter 2, encompasses all areas of logistics. One of the goals of effective inventory management is to provide required customer support services at a

minimal cost to the Army. In conjunction with this goal the inventory manager is responsible for insuring that the interrelated functional responsibilities of the various logistical areas are properly coordinated and controlled. These interfaces and relationships are prominently evident between the various logistics areas; but the relationships with which the inventory manager is most concerned, insofar as his supplying required assets to customers, are those involving the logistics areas of maintenance and procurement.

b. One of the mission elements of inventory management is to determine materiel requirements for Army forces and to obtain the serviceable assets required. These assets are acquired in two ways—by new procurement and by the depot level maintenance program. Maintenance management, like procurement, is a mission element of inventory management; and the status of the depot level maintenance on existing equipment. Several factors are considered in the decisionmaking process. Among these factors are the following:

- (1) Procurement leadtime requirements as compared with overhaul inprocess time.

- (2) Original purchase price as compared with overhaul cost (including considerations such as projected life expectancy of both the new and the overhauled item).

- (3) Urgency-of-need considerations and the most logical and economical means of satisfying these needs.

- (4) Availability of funds as they relate to total materiel requirements.

- (5) Economic repair policies.

c. When factors such as limited funds, urgency-of-need, and reduced procurement leadtime are prime considerations in the acquisition of assets, the inventory manager relies heavily upon the depot level maintenance program to furnish the items required. In addition, the depot level maintenance program is one of the principal means by which the inventory manager maintains a required stockage level; and in many instances, it is the most effective means of insuring that materiel is available on a timely basis. By means of the maintenance program, leadtimes are reduced, funding requirements are lowered, and program coordination and control as required by inventory managers are enhanced.

8-3. Maintenance Principles and Concepts.

Maintenance principles and concepts delineate in broad terms the policies by which maintenance operations are governed. They designate who is to perform maintenance and how, when and where it will be performed; and they apply throughout item life-cycle management—from the earliest design phases of development through the disposal phase. Except for the function of requirements determination, the inventory manager is not directly engaged in the maintenance process. Because of his overall responsibility for managing the logistics program, however, being certain that the right item is at the right place at the right time, it is essential that inventory managers possess a general understanding of the concepts and principles that govern maintenance operations. This knowledge is necessary to the performance of a thorough analysis of the overall logistics function, an understanding as to where responsibilities for materiel maintenance management lie, a determination of the capabilities and limitations of maintenance logistical support, and an understanding of required interrelationships with the Army in the field.

a. Maintenance Principles. The basic principles of maintenance which are of interest to the inventory manager are:

(1) When maintenance is accomplished or planned, due consideration must be given to economy as it applies to pertinent resources.

(2) Continuous command emphasis must be placed on the prompt evacuation of reparable, unserviceable end items and components to direct support, general support, and depot maintenance facilities as appropriate. This emphasis is necessary to be certain that maintenance contributions to the materiel readiness program are made on a timely basis.

(3) Ordinarily, Table of Organization and Equipment (TOE) units will not be designated to perform as a primary mission more than one category of maintenance, direct support maintenance, for example. Specific exceptions, however, may be authorized by Headquarters, DA. These exceptions might involve special assignment, low-density equipment, and complex weapons systems; and they may require that a TOE unit perform more than one category of maintenance—direct support and general support, for example.

(4) Normally, Table of Distribution and Allowances (TDA) fixed maintenance facilities at installations are assigned combined direct and general support (DS/GS) maintenance missions in support

of units permanently located on the installation or satellited thereon. Items repaired may be either returned to the user or returned to the local supply system.

(5) Maintenance is accomplished in accordance with the applicable Maintenance Allocation Chart that is designed for each item of equipment. This chart prescribes the specific scope of maintenance authorized to be performed at each category of maintenance and engineered performance standards established for each maintenance task.

b. Maintenance Concepts. Basic maintenance concepts which are of interest to the inventory manager are as follows:

(1) *Repair parts supply.* Repair parts allowances and initial guide quantities to support maintenance missions are shown in appropriate technical manuals entitled "Repair Parts and Special Tool Lists" (RPSTL). Direct support TOE maintenance activities furnish repair parts to units they support; but normally, general support TOE maintenance units are not assigned a repair parts distribution mission. Repair parts are assigned to general support units primarily to support the assigned maintenance mission. In all maintenance categories, controlled cannibalization, when authorized, is used as a source of supply for specific repair parts and accessories.

(2) *Equipment records.* Accurate, required records of data generated by The Army Maintenance Management System (TAMMS) (DA PAM 738-750) must be kept by commanders at each appropriate command level.

(3) *Maintenance Assistance and Instruction Team (MAIT).* The MAIT program augments the commanders capability for providing maintenance and associated logistics assistance and instruction to organic, attached, and supported units. This program is designed to promote maintenance awareness at all levels and provides a means whereby technical expertise, not otherwise available within the organic resources of a unit or a supporting direct support unit, could be furnished individual unit commanders. This assistance helps commanders identify and solve problems which contribute to the inability of their units to meet readiness standards. Assistance and instruction teams stress the importance of proper care and operation of Army equipment and emphasize practical application of maintenance techniques and procedures for the individual soldier.

(4) *Contract maintenance.* Contract maintenance supplements the inhouse maintenance capability of the Army. Its principal application is in support of nontactical activities. Contract maintenance is not used when it precludes or jeopardizes

the Army's attaining and sustaining the military organic capability necessary to support mission-essential equipment.

(5) *Maintenance float.* A maintenance float consisting of end items or major components of mission-essential, maintenance-significant equipment is authorized for stockage by direct support, general support, and depot maintenance activities as applicable. Float items are used to replace unserviceable, mission-essential equipment (discussed in more detail in chap 7).

(6) *Maintenance standards.* Maintenance standards must be established for each major item of equipment. These standards specify the minimum condition to which an item must be restored to insure satisfactory performance for a specified period of service. Repair, overhaul, or some other maintenance function are the means by which the restoration is effected.

(7) *Maintenance expenditure limits.* Maintenance or repair expenditure limits are the means by which the economical reparability status of Army materiel is determined. Initially they are included in the maintenance support plan for the items; they are based upon maximum one-time repair costs and the projected or established life expectancy of the item.

(8) *Modifications.* Item modifications must be authorized by DA Modification Work Orders (DAMWO). The DAMWO is initiated by the agency assigned the logistical responsibility for an item, and it consists of authentic and uniform instructions for the alteration of materiel.

(9) *Reporting.* Each level of command, as appropriate, is required to report maintenance accomplishments and to submit these reports in accordance with TAMMS and other established policies and criteria.

(10) *Maintenance management.* Managing the maintenance function, using approved management techniques, is a responsibility of commanders at all levels. It includes the task of determining the scope of resource requirements and the judicious use of resources to accomplish maintenance objectives.

8-4. Maintenance Categories.

a. Effective management and operation of the Army maintenance system depends upon a well-knit, smoothly functioning organization that ranges from depots, where the highest level of complex repair and overhaul operations are performed, to units and organizations, where relatively simple preventive maintenance operations are performed. Mission responsibilities, mobility requirements, and organic capabilities are consid-

erations involved in designating the type or organization to which specific maintenance functions are assigned.

b. To facilitate the assignment of maintenance functions, the Department of the Army has classified maintenance functions into four levels: unit, direct support, general support, and depot. The maintenance support planner uses these maintenance categories as aids in relating maintenance operations to other military operations; providing bases for identifying organizations that perform specific maintenance operations; defining the degree of maintenance which can be performed by a unit, an organization, or a maintenance facility; and distribution resources in accordance with requirements. The specific mission responsibilities assigned to each specific category of maintenance are as follows:

(1) *Unit maintenance.* Unit maintenance is the responsibility of the unit commander. It is the means by which equipment is maintained at the required level of operational readiness. It includes both preventive maintenance services and the unit level repairs authorized in appropriate technical publications.

