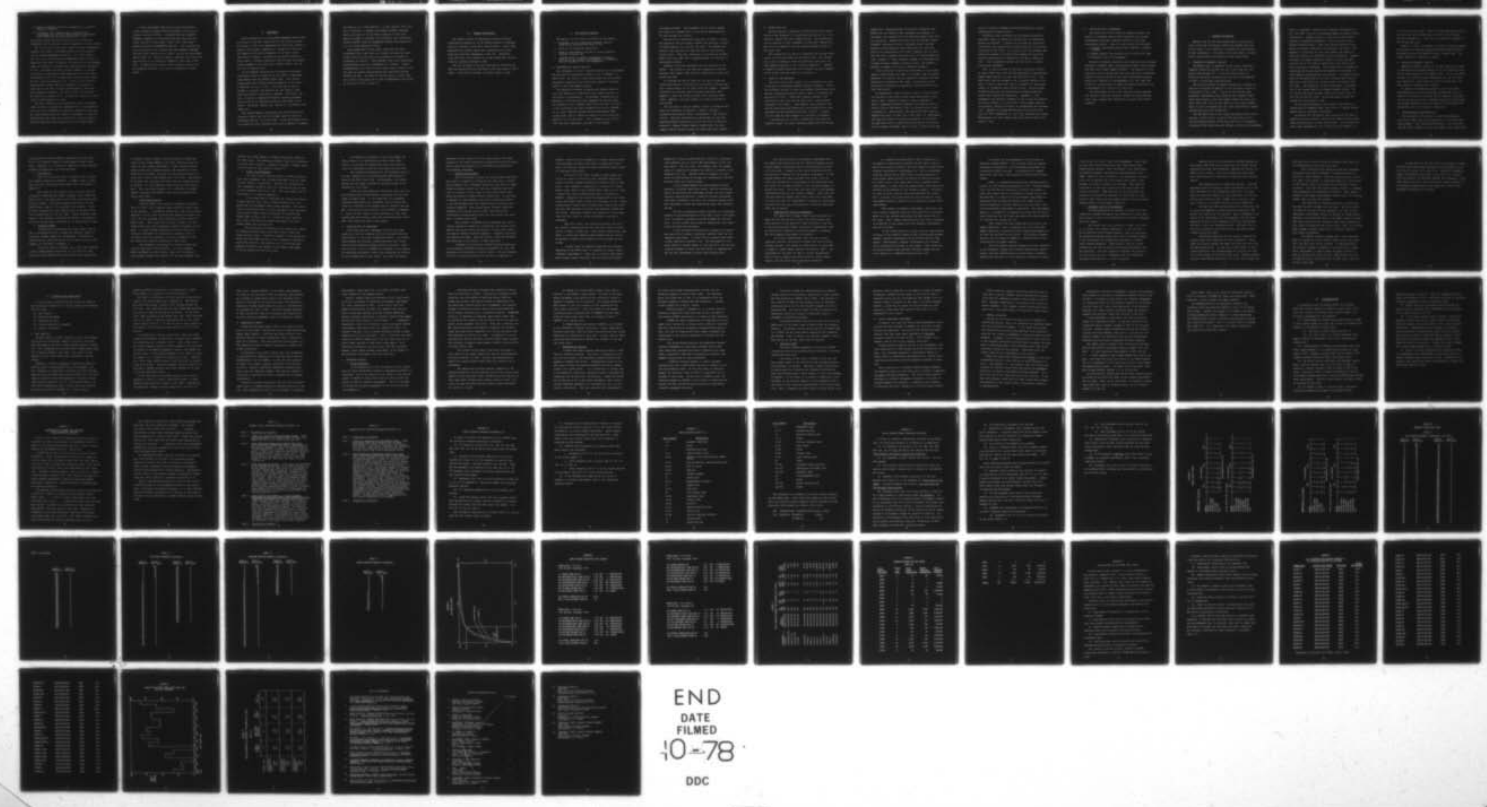
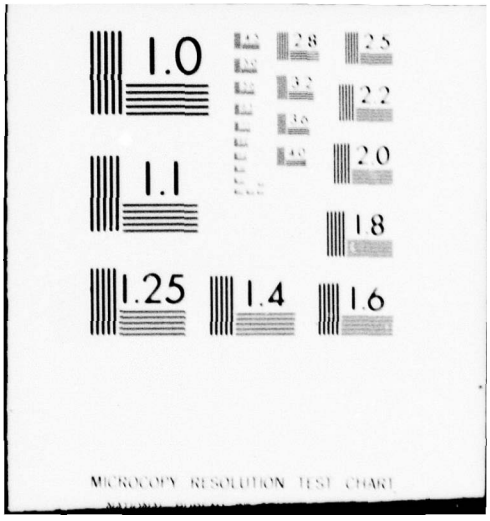
AD-A057 994 NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF F/G 5/1
THE EFFECTS OF THE STOCK COORDINATION PROGRAM UPON INVENTORY MA--ETC(U)
JUN 78 R N SEEBECK

UNCLASSIFIED NL

1 OF 1
AD
AD57 994



END
DATE FILMED
10-78
DDC


1.0
1.1
1.25
1.4
1.6
2.8
2.5
2.2
2.0
1.8
MICROCOPY RESOLUTION TEST CHART

ADA057994

(2) LEVEL II

NAVAL POSTGRADUATE SCHOOL

Monterey, California

DDC
RECEIVED
AUG 24 1978
B

(9) Master's THESIS

(6) THE EFFECTS OF THE STOCK COORDINATION PROGRAM UPON INVENTORY MANAGEMENT AT THE NAVAL ELECTRONIC SYSTEMS COMMAND

by

(10) Robert N. Seebeck

(11) Jun[redacted]78 (12) 86p.

Thesis Advisor: A. W. McMasters

Approved for public release; distribution unlimited.

251 450 Jcw
78 08 23 040

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

1. REPORT NUMBER	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): The Effects of the Stock Coordination Program Upon Inventory Management at the Naval Electronic Systems Command	5. TYPE OF REPORT & PERIOD COVERED: Master's Thesis; June 1978
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): Robert N. Seebeck	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Naval Postgraduate School, 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 1978
	13. NUMBER OF PAGES
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)

Inventory Control
Inventory Migration
Stock Coordination

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

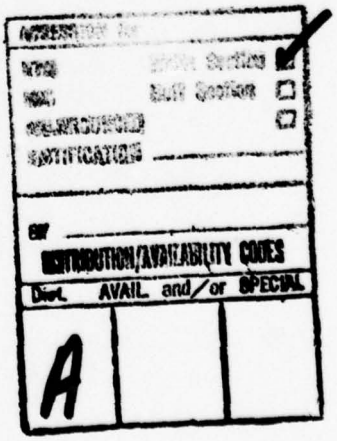
This study is a continued effort to assist the Naval Electronic Systems Command (NAVELEX) in identifying and transferring items to the Ships Parts Control Center (SPCC) in response to reemphasis by the Chief of Naval Material on stock migration from the Hardware Systems Commands (HSC) to the Naval Supply Systems Command (NAVSUP). Analyses conducted included a revision and expansion of earlier computer analysis of demand data for

DD FORM 1 JAN 73 1473 (Page 1) EDITION OF 1 NOV 65 IS OBSOLETE S/N 0102-014-6601

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

78 08 23 040

items managed by NAVELEX, study of the Stock Coordination Program and the criteria by which items are considered for transfer to NAVSUP or retention at an HSC, and the effects on inventory management of stock migration from NAVELEX to SPCC. Definitive recommendations for retention/transfer criteria were not achieved within the time of this research, but the analysis performed sustained earlier recommendations that a majority of items should be transferred from NAVELEX to SPCC.



Approved for public release; distribution unlimited.

The Effects of the Stock Coordination Program upon Inventory Management at the Naval Electronic Systems Command

by

Robert N. Seebeck
Lieutenant, Supply Corps, United States Navy
B.S., Georgia Institute of Technology, 1972

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
June 1978

Author: Robert N Seebeck

Approved by: Alan W. McMasters
Thesis Advisor

John Shrake
Second Reader

Chairman, Department of Administrative Sciences

Dean of Information and Policy Sciences

ABSTRACT

This study is a continued effort to assist the Naval Electronic Systems Command (NAVELEX) in identifying and transferring items to the Ships Parts Control Center (SPCC) in response to reemphasis by the Chief of Naval Material on stock migration from the Hardware Systems Commands (HSC) to the Naval Supply Systems Command (NAVSUP). Analyses conducted included a revision and expansion of earlier computer analysis of demand data for items managed by NAVELEX, study of the Stock Coordination Program and the criteria by which items are considered for transfer to NAVSUP or retention at an HSC, and the effects on inventory management of stock migration from NAVELEX to SPCC. Definitive recommendations for retention/transfer criteria were not achieved within the time of this research, but the analysis performed sustained earlier recommendations that a majority of items should be transferred from NAVELEX to SPCC.

