1.0

2.8

2.5

3.2

2.2

3.6

2.0

4.5

1.1

1.8

1.25

1.4

1.6

MICROCOPY RESOLUTION TEST CHART

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

COMPUTERIZED INTEGRATED INVENTORY CONTROL
FOR AN AIR FORCE BASE-LEVEL SUPPLY SYSTEM.

by

Angelo Concepcion/Molato

June 1980

Thesis Advisor:　　　　　N.F. Schneidewind

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80 10 3 091

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A089936	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) COMPUTERIZED INTEGRATED INVENTORY CONTROL FOR AN AIR FORCE BASE-LEVEL SUPPLY SYSTEM		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis June 1980
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Angelo Concepcion Molato		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate Achool Monterey, California 93940		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		12. REPORT DATE June 1980
		13. NUMBER OF PAGES 136
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) Naval Postgraduate School Monterey, California 93940		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

computerized inventory control, computer hardware upgrade

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This study deals with the design and implementation of a computerized Air Base-Level Supply System. It determines the different components of the organization directly benefitted by the system and identifies their respective responsibilities in the conversion from manual to a computerized system. The study further incorporates the use of an existing computer system with hardware upgrade in implementing the system to harness its full potential.

DD FORM 1473 EDITION OF 1 NOV 68 IS OBSOLETE
(Page 1) S/N 0102-014-6601

Computerized Integrated Inventory
Control for an Air Force Base-Level
Supply System

by

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN COMPUTER SCIENCE

from the

NAVAL POSTGRADUATE SCHOOL
June 1980

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I. INTRODUCTION

A. PROBLEM DEFINITION

The growing complexity of organizations and their inherent operations has created a need for management to grasp instantaneously information relevant to their decision-making processes. Technological advancements have created a phase, which over the past decade, has put upon the shoulder of managers the burden of searching through piles of information for the kernel to cope with these dynamic changes. This phenomena has rendered the manual system both inefficient and inadequate. As a consequence, organizations are turning to computerization of their basic management information systems to help deal with problems whose immediate attention is of utmost necessity. They are harnessing the very potential of computer systems-mass storage, efficient data recovery and fast information processing.

The Armed Forces, the Air Force specifically, is not an exception to the increasing demand for timely, accurate and relevant information. It has its share of requirements along this area. This study explores the feasibility of computerizing a Base-Level Supply System for better management of its inventory. Although the study is specifically tailored towards a certain organization, the steps involved in the design and implementation of a computerized information system is highlighted to provide as a guideline for similar undertakings.

B. MAJOR OBJECTIVE

The main objective of this study is to outline the different steps a system designer has to undertake in developing a computerized information system. It uses as a vehicle a typical Air Force Base-Level Supply System as a means of conveying concepts in the development process.

The study further illustrates how an existing environment (organization) could be affected by computerization. Since information systems cuts through organizational lines, the different end-users must be taken into consideration to ascertain their respective responsibilities towards the attainment of a common goal.

Lastly, the study exemplifies the concept of effective utilization of critical resources. By upgrading an existing computer system to its full complement, the study shows that the benefits to be derived outweigh heavily the incremental cost of hardware upgrade.

C. SCOPE AND LIMITATIONS

In absence of real data, this study made certain assumptions to facilitate computations. Since the major objective is for illustration purposes (as indicated in Section B above), it is presumed that those factors left out could easily be added-on in the event that an actual system development is made. Due to the wide latitude of end-user requirements and

different organizational constraints, the study specifically refrained from discussing such areas as they fall beyond the scope intended.

II. PRESENT ORGANIZATION

Discussed hereunder are the different potential users of
the Inventory Control System. Being integrated in nature,
different facets of the organization will be directly involved
in its implementation. Organizations are presented in their
skeletal form only to illustrate the relationship of the
different system users involved.

A. COMMAND LEVEL

Figure 1 illustrates a typical command level of organization.
Assisting the commander on matters pertaining to material
requirements is Supply and Logistics, a function primarily
responsible for strategic planning along this area. Under its
functional supervision is the Procurement Office which is
involved directly in the actual purchase and acquisition of
needed supplies.

The Comptroller is the other potential user of the system
at strategic level. Budget and financial planning is the main
concern of the Comptroller, whose timely and accurate reports
are a must in his line of work. The Accounting Department is
under functional supervision of the Comptroller whose main
task is the handling of all financial records of the organi-
zation. It is foreseen that the proposed system is to assist
these potential users in their planning and operational needs.

B. DEPOT

The Depot has the primary mission of ensuring continuous
flow of supplies in the command and undertaking major repairs
on aircraft of the different operating units. The specific
functions of the Depot are distributed over three directorates
as shown in Figure 2.

The Directorate of Supply Management is directly concerned
with inventory control of the two squadrons under it. The
Depot Supply Squadron is charged with the base-level material
support and services.

C. DEPOT SUPPLY SQUADRON

The hub of the system is to be implemented in this unit.
The unit is organized as shown in Figure 3. A detailed dis-
cussion follows on the functions of the different branches
under the squadron to pinpoint what areas are to be greatly
affected.

1. Administrative Branch

a. Provides administrative support for the Squadron
like planning and administering functions relating to receipt
and transmission of the unit's correspondence to include main-
tenance of files and control of classified materials.

b. Responsible in the maintenance of 201 files for
officers, airmen and civilian employees to include computation
of furlough and leaves.

2. **Plans and Management Branch**

Maintains policy and procedural control for the Squadron, by initiating, formulating, coordinating, disseminating and/or implementing methods, policies and procedures relative to the internal operation of the squadron.

   a. Management Section

Exercises centralized control of management methods and procedures to effect maximum utilization of supply facilities, personnel and material in the most economical manner for the Squadron. Initiates, coordinates and disseminates supply operating methods, policies and procedures.

      (1) <u>Management Analysis</u>. Evaluates and analyzes managerial data to determine the operating efficiency of the Squadron. Prepares graphs, charts and brochures, containing statistical figures in order to accomplish the assigned mission.

      (2) <u>Supply Management</u>. Evaluates Supply effectiveness and efficiency based on methods surveys; inspects regularly and frequently supply work areas; determines manpower requirements by analysis of workload data and conducts such operational studies as may be directed by higher headquarters.

   b. Plans Section

Provides control agency service for the receipt and dissemination of planning data; evaluates plans and converts these into personnel and facilities requirement. Conducts continuous research of problem areas in the development of long

range plans. This includes services testing of Squadron and/or
higher headquarters supply policies and procedures.

(1) **Plans and Program**. Accomplishes projected
planning and service testing of new policies and procedures
received from higher headquarters. Responsible for gathering
data from the entire Squadron divisions/offices for computing
and analyzing efficiency of all operations. Maintains supply
data in the form of statistics, charts, and graphs for effec-
tive display and management control. Operates drafting faci-
lities for preparation of visual presentation.

(2) **Training**. Responsible for the indocrination
of newly assigned personnel; conducts training courses for
depot supply; conducts and maintains on-the-job training pro-
grams. Monitors all aspects of training for military and
civilian personnel; requests designated supply personnel to
pursue appropriate training courses.

3. **Quality Control Branch**

Insures the fulfillment of the supply Quality Control
Program for the Squadron. Develops plans and procedures of
the Quality Control program of the Squadron in order to estab-
lish an effective and efficient system of quality control for
materi-l and equipment received, stored and issued by the Depot.

a. Quality Inspection Section

Performs inspection to determine compliance with
prescribed quality control procedures; insures identification

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of all property received, stored and issued by the Depot; sees
to it that tags, labels and markings are affixed to property
to reflect identity, status and condition. Inspects also pro-
perty in storage to insure proper identification, condition
and status, and maintains technical survellance over property
to insure technical order compliance, packing and preservation
application.

   b. Inventory Section

      Responsible for all operations related to the
scheduling and accomplishment of cycle and/or special inven-
tory of all items stored in warehouses. Responsible for the
accomplishment of inventory count and research necessary in the
establishment of an accurate inventory of the Depot assets.

   c. Analysis, Reports and Record Section

      Establishes detailed quality control analysis;
sampling procedures and quality control methods for the Squadron.
Determines causes of deficiencies and recommends corrective
actions. Monitors reports and maintains quality control
reports for the Division.

      (1) Quality Analysis. Complies quality control
analysis data; maintains quality control data in the form of
statistical charts and graphs for effective management control.

      (2) Reports and Record. Responsible for the pre-
paration of discrepancy or damage reports, reports of surveys,

inventory adjustment reports and other reports pertaining to
material quality; and the maintenance of records and files
of same.

      d.   Technical Publication Section

      Responsible for maintaining a centralized, limited
and accurate file of technical orders, Technical and Supply
Manuals and other related technical publications. Takes charge
of the Unit's Technical Library.

    4.   Statistical Services Branch

      Assists the Squadron Commander on all matters pertaining
to statistical functions; responsible for the timely submission
of accurate statistical reports required by headquarters; per-
forms support mission relative to requisitioning procedures
and reporting system; and assumes other responsbilities regard-
ing special projects required to accomplish the overall supply
mission.

      a.   Statistical Analysis Section

      Plans, develops, administers and analyzes statis-
tical reports and statistical data gathered from different
activities.

      (1) Data Service Analysis. Provides centralized
control in the processing and compilation of statistical data
necessary as a guide or management tool of the Squadron or
higher headquarters in command operation and programs. Prepares
graphs, charts and brochures showing statistical trends of

various projects to insure that reports initiated and/or required of the Division are accurately done and submitted on time.

(2) Reports Control. Responsible for the preparation of reports and summaries relating to statistical data as may be required by the Squadron Commander or higher headquarters. Maintains a complete file of all current directives, policies and/or SOPs governing each report.

b. Centralized Accounting Section

Establishes and develops a system of receiving receipts and issues supplies and equipment to include updating and maintenance of files and requisition document control of units based on established programs, projects and monetary accounting.

5. Material Facilities Branch

Plans, administers and supervises the operation of the storage warehouses and outside storage area; responsible for the receipt and/or pick-up of supplies and equipment intended for the Depot other than those procured directly by the different Units; performs such functions relating to the receipt, storage and issue of supplies and equipment assigned to the supply Depot, to include the application of corrosion control, packaging, packing and preservation methods to material requiring such action.

a. Receiving Section

Provides centralized receiving, classification and inspection functions pertaining to purchased items. Responsible for the operation of all cargo traffic.

(1) **LP Property Receiving**. Responsible for the processing and receipt of locally purchased items prior to direct issue or transfer to the appropriate storage warehouse. Also responsible for accomplishment of pertinent papers or auditorial requirements to support payment of such receipts.