(2) *Direct Support (DS) maintenance.* DS maintenance pertains to the maintenance support which TOE and TDA maintenance activities provide to designated units within a specified area. Maintenance is performed on a repair-and-return-to-user basis, and unit maintenance repair parts are supplied by TOE, DS maintenance units to using units. In addition, DA maintenance activities may be assigned maintenance float which consists of mission-essential, maintenance-significant end items (for supported organizations) which may be floated for unserviceable like end items which cannot be repaired in a timely manner.

(3) *General Support (GS) maintenance.* General support maintenance is, normally, assigned to and performed by designated TOE and TDA maintenance units or activities in support of the Army area supply system. Except when assigned a direct support mission, GS maintenance does not have a repair parts distribution function. General support maintenance units receive equipment for repair and overhaul from direct support units, collection points, supply units, and other activities for which they are assigned maintenance support responsibilities. It constitutes the principal maintenance overhaul capability available to the field Army commander.

(4) *Depot maintenance.* Normally, depot level maintenance is assigned to and performed by either designated TDA industrial-type organic ac-

tivities or commercial contractors. The primary purpose of depot maintenance is to augment stocks of serviceable assets by repairing and overhauling, unserviceable ones which require maintenance that is beyond the capability of general support maintenance activities. In some instances, however, items undergoing depot maintenance are returned to the user—as is the case when certain

types of vessels undergo cyclical overhaul. Depot maintenance is usually accomplished in fixed shops and facilities that are Government owned and operated, Government owned and contractor operated, or contractor owned and operated. Depot maintenance normally encompasses one or more of the following work accomplishment functions: fabrication, manufacture, reclamation, and disassembly.

Section II. RESPONSIBILITIES FOR ARMY MAINTENANCE MANAGEMENT

8-5. Major Command Relationships.

a. Within the Department of Army, staff responsibility for the logistics function and, therefore, inventory management and maintenance function, is assigned to the Deputy Chief of Staff for Logistics (DCSLOG). The missions of other staff elements, however, have a great amount of influence on the maintenance effort. For a clear perspective of the maintenance management function and the responsibilities involved in its accomplishment, it is necessary to recognize these influences and the intrinsic command relationships which they generate.

b. The term "maintenance management" is often envisioned as pertaining solely to the performance of a work operation. This viewpoint, however, is restrictive, and is not completely valid. Maintenance is one of the many actions involved in item life-cycle management. Before maintenance can actually be performed, determinations are made as to the type of warfare to be waged, the kind of equipment and materiel required to support the combat effort, ways and means of acquiring materiel, and both the types of skills and the qualifications of personnel required to operate and to maintain materiel assets. Three major commands and Total Army Personnel Activity (TAPA) are responsible for making these determinations. TAPA is responsible for providing both the officers and the enlisted men required for Army operations: the U.S. Army Training and Doctrine Command (TRADOC), for establishing doctrine as to how the Army will fight and what kind of equipment is required; AMC, for providing and maintaining the materiel required to support Army operations; and TRADOC, for accomplishing the training mission of the Army. In addition, pertinent communication media must be established and facilities must be made available. In the area of maintenance management, these command functions are interrelated and interdependent. These interrelated functions must be formed into a well-organized, integrated system which insures the timely availability of resources and

their maximum utilization. This will allow the development of a maintenance system which provides effective support to Army operations.

8-6. Department of the Army Responsibilities for Maintenance Management.

The objectives and operations of the Army maintenance management program are profoundly affected by national policy-level decisions made by the President and Congress and transmitted through channels to the Department of Defense and then to the Department of the Army. Specific maintenance policies for the Department of the Army, however, are formulated under the direction of the Secretary of the Army. These policies are discussed in detail in FM 750-80. A brief review of those of primary concern to the inventory manager follows.

8-7. Deputy Chief of Staff for Logistics (DCSLOG).

a. Within the Office of the DCSLOG, the Directorate for Supply, and Maintenance acts for the DCSLOG in matters pertaining to the Army worldwide supply, and maintenance system. Specific functions of this responsibility are assigned to the Supply Division and Maintenance Division within the Directorate of Supply and Maintenance.

b. The Maintenance Division is responsible for developing and promulgating Department of Army policy applicable to the maintenance and to readiness of Army materiel. In conjunction with this responsibility the director coordinates and exercises General Staff supervision over the Army Maintenance System. This staff supervision includes coordinating and supervising materiel readiness functions related to programs which support international logistics, programing and budgeting actions, mobilization planning for maintenance, and career field programs pertinent to maintenance management.

c. The Supply Division exercises General Staff supervision over policies and procedures which govern the supply distribution system and require-

ments determination for major items, secondary items, and repair parts.

8-8. U.S. Army Materiel Command (AMC).

AMC has overall responsibility for managing the materiel and related services required by the Army. This responsibility includes maintenance management as it applies to BP7M (Depot Materiel Maintenance Support Activities); and in executing this responsibility, the Command of AMC reports to and receives instructions from the Chief of Staff, U.S. Army. Because of the interdependent relationships which exists between logistics elements, each directorate within AMC has an interest in the management of the maintenance function. However, the Director for Materiel Management is the most directly involved. Its primary missions are:

- (1) To direct and control budget programs for Operations and Maintenance, Army (OMA) Program 7, BP7M (Maintenance) and BP7S (Supply).
- (2) To establish policy and provide guidance for materiel requirements determination for acquisition, overhaul, retention, replacement, and disposal.
- (3) Preparation of the OPS Form Exhibits.
- (4) Establishing maintenance float and repair parts replacement factors.
- (5) Establish policy and provide guidance for depot maintenance mobilization planning.

8-9. AMC Major Subordinate Commands.

a. Within the AMC complex are six major subordinate commands (MSC) responsible for materiel readiness. These MSC's are responsible for either the total or the integrated management of specific commodities or materiel groupings. This responsibility includes depot level maintenance management. Among the maintenance responsibilities assigned to these commands are the following: maintenance support planning, to include the provisioning of initial repair parts, test equipment, and materials handling equipment; the preparation of equipment publications; technical assistance requirements; national maintenance contracting; requirements computation; and depot maintenance program direction.

b. A national maintenance point (NMP) is established within each MSC. The NMP (or Director of Maintenance) functions as a coequal entity with the National Inventory Control Point (NICP). Actually, the NMP is the key to the success of the maintenance management program of AMC. Even

though its activities are influenced to a considerable degree by the requirements of the NICP, the NMP has both maintenance and technical responsibility, worldwide, for a specific commodity or group of commodities. In addition, it is responsible for providing to the Army depots with specific working-level direction relative to the maintenance support required for the commodity group. The major functions of the NMP are in the areas of maintenance engineering, support planning, publications, and technical assistance; therefore, the responsibilities of the NMP for a particular item or commodity continue throughout the life cycle of the item. The NMP and the NICP, because of the interrelationship of their missions, must closely coordinate their maintenance functions. This coordination is necessary to be certain that the technical and administrative resources required to meet the needs of the equipment user are available and programmed properly.

