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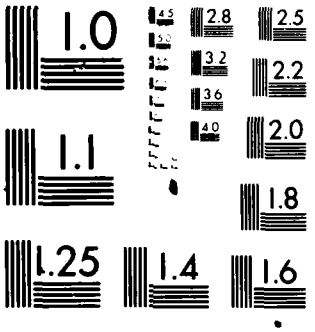

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THESIS

FEASIBILITY OF GATHERING
DEPRECIATION INFORMATION FROM EXISTING
SOURCES FOR US ARMY INSTALLATION
ACCRUAL ACCOUNTING SYSTEMS

by

Robert Emerson Blackwood

December 1981

Thesis Advisor: James M. Fremgen

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This thesis examines the feasibility of gathering depreciation related information from existing sources for United States Army organization equipment. Ten sources are identified, and the amount and type of information each can supply is evaluated. Methods for estimating missing information are demonstrated and evaluated. The resources required to gather this information are estimated for the most promising sources. The primary

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conclusion reached is that all necessary information cannot be gathered. However, gathering existing information is feasible and useful. Fourteen recommendations are made concerning actions needed to prevent destruction of existing information, correct property accounting systems so that future information is recorded, and ensure that information sources can efficiently provide depreciation related information for equipment when depreciation systems are implemented.

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Feasibility of Gathering Depreciation Information from Existing Sources for US Army Installation Accrual Accounting Systems

by

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Captain, United States Army
B.S., Southwest Missouri State University, 1973

Submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

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Dean of Information and Policy Sciences

ABSTRACT

This thesis examines the feasibility of gathering depreciation related information from existing sources for United States Army organization equipment. Ten sources are identified, and the amount and type of information each can supply is evaluated. Methods for estimating missing information are demonstrated and evaluated. The resources required to gather this information are estimated for the most promising sources. The primary conclusion reached is that all necessary information cannot be gathered. However, gathering existing information is feasible and useful. Fourteen recommendations are made concerning actions needed to prevent destruction of existing information, correct property accounting systems so that future information is recorded, and ensure that information sources can efficiently provide depreciation related information for equipment when depreciation systems are implemented.

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I. INTRODUCTION

A. BACKGROUND

Department of Defense accounting systems are required by the Budget and Accounting Procedures Act of 1950 to be approved by the Comptroller General of the United States. As of June 1981, only 77% of those accounting systems had been approved. The primary reason the Comptroller General has not approved these systems is that the systems do not operate on an accrual accounting basis. That basis has been prescribed by Public Law 84-863.

One significant facet of accrual accounting which has been deficient in Department of Defense systems is depreciation of long-lived assets. These systems seldom are designed to depreciate assets, and often property accounts are maintained independent from the appropriations expenditure accounts. For Department of Defense accounting systems to be approved by the Comptroller General, the existing unapproved systems must be modified or replaced with accounting systems which do operate on the accrual basis.

B. ISSUES TO BE RESEARCHED

In developing a depreciation subsystem of an accrual accounting system, the major requirement is to establish a depreciable asset data base which contains the detailed

item information needed to compute depreciation. Three problems must be addressed during the development of this depreciation subsystem. The first is identifying the specific types of information needed to be gathered for items which are to be depreciated. The second problem is selecting the items to be depreciated. The third problem is determining if information for depreciable items already on hand is available or, if it is not available, how to estimate the information. This study will address these problems.

C. OBJECTIVES AND SCOPE OF STUDY

There are three objectives to this study. First, the study will determine the types of information that are needed for depreciable assets in order routinely to compute depreciation. Second, the study will develop criteria for determining whether an item should be depreciated. The study will then identify and evaluate sources of depreciation related information for existing Army equipment. Finally, possible means of estimating missing information will be described and evaluated.

The scope of this study will be quite limited. It will examine one segment of the property that will be depreciated by the approved successor to the Standard Financial System. That segment is the organization property, accounted for by the Division Logistics System and belonging to an Army Infantry division. The property belonging to the 7th Infantry

Division, Fort Ord, California, as of 12 February 1981, was the specific property segment examined.

D. METHODOLOGY

Before beginning research on the various information sources, the author reviewed the literature of both the public accounting profession and the General Accounting Office to establish the types of information required in order to account for depreciation. Further literature searches were conducted to establish what information sources existed for divisional equipment, not only at the division's installation but also throughout the Department of the Army. Interviews were conducted with activity managers, analysts, and other logistics personnel throughout the Department of the Army. Information provided by these personnel was used to establish what and how much relevant data regarding depreciation each source could provide. At the installation level, the author devised and conducted tests to evaluate the usefulness of unautomated information sources. The author conducted additional interviews with managers and obtained from them information which was used to estimate the resources required to gather relevant depreciation data from the more promising sources. No sources were found for certain information. In these cases, the author demonstrated methods for estimating missing information from historical data gathered from the sources.

E. OVERVIEW OF THE CHAPTERS

Chapter II discusses briefly the nature of the current Standard Financial System. It identifies the legal reasons the system is being changed and describes the General Accounting Office depreciation standards which must be incorporated into the modified accounting system.

Chapter III identifies the types of information that are needed to calculate depreciation. The required information is grouped into categories and discussed in detail. Exceptions to the requirement to depreciate all equipment are also discussed.

Chapter IV examines the 7th Infantry Division Organization Property Book Listing (C) as a property control system. The contents of the 12 February 1981 Listing are used to demonstrate the effects that the depreciation exceptions have on the body of equipment which must be depreciated. The listing is also used to demonstrate that the cumulative value of specific types of equipment can be used by comptrollers to stratify the depreciable property into groups for which different depreciation methods may be used.

Chapter V identifies the information sources which are available throughout the Department of the Army and describes the types of information each source contains. Chapter VI evaluates the usefulness of the sources, both individually and in combination, and identifies the more promising sources.

Chapter VII estimates the resources required to gather information from the more promising sources.

Chapter VIII contains conclusions concerning the feasibility of gathering the required information and fourteen recommendations. The primary conclusion is that, while it is not feasible to gather all depreciable asset information for every item, a material amount of information exists in certain sources. Although not very efficient, gathering this available information is both feasible and useful. Another conclusion is that a significant portion of the existing information will be systematically destroyed unless certain Department of the Army regulations are changed.

Five of the fourteen recommendations address the actions needed to ensure that an adequate depreciable asset data base will be included in the Standard Financial System and that efficient sources of information exist when the System is implemented. These recommendations include requiring National Inventory Control Points to develop and publish service lives for items they manage, requiring those service lives to be included in appropriate Supply Bulletins, extracting historical price information for items from existing microfiche files and entering that information into an automated price data base, making actual residual value information gathered by the Defense Property Disposal System routinely available to installation comptrollers, and proposing the types of

information that a depreciable asset data base needs for calculating depreciation.

Of the remaining nine recommendations, one suggests modifying the Division Logistics System for property book accounting to capture individual item acquisition dates and prices and also item disposition dates. The last eight recommendations address actions needed to protect existing information, correct current practices and fill information voids. These include two proposed interim changes to Army Regulations, acknowledgement of the existence and value of certain historical acquisition price files, changing the value and uses of the composite service life for calculating depreciation at Fort Ord, and three recommendations for the use of estimates for missing item residual values, acquisition dates and prices.

II. NATURE OF THE PROBLEM

Over thirty years ago, the United States Congress enacted the Budget and Accounting Procedures Act of 1950. Among other things, this law designated the Comptroller General as the approving authority for all government agency accounting systems. Six years later, in 1956, Congress enacted Public Law 84-863, which specified that agency accounting systems should be based on accrual accounting. As of 30 June 1981, the Department of Defense (DOD) has succeeded in gaining approval for 77% of its accounting systems (78 out of 101). [Ref. 1] Adopting accrual accounting principles for capital assets has proved to be one of the major stumbling blocks for DOD in its efforts to gain accounting systems approval.

Approval of DOD accounting systems by the Comptroller General has been slow for several reasons. The foremost reason is that the Budget and Accounting Procedures Act of 1950 provided no means by which the Comptroller General could enforce compliance. [Ref. 2: p. 13770] That is, there were no explicit penalties levied against agencies failing to comply with the law. Another reason is that Congress historically has been reluctant to take an active role in overseeing the implementation of its laws. Members of Congress "tend to concentrate on activities that have more potential for electoral rewards." [Ref. 3: p. 160] Third, Federal programs

grew dramatically in the late 1960's and early 1970's. [Ref. 4: p. 24] This growth, coupled with Congress' reluctance to oversee those programs' execution, precluded Congress from identifying Federal agencies not complying with the law. Ignorant of the agencies' intransigence, Congress could not push for compliance. Over the last thirty years, DOD has not been pressured to obtain approval of its accounting systems; so it has not striven to obtain approval.

Public Law 84-863 specified that agencies adopt accrual accounting. In that "simple" requirement lay a significant change from existing DOD accounting systems. DOD systems had been developed to reflect appropriations. Because appropriations were--and are--enacted in terms of obligational authority (authorization to enter into contracts) and budget outlays (actual payments of funds against current and prior years' contracts), the accounting systems which were developed simply recorded those obligations (contracts let) and outlays (payments). Accrual accounting principles were not needed for managing appropriations.

A new use of accounting systems was introduced to DOD in the early 1960's by Secretary of Defense Robert McNamara. The information products of the systems began to be used in making resource allocation decisions. Accordingly, the accounting systems took on new meaning. They became systems which reflected the use of DOD resources. The name of the operations

and maintenance accounting system was changed to reflect this new use. It became the Resource Management System. Now the purpose of the DOD accounting systems and the concepts of accrual accounting began to be compatible.

That accrual accounting must be incorporated into DOD accounting systems has been clearly established. What accrual accounting is, however, is not yet clear. The Comptroller General offers this definition of accrual accounting:

> The accrual basis of accounting consists of recognizing in the books and records of account the significant and accountable aspects of financial transactions or events as they occur. Under this basis, the accounting system provides a current systematic record of changes in assets, liabilities, and sources of funds growing out of the incurrence of obligations, expenditures, and costs and expenses; the earning of revenues; the receipt and disbursement of cash; and other financial transactions. [Ref. 5: p. 2-14]

Finney and Miller, in their Principles of Accounting, discuss accrual accounting as follows:

> On the accrual basis of accounting, revenue is regarded as earned in the period in which sales are made or the services rendered (regardless of when collected), and expenses are regarded as applicable to the period in which they are incurred (regardless of when paid). [Ref. 6: p. 10]

The key to these definitions, in the context of DOD accounting systems, is that costs are recorded when the resources associated with the costs are actually consumed, not when contracts are let or when bills are paid (which may be before or after actual consumption). This concept of the actual consumption of resources being the key to recording their associated

costs applies not only to monetary and personnel resources but also to capital assets. Accounting for the consumption of capital assets is accomplished by calculating the depreciation of those assets during a period.

DOD agencies have balked at incorporating depreciation into departmental accounting systems. The major reason for this can be traced to the sources of funds for various purposes--the appropriations. Real property assets--land, buildings, improvements, etc.--are funded with military construction appropriations. Long-lived equipment items are funded with procurement appropriations. The conduct of operations which support military missions are funded with operations and maintenance appropriations.

Leaders managing the operations are concerned, above all, with the operations and maintenance resources. Buildings and equipment are, to managers at all but General Officer grade, a fixed quantity. The managers cannot control the availability and/or replacement of these assets and are prohibited by law from diverting operations monies to the acquisition or replacement of real property assets. With some justification, these managers consider depreciation to be irrelevant in evaluating how well resources are being used by them.

The General Accounting Office (GAO) has repeatedly pointed out the lack of depreciation in DOD accounting systems. This one shortcoming in accrual accounting has been highlighted

repeatedly in GAO reviews and audits. However, GAO has implicitly recognized the "irrelevance" of depreciation as an everyday resource cost which must be included and considered by DOD leaders. In the Comptroller General's Accounting Principles and Standards for Federal Agencies, depreciation requirements are discussed as follows:

> A basic responsibility of agency management is to fully and fairly account for all resources entrusted to or acquired by the agency. This responsibility extends to the consumption of those resources through use in carrying out operations and is just as applicable to long-lived physical facilities as it is to expendable materials.
>
> Basic Principles
>
> Depreciation as an element of cost is an estimate of the portion of the total cost of a long-lived capital asset consumed through use, approaching obsolescence, or having other reason to be assigned as a cost of operation or performance over its estimated useful life.
>
> Accounting for depreciation as a cost is an integral part of the accrual basis of accounting. The purpose of accounting for depreciation (or amortization of cost) of long-lived capital assets is to systematically allocate their cost over the period of their estimated usefulness or capacity to render service so that all significant costs will be included in total costs of performance reported to management officials, the Congress, and the public.
>
> Although depreciation is not represented by current expenditures of funds and although there is no precise way to arrive at an accurate measure of depreciation as a current cost, it is nonetheless a real cost. However, the activities of the Federal Government are so varied that a uniform requirement to account for depreciation of capital assets cannot be justified.
>
> Procedures shall be adopted by each agency to account for depreciation (or amortization of cost) of capital assets whenever need arises for a periodic

determination of cost of all resources consumed in performing services. This information is needed when:

(1) The financial results of operations, in terms of costs of performance in relation to revenues earned, if any, are to be fully disclosed in financial reports.

(2) Amounts to be collected in reimbursement for services performed are to be determined on the basis of the full cost of performance pursuant to legal requirements or administrative policy.