(2) **Logistics Center**. Responsible for the processing and receipt of supplies procurable through the Logistic Center. Performs such other functions as submission and follow-up of requisitions with Logistic Center.

(3) **Turn-In Property Receiving**. Responsible for the processing and receipt of all serviceable and/or unserviceable turn-in from using units.

b. Shipping Section

Responsible for maintaining technical surveillance on shipping activities of the Squadron. Determine mode of transportation to be utilized in effecting cargo movements. Maintains records of cargo shipped and furnishes statistical workload data reflecting operational accomplishments.

c. Facilities Service Section

Responsible for general utilities operations, including labor and equipment service. Responsible for the operation, maintenance and dispatching of vehicles assigned to the Squadron. Conducts such inspections and repairs required in the maintenance of special purpose vehicles in use and Squadron buildings to include grounds.

(1) **Material Handling Equipment**. Responsible for the maintenance, repair and control of all motor vehicles and material handling equipment assigned to the Squadron.

(2) **Service**. Responsible for furnishing labor force (civilian) within the Material Facilities Division.

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d. Storage Section "A"

Responsible for the proper storage, issue and maintenance of locator cards for all items falling under the following commodity classes:

1005-1305	3805-3895	6910-6940	7910-7930
1410-1430	4610-4630	7105-7195	8010-8040
2310-2350	5410-5430	6210-7290	8105-8140
2410-2430	5510-5530	7310-7360	8305-8345
2510-2590	5610-5680	7410-7490	8405-8475
2805	5805-5895	7510-7540	8510-8540
2815	5805-5999	7610-7540	8510-8540
2820	6505-6645	7710-7740	9110-9160
2830	6810-6859		
2839			

e. Storage Section "B"

Responsible for the proper storage issue and maintenance of locator cards for all items falling under the following commodity classes:

1510-1560	1560MF	2810PA	UH-IH
1560DB	1560RE	2810PB	T-41D
1560DC	1560SC	2810PD	U-17 A & D
1560HG	1560WB	2840	400KVA
1560LC	1560WD	2840PJ	Spares
1560MB	1610-1680	2840PL	
	2810		

f. Storage Section "C"

Responsible for the proper storage, issue, and maintenance of locator cards for all items falling under the following commodity classes:

1710-1740	4130-4140	5305-5355
2610-2640	4210-4240	6105-6150
2910-2995	4305-4330	6210-6250
3010-3040	4420-4460	6310-6350
3110-3130	4310-4330	6605-6695
3220-3240	4510-4540	6710-6780
3400-3465	4710-4730	9110-9180
3515-3540	4810-4820	9320-9360
3620-3694	4910-4940	9505-9540
3720-2750	5110-5180	9620-9650
3805-3030	5210-5280	
3910-3995		
4010-4030		
4210-4240		

g. Storage Section "D"

Responsible for the storage, issue and maintenance of locator cards for all unserviceable generations of the depot and turn-ins from the different units.

h. Packing and Preservation Section

Provides packaging and crating service, corrosion control and preservation responsiblities for all supplies and equipment stored, issued or processed for shipment as required.

(1) Carpentry. Designs and manufactures or repairs crates, boxes or other containers for the shipment or storage of supplies in accordance with approved methods. Performs repair work of DSS buildings.

(2) Packing and Crating. Performs packaging servicing for the Wing, packs packaged or crated materials for shipment or storage in accordance with established packing and crating methods.

(3) Corrosion Control. Responsible for the implementation of the corrosion control and preservation program of this Squadron.

6. Property Disposal Branch

Responsible for promoting and insuring maximum utilization and conservation of all property received for disposal. This includes the proper admininstration.

a. Receiving and Inspection Section

Responsible for the receipt, inspection and storage functions of items transferred or turned in to the Disposal.

b. Redistribution, Accounting and Reporting Section

Responsible for maintaining records and reporting of excess or condemned property received, utilized, sold, transferred, redistributed, donated, reclaimed or destroyed.

c. Marketing Section

Responsible for screening and preparing lists of items authorized for bidding or sale and the keeping of records of such for sale.

7. Stock Control Branch

Responsible for maintaining and administering inventory management control over all materials received, stored and issued by the activity; computes requirements, controls levels, initiates material procurement action, and maintains such records affecting the supply system.

a. Processing Section

Responsible for the establishment, management, and control of all supply documents reflecting and supporting the receipt, issue, transfer and adjustment of the depot stock inventory.

(1) Document Receiving and Distribution. Responsible for the receipts and screening of all supply domcuments and for their proper routing distribution to the different stock

record sections or storage warehouses. Insures that such documents are properly registered, authenticated and validated prior to distribution or filing.

(2) Voucher File. Responsible for the quality editing of all supply documents to insure correctness and validity before filing permanently.

b. Requirement Section

Responsible for the dissemination of supply action on items of general support nature and logistics support to all activities and agencies within the command and other activities as pertains to Program and Requirements. Initiate procurement action of Depot support of Group and Class items assigned. Maintains control and supervises overall property transaction for assigned classes. Exercises supervision and control over all critical items. Determines repair support requirements.

(1) Priority Requirement. Responsible for the expeditious processing and monitorship of all priority requests to include editing and close monitorship and control over such requests while these are being processed through the supply system. Prepares reports to reflect daily, weekly or monthly workloads. Responsible for obtaining and/or furnishing supply information and data concerning the requirements of customer units.

(2) Repair Progress Requirement. Develops the annual Repair Requirement Listings.

(3) <u>Logistics Center Property Requirement</u>. Responsible for the submission of requisitions to Logistics Center for items required by customer units.

(4) <u>Excess Priority</u>. Responsible for processing, reporting or turn-in of redistributable and disposable excess property.

(5) <u>Special Project Requirement</u>. Responsible for the monitorship, planning and administration of special projects, to include processing or supply documents, selection, identification and segregated storage of material required to accomplish such projects. Insures rendition of progress and status on outstanding projects as directed.

c. Stock Record Section

Maintains and establishes property accounting records, supply Depot assets, and performs such related functions as initiating procurement and research necessary in updating property accounting records.

(1) <u>Back Order Release</u>. Responsible for the preparation and typing of back order releases for items intended for customer units previously requested but not available for issuance at the time of requisition.

III. PRESENT SYSTEM

The present system of inventory control is basically manual in nature. Stock levels are recorded on stock cards (Figure 4) and all managerial and statistical reports to higher levels of command are done manually. Sheer volume alone of the inventory at hand precipitates various problems which will be discussed later.

Aside from Consuming Units, there are certain Supply Points that draw supply from the Depot as illustrated in Figure 5. These Supply Points are to maintain their respective stock levels but with close monitoring from the Depot. Critical items have to be ascertained as to their specific location in the Supply Points for the Depot to be flexible in moving these items in case the need arises.

There are generally two types of items received by the Squadron. First type are receipts which are items procured through vendors or requisitioned from the Logistics Center. Second type are Turn-ins received from using units which are either excesses or unusable items.

A. REQUISITIONING PROCEDURE

The basic request for supplies and materials emmanates from the using unit. The unit concerned accomplishes a Requisition Issue voucher (RIV) (Figure 6) in six copies. This

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requisition is received at the Depot Supply Squadron. The
document first goes through the administrative portion commonly
known as demand processing where pertinent papers are checked
for validity and accurateness. The RIV then goes to Stock
Control where the item requested is checked against balances
on hand. If the item is available, the RIV goes to Vouchering,
then the Warehouse where the item is issued. If an item is not
in stock, a Single Line Item Requisition is prepared to get the
item from Logistics Center. Otherwise, a local purchase is
made (Figure 7 outlines in detail these steps).

B. PRIMARY DOCUMENTS

   1. Stock Control Record

      A series of three cards containing all data in reference
to a single item. It is commonly known as the memory of the
whole supply system (Figure 4).

   2. Single Line Item Requisition (SLIRIT)

      This document is used on requests for all types of
supplies requisitioned at Logistics Center (Figure 8).

   3. Requisition and Issue Voucher (RIV)

      These documents are primarily used by units in requesting
for supplies. The frequency of input daily is more or less
200, 1400 weekly and 5,000 monthly. The maximum volume received
is 200, the minimum zero with 100 as average (Figure 6).

   4. Property Turn-in Slip (PTIS)

      This document is used to turn-in to the supply instal-
lation of the next higher level all excess and unserviceable
supply (Figure 9).

5. Memorandum Receipt (MR)

This is a separate document maintained for equipment received from a supply officer and equipment issued to individual person of the unit (Figure 10).

6. Property Issue Slip (PIS)

Issued together with the MR from a supply accountable officer to a responsible supply officer (Figure 11).

C. PROBLEMS WITH THE PRESENT SYSTEM

1. Difficulty in Locating Parts

There are at present five supply points located at various locations. Supply levels at these points are supposed to be closely monitored at Depot level to avoid disparity of supply allocation and at the same time to keep tab of where critical items are located. Requisitions made by Consuming Units to the Supply Points are likewise monitored by the Depot. These tranactions are supposed to be reported but due to the manual nature of the system, this procedure is at times neglected. The overall supply situation picture does become distorted from the Depot's point of view.

When critical items run out at a particular Supply Point, the Depot is incapable of determining where these items are or if every other Supply Points or Consuming Units still have them in inventory. During that time, equipment are rendered inoperational and crucial man-hours wasted in waiting for needed spare parts.

2. Inaccurate Stock Cards

The Depot at present handles about 120,000 line items.
This means that, at least 120,000 stock cards are updated and
maintained by the Stock Control Branch. These cards are kept
in steel drawers and updating is done as requisitions or
receipts are made. During the past wall-to-wall inventory made
by the Depot, the balance as reflected in the stock cards did
not correspond to the balance in the warehouse. The inconsis-
tencies noted could have had a dozen reasons behind them. One
reason could be that documents are not routed properly. Some
requisitions might have gone through the process without
passing the Stock Control Branch. Another reason could be pure
neglect due to the volume of transactions handled by the Branch
making updating both cumbersome and confusing.

3. Unrealistic Reports

Since the very data used to come out with management
information is erroneous, it follows that reports based on
these are as erroneous. This has an effect of a chain reaction
in nature. If what higher headquarters gets is an unrealistic
report, their decision making processes will be adversely
affected. Hence, benefits to be derived from these decisions
are not harnessed properly.

4. Difficulty in Preparation of Reports

Reports prepared by the Stock Control Branch are both
tedious and time consuming. The annual report on inventory
alone could consume a sizeable number of man-hours in its

preparation. All of these reports are manually prepared. This is one problem that the computer could very well eliminate due to the nature of its processing.