c. Currently, there are 19 depots and depot activities within the complex, including depots in Germany. These depots function under the control of the Commanding General, U.S. Army System Command (DESCOM), one of the major subordinate commands of AMC. Generally, the maintenance missions assigned to these depots encompass the following functions: fabrication/manufacture and reclamation/disassembly. A depot may be assigned maintenance workloads relative to one or more commodities. The present trend for workloading, however, is based upon the "Prime Depot Concept." Under this concept, each National Stock Numbered item programmed for depot maintenance is assigned to a prime depot which will usually handle all of the depot maintenance on that item until its capacity is reached. If the depot maintenance requirements exceed the prime depot's capability a secondary and possibly a tertiary depot may be assigned to handle the program. The Army depots assigned a depot maintenance mission are as follows:

- (1) Anniston Army Depot.
- (2) Corpus Christi Army Depot.
- (3) Letterkenny Army Depot.
- (4) Lexington Blue Grass Army Depot Activity.
- (5) Mainz Army Depot.
- (6) New Cumberland Army Depot (AOD).
- (7) Ober Ramstad Army Depot.
- (8) Pueblo Army Depot Activity.
- (9) Red River Army Depot (AOD).
- (10) Sacramento Army Depot.
- (11) Seneca Army Depot.
- (12) Sierra Army Depot.
- (13) Tobyhanna Army Depot.

(14) Tooele Army Depot.

d. In addition to depots, other activities such as arsenals and plants are assigned depot maintenance missions. A considerable portion of the maintenance mission at these activities pertains to demilitarization and surveillance functions. Among the activities of this category are Rock Island Arsenal, Joliet Army Ammunition Plant, Iowa Army Ammunition Plant, Pine Bluff Arsenal, and Rocky Mountain Arsenal.

e. Command and control authority over the AMC depots has been assigned to HQ DESCOM.

Section III. PLANS, PROGRAMS, BUDGETS, AND FUNDS FOR DEPOT MAINTENANCE

8-10. Relationship of Plans, Programs, and Budgets.

Plans, programs, budgets, and funds provide the framework by which concepts and mission functions evolve into operations. They are inextricably linked; and together they provide the means by which strategic, tactical, and organizational concepts; technological forecasts; and intelligence estimates are developed, examined, and adopted. Plans are broad, and generally they project objectives up to 20 years into the future. Programs evolve from plans, and usually they provide detailed data for the first 5 years of the planning cycle and general data for the succeeding 3 years. Budgets, normally, are prepared in detail and reflect the resources required to support the program during the budget year. A detailed discussion of DOD and DA plans and programs is given in chapter 4. The application of these programs to maintenance management is presented in detail in FM 750-80, Army Wholesale Maintenance Management. It is essential that the inventory manager understand the maintenance management

The mission includes responsibility for managing and executing the Worldwide Asset Data Evaluation Program and performing reconciliation and evaluation for Army Workload Assets; assisting in managing Procurement Appropriation (PA) major items and selected secondary items by operating and maintaining the Army logistics data base for PA items; managing, allocating, and controlling funds to operate and maintain the depot system. HQ DESCOM is responsible for depot maintenance mobilization planning and workload distribution.

application and the funding concepts applicable to them.

8-11. Army Five-Year Defense Program.

Within the Army Program System, the Army Five-Year Defense Program (FYDP) has the greatest significance to the depot maintenance program. The FYDP forecasts for each year of the 5-year period the description, the quantity, and the cost of items required to support the Army Force structure. Initial requests and justifications for program operating funds are based on this program.

8-12. Exhibit OPS 25 Forms.

The Exhibit OPS 25 Forms are major documents used in developing the depot maintenance portion of the Army FYDP. The U.S. Army Depot System Command is responsible for their consolidation. The OPS 25 Forms cover a period of 5 years and show the present supply status of major items of materiel and the proposed use of BP7M funds and other resources to satisfy requirements.

Section IV. DEVELOPING AND EXECUTING THE DEPOT MAINTENANCE PROGRAM

8-13. Determining Requirement.

a. As discussed in Chapter 5 one of the primary mission responsibilities of the inventory manager is to determine what portion of a total asset requirement will be satisfied by means of the depot maintenance program.

b. To determine asset requirements for the depot maintenance program, the inventory manager must ascertain the number of standard assets available, worldwide, for each item and must relate this number to the gross requirements for the item. This determination is accomplished

periodically by means of:

- (1) The Army Materiel Plan for major items.
- (2) Item Management Plan (Supply Control Studies).

These studies include an analysis of stock status reports submitted by depots, overseas commanders, major Army CONUS commanders, and other reporting agencies. In conjunction with the review and analysis of these studies, the NICP considers factors such as combat losses, real or anticipated; losses incurred during training routines; prescribed stockage levels; materiel in transit from

one place to another; availability of substitute items; Class IV (special project) requirements; recurring and nonrecurring demands for components and accessories as reflected on depot maintenance parts requirements list (DMPRL); and float requirements. Included in the data contained in the Army Materiel Plan and Supply Control Studies are the total number of assets in the inventory. In addition, these assets are identified as being serviceable or unserviceable but economically repairable. Assets considered as prime candidates for the depot maintenance program are the unserviceable ones classified under condition codes "F" or "M." Code "F" pertains to unserviceable but economically repairable materiel which is in the possession of the using activity. Code "M" pertains to unserviceable but economically repairable materiel which has been submitted to a depot maintenance facility for processing and identified as such on the inventory control records of the using activity.

8-14. Planning the Target-Year Workload.

a. The planning cycle as it pertains to the target-year workload for BP7M actually begins 14 months prior to the year the program is to be executed. The first stage in this planning cycle is the designation of requirements to be satisfied by the depot maintenance program. Generally, worksheets are used to transmit requirements data from the NICP to the NMP. These worksheets identify by nomenclature and National Stock Number those economically repairable assets which comprise the depot maintenance program. In addition, the worksheet contains overhaul costs, economic repair limitations in terms of years and dollar percentages, customers, priorities, and any other information required to initiate programing and scheduling actions for Budget Program 7M. Also, these data and information are used to complete Procurement/Work Directives (PWD). A Procurement/Work Directive is prepared for each item for which an overhaul program for a specific depot is planned.

b. National maintenance points are responsible for furnishing PWD's to DESCOM where data from the PWD is developed into individual Depot Master Plans. These plans are forwarded to the applicable depot or maintenance activity. The plans also show program delivery dates recommended by the item manager. Depot maintenance facilities analyze the plan, annotate it to reflect acceptance or recommended adjustments to program requirements, and return the marked up plan to DESCOM. From the marked up plans,

DESCOM prepares a tentative Depot Maintenance Plan.

c. In conjunction with the review, depot mark-ups of the Master Plan are analyzed, maintenance requirements are updated, and workload projects are adjusted. As a result of the actions, a firm depot maintenance program is established and provided to NICP representatives, both supply and maintenance. Based on this firm program, inventory managers amend the initial PWD's and submit them to DESCOM. These PWD's constitute the basic asset requirements to be provided through BP7M. These requirements are adjusted continuously as dictated by changes in program elements such as funding guidance, force requirements, asset availability, and performance capabilities.

d. Work Authorizations (WA's) are prepared by DESCOM and are based on data shown on the amended PWD. They contain specific program information such as the work to be performed, the authority to perform it, the applicable technical standards, the number of assets on hand, and the support materiel required to accomplish the program. For Army Industrial Funded activities, the WA is also a funding document. Actually, a WA is an agreement by one party to perform work for another in accordance with stated specifications. In this sense, it is very much like a contract. DESCOM issues work authorizations to the performing maintenance activities. These activities either accept the program as it is shown or mark up the WA to show adjustments required to being the program within the capability limits of the activity. Depot maintenance activities are allowed to accomplish only those programs for which Work Authorizations authenticated and issued by DESCOM are received.