(3) Investment in fixed-property assets used is substantial and there is a need to assemble total costs to assist management and other officials in making cost comparisons, evaluating performance, and devising future plans.

(4) Total cost of property constructed by an agency is needed to determine the amount to be capitalized. [Ref. 5: pp. 2-35 and 2-36]

In other words, agencies must devise a depreciation accounting system to be able to calculate depreciation when that cost is needed. Agencies need not include depreciation as a cost in normal management reports, if the uses of those reports do not consider depreciation to be a relevant cost.

This research will examine one accounting system, the Standard Financial System (STANFINS), used at most Department of the Army (DA) field installations in the United States and Europe and designed to account for the three primary appropriations which fund the installations--Military Construction, Army, Procurement Army, and Operations and Maintenance Army. STANFINS is used by the Fort Ord Comptroller for management of funds supporting Fort Ord, the Presidio of Monterey, Fort Hunter Liggett, and the 7th Infantry Division. This system

has no inherent mechanism for calculating depreciation and has not been approved by the Comptroller General. [Ref. 7]

The primary reason no depreciation mechanism exists within STANFINS lies in the fact that the appropriation accounting system is operationally independent from the property accounting system. The normal tie between the two in a standard accounting system, the general ledger, has never included long-lived assets. When such assets are acquired with appropriated funds, the accounting entry shows a decrease in the appropriation balance and an increase in the amount of funds expended to buy equipment. As a separate transaction in the property accounting system, the records are posted to show the acquisition of the asset. An accounting entry for a system in which long-lived assets are tied to the general ledger would show a decrease in the appropriation balance and an increase in the value of assets on hand.

The fact that DA installation systems are not designed to facilitate depreciation calculations does not mean that installation comptrollers do not calculate depreciation. When required, they do. One prime example of such calculations occurs as part of cost-benefit analyses associated with Commercial-Industrial Type Activity evaluations. In these cases, budget analysts in the Comptroller's office go to supervisors of the activities affected and find out what equipment is involved in the activity. Next, they go to the

property book officer accountable for the property and acquire whatever depreciation-related information he has. They then identify any information still missing and determine whether that information is readily available. If so, they gather it. If information is not available, the analysts make assumptions on items such as service life, acquisition cost, and residual value of the assets. Finally, the analysts compute depreciation on the assets. That is obviously a time-consuming process, necessitated by the lack of an integrated asset accounting system which contains the required information for depreciable assets.

A depreciable asset information data base lies at the heart of this author's research. Since such a data base is non-existent, the first step needed to develop it is to identify the items of information required for the base. The next step is to gather the information. Assets received after the initiation of such a base present little problem, since the required information could be transferred from receipt vouchers at the time of receipt.

Gathering the information for items already on hand presents a much more serious problem. None of the present systems routinely captures the acquisition costs at time of receipt of an item. Likewise, none captures service life or residual value information at all.

This research will first identify the information required to be contained in a depreciation information base. Next, it

will define the property for which information is needed. Third, it will identify the various sources of depreciation information available both in the field and throughout DA. Fourth, it will evaluate the usefulness of each source of information. Finally, this research will examine the feasibility of gathering the required depreciation information. If not feasible, the research will examine some methods to estimate information which cannot be obtained directly. The research scope of the 7th Infantry Division as of 12 February 1981, as shown on the Division Organization Property Book Listing (C) of that date.[1]

---

[1]This document is classified because it reflects the quantities authorized and on hand for each item of equipment in the division. This thesis will at no time reproduce those individual item quantities or authorizations. It, therefore, remains an unclassified study.

III. DEPRECIATION INFORMATION NEEDED TO MEET ACCRUAL ACCOUNTING REQUIREMENTS

Before undertaking a search for information sources, the author first had to identify the type of information to be sought. As a starting point, the Comptroller General had defined the purpose of depreciation in Governmental agencies and had specified the general input information functions needed to compute depreciation. These functions were as follows: identifying those long-lived assets whose usefulness was limited, ensuring that the costs of those assets included all reasonable costs of acquisition, recognizing that the amount to be amortized would be neet of reasonable estimates of realizable salvage values at the ends of the assets' lives, amortizing the net cost over the available estimates of useful life, and devising depreciation methods which were simple and avoided undue precision and detail in maintaining depreciation records. [Ref. 5]

A. REQUIRED INFORMATION

Armed with the guidance of the Comptroller General, this author began to review pertinent accrual accounting depreciation literature. The guidance and the literature together specified a list of data which would be required in any depreciable asset information base. These data could be

considered in three groups. The first group included information which identifies a particular asset. The second group included information on the asset's acquisition. While these first two groups of information are necessary for all accounting uses, the third and final group contains information used almost solely in depreciation calculations.

1. Group One - Item Identification Information

To be able to calculate depreciation on an asset a comptroller must first identify that asset. Through identification, he can establish a coherent record of all the required depreciable asset information for each item in the command which is long-lived and whose usefulness is limited. This identification information serves the comptroller not so much in calculating depreciation, but more as an index of the assets which must be depreciated. Military comptrollers serve in a huge bureaucracy. This bureaucracy has institutionalized identification information. [Ref. 8] That information includes item nomenclature, national stock number, and line item number.

a. Item Nomenclature

Item nomenclature identifies a particular asset. This naming process is divided into two parts. First, the asset is identified in generic terms. For example, a two-way radio which is to be mounted in a vehicle would be generically named a RADIO SET. Next in the nomenclature is a code which

specifies its use. In the example of the radio, the code is AN/VRC (the V identifies the radio as being mounted in a vehicle). Finally, a specific model number is added. The model number for this radio set is 46. Thus the complete nomenclature is RADIO SET AN/VRC-46. All nomenclatures in DA are standardized to twenty characters; when complete nomenclatures exceed that total, abbreviations are used to shorten them.

b. National Stock Number

Using nomenclature alone to identify an item is inadequate. DOD has hundreds of thousands of different items in both its inventory and capital property accounts. Some capital assets are essentially similar but vary in some respect(s). Other assets are quite different but serve the same purpose. Even more importantly, automation of the procurement, inventory control, requisitioning and issue, and asset control functions throughout DOD could not be accomplished solely with item nomenclatures. Therefore a standardized stock number system has been developed for DOD and other governmental agencies. In this system an item is assigned an individual number called a National Stock Number (NSN). Slightly different models of the same item are assigned different numbers.

The NSN is a thirteen-digit number group. That group is divided into two subgroups. The first subgroup, the

first four digits of the NSN, identifies the Federal Supply Group (FSG) and Class (FSC) of the item to which the number is assigned. The Federal Supply Group identifies a generic group of items. The Federal Supply Class identifies more precisely the generic item. In the example, the FSG of the radio set is 58 (Communications Equipment); the FSC is 20 (Radio Sets). Thus the first four digits of the NSN are 5820.

The second subgroup is called the National Item Identification Number (NIIN), and includes the last nine digits of the NSN. The NIIN is divided into two parts. The first part includes the first two digits of the NIIN (or the fifth and sixth digits of the complete NSN). These two digits identify the country in which the item was manufactured.[2] The remaining seven numbers of the item, in conjunction with the country code, are used to identify the specific item. In the example the NIIN of the radio set is 00-223-7434. The complete NSN of the RADIO SET AN/VRC-46 is 5820-00-223-7434.[3]

c. Line Item Number

Because of the length, quantity and similarity of NSNs and the unwieldiness of nomenclatures, another means

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[2]All items manufactured in the United States are coded 00 or 01. Other countries have different code numbers.

[3]There are two different models of this radio set, each slightly different. The NSN assigned to the other model is 5820-00-223-7473.

exists to identify an asset. This means is a Line Item Number (LIN). Its primary uses are to cross-reference NSNs with item nomenclature and to serve as a form of shorthand in identifying what assets are to be authorized for use in specific units. The LIN is a six-character group. The first character is normally alphabetic, and is assigned so that, when LINs are arranged alphabetically, the nomenclatures are also arranged alphabetically. The assignment scheme does not always result in the first character of a LIN and the first character of a Nomenclature being the same, as the example illustrates. The LIN of the radio in the example starts with Q. The remaining five digits of the LIN are assigned so that all items in the letter group will be in alphabetical order when arranged according to LIN ascending sequence. The complete LIN for the radio set example is Q54174.

Used together, these three identification items provide the means to index information on a disparate group of assets. Information can be retrieved by using the most expeditious of the indices. The NSN and LIN information items can also be used to gather information on specific items from supply bulletins and catalogues and from other information bases throughout DA and DOD. This information triad provides the framework within which the more useful acquisition and other depreciation related information can be built.

2. Group Two - Acquisition Information

At the time an item of equipment is acquired, two primary pieces and one secondary piece of information must be gathered. The primary data are the acquisition date and cost of the new asset. The secondary datum is the physical location of the asset.

a. Acquisition Date

For use in accrual accounting, the acquisition date must be specified. In this context, the acquisition date is the date the item was received by the field unit; for that is when it was placed into service. The alternative for an acquisition date is the date an item was delivered to the government. This date is not an appropriate choice. An item may well have been procured by the government decades ago, remained stored in a depot as inventory with no loss of useful life, and only recently issued to a unit. Obviously, none of the item's usefulness has been consumed during storage. Further an item might have been used by previous units, returned to a depot for overhaul, and either re-issued to a new unit or placed back into depot inventory. In this case, the dates of both original acquisition and subsequent overhaul are inappropriate for accrual accounting purposes in the field. The key date for depreciation purposes must be the date an item's usefulness begins to be consumed.

b. Acquisition Cost

The cost of an item is the second primary acquisition information datum. The Comptroller General has prescribed the costs which must be included in the acquisition cost of an item:

> The basic cost of property acquired shall include the amounts paid to acquire it, including transportation, installation, and related costs of obtaining the property in the form and place to be used or managed.... [Ref. 5: p. 2-28]

In accrual accounting, the acquisition costs of an item within DOD should include procurement costs, first and second destination transportation charges, storage costs prior to issuance to a a using unit, administrative costs of storage and/or issuance, and any initial maintenance of the item prior to its issuance to the using unit.

For DA, acquisition cost composition is prescribed by Army Regulation (AR) 37-60, dated 15 November 1979, and entitled Pricing for Material & Services. [Ref. 9] This regulation specifies the costs which will be included in the standard (acquisition) cost of an item. This regulation's guidelines are obscured somewhat by the fact that the individual costs included in the standard cost for an item vary depending on the source of funds used to acquire the item initially. Items acquired by DA with Army Stock Fund monies have these costs included in the item's standard price:

> Current procurement/production costs.
> First and second destination transportation cost surcharges.
> A surcharge for operating losses and expenses.[4] [Ref. 9: p. 2-6]

Items acquired by DA with procurement appropriations include only two costs in the standard price of the item. Those two costs are the current procurement cost and the first destination transportation cost.

The underlying costing philosophy in the different individual costs is readily apparent. Stock fund items are generally low dollar value items. When compared to the procurement cost of an Army Stock Fund item, transportation, administrative, and storage costs are material additions to the item's total acquisition cost. Procurement appropriation items, on the other hand, are generally high dollar value items (greater than $1000.00). When transportation, storage, and administrative costs of an item are incurred, the costs are insignificant when compared to the procurement costs of the item. This philosophy is consistent with Comptroller General guidance:

> Agency accounting policies should prescribe the accumulation of all <u>significant</u> costs applicable to property acquisitions so that agency accounts will disclose the full extent to which public funds are applied to such purposes. [Ref. 5: p. 2-28] (Emphasis added.)

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[4]Army Stock Funds are revolving funds that were initially endowed by Congress with a fixed amount of money or corpus. The Funds are required to sell items at cost, or to break even. If, in one year, the sales do not cover costs, the Stock Fund is required to make up the loss by adding a surcharge to the standard price in the next year.

Another policy prescribed in AR 37-60 affects the standard or acquisition price set for items. Paragraph 1-1, subparagraph a. prescribes:

> sales to DOD and other Government agencies of new or overhauled...material...will be made at the standard price in existence at the time of drop from inventory. [Ref. 9: p. 1-1]

This policy, in conjunction with the policy of using procurement/production costs in establishing the standard price, means that overhaul costs of an item are not considered in establishing an overhauled item's standard cost. Rather, overhauled items are assigned standard costs based on the cost to procure a new, like item. This policy is not consistent with the conventional definition of acquisition cost.

c. Item Location

A secondary piece of acquisition information also must be gathered at the time an item is received by a using unit. That is the location of the item within the field unit. This datum is necessary to field comptrollers so they can depreciate groups of equipment which form integral sub-groups of a larger unit. An example may clarify this need. Many times a division-sized unit will be tasked to provide a subordinate unit to assist a research and development activity in the operational testing of a new item of equipment. The subordinate unit is required to provide all its normal equipment except for the new item being tested. For the test, the unit's normal operations and maintenance funds should be

replaced by research and development funds. For the research and development activity accurately to capture all costs of development, depreciation of the unit's other equipment should be included. The installation comptroller servicing the parent division would be called upon to provide those depreciation costs. Without data on the types and quantities of equipment located in that test unit already in the information base, the comptroller would be unable to provide the necessary information.