5. Inaccurate Determination of Requirements

The present method of determining requirements is one that is based on uncertainty. Many of the fast-moving items are frequently out of stock.

6. Dormant Stocks

Of the 120,000 line items carried by the Depot, 50-60 percent are considered dormant. Those are the items that had no transactions for at least one year. Records show that some of the items had been dormant for the past five to eight years.

D. PRESENT COMPUTER SYSTEM

The Inventory Control System is designed within specification of the present computer system used by the command for various administrative application areas. It is operated by the computer center under the direct supervision of the Comptroller. Utilizing the present configuration as the basic main frame with the needed upgrading would lessen the total implementation cost. Discussed hereunder are the major characteristics of the present computer system.

1. Memory Unit

Present Size - 98,304 bytes

Max size   - 262,144 bytes

Cycle Time   - 0.6 microseconds

Bytes Fetched per Cycle - 2

2. <u>I/O Channels</u>

   No. of Selector Channels - 2

   Max Selector Channel Data Rate - 333,000 bytes/sec

   No. of Multiplexer Channels - 1

   Max Multiplexer Channel Data Rate - 85,000 bytes/sec

3. <u>I/O Units</u>

   a. Disc

      Rotational Delay - 12.5 millisec

      Seek Time - 60 millisec

      Transfer Rate (max) - 312 millisec

      Max Capacity - 29 M bytes

      Format - Variable length physical record of any

size. Each inter-record gap in the equivalent of 30 bytes.

   b. Tapes

      Tape Speed - 42.7 ips

      Recording Density - 800 bits per inch

      Peak Speed - 34,160 char per sec

      Inter-Rec Gap - 0.6 inch

                    14.1 M sec

                    960 bytes

   c. Card Reader

      Reading Speed - 80 col cards @ 1000 cpm

      Input Hopper Capacity - 24,000 cards

      2 Output Hopper Capacity - 2000 cards

      Connects to multiplexer channel

d. Line Printer

Print Speed - 900 lpm @ 62-char set

Print Positions - 132

Connects to multiplexer channel.

e. Terminal

Buffer Size - 1,920 char

Max I/O Supported - 31

Auxiliary Units = Printer, Mag Tape

Screen Size - 1,920 char

Line Facility - voicegrade; leased, switchboard,

or private

Line Speed - 300 - 900 bits per sec

Line Mode - HOX

Line Code - ASCII

Synchronization - Async; Sync

4. I/O Control Units

a. Disc Controller

Max No. - 8 Controllers/Selector Channel

Max No. Drives - 8 Disc Drives/Controller

b. Tape Subsystem

Max No. of Drives - 16 per subsystem

Each "master" tape unit can control up to three

"slave" tape units.

Max No. of Sybsystem Per Selector -8

c. Terminal Multiplexor

Max No. Avail - 4

Max Terminal per Multiplexor - 8

5. Modems

   Modem Speed - 4800 bps

   Type - FOX, HW/DU/L

6. Central Processing Unit

   Address per instruction - 2

   Instruction (word) size - 32

   Add time - 6.0 micro sec (32 bit binary fields)

   Add time - 22.2 micro sec (5 digit decimal fields)

7. Operating System

   Resident storage required - 90 K bytes

8. Other

   Average machine instruction to Source Statement - 10

9. System Configuration Diagram

   See Figure 12.

   .

IV. THE PROPOSED SYSTEM

The system proposed is one that is geared towards on-line processing. It will need the facilities of a computer system with remote data communications capabilities. Remote terminals will be used as focal points of inquiries into the data base that supports the system.

A. SYSTEM OBJECTIVES

1. Minimize Inventory Investment

With the accurate recording of all transactions, more realistic unit requirements are purchased, thereby lessening tied-up capital to inventory.

2. Minimize Inventory Carrying Cost

With lead-time properly calculated, stocks will not be stored over an extended period of time.

3. Minimize Ordering Cost

The procurement pipe-line time will be properly identified with the system. Items which are traditionally needed will have an established supplier thereby lessening the problems of procurement.

4. Maximize Customer Service

Units requisitioning items from the Depot will have what they need in shorter periods of time. This is done through proper stocking of needed items and forecasting of critical supplies.

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B. SALIENT POINTS

1. Automatic Replenishment Concept

The system will adopt the Automatic Replenishment Concept. This will eliminate the necessity of Consuming Units or Supply Points requisitioning requirements to the Depot. Requisitions and purchase orders are automatically triggered by the system when re-order points are reached. (Figure 13.)

2. Computer-Based System

The system is basically computer-based with all activities and record-keeping monitored through a computer. Management and statistical reports will be generated by the system as a by-product.

3. Full Accounting of Transactions Pertaining to Any Given Unit

With all the transactions recorded on the data base, needed information regarding a certain unit could easily be retrieved. All the requisitions of that particular unit could easily be printed by the computer as the need arises.

4. Better Customer Service

With the remote on-line terminal, balances of stocks-on-hand can easily be accessed. This will give the users an opportunity to inquire at no delay whether the item in requisition is at hand or not.

5. Monitoring of Activities

Management at any point in time can easily review current activities in the warehouse. This will give them up-to-date reports of inventory status.

6. **Accurate, Timely and Reliable Reports**

Periodic reports are printed out by the computer for use in management decision making. This is done at a fast phase due to the inherent capabilities of the computer system.

7. **Pin-Pointing of Dormant Stocks**

Since movement of items are properly recorded, items that are dormant could easily be determined. They could be re-channeled by management to other Line Units in need of such items.

C. SOFTWARE FUNCTIONAL DESIGN

The Functional Process Flowchart shown on Figure 14 outlines the sources of information and data (input) coming into the system and the different outputs generated. It gives an overview of the different users with their respective input and output documents. Figure 15 shows the Cycle Process Flowchart which divides the output into the different reporting periods.

1. **On-Line Software Modules**

The Inventory Control System is composed of six software modules for the on-line (interactive) portion. The general structure as is depicted on Figure 16. These modules will be programmed as subroutines enabling control to be passed on to a module where a particular processing is needed. Control returns to the calling program after the module performs its assigned functions.

a.   Input Validation/Formatting Module

This module is the primary interface between the system and user terminals. After a message request is initiated by a user via the terminal, validation of the given password is made to ascertain only authorized users gain access to the data bases. It further formats the input message to specification for subsequent processing by other modules. When an error is detected, an invalid message is sent to the user with comments on what kind of error was made. If no error is detected, the type of processing needed is determined and control is passed on to that particular module.

b.   On-Line Inquiry Module

Control is passed on to this module if user message request is for inquiry into the data base. Program flow is as shown on Figure 17. Main function of the module is to determine what particular display is needed, interact with the Data Retrieval Module, group them logically into the desired information, then pass control on the Output Message/Edit Module. CRT display format are shown on Appendix B.

c.   On-Line Update Module

This module retrieves the needed file from the data base through the Data Base Maintenance Module, then updates all or part of it as called for by the user. Program flow is as shown on Figure 18.   When all the fields needing updating have been written back on their respective files, the program sends

a message of its completion to the user through the Output

Message/Edit Module. CRT display formats are shown on Appendix

C. These formats will be made available to users in preprinted

form as backup when communication lines are down.

        d. Data Base Maintenance Module

        This module retrieves the needed data during inquiry

or updating. In the case of updating, the Module writes back

the updated fields in their respective files in its rightful

location. One important function performed by this module is

the generation of backup files of all updating activities. This

procedure insures a fallback routine in case of mechanical fail-

ure (head crash).

        e. Message Output/Edit Module

        Data or messages to be transmitted back to the user

terminal are handled by this Module. The response is edited

and formatted to specifications before transmission.

        f. Module Size

        Based on Figures 16-19, the following module sizes

are estimated.

Module Name	No. of Source Statements
Input Validation/Formatting Module	600
Inquiry Module	1500
Update Module	1000
Data Base Maintenance Module	300
Message Output Edit	100
TOTAL	3500

2. Report Generators

Management and statistical reports will all be generated through batch processing. One program will generate one specific report. Appendix D is a compilation of the different printouts generated by the system.

3. Backup Batch Update

In cases where communication lines between the computer and terminal users are down, a backup batch update routine is used in order not to jeopardize data base maintenance. Figure 19 shows the steps taken to achieve continuity of operation in spite of non-use of terminals in updating the data base.

4. Master File Creation

The Inventory Control System like any other computerized system relies heavily on accuracy of data for its effectiveness. As such, particular attention must be given to the initial Master File Creation. To preclude an erroneous data base, all balance fields will be zeroed-out initially as shown on Figure 20. Next step is to prepare Inventory Tags and Control Listings using the initial Master File for a wall-to-wall inventory of the warehouse. Tags will help facilitate location and indentification of the different line items in the physical count. Control Listings will be the audit trail for count accuracy. Figure 21 shows the flow in Step 2. After the inventory in Step 3 (Figure 22), the released tags with count are keypunched, then matched with the inventory tag file (in tag number sequence).

Matching part numbers are selected, and both the tag file and
the part number master file are updated by quantity. An audit
listing is printed for all part numbers with quantity out of
pre-established ranges. A missing tag listing is prepared.
Unmatched part numbers are listed for correction. Figure 23,
Step 4, shows completion of inventory. A multi-bin location
listing is prepared to allow gathering and restocking of like
items into a common storage location. An inventory comparison
listing is printed to show before and after inventory balances.

5. Inventory Analysis Processing

This part of the system is used to analyze and update
historical activities to help management predict future trends
in inventory movement. Figure 24 shows how the different files
are processed to yield the desired outputs. Here is where
planning and control is achieved through availability of
relevant information.

D. DATA BASE FUNCTIONAL DESIGN

Figure 25 illustrates the file relationship of the different
component files of the system. The Data Base Design approach
is evident in this diagram to preclude redundancy and dupli-
cation of similar data fields. Data maintenance efficiency
would be greatly enhanced in this approach since data fields
are distinct from each other facilitating retrieval and updating.
Appendix E contains the detailed design of the component files
of the data base.