8-15. Programming and Scheduling Depot Maintenance.

a. Development of Depot Maintenance Requirements.

(1) The process for developing depot maintenance requirements is presented in FM 750-80. The MSC's develops the gross AMP, reviews the gross maintenance requirements with regard to their supportability, and forwards the requirements to DESCOM for further analysis. DESCOM evaluates the organic depot maintenance requirements. The appropriate MSC also performs economic analyses to determine the means of accomplishing the maintenance workload by making comparisons and trade-offs among alternative sources considering cost, schedule, and performance.

(2) The DA level depot maintenance Budget Manpower Guidance (BMG) utilized in the preparation of the depot maintenance requirements is promulgated by DA DCSLOG to HQ AMC. AMC utilizes this guidance to develop the net depot maintenance requirements, which are forwarded then to the appropriate MSC for finalization of the requirements data portion of the AMP.

b. Detailed Information Flow of the Major Item Depot Maintenance Process.

(1) As indicated in the previous section, the planning program for depot maintenance begins with the input of the gross requirements from the AMP. The MSCs develop program requirements from the gross materiel requirements within the existing funding constraints, and transmit the planned program via BT cards (automated maintenance data transmission information) to DESCOM which develops the depot capacity and capability. The BT series cards present detailed statements of depot requirements for the coming fiscal year.

(2) DESCOM runs the input from the MSCs against the depot capacity and capability data and workloads the depot for both the planning out years and the execution year. The depots then accept, reject, or mark up the programs and return them to DESCOM. MSC's are notified by DESCOM of the latest depot workload. DCSLOG and AMC representatives meet to review/revise maintenance plans. The basic input to this meeting is the set of initial planning estimates of materiel requirements to be satisfied by depot maintenance. At this meeting, representatives measure the tentative depot maintenance plans against original materiel requirements; changes to those requirements, financial guidelines, and procurement plans. The result of these reviews is a refinement of the 5-year depot maintenance planning base.

c. The Depot Workloading Process.

(1) The detailed procedures represent the depot workloading process performed in the maintenance planning phase. The preparation by the MSCs commands of the BT-series cards which are forwarded to DESCOM, generates workloads for the depots. As indicated in the discussion of the detailed flow chart, both the major subordinate commands and DESCOM receive the BMG financial guidance that is generated as a result of the DOD/DA budgetary planning process. The MSCs prepare their maintenance programs to be in agreement with this financial guidance. In addition, DESCOM also reviews the programs to see that they are in agreement with the BMG. If any deviations are found, the BT cards are returned to the MSC for correction.

(2) As a part of the planning process for depot

maintenance, prime and secondary depots will be designated by DESCOM and AMC. As used here, "primary" refers to the most cost-effective depot facility and "secondary" refers to the next most cost-effective depot facility. These designations are made on the basis of lowest time/overhaul cost for the system and other significant factors.

(3) DESCOM, using the depot maintenance requirements, the priorities, the designations of the primary and secondary depots, and known constraints on manpower and funding, prepares the depot workloads that are used as input to the Exhibit OPS 25 Forms.

(4) Depot workloading for planning years is accomplished by using the constraints of manpower, equipment, and facility limitations. There is an implicit cost constraint, since the only programs used to develop the workload are those which are in accordance with the funding constraints of the BMG. The primary depot is loaded first and then the secondary depot. DESCOM assumes acceptance of planning workloads.

(5) For the execution year, the workload is generated by DESCOM. Each February, prior to the execution year, DESCOM will transmit the execution year workload on BT-series cards for initial action. Once the depot workloads for execution year are generated, the depots can accept, reject, or mark up. If a depot accepts the program, DESCOM is so notified. When a depot rejects its portion of a program, DESCOM is informed of the rejection and the reason for it. DESCOM also informs the MSC of programs which cannot be completed (e.g., rejects) so the command can re-evaluate its requirements.

(6) A third possible result of the depot's review of the execution maintenance program is a markup. The only portion of the plan the depot is permitted to modify is the unit maintenance funded cost. The proposed cost is submitted to DESCOM. Once a price has been agreed upon by the depot and DESCOM, the price is "fixed" and cannot be changed for the life of that program, unless the customer changes the maintenance specifications or compresses the production quantity 3 or more months. If either of these exceptions occur, the depot may negotiate a "new" fixed price with DESCOM.

d. Budgeting.

(1) At the DA level, the depot maintenance plans are combined with the procurement plans (AMP) as a part of the total Army budget preparation process. At the same time the DOD/DA review of the depot maintenance program plans for the budget execution year is occurring, these plans are undergoing detailed refinement within AMC.

(2) Once Congress approves the budget, DA reviews the budget and manpower guidance, forwards the guidance to AMC who, in turn, notifies the MSC's and DESCOM of changes in the planned program.

(a) With the refined program input from the MSCs, DESCOM reworkloads the depots and sends a magnetic tape of planned program to the depots and the MSC. The depots refine their programs in the DESCOM Depot Maintenance Data Bank.

(b) The DOD/DA path of the apportionment planning cycle begins when the Congress approves the DOD budget. Based on the Congressional appropriations, DOD makes apportionment decisions and forwards them to DA. DA and AMC in turn, make more detailed apportionment decisions which result in the allocation of the Army budget to the various programs. The maintenance programs are refined by the MSCs in accordance with the funding constraints.

(c) A final review of the depot maintenance plans for the coming year is made by DA and AMC. Any changes needed in the plans to bring them into line with the apportionment decisions are made, and the MSCs are informed of the changes. The MSCs, in turn, update the DMDB to reflect the latest program revisions. Once again DESCOM workloads the depots, and the depots reschedule their work in light of these changes.

8-16. Parts Forecasting.

a. Parts forecasting is one of the most important functions of the depot maintenance management effort. Determining end item overhaul requirements is relatively predictable; but accurately forecasting repair parts requirements is difficult and often impossible, unless a complete teardown and inspection of the item to be overhauled is performed. The age of an item, the environment in which it is used, its operator, and a number of other variables combined to make unique the usage history of each item entering the depot maintenance shops.

b. The estimated number of repair parts, components, and accessories required for an overhaul program is based on recurring and nonrecurring demands. The demands are established as Depot Maintenance Requirements Levels (DMRL). The NMP of each MSC is responsible for consolidating specific item levels reported by the individual depot or overhaul facility and transposing resulting totals into consumption rates. These rates are transmitted to the inventory manager who, by applying them to the applicable end item, computes worldwide repair parts requirements.

c. Procurement action for repair parts required to support maintenance programs for a budget year is initiated during the current year. These requirements are based upon the funded part of the BP7M. Procurement is initiated far enough in advance of the program year to allow for procurement leadtime and other related time-consuming actions; and to insure that parts are delivered to the performing activity at least 90 days before the repair or overhaul program is scheduled into the shop. As a minimum, quantities delivered must be large enough to support maintenance schedules for at least one quarter. Procurement action is the responsibility of the item manager and includes all repair parts required, regardless of which NICP or DOD management activity has inventory control of the required repair part. Repair parts procured or acquired for worldwide maintenance programs are pre-positioned, insofar as practical, at a storage location close to the depot maintenance facility at which maintenance will be performed. Should the supply manager be unable to obtain the number of repair parts required, the planned overhaul quantity of end items reflected on the PWD is reduced proportionately. DESCOM accepts PWDs with the assumption that repair parts will be available when required. This assumption is based upon the DA policy which states that maintenance will not be programmed unless parts are either on hand or ordered in time to be certain that they are available at depot shops or contractor plants in time to satisfy production schedules.