TABLE OF CONTENTS

I. INTRODUCTION----------10

II. BACKGROUND----------14

III. PROBLEM DESCRIPTION----------16

IV. THE ANALYSIS PROCESS----------17

A. REFINEMENT OF EARLIER ANALYSIS----------17

B. TRANSACTION SIZE----------19

C. STUDY OF ITEM BEHAVIOR----------19

D. IDENTIFICATION OF PROCEDURES----------22

V. RESULTS OF ANALYSIS----------23

A. TRANSACTION FREQUENCY ANALYSIS----------23

B. TRANSACTION QUANTITY ANALYSIS----------25

C. ITEM MANAGEMENT CHARACTERISTICS----------25

1. LRC Analysis----------26

2. Financial Impact----------26

3. Item Classification----------27

4. Parent Item Management----------28

D. IDENTIFICATION OF PROCEDURES----------29

1. Emergent Requirements----------30

2. Budgeting and Inventory Management----------33

3. Equipment Life Cycle Management----------36

VI. DISCUSSION AND CONCLUSIONS----------40

A. DATA ANALYSIS----------40

B. NONRECURRING DEMAND----------42

C. RETENTION CRITERIA----------43

1. Design Stability---------- 43

2. Configuration Control---------- 45

3. Arbitrary Goals---------- 47

D. INITIAL COGNIZANCE ASSIGNMENT---------- 48

E. GENERAL DISCUSSION---------- 49

VII. RECOMMENDATIONS---------- 52

APPENDIX A: Comparison of Current and Proposed Stock Retention Criteria---------- 54

APPENDIX B: CENILE Record Screening Procedure---------- 58

APPENDIX C: CENILE Record Layout---------- 60

APPENDIX D: CENILE Record Screening Procedure (Revised)- 62

APPENDIX E: Demand Tableau Samples---------- 65

APPENDIX F: Frequency Distribution Tables---------- 67

APPENDIX G: ABC Analysis Curves---------- 72

APPENDIX H: Sample Average Transaction Size Tableaus---- 73

APPENDIX I: Item, Inventory Manager and Unplanned Cost Listing---------- 75

APPENDIX J: Inventory Manager and High Volume Item List- 76

APPENDIX K: Clarification of the Term "End Items"------- 78

APPENDIX L: "AN/" Equipments with Business Frequency of 10 or More and Quantity of 12 or More---- 80

APPENDIX M: Average NRD Business versus Edict Entry Year for "AN/" Equipments---------- 83

APPENDIX N: Parent Equipment and Secondary Item Summary Data Table---------- 84

LIST OF REFERENCES---------- 85

INITIAL DISTRIBUTION LIST---------- 86

LIST OF ABBREVIATIONS

ASO	Aviation Supply Office
ASU	Approval for Service Use
BUSANDA	Bureau of Supplies and Accounts
CASREPT	Casualty Report
CENILE	Cumulative End Item Ledger
COG	Cognizance Symbol
CNM	Chief of Naval Material
CNO	Chief of Naval Operations
DIC	Document Identifier Code
DOD	Department of Defense
DRIPR	Disposal, Requisition, Issue, Procurement and Restoration
EDICT	Equipment Dictionary
EW	Electronic Warfare
FMSO	Fleet Material Support Office
HSC	Hardware Systems Command
ICP	Inventory Control Point
LRC	Local Routing Code
MDF	Master Data File
MILSTRIP	Military Standard Requisitioning and Issue Procedure
NAVELEX	Naval Electronic Systems Command
NAVMAT	Naval Material Command
NAVSEA	Naval Sea Systems Command
NAVSUP	Naval Supply Systems Command

NRD	Nonrecurring Demand
NRFI	Not-Ready-For-Issue
NSD	Naval Supply Depot
NSC	Naval Supply Center
NSN	National Stock Number
OPN	Other Procurement, Navy
O&MN	Operations and Maintenance, Navy
PASU	Preliminary Approval for Service Use
PPR	Planned Program Requirement
P-C	Pettersen and Casey [See reference 5]
RADIAC	Radioactivity, Detection, Indication and Computation
RDD	Required Delivery Date
RDT&E	Research, Development, Test and Evaluation
RFI	Ready-for-Issue
SCN	Ship Construction, Navy
SMA	Supply Material Availability
SPCC	Ships Parts Control Center
STRAT	Stratification
SYSCOM	Systems Command
TIR	Transaction Item Report
UIC	Unit Identification Code
UICP	Uniform Inventory Control Point

ACKNOWLEDGEMENTS

I would like to take this opportunity to express my gratitude and appreciation to the many people who have supported and assisted me throughout the course of this thesis. Mr. R. F. Vogel of the Naval Electronic Systems Command, who provided the impetus for this study, and his staff, especially Mr. R. Deickman, provided excellent assistance throughout this study. A special note of thanks is due Professor A. W. McMasters for his advice and guidance. Messrs. E. Donnellan and M. Anderson of the W. R. Church Computer Center at the Naval Postgraduate School were very helpful in the data analysis phase of this research. Lieutenants Pettersen and Casey assisted in the review of their thesis in order that I could continue their efforts. And, last but not least, my wife, Susan, provided invaluable assistance in typing and editing this paper while offering moral support throughout.

I. INTRODUCTION

In this age of rapid technological advancement, the management of material resources within the Department of Defense (DOD) is becoming increasingly more complex. Management effort, especially within the Department of the Navy, is being directed at policies, plans and procedures which will help to attain more effective management of these resources. A primary goal in this respect for the Navy is to ensure that the inventory management responsibilities for given materials reside in one command and that the most appropriate command be chosen for the task.

Navy Policy and Standards for Supply Management (NAVSO P-1500) contains the following definition and statement of purpose for stock coordination:

> "Stock coordination is the administrative process by which an item, group or category of material is identified and assigned to one inventory manager. The purpose of this process is to sustain the proper application of item management . . . (and) . . . is required on a Navy-wide basis to ensure that the interrelated actions of Systems Commands/Project Managers and inventory managers are mutually responsive and integrated." [1]

Stock coordination has also become synonymous with the annual cycle of review and transfer (migration) of items between Hardware Systems Commands (HSC) and Inventory Control Points (ICP).

The cognizance symbol (COG) is a two character alpha-numeric code (e.g., 2Z) used to assign inventory management

responsibility for an item. It is assigned when an item first enters the Navy's logistic system but may be changed at some later date if the item is reassigned to the material cognizance of another command through the Stock Coordination Program. For example, items managed by the Naval Electronic Systems Command (NAVELEX) are assigned 2Z COG and when transferred to the Ships Parts Control Center (SPCC) change to 4G COG.

A cognizance assignment pertains only to a specific item. Even though an item may be a part in another item, there is no effort made to have identical COG's for the two items [1].

The Chief of Naval Material (CNM), in his capacity as logistics director for the Navy, has set forth the basic guidelines for stock coordination in NAVMATINST 4440.37C. The Deputy Chief of Naval Material for Logistics is assigned the overall policy and guidance responsibility for this process. The Commander, Naval Supply Systems Command (NAVSUP) is charged with: (1) direct management responsibility for stock coordination, (2) ensuring single item inventory management, (3) scheduling yearly stock coordination reviews with the HSC's, (4) developing and maintaining a mechanized file of items under HSC-cognizance, and (5) establishing transfer and reporting procedures [2]. The HSC's are responsible for command implementation of the Stock Coordination Program and have been delegated the following tasks:

"(1) Designate stock coordination representatives.

(2) Thirty days prior to a scheduled meeting, return to NAVSUP one copy of the FSN (Federal Stock Number) listing (of items currently under HSC material cognizance) annotated with appropriate retention/transfer criteria.

(3) Maintain adequate technical documentation to justify material retention.

(4) Coordinate item transfer dates, technical data requirements and contract administration requirements with NAVSUP and the receiving activity." [2]

The current retention/transfer criteria are set forth in NAVMATINST 4440.37C and are listed in Appendix A of this report.

Due to the lack of an active, effective stock coordination program, just prior to 1976, CNM directed that this process receive renewed management attention. In a letter dated 9 July 1976 [3], the provisions of NAVMATINST 4440.37C were re-emphasized and a goal to identify 25 percent of the HSC-managed items for transfer or deletion was established for completion in 1976. The Naval Electronic Systems Command, in response to the goals established by CNM, nominated 223 2Z COG items for migration to 4G COG at Ships Parts Control Center during the 1977 stock coordination cycle. Prior to this transfer, approximately 18,000 items were assigned to the material cognizance of the HSC's of which approximately 2,000 items were assigned to NAVELEX. The last of these 223 transfers was effected in January 1978. In addition, interest was withdrawn in approximately 250 items.

The next scheduled stock coordination review for NAVELEX items (2Z COG) is planned for September 1978. In preparation for this review, NAVELEX has tentatively identified 936 items for stock migration and 287 items for withdrawal of interest. Approximately 800 items are projected for retention under 2Z material cognizance upon completion of this coming transfer.

A recent development dealing with stock coordination centers around the modification and update of the stock retention criteria for HSC's. The Naval Material Command's (NAVMAT) reemphasis on stock migration has taken the additional form of a letter dated 7 April 1978, containing a proposed revision of NAVMATINST 4440.37C. This proposal has been circulated to all concerned Systems Commands (SYSCOMS), the Ships Parts Control Center (SPCC), and the Aviation Supply Office (ASO) [4]. Specific comments regarding this draft have been invited, to be received at NAVMAT no later than 19 May 1978. A comparison of current stock retention criteria and the proposed revisions is set forth in Appendix A of this thesis.

II. BACKGROUND

Stock coordination as a prescribed management process has its origins in the Navy Supply Plan of 1947 and first came into being in 1950 via a memorandum from the Chief, Bureau of Supplies and Accounts (BUSANDA) on 5 December of that year. The complete historical development of the Navy's Stock Coordination Program is detailed by Pettersen and Casey in their thesis, "Inventory Migration from the Naval Electronics Systems Command to the Ships Parts Control Center" [5] and will not be repeated here.

In 1975 NAVELEX requested the assistance of the Naval Postgraduate School in analysis of the impact of unplanned requirements upon the NAVELEX budget base. This request brought about the research effort documented in the thesis by McCarthy, et al., in 1976. This work was an initial attempt to classify item behavior for the range of items under the material cognizance of NAVELEX. The effort, however, to devise a computerized demand screening procedure was not able to be completed within the time frame of the report. Therefore, analysis was limited to a 20 percent item sample [6].

The renewed emphasis placed upon the Stock Coordination Program by CNM in July of 1976 brought about the need for additional analysis of 2Z COG items. Using the McCarthy thesis as a departure point, Pettersen and Casey attempted to complete

the analysis of 2Z item behavior. In this respect, they were able to construct a computerized demand document screening process and apply it to the entire range of 2Z COG items. They also sought to document the differences and similarities between NAVELEX inventory management methods and perspectives vis-a-vis those employed at SPCC.

Upon completion of their study, Pettersen and Casey recommended that items which were stable in design and exhibiting little or no activity be considered for transfer or withdrawal of interest. Those NAVELEX items which experienced random demands were also recommended for transfer. Further recommendations set forth in their report dealt primarily with the need for greater understanding and cooperation between NAVELEX and SPCC. The need for further study of stock transfer criteria constituted their final recommendation and served as the basis for this report [5].

III. PROBLEM DESCRIPTION

The primary problem in developing an effective Stock Coordination Program lies in the identification of candidate items for transfer to the ICP's from the HSC's. Those items nominated for transfer should have characteristics which allow more efficient management at the ICP. Conversely, items which are to be retained at an HSC should meet certain criteria, currently defined by CNM.