3. Group Three - Other Depreciation Related Information

Item identification information provides the framework upon which depreciation information may be arranged. Acquisition information establishes the starting point for depreciation--the gross costs to be amortized--and the physical location or owning unit of items requiring depreciation. There remain two key pieces of information missing from the information data base. One is the service life (also called useful life) of each item in the base. The other is the residual value of each item.

a. Service Life

The service life of an item is the period over which the acquisition cost of the item is amortized. Often this service life is not known from experience; it must be estimated. The Comptroller General has commented on estimating service life:

> The period of usefulness selected for writing off costs of capital assets should be estimated with due regard to available information on physical life; technological, social, and economic forces; and any other factors having a bearing on the probable service period of the assets. [Ref. 5: p. 2-36]

Army Audit Agency (AAA) guidance on service life estimations is similar, but with one addition. AAA states that, when an asset has passed the original estimate of its service life, "any asset which is still in use should not be considered as fully depreciated." [Ref. 10: p. 55] In other words, estimates must be reviewed and updated to reflect actual experience.

b. Residual Value

The residual value of an asset is the salvage value of the asset at the end of its service life, net of the costs of disposing of the asset. The residual values of assets, under accrual accounting concepts, should reduce the gross acquisition costs of those assets to arrive at a net cost to be amortized over the assets' service lives. The Comptroller General has concurred; he states, "The amounts to be written off shall be reduced by reasonable estimates of realizable salvage values at the end of this period...." [Ref. 5: p. 2-36] AAA also concurred but added another significant remark. "Residual value is often an insignificant amount which can be ignored in the computation of depreciation." [Ref. 10: p. 55] What both agencies fail to recognize explicitly is that the residual value of an item

is not known with certainty. It must be estimated, and often such estimates are based upon very gross economic assumptions. The basic question which remains unanswered in the guidance concerns the method by which residual value is to be estimated.

B. CAPITALIZATION EXCEPTION CRITERIA

The values of items in a depreciation data base could well vary from million-dollar helicopters to sixteen-cent match boxes; both are long-lived assets. This statement points out that the value of information contained in any depreciation data base is subject to the law of diminishing returns. In this case, there exists some point in the process of including increasingly lower valued long-lived assets in the data base at which the increased detail of the depreciation calculation is simply not worth the cost of obtaining the added accuracy. The location of that point becomes a threshold for determining whether an item should be capitalized as an asset in the depreciation data base or treated as an expense in the period of acquisition.

The philosophy used in establishing an expense/capitalization threshold is relatively simple. Items whose individual values or groups of items whose cumulative values are not material should be treated as expenses in the period of acquisition. If the value is material, the asset should be capitalized and depreciated over its useful life. The

Comptroller General has commented on this asset/capitalization threshold:

> In establishing identifiable property units or groupings, due consideration should be given to materiality, and it is appropriate to establish reasonable dollar minimums as a basis for excluding certain property units from capitalization. No minimums in excess of $300 should be established. [Ref. 5: p. 2-29]

In 1980, the Comptroller General raised the minimum to $1000. [Ref. 1]

Another ramification of the Comptroller General's guidance lies in his reference to asset groupings. This reference, in conjunction with the previous guidance to make any depreciation system as simple as possible, opens another possibility for treating assets. That possibility lies in stratifying depreciable assets into at least two groups. The first group would include a relatively low number of high dollar items and/or a group of identical items whose cumulative value was extremely high. These high value items would represent a disproportionately high percentage of the total value of the assets being depreciated. For these assets, detailed depreciation information would be kept. The second group would include the remaining depreciable items. The proportion of the total value of the assets in this group would be quite small when compared to the total value of items being depreciated. This group of assets would not have detailed information in the base; rather, summary

records would be kept and group depreciation procedures would be used to amortize the value of the assets.

There are two types of assets which need not be subjected to the expense/capitalization threshold described above. The first type is inventory in the hands of users. The second type is assets which have indefinite usefulness.

In an Army combat unit, many items potentially classifiable as capital assets are inventory in the hands of the unit. The items are issued to a unit and stored permanently by that unit. Only in the event of combat will the unit remove the items from storage and use them. In this case the items should not be capitalized but, rather, carried in an inventory account.

The other type of item is used regularly in divisional units. It is composed of many individual items (individual mechanics' tool kits, for example) whose individual usefulness are consumed over time. However, when a tool is broken through fair wear and tear, the individual tool is replaced by the Government from operations and maintenance funds; that cost is treated as an expense. Negligent damage or loss of individual components by the user are paid for by the user. The individual components of these asset items have such universal usage that the chance of obsolescence of the complete item is quite small. Expensing the cost of replacing the components of such items takes the place of

amortizing their acquisition costs. The item's usefulness, therefore, is indefinite. Thus, this item should be considered a non-depreciating capital asset.

IV. DEFINING THE DEPRECIABLE ASSET DATA BASE

In Chapter II, the types of information required to depreciate assets were identified. Also, exception criteria were established for deciding whether or not to depreciate certain assets. In this chapter, the existing installation property accounting systems will be described and the types of information the systems capture will be identified. The exception criteria will then be applied to the Division's equipment to demonstrate the effects of using those criteria to reduce the size of the depreciable asset data base.

A. CURRENT PROPERTY ACCOUNTING SYSTEMS

The property accounting system used at Army installations is not a true accounting system. It is an asset control system. At Fort Ord, three different control systems are used by various activities. The three are similar in concept and procedures but differ in the specific types of records used. Two systems are manual; one is automated.

The manual systems are used by the Directorate of Industrial Operations (DIO) and the non-divisional unit property book officers. The important components of these systems are the document register, the document file, the property book pages, and hand receipts. The document register is essentially a transaction journal. The document file contains vouchers supporting acquisitions and dispositions

of property. The property book pages are subsidiary ledger pages.[5] When property is entrusted to others, those individuals acknowledge receipt and responsibility for the property by signing hand receipts.

The control system used by the 7th Infantry Division property book officer is automated. Property records are maintained on a subsystem of the Division Logistics System (DLOGS). This system maintains the official property records on magnetic tape. The records are updated periodically by batch processing techniques. Father and grandfather tapes are maintained as backup for the current property records. There are two basic printouts from the tapes--a consolidated property book listing (classified CONFIDENTIAL) and hand receipts for property in the possession of company-sized unit commanders within the division.

The information contained in the consolidated listing for the division and the two manual systems includes:

- Item Nomenclature
- National Stock Number (NSN)
- Line Item Number (LIN)
- Quantity:
  - Required
  - Authorized
  - On Hand
- Current Replacement Cost
- Identification of unit(s) in physical possession of the property.

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[5]The specific property book pages used by the DIO and non-divisional property book officers are different, but only in format. The same information is contained on each type of page.

Quantities required, authorized and on hand show the requirements both in wartime (required) and in peacetime (authorized) and the total physically on hand.[6] Instead of showing individual acquisition costs for items when received, the systems are simplified by showing the current acquisition (replacement) cost for each type of item.

B. ESTABLISHING THE DEPRECIABLE ASSET BASE

For this research, the initial depreciable asset base is defined as all organization equipment[7] in the possession of the 7th Infantry Division on 14 February 1981. In this section the size of the asset base will be defined in gross terms. The gross amount of property will then be filtered through the exception criteria established in the previous chapter. Next, the remaining property will be compared to the expense/capitalization threshold. The capitalizable property will then be examined to determine if the assets can be stratified on the basis of the total value of each type of equipment listed on the property records.[8] Ultimately, the

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[6]The manual control systems also contain entries showing the dates and quantities of acquisitions and dispositions of items of equipment. The DLOGs system does not.

[7]Organization equipment is that equipment which a unit would take with it, if deployed. Equipment which remains in the installation, like beds and desks, is installation equipment.

[8]The total value of the property used for this process is the listed standard cost of each NSN on hand of the property book listing as of 12 February 1981. The values shown in that book are not necessarily original acquisition costs of items.

size of the property population upon which further research will be conducted will be summarized.

The Division Organization Property Book Listing for the 7th Infantry Division contained 1,212 different types (LINs) of equipment on 12 February 1981. Included in those lines were 113,690 individual items of equipment. The cumulative value of that equipment was $231,143,005.38.

Property excluded from the depreciable asset base on the basis of the exclusion categories and expense/capitalization criteria discussed in the previous chapter are shown in Table I.

TABLE I

EXCLUSIONS FROM THE DEPRECIABLE ASSET BASE

Basis	LINs	Items	Value ($)
Inventory	7	13,390	41,251.76
Non-Depreciating	32	1,795	414,087.01
Expensable	394	6,827	1,236,507.10
Total	433	21,012	1,691,845.87

Seven hundred seventy-nine LINs qualified to be included in the depreciable asset base. These LINs contained 91,138 items. Their value as of 12 February 1981 was $229,451,159.51. This equipment is the base upon which further research will focus.

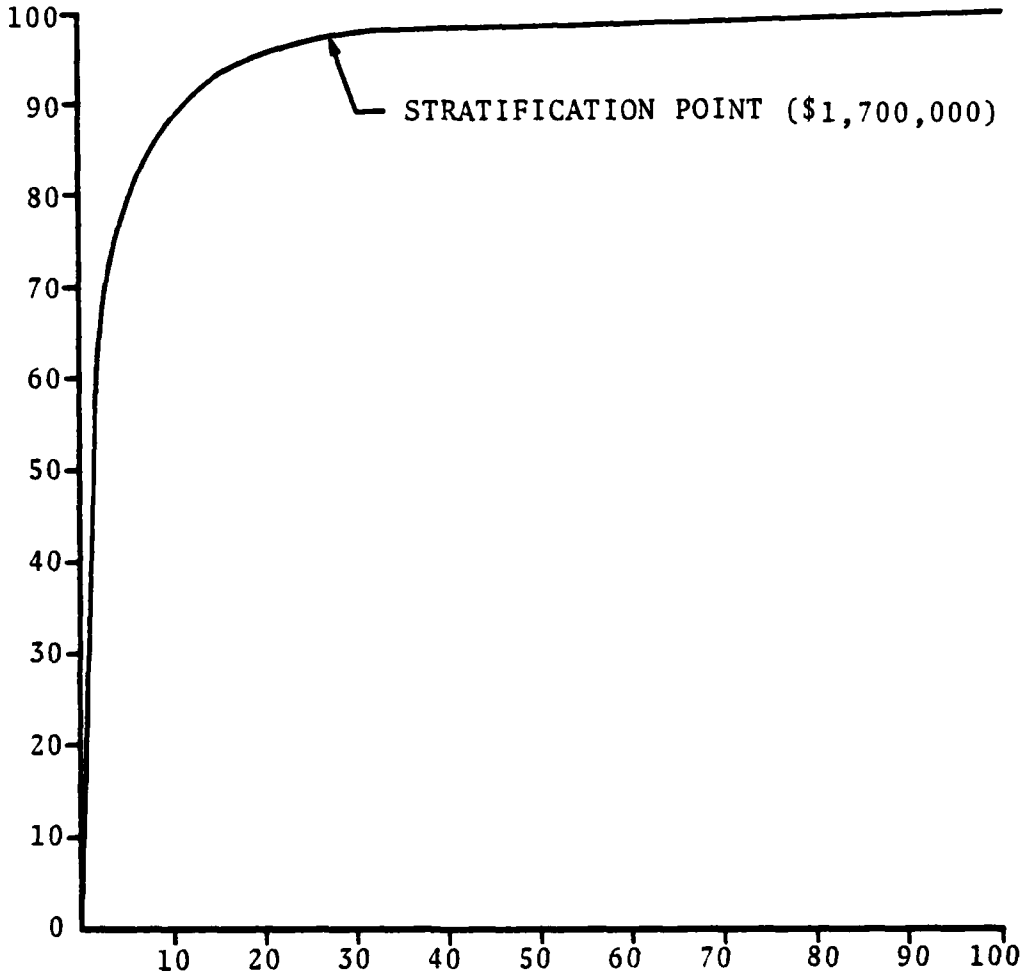
The next step involves stratifying the depreciable equipment LINs according to each LIN's extended value. The

stratified results are then examined. If the results show a small number of LINs with a disproportionately high percentage of the total value of the depreciable equipment, then these LINs should be handled individually in the depreciable asset base. The remaining lines can be grouped in some logical manner in the data base and depreciated as a group (or groups). The 779 depreciable LINs were stratified into 32 categories according to their individual total dollar values. The results of that process are shown graphically in Figure I. This stratification is also shown in tabular form in Appendix A. A high percentage of total value is found in a low percentage of LINs.

The author divided the depreciable property into two groups. The stratification point chosen was $1,700,000. Above the stratification point lay stratum 1, which included 20 LINs, 19,387 items, and was valued at $164,658,257. This stratum contained only 2.6% of the LINs but 71.8% of the total dollar value of the assets. Stratum 2 contained all LINs with extended values less than the stratification point. This stratum contained 759 LINs (97.4%). There were 71,751 items in the stratum. The value of these assets was $64,792,902.51 (28.2%).

FIGURE I

STRATIFICATION OF EQUIPMENT LINS BY LIN TOTAL VALUE



V. SOURCES OF DEPRECIABLE ASSET INFORMATION

In this chapter the various sources of depreciable asset information will be presented. As each source is discussed, the specific types of information available from the source will be identified. The inherent limitations on the information source will also be detailed.