8-17. Generating Assets.

a. Comparable to the value of repair parts to an overhaul program is the availability of unserviceable assets. Without either repair parts or unserviceables, the program cannot be accomplished. In recognition of this requirement, unserviceable asset turn-in schedules are established. These schedules, or turn-in forecasts as they are sometimes called, are reviewed by item managers, DESCOM, and AMC 90 days prior to the start of the execution quarter. As a result of this review, Procurement/Work Directives and Work Authorizations are updated.

b. When it appears that unserviceable assets will not generate in accordance with unserviceable distribution schedules, the commander of the applicable depot maintenance activity is responsible for making this status known to the item manager. The item manager, in turn, is responsible for taking whatever actions are necessary to expedite the turn-in of unserviceable repairable assets.

When the user fails to react to the expediting actions, the item manager refers the problem to HQ, AMC for disposition.

c. The NICP's, under the direction of AMC, have established automatic-return time standards for intensively managed items and some others

Section V. REPORTING DEPOT MAINTENANCE ACCOMPLISHMENT

8-18. Management Data.

a. The term "management data" as used in this discussion pertains to the information which a system generates during day-to-day operations. This information is reflected in reports of various types and is used by inventory managers and maintenance managers to determine program performance levels.

b. Management data serve many purposes. When made available on a timely basis, they are indispensable to effective life-cycle management of systems and equipment. These data are required to conceive, define, develop, test, and acquire materiel; and, in addition, to maintain and support it properly. Too, they provide inventory managers and maintenance managers with the information required to evaluate the readiness-availability status of equipment, the adequacy of resources, and the cost-effectiveness of maintenance operations. By carefully analyzing management data, managers are able to isolate problem areas and to make adjustments necessary for improvement.

c. The Army Maintenance Management System (TAMMS) (DA PAM 738-750), which is discussed in detail in FM 750-80, Army Wholesale Maintenance Management is the prime source of data used in maintenance management operations. Two of the principal reports generated by TAMMS, the Equipment Improvement Recommendation (EIR) and the Modification Work Order (MWO), influence the requirements computations of the inventory manager and help to determine the workload of depot maintenance facilities. In many instances depending upon the urgency-of-need, units may not be able to use equipment until required improvements or modifications have been made. When these conditions exist, the item manager must ascertain whether the time frame within which

that either require cyclical overhaul or have been classified as unserviceable but economically repairable. Instructions for the automatic return of these items to designated depot maintenance facilities in CONUS are published in the ARIL provided by CDA.

equipment is required is compatible with the time frame within which it can be made available. On the basis of this analysis, he determines whether new procurement or depot maintenance is needed to satisfy requirements on a timely basis. Other factors, such as the capabilities of organic facilities, are also considered. In addition to the EIR and the MWO, other reports such as the Program Status Report, Capability Study, and the Army Equipment Distribution Plan play prominent roles in the mission functions of the inventory manager and the maintenance manager. How these reports influence mission functions is explained in the paragraphs that follow.

8-19. Program Status Report.

A program status report (PSR) is a current account of the transactions and status of the depot maintenance programs assigned to a performing activity. Each maintenance activity to which work authorizations have been issued is required to furnish to DESCOM each day, or as events of significance happen, a report on official authorized programs. Cost information, except that pertaining to national contracts, is reported as of the 15th day and the last day of each month. National contract cost information is reported only on the last day of each month. The report is by line item and contains production data and cost data as appropriate. The production data reflects the asset position of the item in terms of authorized quantities, planned quantities, completions, schedule information, and the number of direct labor man-hours expended. The cost data reflect total planned program cost, costs incurred to date by cost element, work-in-process costs, acquisition value of completed quantities, funded costs of onhand and scheduled turn-in quantities, and direct labor man-hours costs.

CHAPTER 9

MANAGEMENT OF EXCESS AND SURPLUS PROPERTY

Section I. THE DEFENSE PERSONAL PROPERTY UTILIZATION AND DISPOSAL PROGRAM

9-1. General.

a. Logistics managers must constantly face the task of balancing supply and demand. Excesses of some items of supply due to such factors as obsolescence, miscalculations, and overly conservative safety levels is inevitable. Despite the inevitability of excesses, good management practices can reduce the magnitude and increase the economic return through reutilization.

b. A clear understanding of the distinction between excess and surplus property is essential to this discussion. Excess property is the quantity of property in possession of any component of the Department of Defense (DOD) which exceeds the quantity required or authorized for retention by that component. Surplus property is any excess property not required for the needs and for the discharge of the responsibilities of all Federal agencies, including the DOD, as determined by the General Services Administration (GSA).

9-2. Objectives.

Personal property (including scrap) will be disposed of in a manner which will insure maximum Federal utilization through withdrawal or transfer; permit authorized donation to satisfy valid requirements; obtain optimum monetary return to the Government for property sold; and minimize the need for abandonment or destruction. The procedures, codes, and uniform formats of the Military Standard Data Systems, Military Standard Requisitioning and Issue Procedures (MILSTRIP), Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP), etc., will be used on the maximum extent possible in all property disposal transactions. Precious metals bearing scrap and end items containing precious metals will be disposed of in a manner which will insure cost-effective disposition and recovery of precious metals when economically feasible under the Precious Metals Recovery Program.

a. As a general policy, property once advertised for sale will not be withdrawn. Exceptions to this general statement will be permitted only when property involved is required in support of approved Government programs, and the action determined to be in the best interest of the Government.

b. To achieve these objectives, disposal programs should be integrated with other logistics programs. Research and development, inventory management, distribution management, maintenance management, and procurement and production management all have a direct relationship to disposal programs. In most instances, introduction of new major items of materiel will result in similar items being declared obsolete. Planning for the gradual phaseout of materiel being replaced is essential to preclude large quantities of excess.

9-3. Authority and Responsibilities.

a. The Federal Property and Administrative Services Act of 1949, as amended, (Act of 30 June 1949, 63 Stat. 388, 40 U.S.C. 471) assigned responsibility for the overall supervision and direction over the disposition of domestic excess and surplus property to the General Services Administration. The act further assigned the responsibility for supervision and direction over the disposition of DOD foreign excess property to the Secretary of Defense. The Administrator of the General Services Administration has delegated to the Secretary of Defense the responsibility for the disposition of domestic excess and surplus property generated by DOD.

b. The Secretary of Defense has assigned responsibility to the Director of the Defense Logistics Agency (DLA) for the overall worldwide management of the Defense Personal Property Utilization and Disposal Program in the role of integrated program manager. Accordingly, HQ DLA, is responsible for the development of policies relating to this program and the development of systems, techniques, and procedures as may be appropriate. In its role as the integrated program manager, DLA will:

(1) Promote maximum utilization of excess, surplus, and foreign excess personal property.

(2) Establish/disestablish defense personal property utilization and disposal organizations under the control of DLA and coordinate such action with the appropriate military services and other DOD components when it will affect the disposal support currently being provided their activities.

(3) Administer the Surplus Personal Property Program as it applies to approved donations to service educational activities. This includes such

actions as prescribing procedures, development of donation agreements, and processing requests to higher authority for deviation from formal agreements.

(4) Insure maximum compatibility between documentation procedures, codes, and formats used in property disposal systems and the military standard systems.