This was the goal of the work initiated by Pettersen and Casey but answers were not obtained in the time frame of their effort. This thesis continues the effort begun by them.

IV. THE ANALYSIS PROCESS

The analysis in this thesis consisted of four phases:

1. Refinement of the transaction frequency analysis conducted by Pettersen and Casey [P-C];
2. Analysis of transaction quantities;
3. Study of item behavior related to stock retention/ transfer criteria; and
4. Identification of inventory management procedures relating to (a) emergent requirements, (b) budgeting and (c) equipment life cycle management.

A. REFINEMENT OF EARLIER ANALYSIS

The refinement of the P-C frequency analysis of item demand was motivated by discussions during a visit to NAVELEX in March 1978. The result of these discussions was that certain legitimate transactions had either been ignored or had been placed in the wrong demand category.

The methods of document screening and demand categorization were found to be inconsistent with actual practice in two specific circumstances. The document screening process employed by Pettersen and Casey [Appendix B] had discarded all documents with a Document Identifier Code (DIC) of "A4R." It was discovered that these documents were used by NAVELEX to (1) clear completed Planned Program Requirement (PPR) transactions, and (2) authorize release of issue-restricted material from a stock point. Also, documents with a DIC of "D7K" had been unknowingly included in the document

screening procedure. Such documents do not reflect demand but rather are intended only to relocate on hand quantities of items between stock points.

The historical transaction record for 2Z items is called the Cumulative End Item Ledger (CENILE) and provides a record of demand behavior for the past ten years. The CENILE tape served as the data base for both the earlier work and the current study. Since this data base is a derivative of SPCC's Master Data File (MDF) and is updated weekly, its validity is considered excellent.

Appendix C provides information on the structure of the CENILE. The records on this tape are sequenced in order of National Stock Number (NSN) and Unit Identification Code (UIC) within each NSN.

In refining the earlier analysis, the basic screen procedure constructed by Pettersen was not entirely reformulated; only certain aspects of its logic flow were changed. Appendix B presents the original record screening procedure while Appendix D shows the revised version, with revisions underlined. Appendix E provides samples of results obtained by each method.

The revisions to earlier summary results of Pettersen and Casey are presented in Appendix F, Tables 1 through 4 (Frequency Distribution Tables) and Appendix G (ABC Analysis Curves). Detailed information was determined for each NSN regarding demand transactions by type and time (in quarters). Appendix E (Demand Tableau Samples) demonstrates two early samples and the revised results for these same stock numbers.

B. TRANSACTION SIZE

The data analysis conducted by Pettersen and Casey concentrated on the frequency of transactions and did not, as a consequence, examine the total demand picture. The transaction size or quantity of units demanded in individual transactions must also be examined to get the complete demand picture for any given item.

The transaction size analysis determined the average transaction size for each item over the three years, 1975 through 1977, and, in addition, broke the information down into the same demand categories as are listed in Appendix E. Appendix H (Sample Average Transaction Size Tableaus) provides examples of the output from this phase of the analysis.

C. STUDY OF ITEM BEHAVIOR

The first step in this process was to determine the level of business of individual NAVELEX inventory managers. Effort was initially limited to those stock numbers experiencing total business transactions greater than or equal to 20 during the period 1975 to 1977. Individual inventory managers were identified by the Local Routing Code (LRC), a data element contained in the CENILE. Stock numbers were grouped by LRC, and the associated item nomenclature and standard price were obtained from the Equipment Dictionary (EDICT). A sample list of items and their managers is presented in Appendix I.

A second step was to obtain information reflecting the financial impact of random, unplanned demand upon the NAVELEX

budget base. Operating under the explicit assumption that NAVELEX was not funded to meet unplanned item demand, an "extended" item standard cost for unplanned demand (1975-1977) was calculated. Demands which fell into the Casualty Report (CASREPT), Unplanned (Afloat), Unplanned (Other) and Non-Released Issue categories were totaled and the resulting quantity was multiplied by the item's standard cost to calculate the total standard three-year costs of random demand per item. Appendix I (Item, Inventory Manager and Unplanned Cost Listing) provides examples of these results, and Appendix J presents a summary list for all inventory managers.

A third step was to search for some means of classifying items as being either end items or secondary items of supply. Reference [7] contains the most complete, available end item definition discovered in this study. An abstract of this discussion is presented in Appendix K (Clarification of the Term "End Items").

An examination of the criteria listed for classification of principal or end items did not allow application to the data at hand. Results of analysis shown in Appendix F, Table 3 (Unplanned Business Frequency Distribution) were in direct conflict with three of the six considerations listed in Appendix K. Specifically, the transaction data analysis demonstrated that, at least for 22 COG items, (1) requirements were <u>not</u> based solely on end-use allowances, (2) attrition was <u>not</u> based solely on major/total destruction, destructive use or planned retirement, and (3) issues to end-use were <u>not</u>

strictly limited to SYSCOM-established allowance or special SYSCOM-approved authorizations.

Therefore, since literature on the subject provided no measurable means of making this distinction, an alternative method was explored. A search was initiated for positively correlating item characteristics which could aid in the identification of end items. As a first cut at this problem, end items were assumed to be those stock numbers for which the official nomenclature, as defined in the EDICT, began with "AN/." This designation implies that the item is a stand-alone parent equipment.

Next, a check was made for possible correlation between an item's EDICT entry date and the percentage of nonrecurring demand (NRD) business for the item from 1975 to 1977. The EDICT entry date was assumed to be a reliable measure of the point in time at which the item was assigned a 2Z cognizance symbol, an assumption later proven correct. The percentage of NRD business was calculated based on demand quantities rather than transaction frequencies. Appendix L ("AN/" Equipments with Business Frequency of Ten or More and Quantity of Twelve or More) is a list of the 72-item sample used for this purpose, chosen on the basis of nomenclature and business size. Appendix M (Average NRD Business versus EDICT Entry Year for "AN/" Equipments) is a bar chart representing average NRD business for "AN/" sample items with similar EDICT entry dates by year.

D. IDENTIFICATION OF PROCEDURES

The fourth step in this analysis employed research conducted via telephone and personal interviews with various knowledgeable personnel involved directly in the stock coordination process. Specific topics dealt with included:

(1) Emergent requirement processing at NAVELEX as opposed to SPCC;

(2) Budget proposal and execution for 2Z and 4G COG items;

(3) Equipment life cycle management.

Extensive telephone interviews were conducted with personnel attached to NAVELEX, SPCC, Fleet Material Support Office (FMSO) and Naval Sea Systems Command (NAVSEA). The purpose of these interviews was to clarify questions that had arisen concerning subjects directly related to the stock coordination program. Questions on details of the management of 2Z COG items plus a need for clarification of budget procedures motivated a trip to Washington, D.C. from 10 to 12 May 1978.

The final phase of this study entailed drawing together the results of previous research, along with that presented here, into a usable base from which to proceed with further research.

V. RESULTS OF ANALYSIS

Working from the data base established by earlier work with 2Z COG items and having refined and expanded that base in this study, it was necessary to examine the implications of that information. The nature of the data leads to several results which affect the process of stock coordination.

A. TRANSACTION FREQUENCY ANALYSIS

The CENILE tape, as employed in this study, furnished a complete transaction history for all 2Z COG items over the period 1968 through 1977. As in the earlier effort by Pettersen and Casey, activity prior to 1975 was disregarded in order to avoid data inconsistencies.

The revised tableaus of demand transactions, examples of which are contained in Appendix E, were the first results to be obtained in this study. A total of 691 tableaus were generated, representing those National Stock Numbers (NSN) which experienced at least one demand transaction since 1975. Since there were 1,667 distinct NSN's on the original CENILE tape, it can be concluded that 976 items experienced no demand transactions from 1975 through 1977.

The 691 NSN's used in this study experienced 30,570 transactions; 12,535 in 1975, 11,086 in 1976 and 6,949 in 1977. This decreasing business trend would seem to be a consequence of general fleet reductions and, perhaps, previous stock migrations.

Table 1 in Appendix F presents the frequency distribution for all 1,667 NSN's with the corresponding number of demand related transactions. (Demand related is used here to mean either a planned or unplanned requirement.) After revision of the demand-screening process, there were marked differences from levels of business identified in Pettersen's and Casey's work. Appendix E illustrates for two stock numbers the degree to which the results were affected by these refinements. Appendix G presents in summary graphical fashion the total business activity for 2Z COG items as identified in the earlier work and as presently configured. These graphs plot the cumulative percentage of business against the cumulative percentage of stock numbers accounting for that business. It should be noted that the Pettersen-Casey (P-C) curve resulted from a base of 960 active items while the revised version is based on only 691 items. The difference in active item bases is accounted for by the changes made to the demand document screen. The P-C base of 960 items includes items with activity prior to 1975 but no activity since. The revised analysis does not include any zero business items.

The revised ABC analysis curve reveals that business is concentrated in somewhat fewer items and to a slightly greater degree than was previously discovered.

In keeping with the earlier data results and the plan of analysis for this research, studies were limited to only those items experiencing 20 or more transactions. It was found that these items accounted for 187 of the 691 active numbers, or

27.1% of the active items. These 187 items experienced 28,210 of the 30,570 total transactions, or 92.3% of all business from 1975 through 1977. This fact is reflected in Appendix G, the revised ABC curve.

Tables 2, 3 and 4 in Appendix F present the total frequency distributions of Planned Program Requirement (PPR) business, Unplanned business and CASREPT business, respectively. The format employed is identical to Table 1.

B. TRANSACTION QUANTITY ANALYSIS

Appendix H presents samples of the data analysis utilized in determining the average quantities for the different transaction types employed in the demand screen. For the 691 NSN's studied, the overall average transaction size was 5.22 units per transaction. Since there were 30,570 transactions, the total quantity transacted was 159,603.

An analysis of transaction quantity for the 187 NSN's experiencing 20 or more transactions revealed that they accounted for 153,093 of the total 159,603 quantity transacted, or 95.9 percent of all units requested during this time frame. The average transaction size for these 187 stock numbers was calculated to be 5.43 items per transaction.