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E. TECHNICAL FEASIBILITY STUDY

1. On-Line Storage Feasibility

a. Master Stock Record File

Number of Records = 120,000

Size of Fixed Length Files = 125 bytes

Variable Length Files

  Average Number of Customers per Line Item = 50

  Average Number of Vendors per Line Item = 20

  Trailer Header = 4 bytes

  Average Length of Trailer = 70 x 5 bytes = 350 bytes

Average Record Size = 125 bytes + 350 bytes = 475 bytes

Size of File = 475 bytes x 120,000 = 57 M bytes

Allowance for Indices (10%) = 57 M x 1.1

$$= 62.7 \text{ M}$$

Blocking Factor = 2

Size of Logical Record = 1045 bytes

Total Inter-Record Gap = $\dfrac{62.7M}{1045}$ x 30 bytes/gap

$$= 1.8 \text{ M bytes}$$

Total File Size = 62.7 M + 1.8 M = 64.5 M bytes

b. Customer Record File

Number of Customers = 100

Size of File = 100 rec x 58 bytes/rec = 5,800 bytes

Allowance for Indices (10%) = 5,800 x 1.1 = 6,380 bytes

Blocking Factor = 20

Size of Logical Record = 1160 bytes

Total Inter-Record Gap = $\frac{6380}{1160}$ x 30 bytes/gap = 165 bytes

Total File Size = 6,380 + 165 = 6545 bytes

      c.   Turn-In Record File

Number of Records = 10/day x 5 days/week x 52 weeks/year

               = 2,600 per year

Size of File = 2600 per year x 50 bytes = 130,000 bytes per year

Allowance for Indices (10%) = 130,000 x 1.1 = 143 K bytes

Blocking Factor = 20

Size of Logical Record = 1000 bytes

Total Inter-Record Gap = $\frac{143 \text{ K}}{1 \text{ K}}$ x 30 bytes/gap = 4.29 K bytes

Total File Size = 143 K + 4.29 K = 147.29 K bytes

      d.   Daily Transaction File

Number of Transaction per year = 100 tran x 100 cust = 10 K

Size of File = 66 bytes x 10 K = 660 K bytes

Allowance for Indices (10%) = 660 K x 1.1 = 626 K bytes

Blocking Factor = 20

Size of Logical Record = 1320 bytes

Total Inter-Record Gap = $\frac{726 \text{ K}}{1320}$ x 30 bytes/gap = 16.5 K bttes

Total File Size = 726 K + 16.5 K = 742.5 K bytes

      e.   Vendor Data File

Number of Vendors = 200

Size of File = 200 x 100 bytes = 20 K bytes

Allowance for Indices (10%) - 20 K x 1.1 = 22 K

Blocking Factor = 10

Size of Logical Record = 1000 bytes

Total Inter-Record Gap = $\frac{22 \text{ K}}{1000}$ x 30 bytes/gap

$$= .660 \text{ K bytes}$$

Total File Size = 22 K + .660 K - 22.66 K bytes

      f. Due In/Out File

Number of Records = 100 per day x 22 days/month x 12 months/year

$$= 26,400$$

Size of File = 26.4 K x 35 bytes = 924 K bytes

Allowance for Indices (10%) = 924 K x 1.1 - 1,016.4 K bytes

Blocking Factor - 20

Size of Logical Record = 700 bytes

Total Inter-Record Gap = $\frac{1016.4 \text{ K}}{700}$ x 30 bytes/gap = 43.56 K bytes

Total File Size = 1,016.4 K + 43.56 K = 1.059.96 K bytes

      g. Total Storage Requirement

File Name	Size (in Million Bytes)
Master Stock Record File	64.5
Customer Record File	.006545
Turn-In Record File	.14729
Daily Transaction File	.7425
Vendor Data File	.02266
Due In/Out File	1.05996
TOTAL	66.478955

The system is projected to have 10 percent annual growth rate for a period of five years.

Total Storage Requirement = 66.5 x $(1.1)^5$ = 107.1

h. Direct-Access Storage Devices

Based on the present system configuration (Figure 20) of 29 M bytes capacity per drive, total number of drives needed for the Data Base are as follows:

Number of Disc Drives = $\frac{107.1}{29}$ = 3.69 = 4 drives

2. Off-Line Storage Feasiblity

a. Backup Tape Files

Tape Real Length = 2400 ft x 12 in/ft = 28,800 inches

Recording Density = 800 bits per inch = 100 bytes per inch

Inter-Record Gap = 960 bytes

(1) Master Stock Record File

Size of File - 62.7 M bytes

Size of Logical Record = 1045 bytes

Total Inter-Record Gap = $\frac{62.7\ M}{1045}$ x 960 bytes/gap

= 57.6 M bytes

Total File Size = 62.7 M + 57.6 M = 120.3 M

(2) Total Data Base Tape Requirement

Following the same calculations shown on Sec (1), other file sizes are as follows:

File Name	Size (in Million Bytes)
Master Stock Record File	120.3
Customer Record File	.01166
Turn-In Record File	.28028
Daily Transaction File	1.254
Vendor Data File	.043120
Due In/Out File	2.41032
TOTAL	124.299

45

@ 10 percent annual growth rate for five years

Total Tape Requirement = 124.3 x $(1.1)^5$ = 200.18 M bytes

      (3) <u>Tape Reel Requirement</u>

Number of Reels = $\dfrac{\text{200.18 M bytes}}{\text{100 bytes per inch}}$ x 28,800 inc/reel

                = $\dfrac{\text{2.0018 M inches}}{\text{20,800 inches/reel}}$

                = 69.5 = 70 tape reels

    b. Inventory Analysis Processing

      (1) <u>Current Month History File (tape)</u>

          Record Layout

Stock No. 14	Tran Code 2	Date 8	Quantity 6

Record Size = 30 bytes

File Size = 30 x 833 tran/month - 24,990 = 25 K bytes

Blocking Factor = 30

Logical Record Length = 900 bytes

Total Inter-Record Gap = $\dfrac{\text{25 K}}{900}$ x 960 bytes/gap

                    = 26.6 = 27 K

Total File Size = 25 K + 27 K = 52 K

      (2) <u>Demand Master File (Disk)</u>

          Record Layout

Stock No. 14	Seasonal Level 4	Anticipated Requirement 6	Control Level 4	Reorder Point 6	Lead Time 4

EOQ 4	Shelf Life 2	Pipe Time 2

Record Size = 46 bytes

File Size = 46 bytes x 120,000 items = 5,520 K bytes

Blocking Factor = 20

Logical Record Length = 920 bytes

Total Inter-Record Gap = $\dfrac{5520\ K}{920}$ x 30 bytes/gap

$$= 180\ K\ bytes$$

Total File Size = 5,520 K + 180 K = 5,700 K bytes

(3) <u>Reorder History Master File (disk)</u>

Record Layout

Stock No.	Vendor No.	Date Req.	Date Del.	Qty	Unit Issue	Unit Price
14	5	8	8	6	4	9

Record Size = 54 bytes

File Size = 54 bytes x 120,000 items = 6,480 K bytes

Blocking Factor = 20

Logical Record Length = 1080 bytes

Total Inter-Record Gap = $\dfrac{6480\ K}{1080}$ x 30 bytes/gap = 180 K bytes

Total File Size = 6480 K + 180 K = 6660 K bytes

(4) <u>Peripheral Device Requirement.</u> With reference to Figure 20, the following peripheral devices are required for this processing:

File Name	No. of Drives
Current Month History File Input	1
Selected Item Input	1
Exception Report Output	1
Demand Output	1
Forecast	1
TOTAL	5 Tape Drives

File Name	No. of Drives
Inventory Demand Input	1
Inventory Demand Updated Output	1
Master File	4
TOTAL	6 Disk Drives

    c. Backup Load Module Files

        (1) <u>On-Line Programs</u>

Size = 3500 source statements x 10 inst/statement x 4 bytes/

    instruction

  = 140 K bytes

        (2) <u>Batch Programs</u>

Report Generators Size = 25 programs x 300 source line/program

                         x 10 inst/statement x 4 bytes/inst

                         = 300 K bytes

Inventory Analysis Size = 3 programs x 500 source line/program

                         x 10 int/st x 4 bytes/int

                         = 60 K bytes

        (3) <u>Tape Reel Requirement</u>

$$\text{Number of Reels} = \frac{500 \text{ K} \times 2 \text{ (allowance for IRG)}}{100 \text{ bytes/inch} \times 28{,}800 \text{ inch/reel}}$$

$$= \frac{10\text{K/inch}}{28{,}800 \text{ inch/reel}}$$

$$= 1 \text{ reel}$$

3. <u>Main Memory Feasibility</u>

    a. On-Line Software Modules

        With reference to Section C, the following are the

breakdown of on-line software modules:

Module	No. of Statement	Instruction/ Statement	Bytes/ Instruction	Total
Inquiry	600	10	4	24 K
Update	1500	10	4	60 K
Data Base Maintenance	300	10	4	12 K
Message Output/Edit	100	10	4	4 K
				140 K bytes

    b. Buffers

Disc Files

    Input   1.2 K

    Output   1.2 K   2.4 K

Printer

    2 (double) x   150   .0003 K

Tape

    Input   1.2 K

    Output   1.2 K   2.4 K

Card Reader

    2 (double) x   100   .0002 K

Terminal

    Input 10 x 100   1.0 K

    Output 10 x 300   3.0 K
        TOTAL   8.8005 K

    c. Memory Requirement

On-Line Modules   140 K

Buffers   8.8005 K

Operating System   90 K
        TOTAL   238.8005 K

4. Terminal Response Time Feasibility

To compute the terminal response time, all the Wait Times (W) and Service Times (S) will have to be taken into consideration as shown on Figure 26. The following are the data to be used:

Number of Terminals = 10

$\bar{n}$ = average number of queries per day = 1000

queries are assumed to be divided equally among terminals

Queries handled in one 8- hour shift = 480 minutes

Tem W = Terminal Wait Time

Com S = communication service time

$$= \frac{100 \times 8}{4800 \text{ bps}} \times 10^3 = 166 \text{ MS (millisecond)}$$