(5) For sales involving reimbursement to owning activities and programs (e.g., Military Assistance Program (MAP), review the relationship of sales proceeds to disposal expenses for the purpose of recommending to the Office of Assistant Secretary of Defense (OASD) (Comptroller) the percentage of proceeds to be used or other method to be used in establishing estimated expenses that will be deposited to the Deposit Fund Account in conjunction with processing this type of disposal property.

c. The Secretary of Defense has assigned the military services responsibility for the following:

(1) Provide assistance to the Director, DLA, upon request, in the resolution of mutual problems within the Defense Personal Property Disposal Program.

(2) Promote maximum utilization of excess, surplus, and foreign excess personal property.

(3) Provide support to tenated Defense Reutilization and Marketing Region Offices and Defense Reutilization and Marketing Offices (DRMO); and their offsite branch, in consonance with applicable interservice support agreements.

(4) Identify items requiring demilitarization and, as applicable, accomplish demilitarization of those items which cannot be physically accepted by a DRMO in accordance with DOD policy. Reutilization does, however take priority over demilitarization.

d. To carry out its responsibilities in relation to excess and surplus personal property, DLA established the Defense Reutilization and Marketing Service (DRMS) as its primary field activity to perform program management and staff supervision of the Defense Personal Property Utilization and Disposal Program, consisting of five Defense Reutilization and Marketing Regions (DRMR) and assigned the DRMRs the DRMOs worldwide.

e. DOD activities generating precious metals bearing property and scrap and waste materiel will normally turn in all excess to their servicing DRMO.

9-4. Excess Declaration and Reporting.

a. The logistics manager constantly faces the task of purging the inventory of stocks that are excess to current needs or foreseeable require-

ments. Realizing that it is costly to maintain an inventory larger than needed to support using units, supply managers at all levels must determine what portions of stock in long supply (that is, in excess of the quantity authorized or required to be on hand) can be economically retained for future use or reported as excess. It should be emphasized that the inventory manager is concerned with materiel in the possession of using units as well as stocks on hand in supply installations, particularly materiel that must be reported to the appropriate materiel management center overseas or national inventory control point (NICP) within CONUS for disposition instructions when no longer needed by the user.

b. Management tools are available to the inventory manager to assist in predicting excesses. Excesses can be predicted by an economic retention formula which shows at what period the cost of retaining an item is equal to the cost of disposing of it and reprocurring it at a later date. Retention costs include such elements as cost of storage space, care and preservation, cost of issue, transportation, deterioration, and obsolescence. In addition to cost factors, consideration should be given to future utility and essentiality of the item, the effect of retention on procurement of more modern materiel, and capability of procurement and procurement leadtimes.

c. The excess declaration and reporting of automatic data process equipment is governed by DOD 4160.19M, Defense ADPE Reutilization Manual.

9-5. Reporting Channels in the Continental United States.

a. As a rule, excess property in the hands of units at CONUS installations is reported to the accountable officer serving that activity. Excess property at CONUS installations will be reported by the accountable officer to the appropriate NICP for disposition instructions. Excess property will be reported in accordance with procedures outlined in AR 725-50. The rationale for reporting through accountable officers and NICP's is sound in that it permits maximum utilization at the local level and lateral redistribution as opposed to backhaul.

b. Upon receipt of reports of excess, the NICP screens items to determine if the excesses can be used to fill outstanding requisitions or are needed for depot stocks. Appropriate disposition instructions should be provided to the reporting installation as expeditiously as possible, as retention cost could soon exceed potential savings from utilization of some items of materiel. When it is determined that reported excess property is needed for depot stocks, an effort should be made to deter-

mine if the property can be stored at the reporting installation to preclude unnecessary handling and transportation cost, since this cost could also equal or exceed potential savings where significant distances are involved.

c. When the NICP determines that the reported property is excess to the needs of the Army, the reporting accountable officer will be instructed to transfer the property to the DRMO. Major commands should promptly review listings of excesses that are to be transferred to the Defense Reutilization and Marketing Office to determine if utilization within the command is warranted.

9-6. Reporting Channels in Overseas Theaters.

a. In the overseas theaters, it is important that excess and disposal operations be closely tied to both maintenance and supply operations. A large amount of excess property overseas is generated through maintenance operations and, conversely, proper management of excess property will reduce the maintenance workload. Since the primary objective of any disposal program is maximum utilization, overseas supply managers must have knowledge of disposal programs at all levels, since they can serve as a source of supply.

b. Using units in the forward areas of active theaters normally turn in excess property to supporting direct support or general support units as prescribed by theater regulations. Maximum utilization will be enhanced by prescribing that excess

property be returned through the supplying unit prior to actual movement whenever the tactical situation will permit. This increases the probability of lateral utilization while decreasing expensive backhaul and multiple handling. Property that is excess to the needs of the direct support and general units is reported to the appropriate theater materiel management center.

c. In the rear areas of overseas theaters, collection and classification companies generate large amounts of potential excess property through their recovery and cannibalization programs. Such property is reported through the materiel management centers for disposition instructions.

d. As a general rule, excess property with line item value of \$50 or more located in overseas theaters will be reported by overseas inventory control centers to the appropriate national inventory control point (NICP) for disposition instructions. Experience has shown that the cost incurred in reporting excess property of lower value generally will exceed the return. As an exception, an NICP may require reporting a specific item with a line item value of less than \$50. NICP screening of excess reports from overseas theaters is similar to that described above for CONUS installation excess reports. However, since potential savings in transportation cost are quite significant, more emphasis is given to lateral redistribution among theaters. Once the NICP manager determines the property is excess to his requirements, the overseas command is directed to transfer the property to the appropriate DRMO.

Section II. SCREENING OF EXCESS PROPERTY

9-7. Reportable Criteria.

a. After property has been transferred to the DRMO, it is DOD policy to encourage all Government agencies to use the materiel in lieu of new procurement, all property becoming excess is not centrally screened for utilization. To assist the logistics manager in the field, criteria for determining what property is reportable for centralized utilization screening have been developed. Generally, these criteria are based on the amount of utilization accomplished within each Federal supply class or group of property that has been subjected to screening, with due consideration being given to the cost involved in effecting the screening. The criteria referred to above stratify excess property as follows:

(1) Declared service or agency excess property reportable DOD or GSA utilization screening (reportable property).

(2) DOD excess property reportable to GSA for

utilization screening (reportable property).

(3) Excess property nonreportable and subject only to local area screening (nonreportable property).

b. Reportable criteria are developed by DLA in coordination with the military services and GSA. Detail procedures, including Federal supply class stratification, are published in DOD 4160.21-M and AR 725-50.

c. Because of the constantly changing inventory within the Federal supply system, some flexibility in reportable criteria is desirable. DRMO's are encouraged to report excess property for centralized screening whenever it appears to have some reasonable prospect of utilization.

d. Most nonreportable property falls into one of the following categories:

(1) Property determined by competent authority to be classified for reasons of national security.

(2) Property dangerous to public health or safety.

(3) Property used by a single military service, or which has a use potential solely within a single military service; e.g., peculiar arms, ammunition, and implements of war; unit insignia; blank forms.

(4) Perishable property.

(5) Scrap and waste property.

(6) Items manufactured by foreign firms and procured offshore.

(7) Property that does not meet both the minimum line item value and minimum condition criteria of the applicable Federal group or classes published in DOD 4160.21-M will be processed by the DRMO as nonreportable.

e. All other property that meets the minimum line item value and reportable criteria is reported to the DRMS for appropriate utilization screening within the DOD and/or the GSA.