A. DIVISION PROPERTY BOOK LISTING

The Division Property Book Listing has already been described in some detail. This listing is a computer-generated copy of the official property control records maintained on magnetic tapes. The listing is maintained in accordance with the procedures specified in the Functional Users Manual for Division Logistics System (DLOGS), Division Property Book. [Ref. 4]

1. Identification Information

The listing is indexed according to the LIN-NSN-Nomenclature triad discussed in Chapter III. It contains an index entry for every item authorized--or not authorized, but on hand--for use by the division. Additions and deletions to that indexed list of items are entered by property book office personnel. Since these entries are man-made, they can contain errors anywhere in the index triad. However, the listing is periodically compared to revised automated master lists. Any mismatches between the master lists and the

property book listing are referred automatically to managers for correction. Because of this review process, entries in the listing are reliable sources of identification information.

2. Acquisition Information

The division property book listing is virtually useless for gathering acquisition information. The composition of the property book master record contains no explicit field for recording the acquisition date of an individual item. It does, however, record the date of last transaction for a specific type of item issued to a subordinate unit. That means a company-sized unit hand receipt (generated from the master records) will show that date. If, for example, the unit has three RADIO SETS AN/VRC-46 of the same NSN, the date of the last transaction shown on the hand receipt for that item may be the date the last of the three radios was received. That date cannot be associated with any one of the radios, however, nor can that date be assumed to be a date of acquisition or disposition. Under the DLOGS procedures, that date could easily be the date of a change to one of the data fields other than quantity on hand or could reflect a lateral transfer of a radio set from another subordinate unit of the division.

DLOGS master records do not capture the acquisition prices for items at the time they are received. The only price captured in the master record is the current standard

price of a particular item. This is essentially a replacement cost, which would coincide with original acquisition cost only if all items catalogued under a specific NSN were procured under one contract and if no further procurement of the item was planned. [Ref. 9: p. 2-1]

3. Depreciation Information

The division property book listing contains neither service life nor residual value information.

B. DIVISION PROPERTY BOOK SUPPORTING VOUCHERS

Entries in the Division Organization Property Book Listing (C) are supported by vouchers. These vouchers, documentary evidence of transactions posted to the master records, support three types of transactions. They support acquisitions, dispositions, and transactions which do not change on-hand balances.

There are three types of documents which support acquisitions to the master record on-hand balance. The first is Department of Defense (DOD) Form 1348-1. This form is a multiple-use form for all DOD logistics transactions involving depots. The form is prepared in accordance with instructions found in Army Regulation 725-50, Military Standard Requisitioning and Issue Procedures. [Ref. 12] This document is prepared by depot computer systems and is used by depot personnel as a material release order. Depot personnel annotate the document to show the quantity and date actually shipped. When

the items are delivered to the using unit, receiving personnel annotate the document to acknowledge quantity and date received. One copy of this annotated document is then sent to the Property Book Office, where it becomes the source document for posting the acquisition to the master record and is filed in the voucher file. This document contains the following depreciable asset information:

- Identification information
  - NSN - always
  - Nomenclature - always
- Acquisition information
  - Acquisition date - of actual receipt by receiving unit personnel
  - Acquisition price - charged by the National Inventory Control Point against receiving unit funds
- Depreciation information - none

The second document which supports acquisitions to the master record is DA Form 2765-1. This form is completed manually by requesting unit personnel in accordance with AR 710-2, Material Management for Using Units, Support Units, and Installations. [Ref. 13] As mentioned, this document is originated internally within the division. When the request is honored by supply personnel outside the division, those personnel annotate the form with the quantity and date issued to the requesting unit. Requesting unit personnel acknowledge receipt by noting quantity received and the date of receipt on the same form. One copy of the annotated form is returned to the property book office and processed in a manner which is identical to that for DOD Form 1348-1. Depreciable asset

information which can be extracted from the DA Form 2765-1 includes:

- Identification information
  - NSN - always
  - Nomenclature - always
  - LIN - not required but often included
- Acquisition information
  - Acquisition date - actual receipt date will always be shown
  - Acquisition price - not required but occasionally included
  - Depreciation information - none

When an item is transferred to a unit in the division from a non-divisional unit, that transfer is recorded on a Lateral Transfer document, DA Form 3161. The procedures for preparing that document are contained in AR 710-2. [Ref. 13] The form is prepared manually by personnel of the unit giving up the item. When transfer of the property is made, both units' personnel acknowledge the transfer by signing and dating the form. Depreciable asset information available on this form includes:

- Identification information
  - NSN - always
  - Nomenclature - always
  - LIN - always
- Acquisition information
  - Acquisition date - always
  - Acquisition price - always. However, the price shown will be the current standard price at the time of transfer.
- Depreciation information - none

There are five documents which support decreases of the on-hand balance in master records. Two documents are used to prove that items have been returned to the supply system.

Three documents substantiate actual loss of government property.

Returns of serviceable or unserviceable items to the Army supply system are documented on DA Form 2765-1. The procedures for preparation of the form are again found in AR 710-2. [Ref. 13] The form is manually prepared by division personnel. When the item is turned into the supply system, personnel of the receiving activity acknowledge quantity and date received on the form. The depreciable asset information that can be found on this form includes:

Identification information
- NSN - always
- Nomenclature - always
- LIN - not required but often included

Acquisition information - none
Depreciation information - none

The second form used to document turn-ins to other government agencies, such as the Defense Property Disposal Office, is DOD Form 1348-1. The procedures for preparing this form, as with its other uses, are prescribed in AR 725-50. [Ref. 12] The form is prepared manually by unit personnel, and acknowledgement of turn-in is effected when personnel receiving the item annotate the document. Depreciable asset information on this form includes:

Identification information
- NSN - always
- Nomenclature - always
- LIN - not required but often present

Acquisition information - none
Depreciation information - none

The second form used to document turn-ins to other government agencies, such as the Defense Property Disposal Office, is DOD Form 1348-1. The procedures for preparing this form, as with its other uses, are prescribed in AR 725-50. [Ref. 12] The form is prepared manually by unit personnel, and acknowledgement of turn-in is effected when personnel receiving the item annotate the document. Depreciable asset information on this form includes:

- Identification information
  - NSN - always
  - Nomenclature - always
  - LIN - not required but often present
- Acquisition information - none
- Depreciation information - none

One of the three documents which support the physical loss of an item is a Report of Survey, DA Form 4697. This form documents the result of an official investigation of the circumstances surrounding the loss of government property and, collaterally, determines pecuniary liability for the loss. It is manually prepared in accordance with AR 375-11, as are the other two documents. [Ref. 33] In lieu of acknowledgements, this document is approved by a commander of a specified rank. This document contains all necessary identification information, but no acquisition information or depreciation information.

The other two documents are a Statement of Charges, DA Form 362, and a Cash Collection Voucher, DA Form 1131. These two forms are used to recover funds from individuals who lose

government property. The former is used to deduct the payment from the individual's paycheck; the latter records the individual's actual payment to a finance officer. In lieu of acknowledgements, authentication by the finance officer constitutes validation of the document. As with the Report of Survey, all identification information and no acquisition or depreciation information can be drawn from these two documents.

Two documents are used to support entries which do not change on-hand balances in the master records. These are intra-divisional lateral transfers and inventory adjustment reports used to correct erroneous identification information. Both documents, while extant in the document file, are irrelevant as sources of depreciable asset information. They will not be discussed further.

Tying together this plethora of documents is a manually prepared index called a document register. This register is quite similar to an accounting journal. Its index is based on chronological order of documents initiated. Each document is assigned a number composed of the Julian date and ordinal sequence[9] in which each document is initiated. There is no

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[9]A Julian date is a four-digit number composed of the last digit of the current year and the ordinal day of the year. For example, 1 January 1981, would become 1001; 31 December 1980, would become 0366. The ordinal sequence number assigned is a four-digit number which can start with any specified number between 0001 and 9999; for any given day all document numbers assigned will be in sequence; on each new day the first number assigned will be the specified starting number.

correlation between the identification information triad index system and the document register index. The procedures for maintaining this register are in AR 710-2. [Ref. 13]

C. EQUIPMENT TRANSFER DOCUMENTS (DA FORM 2408-9)

As prescribed in Technical Manual 38-750, The Army Maintenance Management System (TAMMS) [Ref. 14], many major items of equipment have been included in an information data base administered by Development and Readiness Command (DARCOM). This information base is designed primarily to keep track of the locations of serially numbered Army equipment throughout the equipment's life.[10] As a part of the inputs for that data base, DA Form 2408-9 is prepared by a receiving unit when a selected item is received. One copy of the completed form is sent to the DARCOM Material Readiness Support Activity (MRSA), located in Lexington, Kentucky. The master file at MRSA is constructed to show the unit currently in possession of an item. Another copy of DA Form 2408-9 is placed into the equipment log book of the selected item. This log book is kept in the maintenance office of the owning unit.

Because this form is used to report when an item is actually received by the using unit and because it is a

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[10]The policy guidance for this program is contained in AR 710-3. [Ref. 15]

permanent record in the log book, this form has great potential value as a source of acquisition information. At present, however, this form contains only NSN and Nomenclature information and the Julian date of receipt by the using unit.

D. NATIONAL INVENTORY CONTROL POINT DATA BASES

Procurement, storage, issue, and overhaul of the vast majority of the equipment in the hands of the Division is controlled by DARCOM National Inventory Control Points (NICP's). The five major NICP's controlling the Division's equipment and the number of lines that each manages are:

US Army Communications-Electronics Materiel Readiness Command (CERCOM), Fort Monmouth, NJ	207 lines
US Army Missile Command (MICOM), Redstone Arsenal, AL	45 lines
US Army Armament Material Readiness Command (ARRCOM), Rock Island Arsenal, IL	140 lines
US Army Tank-Automative Command (TARCOM) Detroit Arsenal, Warren, MI	80 lines
US Army Troop Support and Aviation Systems Material Readiness Command (TSARCOM), St. Louis, MO	129 lines

These NICP's manage items using one standard management information system called Commodity Command Standard System (CCSS). [Ref. 16]

CCSS has two automated files of interest in gathering depreciable asset information. The first is the Inactive

Requisition History File. Contained in this file are all requests which have been completed. There is no set order to the file, although the normal retrieval means is to query the file by using the request document number. This file can also be queried by using other fields in the record. For example, a query could ask for a printout or tape showing all issues of specific NSNs to specific units. The Inactive Requisition History File contains records of the original request, subsequent supply status advices, and a record of the ultimate depot shipment of an item to honor the request. [Ref. 17] Contained in the shipment record is the following depreciable asset information:

- Identification information
  - NSN - always
  - Nomenclature - none
  - LIN - none
- Acquisition information
  - Acquisition date - dropped from NICP inventory records
  - Acquisition price - charged to receiving unit
- Depreciation information - none

The second file of interest is the Procurement History Reference File. This file contains information concerning past procurements of the items an NICP manages. The file is indexed and queried according to the primary NSN associated with each type of equipment. For each procurement contract let, the file contains the date the contract was signed, total contract price, quantity of items procured, and responsibility for first destination transportation charges (F.O.B. manufacturer versus F.O.B. destination). [Ref. 16] While

this file does not contain any depreciable asset information directly, the information it does contain represents the primary component used to establish the standard cost at any point in the history of a particular item.

E. NATIONAL INVENTORY CONTROL POINT ITEM MANAGERS

NICP Item managers are individuals responsible for the detailed management of all facets of the logistics process for a specific item. These managers rely on CCSS to carry out the bulk of their responsibilities. Some managers, however, keep manual records of information which is not captured by CCSS concerning their items. [Ref. 18] The potentially most useful information of this sort is a detailed history of standard price changes and effective dates of changes for specific items. These managers are not required to keep this information, however, and not all of them do.[11]

F. ARMY TECHNICAL BULLETINS

In an earlier chapter, the Comptroller General was cited in connection with estimates of service lives of capital assets. The gist of his guidance is that service lives should be based on actual service life experience. If actual experience does not exist, estimates of service

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[11]Determining which item managers do keep information is an area deserving future research. For that matter, formal cataloging of this information is also a deserving project.

lives may be used. [Ref. 5: p. 2-36] The Army has not maintained records of actual experience, nor has it formally estimated service life in its library of manuals, procedures, or regulations. However, as a part of the guidance DA has given to maintenance activities, there exists a series of publications which address the cost-benefit relationships of spending maintenance funds to repair a major equipment item. These publications consider the age of an item as a parameter for determining whether it should be repaired or discarded. The repair limit, called a maintenance expenditure limit, is shown as a percentage of the current replacement cost of an item. The amount of this percentage varies with the item's age.[12] From these maintenance expenditure limits, reasonable inference can be made as to the estimated service life of a particular item. That inference is that the service life of an item corresponds to the age of an item at which the maintenance expenditure limit becomes constant.

The series of publications containing maintenance expenditure limits is Technical Bulletin series 43-0002-XX.[13] [Ref. 19] There are 25 different bulletins in this series;

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[12]Some maintenance expenditure limits explicitly prescribe a service life, either in years or some other basis.

[13]At each Army installation the Directorate of Industrial Operations normally keeps these bulletins in a reference library.

information must be extracted manually from them. (See Appendix B for a list of the pertinent bulletins.) Individual bulletins establish expenditure limits for specific groups of equipment, based on FSG and FSC groups. While the accuracy of service lives specified or inferred from these bulletins is open to debate, the fact that a service life is presented is much better than an arbitrary estimate, since the NICPs managing the items are the proponent agencies for drafting the technical bulletins. These agencies are presumed to have practical experience upon which the published expenditure limits and service lives are based. Thus, these bulletins do present a useful estimate of the service life of an item, and that is an essential piece of information for depreciation.