In Buf W = Input Buffer Wait Time

= Access Time + Wait Time

Access Time = Disc Access + Rotational Delay + Transfer Rate

$$= Ta + Td + \text{Transfer}$$

$$= 60 \text{ MS} + 12.5 \text{ MS} + \frac{100}{312} = 72.8 \text{ MS}$$

$$p = \bar{n} \cdot \text{Access Time} = [1000/(480 \times 60 \times 1000] \times 72.8$$

$$= .0025 \text{ MS}$$

$$\sigma_s^2 = \frac{(ta \text{ max})^2 + (td \text{ max})^2}{12}$$

$$= \frac{(60)^2 + (12.5)^2}{12} = 313$$

$$\sigma_s = 17.7$$

50

$$\text{Wait Time} = \frac{p \cdot \text{Access Time}}{2(1-p)} [1 + (\sigma s/\text{Access time})^2]$$

$$= \frac{.0025 - 72.8 \text{ MS}}{2(1 - .0025)} [1 + (17.7/72.8)^2]$$

$$= .0966 \text{ MS}$$

In Buf W = Input Buffer Wait Time

$$= 72.8 \text{ MS} + .0966 \text{ MS} = 72.8966 \text{ MS}$$

Disc Q W = Disc Querue Wait Time

$$= 2 \text{ Access (index and data)}$$

$$= 2 \times \text{Wait Time} = 2 \times .0966 \text{ MS} = .1932 \text{ MS}$$

Disc S = Disc Service Time

$$= 2 \text{ accesses (index and data)}$$

$$= 2 \times \text{Access Time} = 2 \times 72.8 \text{ MS} = 145.6 \text{ MS}$$

CPU W = CPU Wait Time

$$= \frac{p \cdot \text{CPU S}}{(1 - p)} \quad \text{(assume exponential distribution)}$$

$$\text{CPU time per statement} = 10 \text{ terminals} \times \frac{32}{8} \times 2 \text{ memory access}$$

$$\times .6 \frac{\text{micro sec}}{\text{inst}}$$

$$= 48 \text{ micro sec} = .048 \text{ MS}$$

CPU S $= .048 \times 1000 = 48 \text{ MS}$

p $= [1000/(480 \times 60 \times 1000] \times 48 = .00167 \text{ MS}$

CPU W $= \frac{.00167 \times 48}{(1 - .00167)} = .0803 \text{ MS}$

CPU S = CPU Service Time

$$= 48 \text{ MS}$$

Out Buf W = Output Buffer Wait Time

$$= \frac{p \cdot \bar{t}s}{2(1 - p)}$$

t_s = communication transfer time (out)

$$= \frac{300 \times 8}{48} \times 10^3 = 500 \text{ MS}$$

$$p = [1000/(480 \times 60 \times 1000)] \times 500 \text{ MS} = .148$$

Out Buf W $= \dfrac{.148 \times 500}{2(1 - .148)} \times 43.43$ MS

Com S $\quad$ = communication Service Time

$\qquad = \overline{t}_s = 625$ MS

Dis S $\quad$ = Display Service Time

$\qquad = \dfrac{300 \times 8}{900} \times 10^3 = 2666$ MS

Total Terminal Response Time =

$\qquad$ Term W + Com S + In Buf W + Disc Q W

$\qquad\qquad$ + Disc S + CPU W + CPU S + Out Fuf W

$\qquad\qquad$ + Com S + Disc S

$\qquad\qquad$ = 0 + 166 MS + 72.8966 MS + .1932 MS

$\qquad\qquad$ + 145.6 MS + .0803 MS + 48 MS + 43.43 MS

$\qquad\qquad$ + 625 MS + 2666 MS

$\qquad\qquad$ = 3767.2001 MS

5. Hardware Configuration

In view of the different feasibility factors discussed in Sections 1 - 4, Figure 27 illustrates the proposed hardware configuration after the present system is upgraded. This configuration conforms to all specifications and limitations embodied in the aforementioned sections.

F. ECONOMIC FEASIBILITY

The present hardware configuration will be upgraded to support the Inventory Control System. Equipment cost will include memory upgrade, additional peripheral devices and

additional maintenance and operating costs. Benefits to be derived from the system will be based mainly in the reduction of inventory, carrying cost and improved efficiency in planning and forecasting of material requirements.

1. Equipment Upgrade Outlay

Component	Purchase Cost ($)	Maint Cost Per Month ($)
Main Storage		
1 - 32,768 bytes storage expansion	24,000	53
2 - 65,536 byte storage expansion	43,104	105
Mass Storage Device		
2 - Two Disc Drives; 58 M bytes	85,056	288
Tape Drives		
1 - Master Tape Unit; 9-track	21,840	138
1 - Slave Tape Unit; 9-track	13,056	83
Remote Terminals		
7 - Display Terminal; 96 Char Gen	35,399	252
7 - Keyboards; A/N option	3,829	14
Interface		
1 - Terminal Multiplexor	1,680	6
Remote Peripherals		
7 - Remote Printer	16,240	-
Modems		
6 - Modems; up to 2400 bps	450	
	244,654	939/mo
		11,268/yr

2. Programming Element

Using programmer output of 160 source statement/man-month.

Software Module	No. of Source Stat	Complexity	Man-Month
Input Vol/formatting	600	2	8.6
Inquiry Module	1500	3	28.2
Update Module	1000	3	19.3
Data Base Maint	300	2	3.8
Message Output Edit	100	2	1.3
Report Generator 25 @ 300	7500	1	46.9
Inventory Analysis 3 @ 500	1500	2	18.8
Master File Creation 4 @ 400	800	1	5.0
TOTAL			131.9

3. Testing Element

Software Module	No.	Size Factor	Complexity	Man-Month
Input Module	1	6	2	12
Inquiry	1	15	3	45
Update	1	10	3	30
Data Base Maintenance	1	3	2	6
Message Output Edit	1	1	2	2
Report Generator	25	3	1	75
Inventory Analysis	3	5	2	30
Master File Creation	4	8	1	32
TOTAL				232

4. Development Personnel Element

Element	Man-Month Analyst	Programmer	Activity
User Requirement Analysis	2		Interview & Data Collection
Feasibility Study	1		Analyze Different Requirements
Evaluate Solutions	2	1	Evaluate Alternatives
Hardware and Software Evaluation	1	1	Performance Analysis
Prepare RFP	3		Functional Specification
Evaluate Proposals	4	2	Evaluate Vendor Proposal
Programming		132	Program design, code, deb
Testing	78	154	Unit, module & system te
Documentation		26	Document system and prog
File Conversion	19	19	Convert to proposal system
Training		10	For user, programmer and operations personnel
Parallel Operation	6	6	Make final adjustments
	116	351	

5. Development Personnel Cost

Aside from the programmer and analysts needed in the development process, console operators and clerks will be needed for parallel operations and three man-months total for general clerical work.

Cost Element	Annual Salary ($1,000)	Man-Months	Total ($1,000)
Analyst	25	116	241.67
Programmer	20	351	585.0
Operator	15	8	10.0
Clerk	10	3	2.49
TOTAL			839.16
Fringe Benefits (30%)			$1090.91

6. Operations Personnel

Maintenance Programming: 2 @ $20 K/yr = $40 K

Computer Operators   : 2 @ $15 K/yr = $30 K

Tape Librarian   : 1 @ $10 K/yr = $10 K

$80 K

Fringe Benefits (30%) $104 K

Salary Increase = 5% per year

7. Other Items

While hardware and software development is going on, a wall-to-wall inventory of the warehouse will be undertaken. Additional clerks will be needed for this purpose. A one-time cost of $50 K will be needed for site preparation and to renovate the present computer center to accomodate the added hardware. Utilities will be treated as part of overhead cost.

Item	Cost
Site Preparation	$ 50 K
Clerks (warehouse Inventory) 5 @ 833/month x 6 months	25 K

	Item		Cost	

Supplies

    Disc Paks: 50 @ $50 = $2.5 K

    Tape Reels: 100 @ $30 = $3.0 K

    Paper: = $10 K   15 K/year

Overhead   5 K/year

8. Cost Tabulation

Cost Elements (in $1000)	0	1	2	Year (10% Growth Rate) 3	4	5
Equipment Outlay	244.7					
Development Personnel	1090.91					
Site Preparation	50.0					
Warehouse Inventory	25.0					
Operations Personnel		104	109.2	114.6	120.4	132.4
Supplies		15	16.5	18.5	19.9	21.9
Overhead		5	5.5	6.05	6.6	7.3
Hardware Maintenance		11.3	12.4	13.6	14.9	16.5
	1410.6	135.3	143.6	152.8	161.8	178.1

Based on the computations above, the whole system when implemented over a five year period would cost $2,182.2 K.

9. Cost-Benefit Analysis

    a. Benefits

        The present level of inventory is estimated at $100 M. With the adoption of the Inventory Control System, a yearly reduction of 1 percent in inventory is anticipated.

Carrying cost based at 10 percent of total inventory will like-
wise have a corresponding reduction. Other intangible benefits
such as customer service and increased procurement efficiency
will not be included in the computations as quantifying them
at this point is not feasible.

    b. Cost Benefits Tabulation

		YEAR ($1000)				
Cost	0	1	2	3	4	5
System Cost	1410.6	135.3	143.6	152.8	161.8	178.1
Benefits						
Inventory Reduction		1000	990	980	970	960
Carrying Cost Reduction		99	98	97	96	95
Total Benefits		1099	1099	1077	1066	1055
Benefits-Cost	-	-1410.6	963.7	944.4	924.2	904.2	876.9
Discounted @ 6% -		-1410.6	905.8	834.5	767.6	705.9	643.5

Net Present Value = $2446.7

The system will break even after two years of operation. Even
with a very conservative estimate of the benefits to be derived
from the system, the Net Present Value is indicative of the
advantage management will have with the implementation of the
system.

V. CONCLUSIONS/RECOMMENDATION

This study as a whole illustrates the benefit an organization can derive out of an existing computer hardware by upgrading it to its full complement to suit increasing demand for processing capabilities. With careful planning and technical know-how, management information systems such as Inventory Control could lessen much of management's problems by providing timely, accurate and relevant information through the computer. Cost of additional processing requirements could be minimized by tailoring the system design to the capabilities of the existing main frame at hand. Only needed upgrade in terms of peripheral devices and main memory will be done to implement the system. This approach not only harnesses the full potential of the existing computer system but provides the organizational benefits that outweigh heavily the incremental cost to upgrade.

Figure 1

ORGANIZATIONAL CHART
COMMAND LEVEL

——— Command Line
----- Functional Supervision

Figure 2

ORGANIZATIONAL CHART

DEPOT

Figure 3

ORGANIZATIONAL CHART
DEPOT SUPPLY SQUADRON

Figure 4

Stock Control Card

STOCK CONTROL RECORD

STOCK NUMBER	UNIT
DESCRIPTION	STATUS
MAJOR ASSEMBLY	PPTY & CLASS
APPLICABLE EQUIPMENT	STD PACKAGE
LOCATION	

REPAIR OR DSPO. CODE	REPAIR OR OVERHAUL DEPOT	SOURCE OF SUPPLY	REQUISITION DATE
SERVICEABLE PRICE	DATE	REPARABLE PRICE	DATE

STOCK CONTROL DATA

DATE	DAYS CONS.	SEASONAL LEVEL	STAND-BY LEVEL	ANTICIPATED REQUIREMENT	CONTROL LEVEL	REORDER POINT	

INTERCHANGEABILITY DATA

Figure 5

SUPPLY REQUISITION CYCLE

Figure 6

SAMPLE FORMAT

<u>REQUISITION AND ISSUE VOUCHER</u>

SIR: Please furnish the following supplies: No. _____

_____
(Date)

BALANCE ON HAND	REQUISITIONS			AS ISSUED	AMOUNT CHARGE
	QTY	UNIT	NOMENCLATURES	UNIT PRICE	TOTAL PRICE

    I CERTIFY the supplies required
above are necessary and will be used
slely for the purpose stated.