C. ITEM MANAGEMENT CHARACTERISTICS

The next phase of the analysis involved formulating a view of how those items with transactions of 20 or more were being managed. This entailed determining (1) the Local Routing Code (LRC) assigned to each stock number, thus identifying

the individual inventory manager responsible for that item, and (2) the financial impact of each manager's high volume items. Appendix I is a listing of items for the two inventory managers assigned LRC's of X2200 and X2300.

1. LRC Analysis

There are 26 distinct LRC's assigned to the 21 inventory managers employed at NAVELEX. A summary table of these LRC's and their associated high volume items is presented in Appendix J.

The result of this analysis was to discover that the two people responsible for Radiac equipment, LRC's XB600 and XB700, held a very large share of the items experiencing high business volumes. They were responsible for 38 of the 187 high business items, or 20.3 percent of these NSN's. These 38 items accounted for 4,446 transactions, 16 percent of the total transactions for all 187 items. Radiac equipment experienced a total quantity transacted of 88,028, 57.5 percent of the total 153,093 units transacted by all high business items.

2. Financial Impact

In addition to stratifying the large volume items by LRC, a simultaneous effort to gauge the financial impact of recurring (random) demand was accomplished. The method of calculation was explained earlier in the plan of analysis and examples are presented in Appendix I.

The total value at standard cost of the items required to meet random demand transactions for the 1975-1977 time period was approximately $59.6 million for high volume items.

It should be noted, however, that procurement of additional items to meet random demand is the least preferred source of assets to meet random requirements. Items obtained from decommissioned ships, program changes, and restoration of Not-Ready-For-Issue (NRFI) carcasses are the preferred sources of items used to meet random demand for 2Z COG items. Restoration of stricken-ship carcasses and other turn-ins, though paid for by NAVELEX, is a less expensive option than new item procurement. Thus, the actual monetary cost to NAVELEX for random demand is probably considerably less than the standard cost figure given above.

3. Item Classification

The next phase of the analysis attempted to separate these 187 NSN's into categories which exhibited similar transaction behavior. A reasonable category for item classification appeared to be all items for which the nomenclature began with "AN/," but not including those which were portable radios or RADIAC items. These items were initially assumed to be end items because they were designated as parent equipments in the EDICT. A second category appeared to be those items which could more reasonably be classified as secondary items in accordance with the conditions set forth in Appendix K and the transaction histories exhibited by these items.

The secondary item category was further broken down into two additional classifications. All field changes, RADIAC equipment, portable radios, repair kits and mounts were grouped together due primarily to low item standard costs

and the very large numbers of random transactions exhibited by these items. The remaining secondary items were considered to be the final category. Appendix N provides a summary table of the results of this analysis [Table N-1].

4. Parent Item Management

The final step in the data analysis focused attention upon "AN/" equipments that included some NSN's with less than 20 total business transactions. Specifically included were "AN/" equipments having at least ten transactions and at least 12 units demanded from 1975 to 1977. The item sample used for this analysis is listed in Appendix L.

It was hoped that by examining the transaction behavior through time for these items, salient characteristics for parent/end-item equipments might become apparent. The conjectures set forth were that (1) these equipments would show both significantly higher overall percentages of Non-Recurring Demand (NRD) business, and (2) a trend that would indicate that a newer item had more planned requirements and fewer random demands than an older one.

The conditions for inclusion in the sample were chosen to eliminate possible bias in the data results toward low volume business items. A business frequency of ten during the three-year time frame was felt to be a reasonable estimate of significant activity. The quantity of 12 was decided upon somewhat arbitrarily but equates to an average item demand of one per quarter for the three years.

As exhibited in Appendix L, each stock number was then crossed to its nomenclature and EDICT entry date. Finally, the percent of transactions that could conservatively be considered as NRD were calculated for each item.

The information formulated in the foregoing analysis was next examined for correlation between NRD percent of business and EDICT entry date. Unfortunately, the scatter diagram for the sample revealed no correlation and is not presented in this report.

Items were next grouped by EDICT entry date year and an average percent of NRD business calculated for each year group of sample items. It was hoped that this averaging technique would smooth out individual item variations and reveal an increasing trend through time of business that was NRD. The results of this analysis are presented in Appendix M. About the only behavior worth mentioning is that items having EDICT dates earlier than 1965 had substantially fewer NRD's than those from 1965 to the present.

D. IDENTIFICATION OF PROCEDURES

It had been necessary throughout the data and trend analyses to talk by telephone with various people involved operationally in the stock coordination effort. As a better understanding was obtained, further questions were raised that were best answered through personal interviews. With this in mind, a visit to NAVELEX was arranged for the purpose of presenting preliminary results and confirming the validity of work accomplished to this point. The topics of primary

importance to the integrity of this report and to the understanding of the Stock Coordination Program which were discussed both by phone and during visits to NAVELEX are presented in the following paragraphs.

1. Emergent Requirements

One of the primary reasons for revising the transaction data analysis conducted by Pettersen and Casey was to include those documents with a Document Identifier Code (DIC) of "A4R." NAVELEX personnel pointed out that these documents were utilized in a variety of ways, some of which necessitated them being considered as demand-related transactions. As described in Appendix D, A4R documents were used to determine whether or not PPR documents had been cleared from the record as having been completed. More significantly, however, those A4R documents which did not match to PPR's were tentatively classified as being authorizations for item release not based upon a recorded requisition.

This category of demand-related documents was seen to contain significant numbers of transactions for certain stock numbers and raised several questions as to their exact nature and usage by NAVELEX inventory managers. Telephone interviews with NAVELEX personnel, especially Messrs. Vogel and Deickman, furnished many of the answers to these questions.

According to the Military Standard Requisitioning and Issue Procedure (MILSTRIP) publication NAVSUP P-437 [8], A4R documents are classified as referral orders. The use, however, of an "R" in the third position of the DIC, as employed at

NAVELEX, identifies this document as a release authorization. These documents are most often used in conjunction with requests for material release of issue-restricted items located at individual stock points.

Since all 2Z COG items stocked at field supply activities are coded as restricted issue, MILSTRIP regulations require inventory manager approval for material issue to take place. Thus, whenever a requisition is received at a Naval Supply Center (NSC) or Naval Supply Depot (NSD) for a 2Z item, a request for release authorization must be forwarded to NAVELEX. Ordinarily this would be accomplished via the Transaction Item Report (TIR) system, but oftentimes is not. Bearer requisitions or high priority requisitions often do not allow the lead time necessary to process the documents through the TIR system. Therefore, requests for authority to issue these items are very likely to arrive at NAVELEX by message or telephone.

When this occurs, the transaction history file will not reflect a requisition for the item unless after-the-fact action is taken to submit one. Such action seldom occurs, and hence, a significant number of A4R documents are not able to be matched to requisition documents on file through the TIR system.

Another cause for numerous unmatched A4R documents appearing on the CENILE tape is a sequence of events termed "emergent requirements." These are, in reality, NRD requirements having a short lead time, and occur when the program

manager for a given system discovers a need for a particular stock numbered item to fulfill NRD requirements in the very near future. This may occur, for example, when the program sponsor is required to increase the scope of a program in the immediate near term. NAVELEX inventory managers are then faced with the problem of filling such requirements from what are most often very limited assets.

If the program manager has been granted the funds necessary to procure additional assets, then the determining factor to fulfilling the requirement becomes the time remaining until required delivery. Since the average procurement lead time at NAVELEX is 210 days, the inventory manager often must find means to meet this requirement other than through a new buy.

The first alternative usually explored is to determine whether an unreserved Ready-For-Issue (RFI) asset is available. If so, it would be released by an A4R document for this purpose. If not, an NRFI asset would be inducted for spot repair within the lead time available.

A less desirable alternative for meeting this requirement would be to release a previously reserved asset for the immediate requirement. It would then be replaced with either a newly repaired or procured item. The replacement of this asset entails a certain amount of lead time also, and thus the inventory manager is faced with the problem of juggling near and far term requirements to meet other program needs.

The above description of emergent requirements does not address the question of how the inventory manager and the program manager decide upon which of the alternative actions is to be chosen. Foremost in this decision process will be the question of funding for the emergent requirement. If the program manager has funds available with which to pay for either the restoration or procurement of the additional item, this money will be made available to the inventory manager to replace the asset. This occurs for about half of the emergent requirements placed on the inventory manager. Thus, half the time the inventory manager must either utilize his own funds to restore an asset for replacement or relinquish a downstream reserved asset and cause the program to slip until additional funds can be secured.

2. Budgeting and Inventory Management

The submission of budget requests and availability of funds are the driving forces behind the effectiveness with which material can be employed to meet the needs of the Navy. It was discovered that budget constraints significantly limit the flexibility permitted to inventory managers in meeting the ever-changing requirements for material.

As in every organization, there are only limited financial resources with which to achieve the level of effectiveness desired. The measure of effectiveness by which SPCC is judged is termed Supply Material Availability (SMA). The achievement of set goals for SMA is a prime consideration that is used in support and justification of future budget requests and thus must receive executive attention.

As a measure of effectiveness, SMA is defined to be the number of requisitions satisfied off the shelf (from on-hand system assets) divided by the total number of requisitions received, expressed as a percentage [9]. Due to the Uniform Inventory Control Point (UICP) levels setting operation, a fixed budget amount dictates the amount of material procured for safety stock. This fixed safety level, together with a fixed budget, in turn, fixes the expected SMA, thus effectively limiting the performance of the inventory manager. Therefore, in order to ensure that the prescribed SMA goal for a given COG is achieved, the safety level of stock on hand for recurring demand cannot be allowed to be stripped off to meet other requirements.

With respect to emergent requirements, there are, however, certain situations that can arise which will allow these needs to be met without diminishing the SMA achieved for 4G COG items. SPCC's budget execution plan lists these situations as exceptions to the general rule that emergent requirements will not be filled.

If the system assets for a given item are significantly in excess of the quantity needed to meet recurring and planned demands, emergent requirements can be filled from this long supply. Unfortunately, emergent requirements will probably not be associated with items in long supply. Other exceptions are based primarily upon approved allowance changes and are still subject to a command-rationing process [10].