G. ARMY SUPPLY BULLETINS

Army Supply Bulletin (SB) 700-20, Army Adopted Items of Materiel - Other Items Selected for Authorization/List of Reportable Items [Ref. 20], is the primary source document for the official identification information triad. The SB is indexed according to LINs. Under each LIN, the individual item nomenclature(s) and NSN(s) is (are) listed. Additionally, this SB provides a relatively current standard cost and shows the NICP responsible for managing the item. This SB can be obtained in two forms, microfiche for manual use and magnetic tape for computer use. After determining what types of

equipment are authorized and/or on-hand in a unit, this SB is quite useful in corroborating the identification information extracted from other sources. By itself, it is of little use. It provides no acquisition or depreciation information.

H. ARMY SUPPLY CATALOGS

Where the SB 700-20 is indexed according to LIN, the Army's consolidated supply catalog, the Army Master Data File (AMDF) [Ref. 21], is indexed by NSN. This catalog, like SB 700-20, will provide all the current identification information on all depreciable assets currently in the Army system. This catalog is the primary document used by DARCOM to publish changes to information associated with a particular NSN, especially price changes. Like SB 700-20, the AMDF provides no acquisition or depreciation information.

I. TECHNICAL SPECIALISTS

Sprinkled throughout DA and DOD activities are technical specialists possessing much practical experience in estimating depreciation information. One such specialist is located in the Maintenance Division, Directorate of Industrial Operations, at each major Army installation. This specialist is normally the Chief of the Quality Assurance Branch. He is involved in the repair or disposal decisions on virtually all Army equipment at the installation. He has observed the actual service

lives of equipment at the installation and, consequently, is in a good position to estimate actual service lives. Another specialist is the Chief of the Defense Property Disposal Office (DPDO) which services a particular installation. This person can render expert judgments on the residual value of Army equipment by groups, at least, if not individually.

J. CURRENT PRACTICES

When an item of information is missing and cannot be readily obtained, certain assumptions are made concerning that item. If, over time, the output of a process which relies on that assumption is adequate, the assumption is accepted and used throughout the organization. Two such assumptions have gained this acceptance. (1) For computation of depreciation, equipment service life is assumed to be 10 years at the Fort Ord Comptroller's Office. (2) For determining the net costs to be depreciated, the Fort Ord Comptroller's Office assumes equipment residual value to be 10%.[14]

In the absence of better information, the assumptions are necessary. The act of making such assumptions, however, entails a danger that the actual information which is replaced by the assumption will never be gathered. If the assumption

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[14]The specific application of these assumptions is in determining the general overhead rate for Fort Ord. This rate is a requirement of the Commercial and Industrial Type Activities cost-benefit analysis program.

is significantly different from the true information, depreciation will be misstated and continue to be misstated indefinitely.

VI. EVALUATING THE USEFULNESS OF THE SOURCES

In the previous chapter, ten different sources of depreciable asset information were identified and described. In this chapter the usefulness and limitations of each source will be evaluated. In the final section of this chapter, multiple sources of the same information will be compared to determine which source is superior.

A. EVALUATION OF INDIVIDUAL INFORMATION SOURCES

This section will quantify the amount of information that each of the ten sources can contribute to the required depreciable asset data base. Chapter VII will evaluate the resources required to gather the depreciable asset information.

1. Division Property Book Listing

The division property book listing is the starting point for establishing any depreciable asset data base. The listing contains the property authorized to be held by the division and shows the property actually on hand, both authorized and unauthorized. This listing contains all of the required identification information, but the quality of that information is subject to error, because entries are generated manually. This qualification is only a short-term problem, since the listing is electronically compared with

the correct identification information periodically and errors are referred to management personnel for correction. [Ref. 11]

The property book listing contains no systematic means for providing acquisition information. The subordinate hand receipts, which are prepared to account for property in the hands of subordinate commanders, will contain a transaction date for each LIN. This date is probably a transaction which reflects acquisition of the item. There is a significant chance, however, that the transaction date shown is either an administrative correction of other information in the record or a transaction supporting disposition of an item. Management personnel subjectively estimate the chance of that transaction date being an acquisition to be 70%. [Ref. 22] This probability is too low to support any inference concerning the hand receipts' last transaction date, and is not testable by any other means.

Except for determining the location of each item, acquisition and depreciation information are not available from the property book listing. The DLOGS EDP system is not designed to capture these data. The system does capture a price, but this is a current standard price for each item listed in the property book. This price is updated quarterly, by use of SB 700-20, to reflect the current

standard (replacement) cost for each item on the listing. The previous standard cost for an item is destroyed during this update. [Ref. 22]

2. Division Property Book Supporting Vouchers

Vouchers which support transactions in the property book listing contain both identification and acquisition information, but contain no depreciation information. The specific data contained in vouchers include NSN, nomenclature, acquisition date, and location. Although the acquisition price is printed on each DOD Form 1348-1, rough handling of the voucher occasionally destroys that information (which is not important in the existing property book system, since historical acquisition cost is irrelevant). Acquisition cost is not required to be entered on DA Form 2765-1 but is occasionally.

Vouchers are not maintained indefinitely. AR 340-18-14, Maintenance and Disposition of Logistics Functional Files [Ref. 23: p. 1416-14], prescribes that voucher files be destroyed on 1 January two years following the calendar year in which a voucher was initiated. Accordingly, the voucher files extant in the Division Property Book Office at Fort Ord include only the current and two previous calendar years' vouchers. Judgmental sampling was used to estimate the proportion of items in each stratum for which acquisition dates and prices are supported by the voucher files. The

files were found to contain documents substantiating approximately 13% of the acquisition dates and approximately 8% of the acquisition prices for all depreciable asset items. (See Appendix C.) Based on these results, the usefulness of the voucher files is extremely limited as a source of acquisition data.

The voucher files are useful as sources of data for estimating historical acquisition costs. Many vouchers in the file contain the acquisition cost of items at specific past points in time. Appendix D demonstrates the use of data extracted from the voucher files, property book listing, and current supply catalogs and bulletins as input parameters for estimating acquisition prices with trend analysis. Another use of the vouchers is to evaluate estimated service lives of equipment based on mortality rates. This use is demonstrated in Appendix E.

3. Equipment Transfer Documents (DA Form 2408-9)

In the previous chapter, the DA Form 2408-9 equipment transfer document was identified as a potential source for acquisition date information for selected equipment items. Using TM 38-750 [Ref. 14] and a related document, AR 710-3, Asset and Transaction Reporting System [Ref. 15], the depreciable asset LINs were screened to identify the equipment for which transfer documents are required. The results of that screening process are shown in Table II:

TABLE II

ITEMS REPORTED ON DA FORM 2408-9

STRATUM	ITEMS		VALUE	
	Number	%	$	%
1	2056	10.6	120,609,305	73.2
2	3670	5.1	31,933,319	49.3
TOTAL	5726	6.3	152,542,824	66.5

These transfer documents can provide the acquisition dates of a significant portion of the depreciable equipment value--roughly two-thirds of the total. More importantly, almost three-fourths of the value of stratum 1 is equipment for which these transfer documents are maintained. Unfortunately, however, acquisition dates can be established in this manner for only ten percent of the items in stratum 1. As a source of acquisition dates, these transfer documents satisfy only a portion of the need.

Copies of the DA Form 2408-9 are sent to the DARCOM Material Readiness Support Activity (MRSA), Lexington, Kentucky, and to US Army Depot Systems Command (DESCOM), Chambersburg, Pennsylvania. Both activities use this document to record the reporting unit's acquisition of the reportable item in their respective data bases. However, the DESCOM base does not capture the acquisition date in the automated

record. [Ref. 24] A subsidiary file of these transactions is kept by DESCOM and includes acquisition date, but it is destroyed after two years.[15] The Material Readiness Support Activity data base does capture the receipt date for items received by using units. That date, however, is recorded in the date of last transaction field of the record. Of the items recorded in the MRSA data base for 7th Infantry Division, 39.5% require additional DA Forms 2408-9 to be submitted annually, reporting the usage (miles driven, hours operated, etc.) of each item during the year. [Ref. 14] When these reports are posted to the records, the acquisition date is destroyed. [Ref. 25] This fact reduces the value of the MRSA data base as a source of acquisition dates. Where the manual DA Forms 2408-9 provide dates for over 5700 items, the MRSA data base has dates for only about 3500 items. The exact effect of usage documents on the MRSA base is summarized in Table III.

TABLE III

MRSA DATA BASE ITEMS UNAFFECTED BY USAGE REPORTS

STRATUM	ITEMS		VALUE	
	Number	%	$	%
1	281	1.4	89,455,300	54.3
2	3187	4.4	17,907,539	27.6
TOTAL	3468	3.8	107,362,839	46.8

[15]The DESCOM data base is presently in the development stage There is no significant amount of historical information.

4. National Inventory Control Point Data Bases

Querying the NICP Inactive Requisition History File (IRHF) will elicit a list of all items shipped to the division. That list will contain the acquisition price of an item and a shipping date, which will be 30-45 days prior to receipt date.[16] Like the property book voucher file, however, that NICP file has the same restrictions prescribed in AR 340-18-14. [Ref. 23: p. 1416-14] All records which have been in the file for two years are destroyed. [Ref. 17] This fact makes the time periods for the NICP and property book files comparable.

These two files are not equally useful however. Detracting from the NICP file's usefulness are transfers of equipment from non-divisional to divisional units at Fort Ord; these transfers will never be reflected in the file. Adding to its usefulness is the fact that the acquisiton price information for each item shipped has not been destroyed during shipment and processing. Direct tests of the NICP file were not conducted. However, tests of the Division Organization Property Book voucher files could be used to estimate the amount of acquisition information in the IRHF. In section A-2 of this chapter, the Property Book voucher files were examined and found to contain vouchers which supported

[16]This lag between date shipped and received was noted in the property book voucher file.

acquisition dates for approximately 13% of the items and prices for about 8% of the depreciable asset items. There were two causes of this observed difference between the item proportions supported by date and price. Some of the acquisitions were items issued by local supply sources, which were recorded on DA Form 2765-1. Other acquisitions were lateral transfers of items from non-divisional units on DA Form 3161. The procedures for preparing both of these forms do not require that the acquisition cost be entered on the forms; however, sometimes that price is voluntarily entered.

Neither the DA Form 2765-1 nor the DA Form 3161 are ever entered onto the NICP Inactive Requisition History File; that file only records shipments from NICP depots to Fort Ord units. The difference between the items whose issue is supported in the NICP IRHF and in the Property Book vouchers is the items acquired locally using these two documents. Since some of the local documents do contain price and are included in the price proportion, the observed item proportion supported by vouchers containing acquisition price--8%--constitutes the upper limit for the proportion of items whose acquisition dates and prices are supported by records in the IRHF.

The procurement reference history file maintained at the NICPs is a source of historical cost data that could be

used to estimate acquisition costs. The contents of this file might be especially useful for procurement funded equipment estimates, because the procurement cost of these items is the largest portion of the standard cost. The other portion of the standard cost, transportation costs, might be estimated using a transportation price index. No information was sought to evaluate such estimates because the historical Army Master Data Files made this source useless. (See A-8 of this chapter.)

The size of the reference history file could be determined in general terms. Prior to the implementation of CCSS by DARCOM NICPs, no such formal file existed as part of a standard management system. [Ref. 16] Some of the NICPs had maintained such a file manually; when CCSS was implemented, some of those NICPs entered the contents of the manual file into the data base. No consistent starting date exists throughout DARCOM, however, because of the individual decisions made by NICP managers concerning the amount of manual files to convert and because individual NICPs implemented CCSS on different dates of a phased schedule which began in 1974 and was completed in 1977. The first NICP to implement CCSS was the US Army Troop Support and Aviation Systems Material Readiness Command (1974); the last was the US Army Tank-Automotive Command (1977). The latter NICP converted manual files dating back to 1974, when the system was implemented. [Ref. 16]

5. National Inventory Control Point Item Managers

Evaluating the usefulness of price change lists provided by NICP item managers involves determining how many managers keep such lists. Considering the number of item managers at the NICPs, this task could not be accomplished within the scope of this research.[17] Some item managers do keep such information. [Refs. 16, 18]

Another way to evaluate the usefulness of this information is to place it in perspective with the other information sources. The price information is of little use by itself; a user needs the acquisition dates of equipment to be able to transfer specific acquisition prices from the lists to equipment records in a depreciable asset data base. The lists could prove quite useful for use with the equipment transfer records. For example, after gathering the acquisition dates of all items of a particular NSN for which a price list is available, the acquisition price for each item may be taken directly from the list and entered into the depreciable asset data base. This method would not be limited by the lack of price information for the item before 1973, nor would it have to rely on price estimates. Another potential use for this information is an input for developing a general price estimation method for all items using trend analysis (see Appendix D).

[17]It is a project worthy of further research.

6. Army Technical Bulletins

The Army Technical Bulletin (TB) 43-0002-XX series (see Appendix B) are the primary sources of service life information available to the field comptroller. [Ref. 19] These publications do not cover all depreciable assets, however. These TBs have not been published for many asset Federal Supply Groups. In other TBs, the service lives for particular assets are shown as indefinite. The single largest group of assets whose lives are shown in this manner are weapons. The service lives of these weapons are not really indefinite, of course; their utility is consumed with use.[18] Their useful lives simply have not been adequately determined. The TBs identify various service lives for various specific assets; those lives range from three years to 30 years. Table IV summarizes the proportion of the total depreciable assets for which the TB series provides service life information.