_____
(Date)

Received the supplies shown above
as issued.

_____
(Requisitioning Officer)

_____
(Signature of persons
receiving supplies)

APPROVED: (For Issuance)

_____
(Designation)

_____
(Signature)

Filled by _____ Rocked by ____
Shipped to _____
Bill of Loading No.___ Date____
NOTE: Requisitioner must invariabl
cross out all spaces not use
below last articles requisi-
tioned.

_____
(Title)

_____19 __

_____
(Property Clerk)

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Figure 7

| LINE UNITS | DEPOT | SUPPLY AND LOGISTICS | PROCUREMENT | COMPTROLLER | COMMANDER | HIGHER HQ | VENDORS |

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Figure 8

SINGLE LINE ITEM
REQUISITION
(SLIRIT)

TO		SHIP TO		DOCUMENT NUMBER		
				REQUISITIONER	DATE	SERIAL
				TECH SVC	UNIT ISSUE	
STOCK NUMBER		NOMENCLATURE		UNIT PRICE	TOTAL PRICE	
END ITEM-NAME-MFTR		MODEL NO.	SERIAL NO.	TYPE REQUISITION		
				/_/ EMERGENCY /_/ SPECIAL		
				/_/ REPLENISHMENT		

R/O	O/H	D/I	D/O	QTY		SIGNATURE OF REQUISITIONER	
					/_/ REQUIRED		
					/_/ EXCESS		
QTY APPROVED		REQUISITIONED APPROVED BY			ISSUE APPROVED BY		

S T O R A G E	QUANTITY INDICATED HAS BEEN		C U S T O M E R	QUANTITY INDICATED HAS BEEN		
	QTY	SIGNATURE & DATE			QTY	SIGNATURE & DATE
				/_/ RECEIVED		
				/_/ TURNED-IN		

SOURCE	EXPENDABILITY	VOUCHER NO.	REMARKS ·
	/_/ NON-EXPENDABLE		
	/_/ EXPENDABLE		
	/_/ RECOVERABLE		

/_/ COMPLETE /_/ PARTIAL /_/ DUE-OUT /_/ LP AUTHORIZED   COPY NO.

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Figure 9
PROPERTY TURN-IN SLIP

	SUPPLY OR CLASSIFICATION OFFICER			PAGE		PAGES	
TO				VOUCHER NO.			
	ORGANIZATION OR UNITS			TURN-IN SLIP NO.			

ITEM No	STOCK NUMBER	NOMENCLATURE	UNIT	QTY	REMARKS	ACTION

LEGEND FOR REMARKS

FWT - Unsvble, due to fair wear & tear
R/S - Unsvble, report to survey
S/C - Unsvble, statement of charges
SER - Serviceable
EAS - In excess of authorized allowance
MR - Memorandum Receipt Property

I CERTIFY that the articles listed hereon are turned in under the circumstances indicated in "REMARKS"

FOR THE COMMANDING OFFICER:

_____   _____
  (Date)   Organization Supply Officer

QUANTITIES SHOWN IN ACTION COLUMN HAVE BEEN RECEIVED:

_____
(For Station Supply Officer)

_____

Figure 10 .

SAMPLE FORMAT

MEMORANDUM RECEIPT FOR EQUIPMENT
SEMI-EXPENDABLE AND NON-EXPENDABLE PROPERTY

_____(Place of Transaction)_____   ____(Date)____ 19__

I acknowledge to have received from _____

(Name of Responsible Officer)

the following property for which I am responsible to the provision of
the Accounting Law, and which will be used in the office of _____

QTY	UNIT	NAME AND DESCRIPTION	UNIT PRICE	TOTAL PRICE	REMARKS

INSTRUCTIONS

THIS form shall be prepared in duplicate.
Always draw a heavy horizontal line along item
and a similar line diagonally from the hori-
zontal line to the last blank line at the bottom
of this form after both copies are properly
signed by the receiving officer and the dupli-
cate by the receiving or responsible officer.

Every sheet must be duly signed.

_____
(Name)

_____
(Designation)

Figure 11

PROPERTY ISSUE SLIP

				Initial	Replace-ment	Memo Receipt	Page of Pages
To	Supply Officer						
							Voucher No.
For	Organization or Unit						Issue Slip No.

Item No.	Stock No.	Nomenclature	Unit	Authorized Allowance	On Hand	Due In	Quantity Requested	Action

Issuance of quantity shown in "Quantity Requested" column is authorized. Items marked "due out" will be ordered and when received organization will be notified.

For the COMMANDING OFFICER:

For Station Supply Officer:

_____ Date   Organization Supply Officer

Quantities Shown in "Action" Column Have Been Received:

_____   _____   _____
Date   Date   Authorized Officer

Figure 12

PRESENT CONFIGURATION

Figure 13

AUTOMATIC REPLENISHMENT CONCEPT

Figure 14

Functional Process Flow Chart

Supply Pts/
LINE UNITS

Requisition/
Issue Voucher

DEPOT

Req/Issue Voucher
Memorandum Receipt
Property Issue Slip
SF1KIT
*Reciever Cards (Receipts)
Post Stock Rec File Update (change)
*Stock Control File Update (change)
*Update of Rec File Update (change)

SUPPLY & → PROCUREMENT → COMPTROLLER
LOGISTICS

Procurement   Purchase Order   Funds
Interactive   *Purchase Order Update   Availability
               *Vendor Data File
                (Update Change)
               *Due In/Out Change

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Figure 15

CYCLE PROCESS FLOW CHART

INPUT

Requesition/Issue Voucher
Memorandum Receipt
Property Issue Slip
SLIRIT
Receipt/Issue Card
Master Stock Record Change
Stock Control File Change
Customer Record File Change
Procurement Directive
Purchase Order
Purchase Order Change
Vendor Record File Change
Due In/Out Record Change
Funding Availability

DAILY

OUTPUT

Automatic Reorder List
Daily Back Order List
Stock Disbursement Record
Daily Receiver List
Master Inventory Activity List
Open Purchase Order Report
Reorder Report

WEEKLY

OUTPUT

Back Order by Customer
Inventory Shorts List
Non-Responsive Vendor List
Accounts Payable
Purchase Order Follow-up

MONTHLY

OUTPUT

Stock Control Catalog
Supply Catalog
Purchase Order Register
Item Traffic Density
Master List of Items by Supply Pts
Items with High Excess
Issue VS Requesition
Status of Turn-In
Status of Items for Repair

QUARTERLY

OUTPUT

Item Activity Report
Replenishment Cycle
Customer Account Report
Item Demand
Detailed Listing of Turned-In Items
Status of Item
Depot Efficiency Report
Vendor Master List

Figure 16

ON-LINE PROGRAM STRUCTURE

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Figure 17

On-line Inquiry Module

Figure 18

On-line Update Module

Figure 19

BACK-UP BATCH UPDATE

Figure 20

Master File Creation
Step 1

Figure 21

Master File Creation
Step 2

Figure 22

Master File Creation
Step 3

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Figure 23

Master File Creation
Step 4

Figure 24

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Figure 25

FILE RELATIONSHIP

INVENTORY DATA BASE NETWORK

Figure 26

TERMINAL RESPONCE TIME FACTORS

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Figure 27

PROPOSED CONFIGURATION

MASTER INVENTORY FILE ACTIVITY LIST
XX/XX/XX

PAGE 999

STOCK NO.	DESCRIPTION OF ITEM	TRANSACTION		PURCH/ISSUE PRICE	TOTAL AMOUNT	STOCK BALANCE	
		TYPE	QTY UNIT			QUANTITY	AMOUNT

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OPEN PURCHASE ORDER REPORT BY PURCHASE ORDER NUMBER
AS OF   XX/XX/XX

PAGE 999

PURCH ORD NO	CUST NO.	STOCK NO.	VDR/DES- CRIPT.ITEM	ORDER UNIT	QTY	UNIT PRICE	ORDER DATE	PROMISED DEL. DATE	LAST ACT DATE	STATUS CODE	REQ NO.	REC'D QTY	DAYS OVERDUE

AUTOMATIC REORDER LIST
AS OF XX/XX/XX

PAGE 999

VENDOR NO.	REQUISITION NO.	STOCK NO.	DESCRIPTION OF ITEMS	CUST. NO.	ORDER			UNIT PRICE	EXTENDED DATE
					DATE	UNIT	QTY		

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DAILY RECEIVER TRANSACTION LIST

PAGE 999

| CUST NO. | PO NO. | STOCK NO. | VENDOR | | DESCRIPTION | UNIT ISSUE | REC'D QTY | REC'D DATE |
			NUMBER	NAME				

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DAILY LIST OF STOCK ITEMS BACK ORDERED

DATE   PAGE 999

STOCK NO.	UNIT	DESCRIPTION	BACK ORDER QUANTITY	UNIT PRICE	TOTAL COST	ORDER QTY	ORDER DATE	PO NO.	VOUCHER NO.

TOTAL VALUE STOCK BACK ORDERED 9999.99   NO.ENTRIES 99

POSITIVE VAL. $9,999.99   NEGATIVE VAL $9,999.99

CLOSING VALUE ALL STOCK ON HAND $999,999.99

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DAILY REORDER WARNING POINT
99 xxxxxxxxxxxxxx 9999

I T E M D E S C R I P T I O N				QUANTITY IN STOCK	HIGH LIMIT	REORDER QUANTITY
F S N	NOMENCLATURE	MODEL NO.	T S			

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APPENDIX C

MASTER FILE DELETION/SUSPENSION/
STATUS REQUEST

DATE: _____   REQUESTED BY: _____

    MASTER FILE STOCK NO: _____

ACTION:

    REPORT STATUS: _____

    DELETE FILE: _____

    SUEPEND STOCK: _____   QUANTITY: ____   CODE: ____

    Stock Suspension Codes:

        Remove from Suspension... = 1

        Suspend - Damaged Material = 2

        Suspend - Outdated Stock. = 3

        Suspend - Reserve Stock.. = 4

MASTER STOCK RECORD FILE CHANGE

FOR CHANGES: ENTER PERTINENT INFORMATION ONLY.

FOR ADDITIONS: COMPLETE ALL APPLICABLE ITEMS.

1 CHARACTER FOR EACH LETTER, NUMBER, MARK OF PUNCTUATION
OR SPACE BETWEEN WORDS.   LIST EXACTLY AS DESIRED AND DO
NOT EXCEED MAXIMUM CHARACTERS SHOWN ( ).