All monies for the management of 4G COG items are channeled through NAVELEX. This includes funds for program requirement procurements, recurring demand procurement and restoration of NRFI carcasses. In preparation for budget submission, SPCC runs a UICP operation termed Stratification (STRAT).

STRAT is a computerized forecasting technique used to predict out-year funding requirements by COG. Predicted demand rates from the MDF are projected to forecast the number of items which would need to be procured in a given fiscal year. Recorded PPR's are added to this procurement requirement as determined from the Required Delivery Date (RDD) on file. After accounting for on-hand quantities for each item, a net system procurement requirement is generated. This procurement quantity is extended at an expected cost value and the sum of these extensions for all items constitutes the funds predicted as necessary for a given COG [11].

These results are then broken down to be used in the budget submission. This is necessary due to the fact that budget submission is based upon major program requirements of the Navy and justified on this basis. The different program sponsors use the results of STRAT as a major portion of the justification for budget requests.

Once the separate program elements have been submitted in the President's budget and received Congressional authorization, the final appropriations are acted upon by Congress. NAVELEX then receives its first quarterly allocation of funds,

in this case, for both 2Z and 4G COG management. These funds are made up on Ship Construction, Navy (SCN) monies from NAVSEA program sponsors; Other Procurement, Navy (OPN) monies for NAVELEX programs; and Operations and Maintenance, Navy (O&MN) funds for item restoration. The Comptroller Division (Code 102) at NAVELEX then re-allocates these funds to the programs for which the monies are intended. O&MN funds are allocated to 2Z COG asset restoration and remain under the control of NAVELEX. O&MN funds for 4G COG restoration are included in the quarterly allotment of funds which is transferred to SPCC along with procurement dollars from the various program elements in the budget submission.

3. Equipment Life Cycle Management

An understanding of the sequence of events from idea formulation through development and production to final equipment disposal is basic to determining the associated integrated logistics support.

The initial step in an electronic system's life cycle is, of course, the concept formulation. As the need for a new or modified system becomes apparent, ideas are generated. The engineering design concept may result from funded studies or may occasionally be proposed and developed by in-house (Navy) program engineers. RDT&E dollars, used for concept formulation, can also be used for prototype development, test and evaluation. The time required to complete this phase in the life cycle will vary tremendously with the complexity, originality and need for the item in question.

Sometime prior to the expiration of RDT&E funding for the program, OPN funds may be authorized for limited initial production provided that Preliminary Approval for Service Use (PASU) can be secured. Full first production cannot begin until final Approval for Service Use (ASU) has been achieved, however.

The budgeting process complicates matters. Full ASU designation must be secured at least nine months prior to the date scheduled for first production initiation. Any lead time less than nine months will cause the delay of first production until the next year's budget cycle, causing a time lag of from 18 to 21 months from ASU to first production.

Provided that ASU has been achieved in sufficient time to allow the budgeting of needed funds for production, OPN dollars are secured for this purpose. Again, depending on the nature of the requirement and the equipment, the time from beginning to end of first production will vary considerably and thus, so will the installation rate. OPN funds will be utilized as necessary and authorized for training and maintenance during this phase.

Additional production runs are usually required for program needs after completion of first production. These funds are secured through the budget cycle and also flow from the OPN appropriation. At some point either before or after second production, the program manager may discover the need for a field change for this particular item. NAVELEX presently receives level-funded OPN dollars for 2Z COG field changes and

thus must use a priority system to determine which ones will be accomplished in any given fiscal year.

Once installation has begun and sufficient equipment operational use time has elapsed, it becomes necessary to initiate a repair program. Since the inclusion of an item in the repair cycle removes it from operational use, extra assets in the form of spares are required to be available in most instances. There has been little success, however, in funding spare equipments for procurement by NAVELEX. SPCC, however, because 4G COG budget requirements include assets for recurring demand, does not face this problem.

This difference in funding procedures is based upon the idea that HSC's manage only end items. One of the defining terms for an end item (see Appendix K) is that it only experiences catastrophic failure as opposed to random failure. Therefore, the prevailing logic in the budget process dictates that spare assets are not required to meet these random failures since by definition they do not occur. SPCC, on the other hand, manages secondary items and is therefore expected to fund random requirements.

The NAVELEX inventory manager must, then, find some means to replace an item in need of repair with an RFI asset until the NRFI asset can be restored. As mentioned above, the inventory manager at NAVELEX is in a position to juggle asset requirements to obtain spares and hence, usually is able to initiate the repair process. OM&N dollars are used to fund the actual restoration work of NRFI assets, both for 4G and 2Z COG items.

At this point in the life cycle for electronic systems, the time span from concept formulation to replacement may be as few as five years or as many as 20. Generally, equipments repeat the production and repair cycles for 10 to 20 years, with the exception of Electronic Warfare (EW) equipment. These items tend to have very short life cycles because response to new equipment capabilities by the opposition creates rapid equipment obsolescence for EW gear.

VI. DISCUSSION AND CONCLUSIONS

In this section, discussion of the results of analysis and conclusions reached are set forth covering the following areas of study:

(1) Data Analysis

(2) Nonrecurring Demand

(3) Retention Criteria

(4) Initial Cognizance Assignment

(5) General Discussion.

A. DATA ANALYSIS

The data analysis results reported in this study support and extend the conclusions reached by Pettersen and Casey. They had proposed that HSC's manage minimal amounts of material. This recommendation was based upon a demonstrated polarity of behavior among 22 COG items. The results of the analyses in this report define that distinction even more clearly.

"NAVELEX is currently managing a significant amount of material which is experiencing little or no demand." [5] This statement was supported by Pettersen and Casey through analysis which indicated that only 960 items out of 1667 had shown any activity from 1968 through 1977 and only 816 had shown activity from 1975 to 1977. The revised analysis of this thesis demonstrates that, in fact, only 691 items had any activity from 1975 through 1977. Thus, an even

greater proportion of business is accounted for by fewer stock numbers as a result of the revised analysis.

This fact is reflected in the more quickly rising initial slope of the revised ABC curve in Appendix G. The revised ABC curve also becomes "flatter" after passing through the P-C curve. This indicates that the items remaining experience less activity than was previously discovered. Of the total 1,667 items contained on the CENILE tape, this study indicated that 1,221 items (73 percent) experienced two or less transactions during 1975-1977. Of the 691 active items studied in this report, 245 (36 percent) experienced two or less transactions.

As pointed out by Pettersen and Casey, these low volume items provide NAVELEX an opportunity to reduce their inventory by eliminating such "insurance stock." These items can be more easily managed through the UICP program at SPCC and would be grouped in the MARK Ø management category (low demand, insurance items) if the predicted demand is less than 0.25 units per quarter (i.e., demand less than one per year). Additionally, these items should present little difficulty in preparation for transfer. Technical packages should not have to be provided by NAVELEX because there would probably be no need to procure additional assets.

At the other end of the demand spectrum, the results in Appendix F, Table F-3, show a significant amount of random demands being placed for certain 22 COG items. Considering the wholesale stockage criterion employed by the ICP's of

three "hits" (random demands) in six months, approximately 170 items of the 691 active items (25 percent) would qualify for stockage as demand-based items at the wholesale level. Again, as concluded by Pettersen and Casey, the presence of significant random demand should be used as a consideration in transferring items to SPCC. The UICP programs available at SPCC provide more effective techniques and capabilities for such inventory management than are available at NAVELEX.

B. NONRECURRING DEMAND

Planned Program Requirements (PPR's) are usually considered to be the primary transactions used to lodge Nonrecurring Demand (NRD) requests. Pettersen and Casey provide a very detailed analysis of these transactions both as employed at SPCC and at NAVELEX. They also point out the existence of a PPR transaction termed a deferred requisition, another form of NRD transaction.

In Pettersen's and Casey's report, they have documented the procedures for submission of a deferred requisition and recommended its use to NAVELEX. At the time this proposal was made, this seemed a logical conclusion to be drawn for all PPR's. However, additional information obtained after their study was completed suggests there may be a degree of difficulty in applying this type of transaction to emergent requirements.

Pettersen and Casey pointed out the fact that a deferred requisition is a funded requisition submitted directly to the ICP. When attempting to utilize this procedure for emergent

requirements, there would have to be funds available from either NAVELEX or the program sponsor.

However, whether funds are available or not, there would still exist a problem in fulfilling an emergent requirement for items transferred to SPCC. In the fiscal year 1978, budget execution plan for SPCC [10], emphasis has been primarily placed upon meeting recurring (random) demand and properly planned (sufficiently in advance) nonrecurring demand. Specifically with respect to 4G COG items, ". . . unbudgeted requirements either in the nature of newly introduced program requirements, NRD requisitions not supported by PPR's, or requests from HSC's with no advance planning through a budget submission will not be procured." This is necessary for proper execution of SPCC's budget due to the fact that there are no excess funds available to meet these requirements. This effectively eliminates the possibility that SPCC inventory managers would juggle planned requirements in an attempt to meet emergent requirements even were they able.

C. RETENTION CRITERIA

1. Design Stability

It was pointed out in the introduction to this report that the Stock Coordination Program is undergoing extensive re-evaluation. One of the results of this effort is the obvious intent by NAVMAT to revise the criteria by which an HSC can retain an item for inventory management. This is an attempt to concentrate inventory management at the ICP vice the HSC (see Appendix A).

Pettersen and Casey discussed the retention criteria which are currently in effect. Specifically included in that discussion was the problem of measuring design stability. Though the current study did not permit an opportunity for the additional research which they recommended, the proposed changes to retention criteria seem to have spotlighted the use of design instability as a retention criterion. NAVMATINST 4440.37D, if approved as proposed, would require that items be considered for transfer from the HSC at one of two specific points in the equipment life cycle. Under this criterion, the HSC would practically be obligated to nominate for transfer items which had either completed First Article Testing or had been Approved for Service Use (ASU). If approved, it can be surmised that the new retention criteria would create considerable pressure to migrate large numbers of NSN's from the HSC's to either SPCC or ASO.

The results of the analysis and study contained in this report do not wholly support the idea of stock migration at these two points in time. Certain item characteristics need to be studied further before objective criteria can be determined.

The definition of design stability employed in the proposed retention criteria provides one area for future study. Several of the individual items studied during the analyses of this report have reached these transfer points in their life cycle, yet may not exhibit design stability when considered as a part of a system.