9-8. Screening of Nonreportable Property.

Excess property not reportable for centralized screening will be given local area screening prior to donation or sale. The type and extent of local screening is determined by the DRMO.

9-9. Screening of Reportable Property.

a. *Types of Screening.* Reportable property is subjected to either DOD and/or GSA screening.

b. *Excess Property Listings.* Excess reports received by the DRMS are used to prepare DOD listings of excess property. Each listing published by the DRMS, categories reported excess property by the two-digit Federal supply group. In addition to the detailed descriptive Federal Supply Catalog data, the listings include the following information pertinent to screening actions and subsequent request for effecting transfer:

(1) Listing serial number; e.g., 75/EPPL-41.

(2) The issue data of the excess listing.

(3) The military priority date.

(4) Instructions for obtaining the excess property listed.

(5) Utilization System Control Number (USCN) for reportable non-NSN items.

c. *Distribution of Excess Listings.*

(1) The DRMS distributes excess listings to other military activities and commands specifically designated by the military services, to GSA approved civilian agencies, to authorized foreign governments, and to approve service education activities. The military services periodically review the distribution of excess listings to military activities and authorize such changes thereto as may be considered necessary or desirable. Other means may also be used to publicize excess property information when considered appropriate by

the DRMS. When means other than excess listings are used, such as direct communications with designated screening activities, adequate screening will be accomplished in a manner consistent with the intent of the Department of Defense Utilization Program.

(2) GSA regional offices distribute or otherwise publicize to military activities excess property information on property that was reported to GSA regions.

d. *Screening Period.* The length of the screening period is controlled by establishing an automatic release data by which a request for excess property must be received. Property not requested prior to this date will be released for donation. This date is established by the DRMS and the GSA as appropriate.

e. *Screening Priorities.*

(1) *DOD screening only.* Requests from military activities of the owning military service are given priority during the screening period. Requests received from military activities are normally allocated on a first-come-first-served basis. Following the automatic release data, there is a donation screening period. Requests from service educational activities are given priority during the 21-day donation period.

(2) *Consecutive screening.* Requests from activities of the owning military service are given priority during the DOD screening period on a first-come-first-served basis. Residue items released to GSA by the DRMS are screened by civilian Federal agencies. The GSA regional offices allocate and approve transfer of the materiel to civilian Federal agencies normally on a first-come-first-served basis. Following the automatic release date, 21 days are allowed as the donation screening period.

(3) *Front end screening (FES).* All declared excess assets reported by the DRMO's are screened to determine if they are integrated materiel manager (IM) controlled or single-service-user items. Assets meeting predetermined criteria are referred to the IMM/NICP for possible utilization. FES procedures are applied prior to any other screening techniques. NICP/IMMs desiring to requisition reportable assets may do so by submitting their requisition to DRMS. Requisitions for nonreportable assets should be submitted to the holding DRMO or DRMS. All requisitions will contain the FES document number and the applicable fund citation(s) in the remarks section. Reportable items for non-standard NSN's will be assigned an automatic release date (ARD) and placed in the Excess Personal Property List (EPPL) or forwarded to GSA for screening, as appropriate. Cataloged

NSN's are no longer printed to the EPPL.

(4) *Final asset screening (FAS)*. Subsequent to the DOD/Federal agencies and after donation screening and prior to the preparation of surplus-sales catalogs. DRMS will generate a notification of surplus assets to the recorded manager of the National Stock Number (NSN). This is a final screening of available assets prior to sale as Government surplus. NICPs will submit requisitions for required items to the DRMO holding the asset. It must be recognized that these items are being processed for sale; therefore, it is in the best interest of the requiring activity to submit the requisition(s) as soon as possible.

f. Interrogation of Assets.

(1) Interrogation procedures have been de-

signed to promote utilization by providing customers with the capability to selectively interrogate item asset data for all items identified by an NSN/FSC in either reportable or nonreportable status from the DRMS.

(2) Asset availability can be interrogated to select assets in a specific condition or a specific geographical location. Interrogations are submitted by NSN/FSC. Want Lists and purge dates can be handled within the Interrogation Requirements Information Systems (IRIS) (Chapter VIII, DOD 4160.21-M).

(3) Organizations or elements authorized to effect interrogations include, in addition to DRMS organizational levels, Headquarters, DLA, other DOD components; GSA; IMMs; and friendly foreign governments.

Section III. TRANSFER OF EXCESS PROPERTY

9-10. Transfer Among Military and Civilian Federal Agencies.

a. For reasons of economy, administrative procedures for transferring excess property should be streamlined as much as possible. However, property accountability must be maintained throughout the screening and transfer process. To preclude uneconomical transfers of excess property, requests for items valued at less than \$50 per line item (regardless of unit cost) are normally not honored. Exceptions are made when the property concerned is the only immediate source of supply.

b. When an Army activity determines that property on a DRMS excess listing is required, it submits a request to the DRMS by telephone, message, or letter. The DRMS has a central computer file of excess property and acts similar to a broker; consequently, requisition forms are not used for this purpose. It is the responsibility of the requesting agency to insure that requests are restricted to those categories of property that are authorized by appropriate documents.

c. Upon receipt of the request, the DRMS either issues authority to requisition, advises the requesting activity that the materiel is no longer available, or advises that availability must be established with the GSA regional office holding redistribution control.

d. Military screening activities should make every effort to submit requests for materiel undergoing consecutive screening prior to the military priority date to obviate the necessity for subsequently withdrawing the materiel from the GSA regional office.

e. When Army activities have requirements for excess property that has been reported through the

DRMS to a GSA regional office for screening and is under the redistribution control of GSA, they submit requisitions to the appropriate GSA regional office.

f. Army activities may also acquire excess civilian Federal agency property offered by the GSA regional offices. Requests for transfer of civilian Federal agency excess property are submitted to the GSA regional office having redistribution control of the property and are restricted to those categories of property that the requesting activity is authorized to acquire.

9-11. Transfer to Foreign Governments.

a. Transfers of DOD excess property may be made to foreign governments designated by the Department of State as eligible to purchase property under the Foreign Military Sales Act, PL 90-629.

b. Requests for availability are submitted by eligible foreign governments directly to the DRMS for the necessary approval (including State Department clearance, if required), for firm determination of availability of property involved and for action to establish or verify the transfer price.

9-12. Financial Aspects of Transfer.

a. Reimbursements.

(1) The inventory manager or other accountable officer informs the DRMO of any designated reimbursement requirements at the time accountability for excess property is transferred to the property disposal account. In the absence of reimbursement data on transfer (of accountability) documents, reutilization and marketing officers will

consider such property as nonreimbursable. Transfer of property by reutilization and marketing officers to DOD users is on a nonreimbursable basis except where the transferee is prohibited by law from acquiring property without reimbursement. Transfers of DOD excess property to civilian Federal agencies will be without reimbursement except when the transferee is prohibited by law from acquiring property without reimbursement or the GSA directs that transfer will be with reimbursement at fair value.

(2) Transfers to eligible foreign governments as a result of DRMS screening operations are made only with reimbursement. Reimbursement

for other types of excess property will be no less than the gross cost incurred by the U.S. Government in repairing, rehabilitating, or modifying such articles to the extent required by the receiving government, plus the scrap value or the market value, if ascertainable, whichever is the greater.

b. Transportation and Accessorial Costs. Costs of transportation of excess property together with accessorial costs, when appropriate, are borne by the receiving agency. Charges for accessorial costs may be waived, however, where these charges are relatively insignificant. This exception includes parcel post shipments.