     1.   Addition _____   Change _____   Delete _____

     2.   Stock No. (14) _____

     3.   Nomenclature (20) _____

     4.   Unit Issue (4) _____

     5.   Major Assembly (10) _____

     6.   Group and Class (4) _____

     7. Applicable Equipment (10) _____

     8.   Standard Package (4) _____

DATE: _____   PREPARED BY: _____

STOCK CONTROL FILE CHANGE

FOR CHANGES: ENTER PERTINENT INFORMATION ONLY.

FOR ADDITIONS: COMPLETE ALL APPLICABLE ITEMS.

1 CHARACTER FOR EACH LETTER, NUMBER, MARK OF PUNCTUATION
OR SPACE BETWEEN WORDS. LIST EXACTLY AS DESIRED AND DO
NOT EXCEED MAXIMUM CHARACTERS SHOWN ( ).

    1.   Addition _____ Change _____ Delete _____

    2.   Stock No. (14) _____

    3.   Seasonal Lebel (4) _____

    4.   Stand-by Level (4) _____

    5.   Anticipated Req (6) _____

    6.   Control Level (4) _____

    7.   Reorder Point (6) _____

    8.   Lead Time (4) _____

    9.   Economic Order Qty (4) _____

  10.   Shelf Life (2) _____

  11.   Pipe Time (2) _____

  12   Interchangeability (12) _____

DATE: _____ PREPARED BY _____

VENDOR DATA FILE CHANGE

FOR CHANGES: ENTER PERTINENT INFORMATION ONLY.

FOR ADDITIONS: COMPLETE ALL APPLICABLE ITEMS.

1 CHARACTER FOR EACH LETTER, NUMBER, MARK OF PUNCTUATION
OR SPACE BETWEEN WORDS. LIST EXACTLY AS DESIRED AND DO
NOT EXCEED MAXIMUM CHARACTERS SHOWN ( ).

1. Addition _____ Change _____ Delete _____

2. Vendor No. (6) _____

3. Name (20) _____

4. Street (24) _____

5. City (21)_____

6. State/Prov (24) _____

7. Zip Code (5) _____

DATE: _____   PREPARED BY: _____

CUSTOMER RECORD FILE CHANGE

FOR CHANGES: ENTER PERTINENT INFORMATION ONLY.

FOR ADDITIONS: COMPLETE ALL APPLICABLE ITEMS.

1 CHARACTER FOR EACH LETTER, NUMBER, MARK OF PUNCTUATION
OR SPACE BETWEEN WORDS. LIST EXACTLY AS DESIRED AND DO
NOT EXCEED MAXIMUM CHARACTERS SHOWN ( ).

    1.   Addition _____ Change _____ Delete _____

    2.   Customer Code (6) _____

    3.   Customer Name (20)_____

    4.   Transaction Code (2) _____

    5.   Date (8) _____ .

    6.   CR/DB No. (6) _____

    7.   Quantity (4) _____

DATE: _____   PREPARED BY _____

DUE IN/OUT FILE CHANGE

FOR CHANGES: ENTER PERTINENT INFORMATION ONLY.

FOR ADDITIONS: COMPLETE ALL APPLICABLE ITEMS.

1 CHARACTER FOR EACH LETTER, NUMBER, MARK OF PUNCTUATION
OR SPACE BETWEEN WORDS. LIST EXACTLY AS DESIRED AND DO
NOT EXCEED MAXIMUM CHARACTERS SHOWN ( ).

    1.   Addition _____ Change _____   Delete _____

    2.   Stock No. (14) _____

    3.   Transaction Code (2) _____

    4.   Date Requested (8) _____

    5.   Req Customer (6) _____

    6.   Voucher No. (8) _____

    7.   Quantity (6) _____

DATE: _____   PREPARED BY: _____

MASTER SUPPLY CATALOG
AS OF   XX / XX/ XX

STOCK NUMBER	NOMENCLATURE	UNIT ISSUE	MAJOR ASSEMBLY	GROUP & CLASS	APPLICABLE EQUIPMENT	STANDARD PACKAGE

STOCK CONTROL CATALOG
AS OF XX / XX / XX

STOCK NUMBER	SEASONAL LEVEL	STAND-BY LEVEL	ANTICIPATED REQUIREMENT	CONTROL LEVEL	REORDER POINT	LEAD TIME	ECO ORDER QTY	SHELF LIFE	PIPE TIME	INTER-CHANGE-ABILITY

PURCHASE ORDER

DATE: _____

ORDERING CUST: _____

CUST CODE: _____

VENDOR NUMBER: _____

DATE REQ'D: _____

PRIORITY: _____

VENDOR NAME _____

QUANTITY	UNIT	STOCK NO.	DESCRIPTION	VENDOR STOCK NO.	UNIT PRICE
			xxx-Nothing follows-xxx	Total	

REMARKS: _____

ORDERED BY: _____   APPROVED BY: _____   APPROVED BY: _____

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PURCHASE ORDER REGISTER

PAGE 999

PURCHASE DEPT. ORDER NO. NO.	STOCK NO.	ITEM DESCRIPTION	ORDER UNIT	ORDER QTY	UNIT PRICE	TOTAL COST	DATE RECEIVED
VENDOR NO. 999999 xxxxxxxxxxxxxxx							

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LIST OF VENDORS WHO HAVE NOT RESPONDED TO THE
PURCHASE FOLLOW UP FORM AFTER THE THIRD NOTICE

PREPARE DATE XX/XX/XX

PAGE 999

VENDOR NO.	P.O. NO.	VENDOR NAME	STOCK NO.	PURCHASE DATE	3RD NOTICE DATE	QUANTITY LEFT

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INVENTORY SHORT LIST
AS OF XX/XX/XX

PAGE 999

STOCK NO.	VENDOR NO.	DESCRIPTION	UNIT	MAX LEVEL	REORDER POINT	CURRENT LEVEL	QTY LOW	QTY ON ORDER	CUSTOMER BACK ORD.

BACK ORDER
FOR WEEK OF XX/XX/XX

CUST	STOCK NO.	DESCRIPTION	ISSUE UNIT	BACK ORD. QTY	ISSUE PRICE	COST	TRANS DATE	ORDER PLACED	QTY ORDER	PO NO.

ACCOUNTS PAYABLE LIST

DATE

VENDOR NO.	PO NO.	STOCK NO.	VOUCHER NO.	INV. NO.	DESCRIPTION OF ITEM	ORDER QTY.	REC'D QTY.	PAID QTY.	EXTRA QTY.	INV. QTY.	ORDER PRICE	INV. PRICE

PURCHASE ORDER: DATE: CURRENT DATE:

PLEASE INDICATE ON THIS FORM WHEN YOU EXPECT TO SHIP THE FOLLOWING ITEMS,
SIGN, AND RETURN THIS FORM TO:

| | | | | | -VENDOR ANSWER- | |
ITEM NO.	QTY	UNIT	PRICE	STOCK NO.	DESCRIPTION	QTY	DEL DATE

AUTHORIZED VENDOR SIGNATURE: -----------------

DATE: -------------

PURCHASING REQUIREMENTS LIST

DATE OF REPORT: XX/XX/XX

STOCK NO.	DESCRIPTION											
VENDOR NAME & NO.	STK ON HAND	DUE IN	DUE OUT	REQ. QTY	CUM. ISS.	CUM. REC.	ISS. UNT.	PUR. QTY	ORD. QTY	PUR. PRICE	TOTAL
1.												
2.												

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VENDOR MASTER LIST

AS OF XX/XX/XX

VENDOR NO.	VENDOR NAME	VENDOR ADDRESS			REMARKS
		STREET ADDRESS	CITY AND STATE	ZIP CODE	

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ITEM ACTIVITY REPORT
xxxxxxx QUARTER 9999

F S N	NOMENCLATURE	T S	END-ITEM APP.	MODEL NO.	NO. REQ	NO. ISS	REMARKS

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REPLENISHMENT CYCLE REPORT
FOR THE xxxxx QUARTER 9999

ITEM	DESCRIPTION				DATE OF PO	QTY	SUPPLIER	OR NO.	DATE DELIV	QTY	BAL.
F S N	NOMENCLATURE	MODEL NO.	UM	PO NO.							

CUSTOMER ACCOUNT REPORT
AS OF 99 xxxxxxxxxxxxxxxx 9999

CUSTOMER UNIT: xxxxxxxxxxxxx

ITEM	DESCRIPTION			ISSUE				TURN - IN				BAL
F S N	NOMENCLATURE	UM	UNIT COST	DATE ISSUED	CREDIT NO.	QTY	COST	DATE T-IN	DEBIT NO.	QTY	TOTAL COST	QTY

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ITEM TRAFFIC DENSITY
FOR THE MONTH OF xxxxx 9999

ITEM DESCRIPTION				DELIVERIES		RELEASES	
F S N	NOMENCLATURE	MODEL NO.	SERIAL NO.	NO.	QUANTITY	NO.	QUANTITY

MASTERLIST OF ITEMS BY SUPPLY POINT
For the Month of xxxxxxxx 9999

SUPPLY POINT: xxxxxxxxxxx

ITEM		END-ITEM APP	DESCRIPTION			QUANTITY			
F S N	NOMENCLATURE		MODEL NUMBER	UI	UNIT COST	R/D	O/H	D/I	D/O

LIST OF ITEMS WITH QUANTITY IN EXCESS OF HIGH LIMIT
As of 99 xxxxxxxxxxx 9999

ITEM	DESCRIPTION			O/H	HIGH LIMIT	SURPLUS
F S N	NOMENCLATURE	MODEL NO.	UM			

ISSUE VS. REQUISITION
FOR THE MONTH OF xxxxxxxxx 9999

ITEM DESCRIPTION			ISSUE			REQUISITION		
F S N	NOMENCLATURE	UM	UNIT PR	U ISS.	QTY	TOTAL PRICE	DOCUMENT NO.	QTY	TOTAL PRICE

DETAILED LISTING OF TURNED-IN ITEMS
PERIOD COVERED xxxxxxxxxxxxx 9999

I T E M D E S C R I P T I O N			QUANTITY	CUSTOMER UNIT	PTIS NO.	DATE REC'D
F S N	NOMENCLATURE	UM				

ITEM DEMAND
xxx QUARTER 9999

| F S N | ITEM DESCRIPTION | | | | NO. OF REQ. | TOTAL QUANTITY | TOTAL COST |
	NOMENCLATURE	MODEL NO.	UM	UNIT COST			

DEPOT EFFICIENCY EVALUATION   AS OF XX/XX/XX

                              CURRENT   PRIOR
                              (M-T-D)   (IF MO-END)

        ITEMS REQUESTED

        ITEMS FILLED

        FILL RATE (%)