7. Army Supply Bulletins

In the previous chapter, SB 700-20 was described as a primary source document for all identification information. The chapter also indicated that this SB is of little use by

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[18]The physical utility consumed during peacetime use of the weapons may be so minimal that the weapons' effective physical lives approach infinity. However, service lives of weapons are also limited by technological obsolescence. For example, the Vulcan air defense cannon (LIN J96845) will be replaced by a newer cannon system by 1990 [Ref. 26: p. 339]; thus, the current cannon's service life is, at most, nine years.

TABLE IV

PROPORTION OF DEPRECIABLE ASSETS HAVING SERVICE LIVES IDENTIFIED IN TB 43-0002-XX SERIES PUBLICATIONS

Service Life	Items	Value	Annual Depreciation
3	12,762	1,020,931.19	340,310.40
5	1,079	118,852.04	23,770.41
6	482	42,626.83	7,104.47
7	1	1,214.00	173.43
8	2,000	1,554,349.01	194,293.63
10	3,545	2,209,199.69	220,919.97
11	23	668,266.00	60,751.45
12	1,209	10,856,768.62	904,730.72
13	24	53,403.00	4,107.92
14	32	70,432.00	5,030.86
15	11,292	33,662,367.45	2,244,157.83
20	950	11,843,502.00	592,175.10
24	10	602,534.00	25,105.58
25	19	58,699.00	2,347.96
30	85	1,268,810.00	42,293.67
Total	33,513	64,031,954.83	4,667,273.40
% of Asset Base	36.8	27.9	

itself. The primary use to which this SB can be put is verifying identification information--either when drawing information from the property book listing or when using the depreciable asset data base.

8. Army Supply Catalogs

The Army Master Data File (AMDF) also contains the identification information, indexed by National Stock Number. Like SB 700-20, it is a primary source of this information and is of little use except to verify the identification information drawn from the property book listing. However,

the publisher of this information, the US Army DARCOM Catalog Data Activity (ATTN: DRXCA-PP, New Cumberland Army Depot, New Cumberland, Pennsylvania) is capable of making the AMDF a much more useful document. The Management Information Research Assistance Center (MIRAC), part of the Catalog Data Activity, maintains a microfiche copy of the monthly AMDF from 1973 to the present. [Ref. 27] These copies contain the records of acquisition prices for items which have been destroyed by all other information sources. MIRAC can provide those prices for a limited number of items, providing a NSN and acquisition date can be established for each item. For large numbers of items, the MIRAC can make a microfiche copy of the complete file.[19] [Ref. 28]

In section A-2 of this chapter, judgmental sampling was used to estimate that approximately 13% of the items held by the division were received in the two-year period from 1979 through 1980. If the items received by the division were received in a constant manner in the past (a uniform distribution)--an assumption which has not been tested--the previous judgmental sampling suggests that as many as 6.5% of all the items were received in each of the past 15 years. If the true proportion is close to the tested limit, the file

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[19]While MIRAC can make a copy of this complete file, it is no mean task. There are 96 monthly packets, each containing 80 cards; 7680 cards must be reproduced. [Ref. 28]

maintained by MIRAC contains the acquisition price of about 52% of all the items the division holds. No estimate can be made of the value of those items.

9. Technical Specialists

Technical Bulletins provided service life information for only 36.8% of the depreciable items. The service lives of many of the remaining items can be estimated by technical specialists. The Chief of Quality Assurance Branch, Maintenance Division, Directorate of Industrial Operations, heads an activity whose employees are such specialists. These employees' competence stems from making repair-or-dispose decisions on Army equipment for many years.[20] [Ref. 29] Obtaining service life estimates from these specialists would compete with the employees' normal duties. Use of this source with service life information should be limited first to those items in stratum 1 for which service life information is missing, then to missing information in stratum 2.

The Defense Property Disposal Office (DPDO) can provide information concerning actual residual value of equipment. The usefulness of this information is limited, however, by the procedures and policies under which DPDO operates. [Ref. 30] DPDO sells property only after offering the property to other

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[20]This author made no serious attempt to elicit service life estimates for specific items. One exception is that the service lives of all types of helicopters is estimated to be 10 years. [Ref. 29]

Federal, state, local and charitable agencies. If property is taken, the agencies are sometimes charged a specific percentage of the current acquisition cost;[21] but most often they are charged nothing. Property which remains unclaimed by other agencies is then inspected. If, in the specialist's opinion, the item has value as an item, it is segregated for future sale; if it is of little inherent value, the item is added to a lot of scrap. Periodically, DPDO conducts auctions or sealed-bid sales of items and scrap lots. For items actually sold, the return to the Fort Ord DPDO has been 5-7% of the current acquisition price.[22] [Ref. 30]

DPDO sells only the marginal items disposed of by the 7th Infantry Division. Therefore, the percentage realized on sales seems to be a low estimate. Evaluating this estimate, however, is difficult because the basis DPDO uses for the percentage computation is the current acquisition cost. Additionally, DPDO receives no information on the original acquisition date or price of the item turned in. The only conclusion concerning DPDO information that can be made is

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[21]This percentage has no relation to the residual value of the item sold.

[22]DPDO values an asset received according to the price assigned by Installation Supply Division, Directorate of Industrial Operations. While the Chief, DPDO, Fort Ord, considered that price to be original cost, the Installation Supply Division assigns prices from the current AMDF; hence this is a current acquisition price.

that the summary residual value data kept as a part of normal operations at DPDO are not useful for estimating residual values of depreciable assets.

However, DPDO has recently started capturing certain data on individually stock numbered (NSN) items. Within the last year, the DPDO regional offices have started providing local offices with a printout which contains the actual proceeds gained from past sales of specific items. This printout and the data base from which it is generated currently contains comparatively little information. [Ref. 30] It is growing and has great promise for establishing realistic residual value information in the future.

10. Current Practices

The current practice of using a 10-year service life for all depreciable assets is an example of depreciating assets under the composite rate method. Under this method, "relatively short-lived assets are grouped with long-lived assets and depreciated at a rate that represents a rough estimate of the 'average' [group] life...." [Ref. 31: p. 15]

In subsection A-6 of this chapter, the service lives of 33,513 depreciable items worth $64,031,955 were referenced to appropriate technical bulletins. Table IV summarizes that process and shows the total annual charge for depreciation

of those assets. That annual charge provides a means to evaluate the composite rate currently used.[23] For the assets considered, the composite service life is 13.7 years (the total value of the assets divided by the annual charge). For these assets, the current practice of using a 10-year life overstates depreciation by 27%. If the assets for which service lives were not available could be included in the evaluation, the result could change dramatically. One adjustment to the annual depreciation charge will demonstrate this. By including an annual charge for helicopters (see footnote 20) based on their estimated 10-year service life, the total charge in Table IV increases to $12,441,260.60 and the total value of the assets increases to $141,771,826.80. The resulting composite life changes to 11.4 years. In this case the depreciation charged would be overstated by only 12.3%.[24] If all the remaining depreciable assets had service lives of 10 years the composite life would be 10.8 years, and depreciation would be overstated by 7.4%.

Composite rate depreciation methods have limitations. They can be used only when the complete depreciable asset base is being depreciated. When portions of the depreciable asset

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[23]This evaluation does not consider the portion of the depreciable assets for which no service life was established--some 72% of total value.

[24]Here, 62% of the total depreciable asset value is included in the computation.

base are being depreciated separately, composite rate depreciation is inappropriate. In this case, unit or homogeneous group depreciation methods must be used and an estimate of each LIN's service life should be obtained. [Ref. 31: p. 151]

B. COMPARING THE USEFULNESS OF THE INFORMATION SOURCES

In the previous section, each source was evaluated to determine the amount and type of information each could provide to the depreciable asset data base. In this section the amount of each type of information that the sources can cumulatively provide will be evaluated.

1. Identification Information

The Division Organization Property Book Listing (C), SB 700-20, and the Army Master Data File individually provide 100% of the required identification information.[25] Despite the fact that the identification information contained in the Property Book Listing is secondary information extracted from the other two sources, the automated verification of these data (discussed in Chapter IV) makes the Listing sufficiently reliable to stand alone as the sole source of identification information. The other sources are needed only as back-up support to the Listing.

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[25]All other sources provide substantially less information.

2. Acquisition Information

Acquisition date, price, and physical location are the three types of acquisition information required. Of the three, only physical location information can be gathered completely--from the Division Organization Property Book Listing.

Acquisition date information can be gathered only for a small number of items. DA Forms 2408-9 provide only 6.3% of the total; Property Book vouchers can provide dates for approximately 12% of the items.[26] The sum of these two percentages, 18.3%, is the relative amount of acquisition date information which can be gathered on all assets. That 18.3% of the total items, however, represents over 66% of the total value of the depreciable assets.[27]

Another means of gathering acquisition date information is by using the combination of equipment transfer documents and queries of NICP inactive requisition history files. This combination will provide dates for approximately 13.8% of the depreciable asset items (6.3% from equipment transfer documents and 7.5% of the remaining items from the NICP files).

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[26]Property Book vouchers provide 13% of the dates for all items, including items for which DA Forms 2408-9 are prepared. To eliminate the double counting of item sources, the percentage of items not required to have DA Forms 2408-9 (93.7%) was multiplied by 13% to get 12%.

[27]An exact estimate cannot be established.

The value of these items is again over 66% of the total value of the depreciable assets.

The best acquisition price source is the MIRAC Army Master Data historical file. It is theoretically capable of providing approximately 52% of the depreciable items' prices, but only if acquisition dates are available for that many items. Since acquisition date is an entry parameter for the historical AMDF, the proportion of items for which dates are available becomes the practical limit for the proportion of acquisition prices that the AMDF can provide. The remaining acquisition price information must be estimated. The only estimation tool seems to be trend analysis of actual prices against time to "backcast" acquisition prices prior to 1973.

3. Other Depreciation Related Information

The single most useful source of item service life information is the TB43-0002-XX series. Service lives for almost 37% of the depreciable assets can be gathered from this series. These TBs, along with the expert judgment of technical specialists, is a combination of sources which can provide the service life information for virtually all depreciable assets. The use of a composite service life, as in current practice, is so limited that it cannot replace individual estimates. Additionally, the specific composite life--10 years--may significantly overstate depreciation when it is used.

Presently, no means exist to estimate reasonably the residual value of an item. Therefore, the adequacy of the current practice cannot be evaluated. This author must defer to the current practice as a means of estimating residual value until such time as the DPDO data base of actual sales of NSN items has been adequately established. When that occurs, the DPDO system will have the information needed to establish reasonable residual values for items.

VII. ESTIMATING THE RESOURCES REQUIRED TO GATHER INFORMATION FROM THE MOST USEFUL SOURCES

In Section B of Chapter VI, many of the potential information sources were eliminated because they provided inferior information when compared to other sources or source combinations. This chapter will examine, in general terms, the relevant resources required to gather information from the remaining sources. Documents or information already generated from an activity's normal operations are sunk costs, which are irrelevant.[28]

A. IDENTIFICATION INFORMATION SOURCES

The most useful source of identification information is the Division Organization Property Book Listing. Since this listing is produced during normal operations, its cost is irrelevant. The major resource required to extract identification information from this listing is clerical labor. Incidental to the research, the identification information for all 1212 LINs was manually extracted from the listing. That process took approximately 20 labor-hours (this converts

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[28]Minor miscellaneous costs will also not be included because the intent of this evaluation is to examine the major resources--labor and extraordinary computer time--required to gather information.

to approximately $146 in clerical salaries[29]). There was little learning curve effect noted; this was basically a transcription process. No other significant resources were required to extract the information. However, the information was verified using the SB 700-20 microfiche. The process took an additional 10 labor-hours. Expressed incrementally, it takes .00825 labor-hours to verify manually identification information for each LIN in the property book listing.[30]

If the depreciable asset data base is automated, the costs of gathering and verifying the information manually could be replaced by the cost of electronically transferring the information from the DLOGS tapes to the data base records. A special computer program would be required, along with a special run of the DLOGS records to extract the information. As long as the costs of writing the program and the computer run did not exceed the clerical costs of manually extracting the data, the automated process would be a superior method.

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[29] This estimate is computed by taking the annual Regular Military Compensation of a military clerk [Ref. 32: p. 12], dividing by the number of working hours in a year and then multiplying the result by 20 hours. The RMC chosen was that for an E-4 with over four years service--$14,809. The number of working hours in a year is approximately 2024 [(365 days - 104 weekend days - 8 holidays) X 8 hours per day]. The cost of clerical labor is $146. [14,809 ÷ 2024 X 20].

[30] There were 1212 LINs verified in 10 hours. That is a rate of 121.2 per hour; the reciprocal of that rate is .00825.

B. ACQUISITION INFORMATION SOURCES

In the previous chapter, two source combinations for acquisition date information were shown to be almost equally useful. The first combination, equipment transfer documents and the property book vouchers, would require certain resources to gather the information. Manual collection of dates from DA Forms 2408-9 would require approximately 52 clerical labor-hours ($377).[31] Manual collection of dates from the Property Book vouchers would require 390 labor-hours ($2855).[32] The total resources required by this source combination would be 442 labor-hours, or approximately $3232.