Section IV. SALE, ABANDONMENT, AND DISTRIBUTION OF FOREIGN EXCESS PERSONAL PROPERTY

9-13. General.

a. This section pertains to the sale, abandonment, and destruction of foreign excess personal property. The term foreign excess includes disposal MAP property for the purpose of this section. The standard merchandising policies and practices relating to surplus property will be equally applied to foreign excess sales; subject to the specific provisions of this section.

b. This section applies only to property located outside the Zone of Interior (ZI), American Samoa, Guam, and TTPI. For property located in Canada, only that portion that prescribes the procedures for the determination of property as foreign excess is applicable. In order to conform to an existing agreement between the United States and Canada, the disposition of such property will be in accordance with that specific agreement.

9-14. Statutory Authority.

These instructions are based on the authority for the disposal of foreign excess property as contained in the Federal Property and Administrative Services Act of 1949, as amended (40 U.S.C. 511-514) and other pertinent statutes as are referred in herein.

9-15. U.S. Foreign Policy.

a. U.S. foreign policy will govern the disposition of foreign excess property whether by sale, donation, abandonment, or destruction. In order that the foreign policies of the United States may be effectively served in foreign countries, foreign excess personal property programs will be developed and conducted with the coordination and approval of the U.S. diplomatic mission in the country concerned.

b. Foreign excess personal property will not be sold directly or indirectly to denied areas.

9-16. Liaison with U.S. Department of State.

a. Sales Plans and Program.

(1) To preclude delays of proposed sales and to afford appropriate Department of State representatives ample opportunity for consideration of possible foreign policy aspects, sales plans or programs should be developed as far in advance of scheduled sale as possible and processed for coordination and approval.

(2) The Sales Contracting Officer (SCO) will request assistance of the U.S. diplomatic mission, when appropriate, to make an Integrity and Reliability (I&R) Check on every successful bidder prior to award, including named purchaser(s) and subreceiver(s), and to make an "End Use Check" to verify that property reached the acceptable destination designated by the purchaser(s).

b. Donation, Abandonment, or Destruction of Foreign Excess Property. The donation, abandonment, or destruction of foreign excess property is also governed by the foreign policy of the United States. Therefore, these actions will be coordinated with the U.S. diplomatic mission and advice obtained on how donation, abandonment, or destruction of foreign excess property can best be accomplished to further U.S. policy.

9-17. Procedures for Coordination With U.S. Department of State.

a. The Federal Property and Administrative Services Act of 1949, as amended, requires that disposition of foreign excess personal property conform to the foreign policy of the United States.

To fulfill this requirement, the following procedures for processing sales of foreign excess and exchange/sale property have been coordinated with the Department of State.

b. The U.S. diplomatic mission of each country where property for an invitation for bid (IFB) is located will be provided expeditiously a copy of that IFB.

c. The U.S. diplomatic mission will be advised of Munitions List Items (MLI) and MAP excess property that are included in the IFB. DRMRs will consult with U.S. mission personnel before entering into negotiations with friendly foreign governments for the sale of United States MLIs. U.S. mission personnel, for this purpose, means American diplomatic or consular representatives in the country whose government wishes to negotiate the purchase of MLIs as designated in the Department of State's International Traffic in Arms Regulations. This requirement also applies to MLI scrap regardless of the purchaser.

9-18. Abandonment or Destruction.

a. Foreign excess property to be abandoned or destroyed, or donated in lieu thereof, will be processed in accordance with Chapter XIV, DOD 4160.21-M. In deference to the significant distances between DRMR Pacific and its subordinate activities, the commander of that region is authorized to delegate his authority to approve abandonment or destruction actions.

b. The following subparagraphs deal with donation in lieu of abandonment destruction.

(1) With the exception of property, dangerous to public health and safety, foreign excess property may be donated to organizations specified below, upon proper findings that the property is donable.

Assistance in obtaining information on the activities or organizations unknown or not familiar to the installation concerned should be requested from the local representative of the Department of State. Preference will be given to eligible donees in the order listed below. Donations may be effected without cost to any:

(a) Organization, institution, or agency of the United States Government.

(b) Organization, institution, or agency of any friendly foreign government or local subdivision thereof.

(c) Nonprofit scientific, literary, educational, public health, public welfare, charitable institution, hospital or similar institution, organization or association in a friendly country, provided its activities are not adverse to the interests of the United States. Donations may be made to foreign nonprofit institutions, but preference shall be given to those organized under the laws of the United States or any territory, State, or possession thereof, and supported in whole or in part through use of funds raised chiefly from sources in the United States, its territories, or possessions.

(2) The advice of the local representative of the Department of State will be obtained as to how donations of foreign excess property will be made so as to serve the United States foreign policy interests and objectives in the area. The advice of the representative of the Department of State will be given consideration in reaching a decision as to the receipt of the property to be donated.

(3) The American National Red Cross should be advised and offered, before donating to other agencies, property which can be readily identified as originally processed, produced, or donated by the American National Red Cross.



APPENDIX A REFERENCES

1-1. Army Regulations (AR).

| | |
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| 11-11 | War Reserves |
| 37-1 | Army Accounting Guidance and Fund Control |
| 70-1 | Systems Acquisition Policy and Procedures |
| 25-30 | The Army Integrated Publishing and Printing Program |
| 310-25 | Dictionary of United States Army Terms |
| 700-18 | Provisioning of U.S. Army Equipment |
| 700-82 | Joint Regulation Governing the Use and Application of Uniform Source, Maintenance, and Recoverability Codes |
| 700-90 | Army Industrial Preparedness Program |
| 700-120 | Materiel Distribution Management for Major Items |
| 708-1 | Cataloging and Supply Management Data |
| 710-1 | Centralized Inventory Management of the Army Supply System |
| 710-2 | Supply Policy Below the Wholesale Level |
| 725-50 | Requisitioning, Receipt, and Issue System |

1-2. Field Manuals (FM).

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| 100-10 | Combat Service Support |
| 750-80 | Army Wholesale Maintenance Management |

1-3. Supply Bulletins (SB).

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| 700-20 | Army Adopted/Other Items Selected For Authorization/List of Reportable Items |
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1-4. DA Pamphlets (DA PAM).

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| 700-30 | Logistics Control Activity (LCA) Information and Procedures |
| 738-750 | The Army Maintenance Management Systems (TAMMS) |

1-5. DOD Manuals.

| | |
|-------------|--|
| 4000.25-5M | Military School Contract Administration Procedures (MILSCAP) |
| 4000.25-6-M | DOD Activity Address Directory (DODAAD) |
| 4100.39-M | Defense Integrated Data System (DIDS) Procedures Manual |
| 4130.2-M | Federal Catalog System Policy Manual |
| 4160.21- | Defense Utilization and Disposal Manual |
| 5105.38D | Defense Security Assistance Agency |

1-6. DOD Instruction (DODI).

| | |
|---------|--|
| 4140.24 | Requirements Priority and Asset Application for Secondary Items |
| 4140.33 | Grouping of Secondary Items for Supply Management Purposes |
| 4140.37 | Asset Knowledge and Control of Secondary Items |
| 4140.39 | Procurement Cycles and Safety Levels of Supply for Secondary Items |

FM 710-27

- 4140.42 Determination of Requirements for Secondary Item Spare and Repair Parts Through
 the Demand Development Period
- 7041.3 Economic Analysis and Program Evaluation for Resource Management

By Order of the Secretary of the Army:

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