        ITEMS BACK ORDER

        BACK ORDERS FILLED

        PERCENT FILLED

STATUS OF TURN-INS
FOR THE PERIOD XXX 99 TO XXX 99

TYPE	QUANTITIES	COSTS
FWT	9,999,999.99	99,999,999.9999
R/S	9,999,999.99	99,999,999.9999
S/C	9,999,999.99	99,999,999.9999
SER	9,999,999.99	99,999,999.9999
EXS	9,999,999.99	99,999,999.9999
MR	9,999,999.99	99,999,999.9999
TOTALS	9,999,999.99	99,999,999.9999

STATUS OF ITEMS FOR REPAIR

FOR THE PERIOD XXX 99 TO XXX 99

QUANTITIES	COSTS	LATEST DATE
9,999,999.99	FORWARDED TO DME 99,999,999.99	99-99-99
9,999,999.99	RECEIVED FROM DME 99,999,999.99	99-99-99
9,999,999.99	BALANCE 99,999,999.99	

STATUS OF ITEM
As of XXX 99

FSN = XXXX-XXXXXX-XXXX   WHSE :LOCATIONS

UNIT OF ISSUE = XX   1.   99-999-99-9
                                          2.   99-999-99-9
UNIT PRICE = 9,999,999.99   3.   99-999-99-9

	QUANTITIES	COSTS
BALANCE ON HAND	9,999,999.99	99,999,999.99
TOTAL RECEIPTS	9,999,999.99	99,999,999.99
TOTAL ISSUES	9,999,999.99	99,999,999.99

LATEST DATE OF RECEIPT: 99-99-99

LATEST DATE OF ISSUE : 99-99-99

Record Format: Master Stock Record File

STOCK NO.	B A L A N C E S			WAREHOUSE LOCATION	DUE IN	DUE OUT	INTERCHANGE-ABILITY	NOMENCLA-TURE	UNIT ISSUE
	SVC	REP	RES						
0 13	14 20	21 27	28 34	35 42	43 48	49 54	55 68	69 88	89 92

MAJOR ASSEMBLY	GROUP & CLASS	STANDARD PACKAGE	SEASONAL LEVEL	ANTICIPATED REQUIREMENT	CONTROL LEVEL	REORDER POINT	LEAD TIME	EDQ
93 102	103 108	109 112	113 116	117 122	123 126	127 132	133 136	137 140

SHELF LIFE	PIPE TIME	NO. TRAILERS	VENDOR	. . . . . .	NO. TRAILERS	CUSTOMER CODE	. . . . . .
141 142	143 144	145 146	147		2	5	

Item	Columns	Char	Description
1	0-13	14	Stock Number
2	14-20	7	Serviceable Balance
3	21-27	7	Reparable Balance
4	28-34	7	Reserve Balance
5	35-42	8	Warehouse Location
6	43-48	6	Due In
7	49-54	6	Due Out
8	55-68	14	Interchangeability
9	69-88	20	Nomenclature
10	89-92	4	Unit Issue
11	93-102	10	Major Assembly
12	103-108	6	Group & Class Code

Item	Columns	Char	Description
13	109-112	4	Standard Package
14	113-116	4	Seasonal Level
15	117-122	6	Anticipated Requirement
16	123-126	4	Control Level
17	127-132	6	Reorder Point
18	133-136	4	Lead Time
19	137-140	4	Economic Order Quantity
20	141-142	2	Shelf Life
21	143-144	2	Pipe Time
22	145-146	2	No. of Trailer (Vendors)
23	147	5 each	Vendor Code Trailer Record
24		2	No of Trailers (customer)
25		5 each	Customer Code Trailers

Record Format: Customer Record File

CUSTOMER CODE	COST TOTAL REQ	COST TOTAL ISS	COST TOTAL TURN-IN	CUSTOMER NAME	CUSTOMER ADDRESS
0	56	910	1314	1718	3738	57

Item	Columns	Char	Description
1	0-5	6	Customer Code
2	6-9	4	Total Cost of Requisitions
3	10-13	4	Total Cost of Issue
4	14-17	4	Total Cost of Turn-In
5	18-37	20	Customer Name
6	38-57	20	Customer Address
		58	

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Record Format: Daily Transaction File (Receipts/Issues)

Transaction Code	Customer Code	Date	P. O. No.	Stock No.	Vendor No.	Vendor Stock No.	Quantity	Unit Price
0	12	67	1415	2223	3435	4041	5253	5657	65

Item	Columns	Char	Description
1	0-1	2	Transaction Code
2	2-6	5	Customer Code
3	7-14	8	Date
4	15-22	8	Purchase Order Number
5	23-34	12	Stock Number
6	35-40	6	Vendor Number
7	41-52	12	Vendor Stock Number
8	53-56	4	Quantity
9	57-65	9	Unit Price
		Total 66	characters (bytes) per rec

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Record Format: Turn-In Record File

STOCK NO.	CUSTOMER CODE	DATE	VOUCHER NO.	TURN-IN SLIP NO.	QUANTITY	STATUS
0 13	14 19	20 27	28 35	36 43	44 47	48 49

Item	Columns	Char	Description
1	0-13	14	Stock Number
2	14-19	6	Customer Code
3	20-27	8	Date
4	28-35	8	Voucher Number
5	36-43	8	Turn-In Slip Number
6	44-47	4	Quantity
7	48-49	2	Status of Item
	Total	50	characters (bytes) per rec

Record Format: Due-In/Out File

Stock No.	No. of Trailers	Trans Code	Date Rqtd	Customer Code	Voucher No.	Quantity Due(In/Out)	Vendor Code
0 13	14 16	17 340	12	910	1516	2324	2930	34

——— Header Record ——— ——— Trailer Code ———

Item	Columns	Char	Description
Header Record -			
1	0-13	14	Stock Number
2	14-16	3	Number of Trailers
3	17-34	17	Blank
	Total	35	Characters (bytes) per rec
Trailer Records -			
1	0-1	2	Transaction Code (Due In/Out)
2	2-9	8	Date Requested
3	10-15	6	Requisitioning Customer (blank if ordinary replenishment)
4	16-23	8	Voucher Number
5	24-29	6	Quantity Due (In/Out)
6	30-34	5	Customer Code
	Total	35	Characters (bytes) per rec

Record Format: Vendor Data File

Vendor No.	Name	Street	City	State	Zip Code
0 56	2526	4950	7071	9495	99

Item	Columns	Char	Description
1	0-5	6	Vendor Number
2	6-25	20	Name
3	26-49	24	Street
4	50-70	21	City
5	71-94	24	State (Province)
6	95-99	5	Zip Code

Total 100 Characters (bytes) per rec

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APPENDIX F

DEFINITIONS AND ABBREVIATIONS

Supplies - All kinds of properties, except real estate, needed in the transaction of official business or for public use, whether in the nature of furniture, stationeries, construction materials, livestocks and such other properties of similar nature, or equipment for issue to troops, units and installations.

Serviceable Property - Those properties in serviceable condition, which are in possession of a unit agency of the government. Serviceable properties include those properties authorized in the TO & E or in the TA, and excess properties.

Excess Properties - Those serviceable properties in the possession of any unit/agency or office which is in excess of the quantity required or authorized for retention, and cannot be utilized as a substitute property to satisfy existing shortages. This includes items of supplies in stocks which have no recorded demand.

Unserviceable Properties - Those properties whose conditions are such that they cannot be used or placed in service because they are worn out or obsolete.

Obsolete Properties - Those properties which are unserviceable and cannot be replaced in service because they are

no longer suited to the purpose intended. These include properties in stocks which have no recorded demand.

Salvage Properties - Those properties which are unserviceable and beyond economical repair. For the purpose of appraisal of values, salvage property is further classified into: high value salvage, whose value is higher than the value of its material content; and scrap, whose value is the value of its material content only.

Disposable Properties - Those properties falling under the following categories:

a.   Excess properties remaining after redistribution;

b.   Obsolete Properties; and

c.   Salvage Properties.

General Voucher - This form shall be used to pick up the accountability of property acquired through purchase from appropriated or reimbursable funds.

Invoice Receipt - This form shall be used in the transfer of property accountability of non-expendable supplies from one supply officer to another. It shall serve as the evidence of issue of transfer. It may be used as a packing slip or a tally out.

Requisition and Issue Voucher - This form shall be used in requisitioning expendable supplies. It shall serve as the evidence of issue and transfer of accountability, as well as the packing slip, tally out, and shipping document.

SLIRIT - Single Line Item Requisition. This form shall
be used for requisitioning non-expendable supplies for one
item only.

Property Turn-In Slip - This form shall be used for turning-
in to the supply installation of the next higher level all
excess and unserviceable supplies. This form shall be used
to debit or credit accountability.

Supplies Adjustment Sheet - This form shall be used to
abstract and sum up all issues of expendable supplies (issued
under "requisition and issue voucher") by Depot Accountable
Officer.

Inventory Adjustment Report - This form shall be used to
adjust discrepancies for properties noted between balances
in the stock cards and actual balance of stock on hand of all
supplies, when such discrepancies do not exceed a specified
amount and the item quantity short is not in excess of 10
percent by line item of the recorded quantitative balance.
Shortages in excess of said limits shall be taken up on a
report of survey. However, in the use of this form for over-
ages no limits are prescribed. Adjustment of records to
tally with physical count is completed by the Accountable
Officer and approved by his Commanding Officer. This form
may also be used in adjusting records when component parts
taken up separately in the records are issued in the form of

assemblies. Adjustment credit shall be established for the component parts and adjustment debit will be made for the assemblies formed by the component parts. In cases like this, adjustment shall be effected first before issue transactions.

Report of Survey - This form shall be used for obtaining relief from accountability and/or responsibility for lost, damaged, stolen, destroyed, or worn-out supplies and equipment.

Technical Inspection Report - This form when duly accomplished shall support the Inventory and Inspection Report; the Report of Survey of Statement of Charges, as the case may be.

Report of Property Found in Station - This form shall be used to pick up accountability of all supplies like found in station, captured enemy property, confiscated property to include donations and/or supplies not taken up in the record of the unit.

Memorandum Receipt - This form shall be used in issuing non-expendable property from a supply officer to user.

Data - A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation or processing by humans or automatic means.

Data Flowchart - A flowchart representing the path of data through a problem solution. It defines the major phases of the processing as well as the various data media used. Synonymous with data flow diagram.

On-Line - (1) Pertaining to equipment or devices under direct control of the central processing unit. (2) Pertaining to user's ability to interact with a computer.

Keypunch - A keypunch actuated device that punches holes in a card to represent data.

LIST OF REFERENCES

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