The second combination, equipment transfer documents and inquiry of the NICPs' Inactive Requisition History Files,

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[31]The records are kept in 33 different units within the division. Each unit would require about 1.5 labor-hours to gather the information and type the report. At division level another two labor-hours would be needed to collate the various reports. The computation is: (1.5 hours per clerk X 33 clerks) + (2 hours to collate X $7.32 per hour) = $376.81.

[32]The author took 20.65 hours to gather this information on 20 LINs during statistical testing of the property book vouchers. The author did experience some learning curve effect during the gathering process, most of which was attributed to becoming acquainted with the filing system. Additionally the author was simultaneously gathering data for use in estimating service lives and acquisition prices. Because of this, it is estimated that the process of gathering information for the 779 depreciable asset LINs would require approximately .5 hours per LIN, or about 390 labor-hours. The cost would be approximately $2855 (390 X $7.32).

would require the same resources for manual collection of dates from the DA Forms 2408-9, 52 labor-hours ($377). Gathering acquisition dates from the NICPs through electronic inquiries, however, would cost considerably less than manually gathering the dates from the Property Book vouchers. Approximately 56 labor-hours would be needed, at a cost of about $653.[33] Thus, the total resources required for this process are approximately 108 labor-hours or $1030. The second combination could be modified to provide the same usefulness as the first combination through scanning the property book vouchers and extracting the acquisition dates of items received on local requests. This scanning and extraction process is estimated to take about 20 labor-hours and cost $146. Therefore, the total cost of information for the modified second combination would be approximately $1176. The usefulness of information extracted by the modified second combination and the first combination would be comparable.

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[33]Each of the 14 NICPs managing items in the property book would need modified programs in order to query the IRHF. Approximately 2 hours of programmer's time would be required at each NICP. [Ref. 17] Another 2 hours of clerical time would be required at each NICP for processing. Assuming a programmer's time cost about the same as an Army O-3, with over 8 years of service, the costs are: 14 NICPs X (2 hours X $7.32 + 2 hours X $16) = $652.96. Querying the IRHF is a routinely scheduled process. This special query is compatible with the normal process; its costs are, therefore, irrelevant.

The acquisition dates for items are the entry parameters for determining acquisition prices. Without the expenditure of resources to gather those dates, no data on prices could be gathered. Since the acquisition dates must be determined first, the costs of obtaining them are then sunk costs of gathering acquisition price data. Only the incremental resources required for gathering prices from available acquisition dates will be estimated. The costs of reproducing and using the MIRAC historical AMDFs are of two types--reproduction costs and clerical costs. Reproduction of the files would require approximately 48 labor-hours ($351).[34] Clerical use of those AMDFs would require about 130 labor-hours ($952).[35] The total incremental resources required to gather acquisition prices would be 178 labor-hours, or $1303. MIRAC can reproduce the AMDF in only one way--microfiche-to-microfiche. [Ref. 28] Therefore, automation of this information gathering process is impossible.

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[34]It would take two clerks three days to reproduce the 96 monthly AMDFs. [Ref. 28] This represents 48 labor-hours ($351.36).

[35]The author has had extensive experience using the AMDF. A clerk can gather the acquisition dates of about 50 items per hour. There are approximately 6500 separate acquisition prices being sought, no matter the source of the dates (5726 items from DA Forms 2408-9 and approximately 800 local issue documents without price information). A clerk would required about 130 labor-hours to gather this information, which would cost approximately $952.

Physical location information is found in the Division Property Book Listing (C). This information can be gathered at the same time identification information is gathered. It would require about five additional labor-hours (costing about $73).

C. OTHER DEPRECIATION RELATED INFORMATION SOURCES

Gathering the service life information from the TB 43-0002-XX series took the author 11.5 labor-hours. The cost of that labor would be $84. Technical specialists would have to render service life estimates on 387 LINs. The nature of this work is such that the time required to estimate service lives for these LINs is not estimatable. Specialists would require negligible amounts of time to estimate some LINs' service lives and substantial time to estimate others.

D. SUMMARY OF THE MOST PROMISING SOURCES OF INFORMATION

Chapters VI and VII have been devoted to evaluating the utility of various information sources and determining the resources required to gather the available depreciable asset information. Table V summarizes both portions of that evaluation.

TABLE V

RESOURCE COSTS AND CONTRIBUTIONS OF INFORMATION SOURCES TO THE DEPRECIABLE ASSET DATA BASE

Source	Information	% of Population for which the Source Provides Information		Resource Costs	
		Items	Value	Labor-hours	Dollars
Property Book Listing	Identification	100	100	20	146
	Physical Location	100	100	10	73
				30	219
Property Book Vouchers/ DA Forms 2408-9	Acquisition Date	18.3	66+	452	3232
NICP Files/ DA Forms 2408-9/ Screen Vouchers	Acquisition Date	18.3	66+	128	1176
MIRAC AMDF	Acquisition Price	52*	?	178	1303
TB 43-0002-XX	Service Life**	37	28	11.5	84
Technical Specialists	Service Life**	63	72	?	?
	Residual Value	0	0	-	-

*Theoretical percentage; actually limited to 18.3--the percentage of the acquisition date sources.

**The percentages for which these two sources provide information are complementary; together they can provide all service life information.

VIII. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Based on the research, this author must conclude that it is not feasible to gather all depreciable asset information for every item. The current sources are not designed to capture all acquisition date or price information, and no adequate means exist to estimate the missing information. These sources are also incapable of providing reasonably supported estimates of residual value for items.

Although gathering all necessary information is infeasible, a material portion of it can be obtained. The most useful and least expensive sources are:

Division Organization Property Book Listing (C) for identification information and physical location of items.

A combination of the NICP Inactive Requisition History File, the manual copies of DA Form 2408-9 equipment transfer documents, and screening of the Division Property Book vouchers for local equipment receipts for gathering acquisition dates.

A combination of the NICP Inactive Requisition History File records and the MIRAC historical AMDF for acquisition prices.

SB 43-0002-XX series publications and the estimates of technical specialists for service life information.

For residual values, no adequate sources currently exist.

A third conclusion that can be drawn from this research is that, unless current DA regulations are changed, more acquisition information will be destroyed. Each January,

files throughout DA are purged of the acquisition and disposition information contained in the calendar year that ended on 31 December two years previously. No alternative means exist to recapture the information.

The final conclusion is that the current information sources are not designed to gather depreciable asset information efficiently. The Division Organization Property Book Listing (C) computer programs do not cause acquisition dates and prices to be captured and retained in the automated records. The MIRAC historical AMDF is maintained on over 7000 microfiche cards; there is no automated historical data base. Service lives for assets are contained in over 30 hardcopy documents; the service lives of all items could be maintained in a single data base.

B. RECOMMENDATIONS

Based on the conclusions and the research, fourteen recommendations are tendered. They are classified by the time period in which the recommendation should be implemented--long-range, mid-range and immediate.

1. Long-Range Recommendations

Long-range recommendations are designed to ensure that efficient sources of information exist when a depreciable asset data base is initiated. Before accounting system changes are implemented, it is recommended that:

NICPs be required to develop and publish service life estimates for all equipment LINs, based on actual experience.

The service lives of LINs be included in a new data field in Supply Bulletin 700-20.

DPDO continue its program for capturing actual residual values of stock numbered equipment and make the information it gathers routinely available to installation Comptrollers.

That MIRAC extract all LIN entries in the historical Army Master Data Files and maintain those entries in an automated standard price history data base.

That the modified Standard Financial System contain a depreciable asset data base which is designed to record the following information for each depreciable asset or asset group: Item nomenclature, National Stock Number, Line Item Number, acquisition date, acquisition price, physical location, service life, and residual value. Further it is recommended that depreciation be calculated by using homogeneous group depreciation methods where feasible and unit depreciation methods for only high dollar depreciable assets.

2. Mid-Range Recommendation

The mid-range recommendation, if implemented within the next year, will protect the depreciable asset information generated in future periods from systematic destruction. To protect future information, it is recommended that:

The DLOGS property book records system be modified to capture individual item acquisition dates and prices and the disposition dates of items.

3. Immediate Recommendations

Immediate recommendations are designed to protect the existing depreciable asset information, correct current practices, and fill existing information voids. It is recommended that:

Until such time as the DLOGS property book record modification is implemented, paragraph 2-8 of Army Regulation 710-2 include a requirement that, at the time an item is received, the acquisition price will be entered in the nomenclature block of the DA Form 2064, Document Register for Supply Action.

Until such time as the Standard Financial System is changed and a depreciable asset data base is implemented, Army Regulation 340-18-14, paragraph 1416-15, be amended to require property book officers to maintain all document register pages in a permanent file.

The historical AMDF maintained by MIRAC be maintained and protected until needed by installation Comptrollers.

The currently accepted composite service life at Fort Ord be modified.

Improper use of the composite service life in lieu of unit service lives be discontinued.

The current estimate of residual value of equipment be continued until actual residual value information becomes available from DPDO.

Items not having verifiable acquisition dates be assigned dates based on a statistically supported population distribution.

Items acquired prior to 1973 for which no acquisition prices are available be assigned prices from the January, 1973, historical Army Master Data File.

APPENDIX A

DEPRECIABLE ASSET LINS STRATIFICATION TABLE

Interval ($X1000)	No. LINs	Total Value ($ Millions)	Cumulative % LIN	Cumulative % Value
1-25.	442	3.270	58.0	1.4
25-50.	92	3.390	70.1	2.9
50-100.	69	4.848	79.1	5.0
100-150	32	3.857	83.3	6.7
150-200	31	5.511	87.4	9.1
200-250	12	2.756	89.0	10.3
250-300	12	3.308	90.6	11.8
300-350	10	3.314	91.9	13.2
350-400	5	1.859	92.5	14.0
400-450	3	1.267	92.9	14.6
450-500	4	1.892	93.4	15.4
500-550	4	2.082	94.0	16.3
550-600	1	.551	94.1	16.6
600-650	1	.622	94.2	16.8
650-700	4	2.704	94.8	18.0
700-750	2	1.479	95.0	18.6
750-800	3	2.300	95.4	19.7
800-850	2	1.624	95.7	20.4
850-900	0	-	95.7	20.4
900-950	0	-	95.7	20.4
950-1000	1	.975	95.8	20.8
1000-1100	3	1.091	95.9	21.3
1100-1200	3	3.389	96.3	22.7
1200-1300	0	-	96.3	22.7
1300-1400	1	1.354	96.5	23.3
1400-1500	2	2.909	96.7	24.6
1500-1600	3	4.637	97.1	26.6
1600-1700	2	3.381	97.4	28.1
1700-1800	2	3.470	97.6	29.6
1800-1900	2	3.793	97.9	31.3
1900-2000	2	3.945	98.2	33.0
> 2000	14	153.451	100.0	100.0

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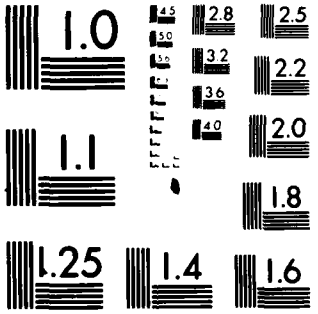

MICROCOPY RESOLUTION TEST CHART
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APPENDIX B

RELEVANT BULLETINS IN THE TB 43-0002-XX SERIES

XX	IDENTIFICATION
- 1	Maintenance Expenditure Limits (MEL) for Federal Supply Groups(FSG) 15, 28, 29, 63, 66 and 81, and Federal Supply Classes(FSC) 2810, 2840, 2915, 2925, 2935, 2945, 2995, 6340, 6620, 8145 and 1560. Headquarters, Department of the Army; Washington, D.C., 2 January 1981.
- 2	MEL for FSC 1710, 1730, 1740, and 4920. HQ, DA: Washington, D.C., 22 December 1980.
- 4	MEL for FSC 1610, 1615, 1620, 1630, 1650, 1660, 1670 and 1680. HQ, DA: Washington, D.C., 17 April 1979.
-11	MEL for FSC 5805, 5815, 5820, 5821, 5825, 5826, 5830, 5831, 5835, 5840, 5841, 5845, 5850, 5855, 5860, 5865, 5895, 5905, 5910, 5915, 5920, 5925, 5930, 5935, 5940, 5945, 5950, 5955, 5960, 5961, 5962, 5965, 5970, 5975, 5977, 5985, 5990, 5995, 5999, 6125, 6130, 6135, 6140, 6750, 6760, 6770, 6780, 6940, 7450, and 8130. HQ, DA: Washington, D.C., 2 May 1979.
-22	MEL for FSC 7310, 7320, 7330, and 7360. HQ, DA: Washington, D.C., 12 September 1973, with changes 1 and 2.
-23	MEL for FCG 45, FSCs 4510, 4520 and 4540. HQ, DA: Washington, D.C., 29 April 1977.
-24	MEL for FSG 39, FSCs 3910, 3930, 3950 and 3990. HQ, DA: Washington, D.C., 14 March 1980.
-25	MEL for FSG 43, FSCs 4310, 4320, and 4330. HQ, DA: Washington, D.C., 10 October 1980.
-27	MEL for FSGS 72, 83, 84, FSCs 7210, 8340, and 8400. HQ, DA: Washington, D.C., 6 September 1974.
-28	MEL for FSG 38, FSCs 3805, 3810, 3815, 3820, 3825, 3830 and 3895. HQ, DA: Washington, D.C., 10 April 1981.
-29	MEL for FSG 49, FSCs 4930, and 4940. HQ, DA: Washington, D.C., 7 November 1980.