An example of a system which exhibits this type of behavior is the AN/WRC-1 Family Radio. All nine of the major parent equipments associated with this system are listed in Appendix K (marked with an asterisk). The average amount of NRD business is only 61.5 percent of all transactions for these items (1975-1977). Also, the results of the demand screening process indicated that 78 CASREPTS had been registered for these items since 1975, an average of almost 3 CASREPT's per item per year.

If random demand, particularly CASREPTS, can be taken as one indication of design instability, a point suggested by Pettersen and Casey, then the items associated with this system should not be transferred at this time. In fact, none of these items have been nominated by NAVELEX for transfer in the coming review cycle.

2. Configuration Control

A second area which requires additional analysis stems from two different problems. The first is configuration control and the second is the difference between inventory management at NAVELEX and at SPCC. Configuration control is the term used to denote the problem connected with serial number control over system assets. This is necessary in systems such as the AN/UYK-20, where each individual system is designed and configured for one particular installation. Though the system may be made up of two or more major equipments, only certain serially-numbered equipments are configured for use in a particular installation. This fact requires exact knowledge of

all assets and planned configurations in order for the inventory manager to control these items. The important point to be made here is that it is inappropriate for the inventory manager to manage each NSN separately. Instead, he must manage the system as a whole.

Referring again to Appendix A, it is noted that configuration complexities have been specifically excluded by the proposed NAVMAT instruction as a reason for HSC retention.

NAVSUP has come to appreciate the importance of serial number asset control but a recent study by FMSO has indicated that this would require an expensive implementation process. Also, the lack of standardized serial number assignment has contributed to this project being held in abeyance for the present time.

The second problem involves the differences between inventory management as practiced at NAVELEX and at SPCC. Items exhibiting configuration control complexity may experience a significant reduction in personalized inventory management attention due to these differences.

A NAVELEX inventory manager is usually assigned responsibility for a given system and has an average of 80 to 100 stock-numbered items. On the other hand, an inventory manager for electronic items at SPCC is responsible for an average of 3,000 items. On the basis of numbers alone, the inventory manager at NAVELEX is more likely to understand and account for both system and item peculiarities when making inventory management decisions.

Provision is made for item peculiarities, however, through the use of the Disposal, Requisition, Issue, Procurement and Restoration (DRIPR) code by SPCC. The presence of this code for an NSN can cause manual review of inventory related actions by the 4G COG inventory manager and the responsible HSC. This device allows the HSC to maintain configuration control but creates an additional layer of management coordination problems.

The proposed NAVMAT instruction allows the use of the DRIPR code "A" for those items in which an HSC has technical interest. In addition, during the period that the DRIPR code is in effect the HSC would remain responsible for budgeting and funding. Thus, in effect, two inventory managers, one at SPCC and one at the HSC, would then be required.

3. Arbitrary Goals

The final problem suggested by the revised NAVMAT instruction focuses upon establishing an arbitrary 25 percent transfer/deletion goal.

The influx of new items at NAVELEX in the past has been roughly equal to the outflow of items through migration and withdrawal of interest. Therefore, simply establishing an outflow goal of 25 percent may accomplish nothing more than institutionalizing a stable amount of items to be managed at NAVELEX. If the intent is to promote a progressive yearly decrement to the absolute numbers of items managed by HSC's, the influx of new items may counterbalance the directed reduction. Thus, a loophole has been created by which an HSC could

maintain relative stability in the number of items it manages. Fortunately, NAVELEX was not aware of this "quota" when it formulated plans for the 1978 migration and intends to try to transfer almost 50 percent of the items it currently manages. NAVELEX is observing the intent of the philosophy of stock migration, rather than some arbitrary goal, and is to be commended for this effort.

D. INITIAL COGNIZANCE ASSIGNMENT

At present, all items for which program management responsibility has been assigned to NAVELEX are initially assigned 2Z material cognizance. Discussions with NAVELEX personnel indicate that some items might reasonably be initially assigned directly to 4G COG at SPCC. Field changes, as an example, seem to fit in this category quite well.

Present practice requires initial 2Z COG assignment, then later migration to 4G COG through the Stock Coordination Program. This procedure generates a considerable amount of wasted effort in identifying and preparing for transfer those items which should not have been managed by NAVELEX to begin with.

There should exist a procedure whereby program managers and engineers review all new items prior to material cognizance assignment and NSN designation. This review would require a knowledge of inventory management procedures on the part of program managers and engineers, a suggestion also proposed by Pettersen and Casey, though not in this particular context.

Future study may suggest that certain general types of items have a greater tendency toward characteristics qualifying them for automated inventory control under 4G COG at SPCC. Examples identified in the course of this study are RADIAC equipment, field changes, portable hand-held radios, repair kits, and simple mounts for electronic "black boxes."

E. GENERAL DISCUSSION

The goal of this thesis has been to assist NAVELEX in identifying specific items to be nominated for migration under the Stock Coordination Program. It was hoped that salient item characteristics would become apparent which indicated a necessity for inventory management as practiced under the UICP programs. Although it has not been possible to deal with all of the problems associated with these goals, progress has been made in identifying some of the procedures which bear on the successful outcome of this program. Additional areas for further study will be highlighted in this section.

Perhaps the single most important development in the stock coordination process is the revision of stock retention criteria. (See Appendix A). The proposal that the criteria for retention be severely restricted could lessen the management flexibility allowed to the Hardware Systems Commands. This may or may not be the right decision in the long run. In the near term, however, there does not seem to have been adequate consideration of the current process and possible obstacles to implementation.

Simultaneous transfer of management resources with migrated items remains as one point of contention between the ICP's and the HSC's. Personnel ceiling points for inventory management of transferred items are not currently required to be shifted with the items [2]. Mass stock migrations, if not properly executed, may create serious dissension among the involved commands and seriously reduce the services to the fleet.

A firm commitment is required in the area of logistic support for transferred items. No specific mention of the Integrated Logistic Support Program is made in the proposed revision. Without proper coordination between the transfering and receiving commands, there exists a possibility that logistic support for transfered items may be deleteriously effected with the obvious consequence on fleet readiness.

The budget process presents other difficulties and bears heavily upon whether the needed logistics support will come about. An item transferred from NAVELEX to SPCC will not receive direct funding to meet random demand until one to two years later when SPCC picks the item up in its STRAT program. This is a consequence of the lead time involved in the budget and appropriation process. All funds for an electronic item pass through NAVELEX, whether a 2Z or 4G COG item.

As noted earlier, NAVELEX has had extremely limited success in asking for and receiving funds to meet random requirements for its items. SPCC, on the other hand, is allowed to request these funds but, even so, seldom receives all the resources needed to do the job.

There seems, then, to be a need for additional consideration on the part of NAVMAT for these two inextricably linked processes, logistic support and budget funding.

The implementation of an integrated, effective and economical Stock Coordination Program is still in its preliminary stages. Whether the program is to become a successful, on-going management process depends to a large degree upon the communication of ideas, procedures and perspectives among the various participants. This is a process which is already well under way. It is hoped that the efforts reflected in this report have aided this process.

VII. RECOMMENDATIONS

In conjunction with the present effort of the Naval Electronic Systems Command to identify as many items as possible for transfer to the Ships Parts Control Center, the following recommendations are advanced:

(1) Items managed by NAVELEX which would qualify as MARK Ø items (annual demand less than one) should be withdrawn from interest or transferred to SPCC unless:

(a) the item is a newly acquired asset; or

(b) the item is part of a system requiring serial number tracking of individual assets due to configuration complexities.

(2) Items managed by NAVELEX which experience more than three random demands in a six-month period should be transfered to SPCC. Examples include items such as RADIAC, field changes, portable hand-held radios, and simple mounts.

(3) The entire process associated with emergent requirements, from the reasons they arise to actual issuance of materials, requires extensive study for both 2Z and 4G COG items. Particular study is needed to determine the effects of different funding practices at SPCC and NAVELEX upon meeting these requirements. Deferred requisitioning procedures should be included in that study.

(4) An effective means of relaying timely information concerning configuration changes and equipment design

capabilities must be devised. That this information must be passed from NAVELEX to SPCC is obviously essential to effective inventory management of newly transferred items.

(5) Effort should be coordinated between NAVELEX and SPCC to devise a procedure for recommendation and assignment of new items directly to 4G COG.

(6) If the newly proposed stock retention criteria are adopted, further study of the effects should be undertaken. Objective measures of design stability still require greater definition. Configuration control through serial number asset accounting is important and should not be discounted. The question of whether Integrated Logistic Support requirements can be maintained during and immediately after stock migration needs to be answered. Funding time lags in budgeting to meet random demand must be explored further.

(7) Even if the newly proposed stock retention criteria are implemented, the establishment of arbitrary percent inventory reduction goals should be avoided. Adherence to the intent of the instruction should be encouraged by NAVMAT vice satisfying arbitrary limits.

APPENDIX A

COMPARISON OF CURRENT AND PROPOSED STOCK RETENTION CRITERIA

Table A-1 sets forth stock retention/transfer criteria as currently in effect in accordance with NAVMATINST 4440.37C. Table A-2 sets forth the proposed revision to these criteria advanced by the NAVMAT letter of 7 April 1978.

A comparison of these criteria reveals several distinct differences. Under the proposed instruction, the number of criteria which allow retention at HSC level has been reduced from four to two, and flag-rank signature would, in the future, be required to certify those items designated for HSC retention. Retention criteria numbers 3 and 4 of 4440.37C, namely, "Items Unstable in Design" and "Items Expressly Assigned to a Single Command Management by Separate Authorizing NAVMAT Directives" respectively, would be entirely eliminated under the proposed guidelines.

The proposed revision goes further to restate the retention criteria for "Items in a Research and Development Stage." Rather than, ". . . not yet in Fleet operational use," the item would have to be, ". . . funded with Research and Development dollars" in order to be considered for HSC retention. Additionally, intrinsic parts of end items, components or assemblies in test and evaluation, would not be precluded from review under this criterion. This added stipulation has been shifted from the current retention criteria code 3.