-30 MEL for FSG 35, FSCs 3510, 3520, 3530, 3540 and 3590. HQ, DA: Washington, D.C., 15 July 1974.

-33 MEL for FSG 41, FSC 4110, 4120, 4140. HQ, DA: Washington, D.C., 7 May 1981.

-34 MEL for FSG 35, FSCs 5410, 5420, and 5430. HQ, DA: Washington, D.C., 18 December 1980.

-36 MEL for FSG 66, FSCs 6605, 6625, 6635, 6640, 6665, 6670, 6675 and 6685. HQ, DA: Washington, D.C., 28 July 1978.

-39 MEL for FSG 36, FSCs 3610, 3611, 3615, 3645, 3655, and 3695. HQ, DA: Washington, D.C., 20 October 1978.

-40 MEL for FSG 81, FSCs 8110 and 8115. HQ, DA: Washington, D.D., 17 September 1975.

-71 MEL for Chemical Equipment in FSG 42. HQ, DA: Washington, D.C., 11 August 1977.

-73 MEL for FSCs 1000, 1005, 1010, 1015, 1025, 1030, 1055, 1090 and 1095. HQ, DA: Washington, D.C., 6 January 1975.

-74 MEL for FSG 12, FSCs 1220, 1240, 1270, 1285 and 1290. HQ, DA: Washington, D.C., 14 August 1974.

-75 MEL for FSG 34, FSCs 3405, 3408, 3410, 3411, 3412, 3413, 3414, 3415, 3416, 3417, 3418, 3419, 3422, 3424, 3426, 3432, 3433, 3436, 3438, 3439, 3441, 3442, 3443, 3444, 3445, 3446, 3447, 3448, 3449, 3450, 3460 and 3465. HQ, DA: Washington, D.C., 12 August 1976.

-77 MEL for FSG 66, FSCs 6645 and 6650. HQ, DA: Washington, D.C., 25 August 1974.

-78 MEL for FSG 49, FSCs 4910 and 4940. HQ, DA: Washington, D.C., 5 April 1977.

-81 MEL for Tactical Wheeled Vehicles only, FSG 23, FSCs 2320 and 2330. HQ, DA: Washington, D.C., 31 August 1976.

-85 MEL for FSG 24, FSCs 2410 and 2420. HQ, DA: Washington, D.C., 17 September 1980.

APPENDIX C

MEASURING ACQUISITION INFORMATION IN THE PROPERTY BOOK VOUCHER FILES

Measuring the amount of acquisition information in the Property Book voucher files was a process for which statistical testing was not useful. Statistical testing of the vouchers was attempted, but one significant problem invalidated the tests. The problem lay in the fact that, for all asset LINs containing more than one item, vouchers found to support acquisitions of items in a LIN could not feasibly be associated with a specific item. The only consistent tie between a voucher and an item was the property book record of the subordinate unit to which the item was given. That tie was effectively broken by the Division's practice--a normal and proper practice--of repeatedly transferring items between subordinate units of the Division.[36] Tracing the transfers was infeasible.

1. SELECTING THE SAMPLE

Because statistical testing [illegible] not be used to measure the proportion of items for which acquisition dates and prices

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[36]Property is transferred when subordinate units' authorizations to hold the property are changed. The property which is no longer authorized to be held by one unit is transferred to a unit authorized that type of property but not possessing it.

could be supported by the voucher files, a means of judgmentally evaluating the files' usefulness was devised. Cluster-type sampling was used to select LINs for examination in each stratum. That is, the probability of a specific LIN being selected for examination was equal to the proportion of items in that LIN compared to the total number of items in the stratum. For stratum 1, 60 random numbers were generated.[37] The sixty numbers were associated with specific LINs; in some cases, more than one number was associated with the same LIN, and was ignored. From this process eight LINs were selected for examination from stratum 1.

The same process was used to select LINs for examination in stratum 2. However, only 24 random numbers were used to select those LINs.[37] Thirteen LINs were chosen for examination.

2. EXAMINING THE PROPERTY BOOK VOUCHERS

Having identified 21 LINs for examination, the next step was to examine the Property Book vouchers.[38] This entailed manually examining each of approximately 25,000 vouchers to determine if the voucher supported an item

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[37]This number arose from an attempt to use statistical attributes sampling. In the context of judgmental sampling this number is arbitrary.

[38]Procedurally, the 21 LINs were combined and examined in one search of the voucher files.

acquisition. If the voucher did, the next step was to determine if the voucher supported an acquisition of an item from one of the 21 LINs being examined. If the voucher did support such an item, the voucher was examined to extract the acquisition date and quantity received and to determine if the voucher contained the acquisition price of the item. Records were maintained of the quantity, date, and price for each voucher supporting acquisitions in the LINs being examined.

3. EVALUATING THE INFORMATION GATHERED

After all Property Book vouchers had been examined and the information pertaining to the selected LINs recorded, the records for each LIN were tallied. The results are shown in Table VI. Based on these meager results, the following judgments are made concerning the usefulness of the Property Book vouchers as sources of acquisition dates and prices for depreciable assets:

> The vouchers contain evidence which supports acquisition dates for approximately 13% of the depreciable asset items.
>
> The vouchers contain evidence which supports acquisition prices for approximately 8% of the depreciable asset items.[39]

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[39]The proportion of items for which acquisition prices exist differs in each of the two strata. The significance of the difference cannot be tested, so the overall proportion was chosen for use in Chapter VI evaluations.

TABLE VI

RESULTS OF JUDGMENTAL SAMPLING TESTS OF THE DIVISION ORGANIZATION PROPERTY BOOK VOUCHERS

Stratum	LINs Examined		Items Examined		Examined Items Supported by Vouchers Containing:			
					Acquisition Dates		Acquisition Prices	
	Number	Percent of Stratum	Number	Percent of Stratum	Number	Percent	Number	Percent
1	8	40.0	18,387	94.8	2399	13.0	1215	6.6
2	13	1.7	35,672	49.7	4826	13.5	3300	9.2
Total Examined	21		54,059		7225	13.4	4515	8.4

APPENDIX D

ESTIMATING ACQUISITION PRICE USING TREND ANALYSIS

One potential means of estimating acquisition prices is trend analysis. While actually a form of regression analysis, trend analysis differs in one important respect. Instead of attempting to establish a causative relationship between changes in independent and dependent variables, trend analysis attempts to describe changes in dependent variables over time. Time is used as the independent variable but has no causative relationship to the dependent variable.

Procedurally, trend analysis relies on the least squares method of linear regression analysis to establish the equation for a line which describes the change of a dependent variable as time changes. The equation usually is used to forecast a value for the dependent variable at a future time but can just as easily be used to estimate a value for the dependent variable at some time in the past. It is this capability that makes trend analysis a possible tool for estimating acquisition prices.

To demonstrate this technique, acquisition dates and prices were extracted from several hundred Property Book vouchers. The data could not be regressed in the existing form; so, both date and price were transformed into usable forms. Dates were transformed by establishing the start of

1975 as the date base--or zero. Each new year would start a new integer; each day of the year would add a decimal fraction to the integer. For example, 30 June 1975, would be 0.4959; 30 June 1977, would be 2.4959. Item acquisition prices were transformed to index numbers using the unit standard price as of 12 February 1981 as the price base. The Division Organization Property Book Listing (C) was used to extract each item's price base. For example, if the current price of an item is $110 and its base price is $100, the index number for its current price is 1.10.

Before beginning any regression analysis, the author noted that not all items changed with time. That observation was consistent with the pricing policies of AR 37-60. [Ref. 9: p. 2-1] If the author included these items in the analysis, the result would be altered. Therefore, the author removed all data LINs which showed no change in acquisition price.

For the first regression analysis, the author assumed that the prices of all types of equipment were affected identically over time. Therefore, all the usable data were used. The independent variable was the transformed date. The dependent variable was the price index. Six hundred thirty-two pairs of date and price index information were entered into the TI-59 programmable calculator regression routine. The resulting regression equation was obtained:

$$\text{Price Index} = 1.07986 + 0.0000012803 \text{ X (Transformed Date)}$$

The coefficient of determination (r^2) was 0.00457, which means that only 0.4% of the change in the price index was explained by the independent variable, time. This is virtually zero correlation, or there is no relationship between time and price.

One possible explanation of this low correlation is that the prices entered in the first regression were from a non-homogeneous group of assets. The second regression was selected to test price index over time for data which had been grouped by Federal Supply Group--the first two numbers of the NSN. The Groups and their resulting regression information are shown in Table VII.

For every FSG the coefficient of determination was higher than the coefficient of the original regression. Of the 16 equations, that pertaining to FSG 71 (Furniture) is the most promising. However, none of the FSG coefficients was sufficiently high that great reliance could be placed on the FSG regression equation as a means of estimating historical cost. Further, only seven equations, those marked with an asterisk, provide price indices which made any sense for input dates before 1975. The rest would provide negative price indices, which would imply that a requestor would be paid to take the item. The year in which the price index goes to zero is shown in Table VII.

TABLE VII

REGRESSION OF PRICE INDEX VERSUS TIME BY FSG

FSG	Data Entered	Regression Equation	r^2	Y=0 in Year
10	27	Y=0.3116 + 0.1752 X	.0609	73
12*	24	Y=0.7775 + 0.066 X	.0234	63
23	48	Y=0.1019 + 0.1705 X	.5005	74
38	11	Y=-.4065 + 0.3112 X	.2117	76
42	40	Y=-1.4121 + 0.5123 X	.1312	77
49	59	Y=0.1245 + 0.1807 X	.0256	74
51*	30	Y=0.6097 + 0.0584 X	.2239	64
58	82	Y=0.2982 + 0.1351 X	.0635	72
59	21	Y=0.0904 + 0.1314 X	.2144	74
61	34	Y=0.2753 + 0.1284 X	.1185	72
65	24	Y=-.1395 + 0.1884 X	.4827	75
66*	63	Y=0.5134 + 0.0879 X	.2106	69
71*	9	Y=0.5109 + 0.0802 X	.6919	68
73*	11	Y=0.5248 + 0.0683 X	.1912	67
83*	38	Y=0.8508 + 0.0307 X	.0176	47
84*	25	Y=0.6170 + 0.0853 X	.2943	67

Y = Price Index

X = Transformed date

The author feels the major reasons the regressions are so unreliable are:

There were insufficient data points within the individual FSGs to correlate the data adequately.

Items within the FSGs were in different stages of their lives. Some were newly developed items for which economies of scale had not been realized. Others were "mature" items for which maximum economies of scale had already been attained, and other economic pressures were affecting price changes. Unfortunately, the author had no means to separate these items.

The range of the dates was to narrow to "stabilize" the regressions. The maximum range of the dates used was

from late 1977 to late 1981, or four years. The majority of data points were in late 1980 and 1981. An evenly distributed data point range of at least five years is needed to provide adequate "stabilization" for the correlation.

While some of this analysis shows potential, the overall results are not promising.

APPENDIX E

ESTIMATING SERVICE LIFE FROM ACTUAL DATA

The Comptroller General prefers basing service lives of equipment on available actual experience concerning the equipment. [Ref. 5: p. 2-36] If actual equipment mortality information is available, it can be used not only to develop service life estimates which are not otherwise available but also to evaluate extant estimates. If the available information includes large numbers of equipment and many historical periods, statistical methods may be employed to determine or evaluate service lives. If the available information is not adequate, judgmental evaluation of the information by managers may be used to establish or revise service lives.

To demonstrate this process, the author examined mortality information on the MASK, CBR, Protective, ABC--M17 series, LIN M11895. This LIN had six NSNs representing small, medium and large masks in two different models, M17 and M17A1. The sum of all the individual masks could be considered as one group because the number of masks of each type depended solely on the sizes required by soldiers assigned to units in the Division, and the masks are essentially identical. The Division generally has one mask for each assigned soldier.[40]

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[40]This mask has been a standard item since the 1960s; there are thousands of these masks on hand in the Division.

The available mortality information on these masks covered only two periods--1979 and 1980. The author determined, from the Division Property Book vouchers, the number of masks that had been rendered unserviceable for each of those two years. Because the total number of masks on hand fluctuated from month to month, the author chose to express the mortality rate by using a stable base, the total number of masks authorized to be held by the division. The mortality rates for these two years were 5.87% in 1979 and 5.97% in 1980.[41] The reciprocals of these rates are two estimates of service live--17.0 years in 1979 and 16.8 years in 1980.

These two estimates cannot be used statistically to evaluate the service lives of these masks, because there are insufficient historical periods to make the results reliable. However, the published service life of this mask--three years--can be evaluated judgmentally by using the estimates. The primary observation is that the number of masks is large and they have been on hand in the Division for a time which is sufficiently long for judgmental evaluation to be useful in verifying service lives. That is, the mortality rate should be at or near a steady state of 33% if the three-year service life is valid. At steady state, the actual annual mortality rate should be near the

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[41]The actual number of unserviceable masks and of the base are omitted to avoid classification of this thesis.

published estimate. The reciprocal of the actual mortality rates, the actual service life estimates, are over five times the published service life estimate. This large difference strongly suggests that the published service life for these masks is incorrect.

LIST OF REFERENCES

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