The retention criterion for "Items Requiring Engineering Decisions" has been extensively reworded. The current instruction states that this criterion ". . . pertains principally to those items requiring engineering decisions during production or prior to each issue." Under the revised instruction, this code would only apply when engineering decisions are required ". . . during the full-scale development through the successful completion of the First Article Technical and Operational Tests."

The engineering control decision criterion, as proposed, goes still further to say that if an item had received Approval for Service Use (ASU), it would be considered a prime transfer candidate; the ASU designation presumably implies strong indication of design stability. Additionally, the fact that an item exhibits complex configuration control would not solely justify its retention at the HSC [2, 4].

There is one additional policy set forth in the revised instruction which is of considerable concern to the participants in the Stock Coordination Program. It is the establishment of an annual requirement for 25 percent of the items at each HSC to be transferred to a NAVSUP Inventory Control Point (ICP).

TABLE A-1

CURRENT STOCK RETENTION/TRANSFER CRITERIA [2]

"Code 0 - Withdrawal of Interest.

Code 1 - Items in a Research and Development Stage. Items qualifying under this category must be under development and not yet in Fleet operational use.

Code 2 - Items Requiring Engineering Control Decisions. This criterion is applicable when a high degree of engineering judgment is required concerning design or relationships to a system. It pertains principally to those items requiring engineering decisions during production or prior to each issue. Items that remain in this category after two (2) years of operational use must be justified in the same manner as Criteria Code Four (4) Items of this Instruction.

Code 3 - Items Unstable in Design. Items which are determined by an engineering decision to be highly subject to design change of the item itself, or replacement of the item through modification of its next higher assembly. End items, components, assemblies, test and evaluation equipment unstable in design do not exclude their intrinsic parts from stock coordination review. Items retained for management under this category will be transferred to an ICP after completion of two (2) years operational use unless a major design change or modification has been approved and/or is being accomplished at the time of the Stock Coordination Review. Further retention upon completion of the approved design change or modification must be justified in accordance with Criteria Code Four (4).

Code 4 - Items Expressly Assigned to a Single Command Management by Separate Authorizing NAVMAT Directives. Items qualifying for this category are limited to items of major importance and depot level repairables. Inclusion in this category is a matter for CNM decision based upon justifying rationale submitted by the originating Command. As a general rule items changed from Criteria Codes (2) and (3) into this code will be transferred to an ICP for inventory management even though the procurement function remains at the headquarters level. Items assigned under this criterion will be considered as an adjunct to stock coordination and therefore are not precluded from formal review when scheduled.

Code 5 - Selected for Transfer"

TABLE A-2

PROPOSED STOCK RETENTION/TRANSFER CRITERIA [4]

"Code 0 - Withdrawal of Interest.

Code 1 - Items in a Research and Development Stage. Items qualifying under this category must be under development and funded with Research and Development dollars. End items, components and assemblies in test and evaluation does not exclude their intrinsic part from stock coordination review.

Code 2 - Items Requiring Engineering Control Decisions. This criterion is applicable when a high degree of engineering judgment is required concerning design or relationships to a system. It pertains principally to items requiring those decisions during the full-scale development through the successful completion of the First Article Technical and Operational tests. The primary purpose of conducting the full-scale development effort is to ensure completion of sufficient engineering and logistics efforts to permit a confident commitment of resources required for production. Full-scale development in certain cases implies limited pilot production. The milestones of Approval for Service Use (ASU) or production approval given by OSD signifies minimal risks and stability of design of the system/equipment and indicates prime candidates for transfer action. Production phase deviations will apply when originally established operational requirements, specifications or DCP thresholds are breached or major changes to the program are approved at the time of the Stock Coordination Review. Configuration control complexities will not justify retention by the SYSCOMS.

Code 5 - Selected for Transfer."

APPENDIX B

CENILE RECORD SCREENING PROCEDURE [4]

In order to classify the demand data on the CENILE tape, the following screening hierarchy was followed:

(1) All documents citing DIC's 105, A4R, A6, ABV, DAC, DAD, DGA, DZA, D4, D6, D8 and D9 were purged from the CENILE tape.

(2) Documents with document identifiers of 100 were matched with either 101 or 102 documents by quantity and requisition number. Matched documents were deleted. Those DIC 100 documents with quantities less than the 101 or 102 DIC documents were considered as partial cancellations and were adjusted accordingly.

(3) Documents with a DIC of AC were matched to either AO, A3, A4, or A5 documents by requisition number with matching documents deleted.

(4) All remaining unmatched 100 and AC documents were deleted.

(5) Using the sequence below, the first document identifier encountered for a given requisition number was retained deleting all others with the same requisition number: 102, 101, A0, A3, A4, A5, and D7.

Those documents remaining were screened further to classify them into the various types of demand.

(1) Documents were divided up into "afloat" or "ashore" by screening the service code for "V" or "R", both of which correspond to an afloat funded requirement. Ashore funded requirements were determined by failing this test. These ashore items were further broken down into categories of unplanned and PPR demands.

(2) CASREPTS were determined by screening afloat documents against the following:

a. Documents with "G" or "W" in the first position of the serial number, or

b. Those documents with a project code of 706, 707, 756, 757, or XB1, or

c. Those documents with a "K" in the second position of the project code and a "0" in the third position.

(3) If the document was coded afloat but was not a CASREPT or a planned requirement, then it was considered unplanned afloat.

APPENDIX C

CENILE RECORD LAYOUT [4]

Data Element	Description
1-3	Document Identifier
4-6	Blank
7	Median/Status Code
8-11	Federal Supply Class
12-20	National Item Identification Number (NIIN)
21-22	Special Material Identification Code
23-24	Unit of Issue
25-29	Quantity
30-43	Document Number
44	Suffix Code
45-50	Supplementary Address
51	Signal Code
52-53	Fund Code
54	Distribution Code
55-56	Cognizance Code
57-59	Project Code
60-61	Priority
62-64	Required Delivery Date
65-66	Advice Code
67-69	Activity Routing Indicator
70	Purpose Code
71	Condition Code

Data Element	Description
72	Management Code
73-75	Transaction Date
76	Material Control Code
77-78	Blank
79-80	Activity Sequence Code
81-84	Error Codes
85-88	Blank
89-90	Process Year
91-95	Local Routing Code
96	Blank
97-105	Original Transaction NIIN
106-115	Repairable Item Model Code
116-140	Equipment Name
141	Item Management Code
142	Blank
143-145	Record Establish Day
146-150	Blank

The following is an example of an entire record contained on the CENILE tape. Three lines were needed to show it here. Each line contains 50 data elements; spaces indicate that the particular data element was blank on this record:

```
A4R   5865000011582  EA00001N6279331521456  N00189
B30  2ZEQ807200  NNZAAR166Z          73XB200
                 FC-3WLA-3A              193
```

APPENDIX D

CENILE RECORD SCREEN PROCEDURE (REVISED)

In order to categorize demand data recorded on the CENILE tape, the following sequence of screening was accomplished:

(1) All documents citing DIC's 105, A6, ABV, DAC, DAD, DGA, DZA, D4, D6, D7K, D8 and D9 were purged from the tape. (A4R documents previously purged were retained.)

(2) All documents citing a Julian date earlier than 1975 were purged.

(3) Data elements which were not desired for final data analysis were purged, leaving only 44 elements of information per record.

(4) Documents with document identifiers of 100 were matched with either 101 or 102 documents by requisition serial number. Matched documents were deleted, only one match per 100 document being allowed.

(5) Documents with a DIC of AC were matched to either AO, A4 or A4R documents by requisition number and quantity. (A3 and A5 documents were not screened against AC documents because it was determined that all A3 and A5 documents had already been eliminated in the previous screens.) Partial cancellation of A0 and A4 documents took place if the requisition serial number matched an AC document, though the quantities differed. Cancellation of A4R documents only took place if both requisition serial numbers and quantities matched. Examination of document sequences dictated this testing procedure.

(6) All remaining AC documents were deleted.

(7) Remaining 100 documents were screened against A4R and D7 documents. A matched requisition serial number caused the retention of the 100 document as a completed Planned Program Requirement (PPR) transaction.

(8) Any remaining 100 documents were deleted.

(9) Using the sequence below, the first document identifier encountered for a given requisition number was retained, deleting all others with the same requisition number: 102, 101, A0, A4, A4R, A5 and D7.

Those remaining documents were screened further to classify them into the various types of demand.

(1) Documents were divided up into "afloat" or "ashore" by screening the service designator code for "V" or "R", both of which correspond to an afloat funded requirement. Ashore funded requirements were determined by failing this test. These ashore items were further broken down into categories of Unplanned and PPR demands.

(2) All A4R documents which had not been previously deleted were classified as "Non-requisitioned, Released" demands because there was not a record of either an A0 or A4 document on file.

(3) CASREPTS were determined by screening afloat A0, A4, A5 and D7 documents against the following:

(a) Documents with "G" or "W" in the first position of the serial number, or

(b) Those documents with a project code of 706, 707, 756, 757, or XB1, or

(c) Those documents with a "K" in the second position of the project code and a "0" in the third position.

(4) Remaining D7 documents were classified as "Unauthorized Issues" since the only record available was the Transaction Item Report (TIR) indicating that an issue had been accomplished.

(5) If the documents remaining were coded Afloat but not a CASREPT or a planned requirement, then it was considered "Unplanned Afloat."

(6) Documents with a DIC of 101 or 102 were classified as incomplete PPR's, meaning that the material on reserve had not yet been issued.

APPENDIX E

DEMAND TABLEAU SAMPLES

NOMENCLATURE = MT-4667/U

NIIN: 001341305

	1975				1976				1977			
QUARTER	1	2	3	4	1	2	3	4	1	2	3	4
CASREPTS	0	0	0	0	2	0	0	0	0	0	0	0
UNPLANNED (AFLOAT)	0	1	4	0	1	2	2	1	4	2	1	0
UNPLANNED (OTHER)	8	39	32	3	6	12	5	7	3	1	1	0
PPR (AFLOAT)	0	0	0	0	0	0	0	0	0	0	0	0
PPR (OTHER)	1	179	114	108	10	63	0	0	11	7	12	1
TOTAL	9	219	150	111	19	77	7	8	18	10	14	1

TOTAL BUSINESS 75,76,77 = 643

Revised version of same stock number:

NIIN: 001341305

	1975				1976				1977			
QUARTER	1	2	3	4	1	2	3	4	1	2	3	4
CASREPTS	0	0	0	0	2	0	0	0	0	0	0	0
UNPLANNED (AFLOAT)	0	0	2	0	1	0	0	0	0	1	1	0
UNPLANNED (OTHER)	1	13	14	1	2	3	1	3	3	2	0	0
PPR (INCOMPLETE)	1	173	114	108	10	61	0	0	10	7	11	1
PPR (COMPLETE)	1	38	28	0	1	20	0	0	0	0	0	0
NON-REQND RELEASE	7	8	12	1	5	9	6	4	6	0	0	0
NON-RELEASE ISSUE	4	26	21	2	3	11	5	5	4	1	1	0
TOTAL	14	258	191	112	24	104	12	12	23	11	13	1

TOTAL BUSINESS 75, 76,77 = 775

NOMENCLATURE = AS-177B/UPX

NIIN: 004705364

	1975				1976				1977			
QUARTER	1	2	3	4	1	2	3	4	1	2	3	4
CASREPTS	0	0	0	0	2	0	3	0	0	4	0	0
UNPLANNED (AFLOAT)	1	6	8	2	4	5	6	1	8	10	4	0
UNPLANNED (OTHER)	30	45	20	9	10	25	13	2	33	5	5	0
PPR (AFLOAT)	0	0	0	0	0	0	0	0	0	0	0	0
PPR (OTHER)	40	66	21	84	4	53	7	1	94	21	34	4
TOTAL	71	117	49	95	20	83	29	4	135	40	43	4

TOTAL BUSINESS 75,76,77 = 690

Revised version of same stock number:

NIIN: 004705364

	1975				1976				1977			
QUARTER	1	2	3	4	1	2	3	4	1	2	3	4
CASREPTS	0	0	0	0	2	1	3	0	0	4	0	0
UNPLANNED (AFLOAT)	0	1	0	1	1	1	0	0	3	1	1	0
UNPLANNED (OTHER)	7	10	2	0	4	5	4	1	9	2	4	0
PPR (INCOMPLETE)	44	92	32	109	10	77	7	2	130	26	46	6
PPR (COMPLETE)	19	4	12	0	3	23	0	0	1	0	0	0
NON-REQN RELEASE	10	14	14	3	6	11	24	2	19	21	10	0
NON-RELEASE ISSUE	13	21	24	7	6	15	13	2	12	12	4	0
TOTAL	93	142	83	120	32	133	51	7	174	66	65	6

TOTAL BUSINESS 75,76,77 = 972

APPENDIX F

FREQUENCY DISTRIBUTION TABLES

TABLE F-1

TOTAL BUSINESS FREQUENCY DISTRIBUTION (1,667 NSN's)

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS	NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
0	976	61	2
1	190	63	1
2	55	68	2
3	51	71	1
4	33	72	1
5	24	73	1
6	18	75	1
7	27	79	1
8	12	80	1
9	11	81	1
10	11	83	1
11	9	85	1
12	10	86	1
13	8	89	1
14	11	93	1
15	4	95	1
16	13	101	1
17	7	105	1
18	4	108	2
19	6	116	1
20	6	117	2
21	9	119	1
22	3	120	4
23	4	122	2
24	3	124	1
25	4	128	1
26	4	129	1
27	5	131	1
28	1	132	1
29	3	133	1
30	4	137	1
31	4	145	1
33	4	149	1
34	2	150	2
35	1	163	1
38	3	169	1
39	2	174	2
41	1	175	1
42	2	177	1
43	1	178	1
44	1	186	2
45	2	193	1
46	1	197	1
47	3	198	1
48	1	203	1
49	1	209	1
51	4	211	1
52	1	212	2
55	3	220	1
57	1	239	1
58	1	255	1

TABLE F-1 (Continued)

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
256	1
258	1
263	1
268	1
272	1
287	1
290	1
296	1
303	1
338	1
345	1
352	1
375	1
380	1
390	1
392	1
399	2
403	1
406	1
409	1
430	1
436	1
454	1
461	1
483	1
497	1
555	1
576	1
621	1
624	1
775	1
818	1
891	1
972	1
1229	1

TABLE F-2

PPR BUSINESS FREQUENCY DISTRIBUTION

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS	NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
0	1412	85	1
1	54	101	1
2	24	107	1
3	13	108	1
4	12	112	1
5	10	114	1
6	15	115	1
7	11	119	1
8	5	125	1
9	7	136	1
10	5	139	1
11	4	145	1
12	4	157	1
13	1	160	1
14	3	173	1
15	4	175	1
16	4	178	1
17	1	191	1
18	3	212	1
19	1	219	1
20	1	222	1
22	1	239	1
23	2	241	1
24	1	244	1
25	1	299	1
26	2	300	1
27	1	302	1
28	2	313	1
34	1	321	1
35	1	322	1
36	3	358	1
37	2	369	1
38	1	431	1
39	2	440	1
40	1	584	1
43	1	643	1
44	1		
46	1		
47	1		
48	1		
49	1		
52	1		
53	1		
54	1		
62	1		
63	1		
67	1		
71	1		
74	1		
81	1		
82	1		

TABLE F-3

UNPLANNED BUSINESS FREQUENCY DISTRIBUTION

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS	NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
0	1156	66	1
1	147	67	1
2	62	71	2
3	52	91	1
4	35	93	1
5	25	95	2
6	21	98	1
7	12	99	2
8	7	112	1
9	10	119	1
10	11	123	1
11	11	126	1
12	6	165	1
13	6	190	1
14	4	207	2
15	3	267	1
16	4	455	1
17	7	461	1
18	2	465	1
19	1		
20	1		
21	5		
22	3		
23	2		
24	3		
25	4		
27	5		
28	2		
29	4		
30	2		
31	1		
32	2		
33	1		
34	1		
35	1		
38	1		
39	1		
41	2		
42	1		
46	1		
47	1		
48	1		
50	4		
51	3		
52	1		
53	1		
54	2		
57	1		
58	1		
61	2		
63	1		
65	1		

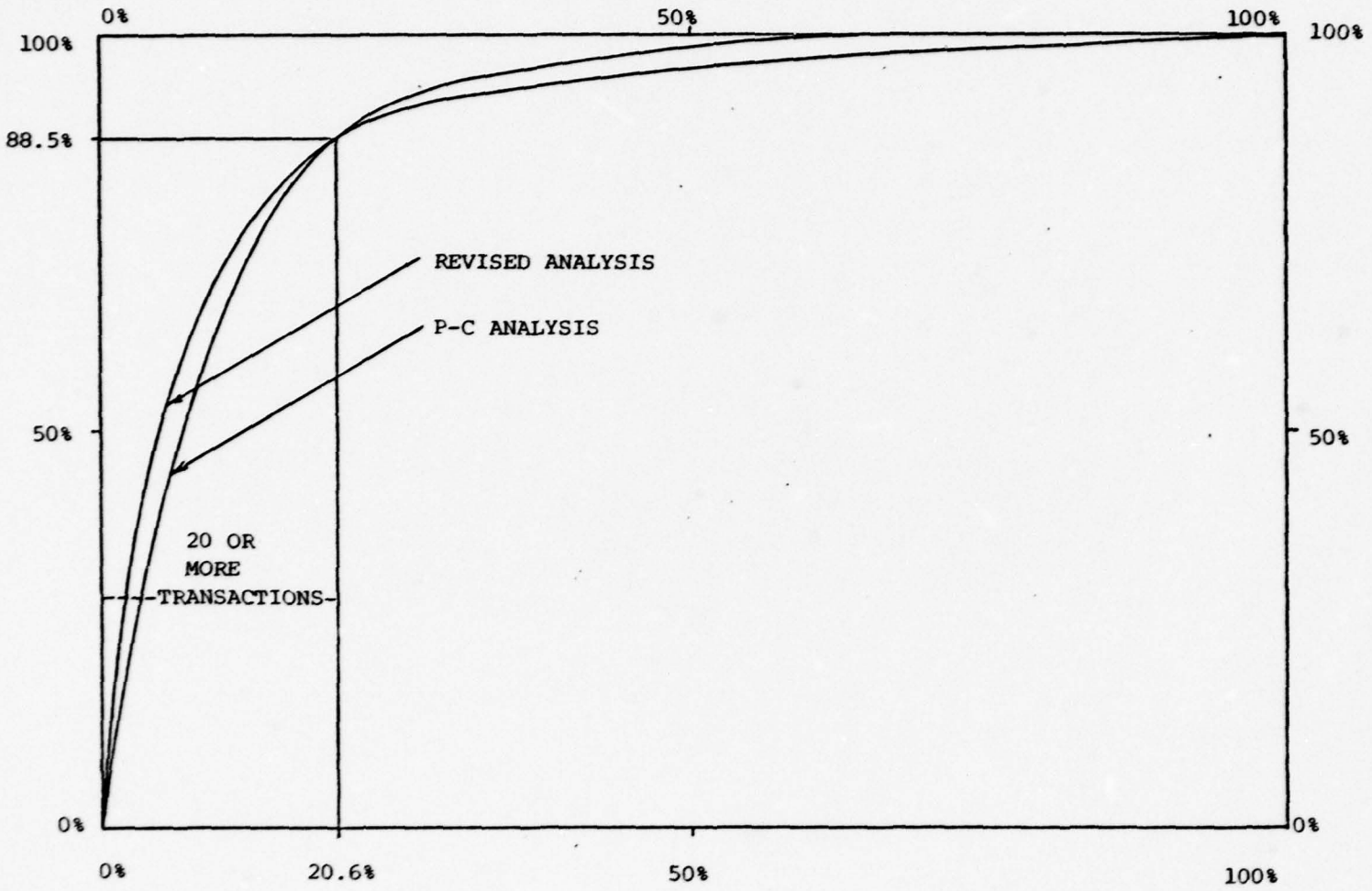
TABLE F-4

CASREPT BUSINESS FREQUENCY DISTRIBUTION

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
0	1536
1	58
2	16
3	14
4	8
5	6
6	3
7	2
8	6
9	3
10	2
11	1
12	2
13	2
14	1
15	1
20	1
22	1
28	1
79	1
115	1
134	1

APPENDIX G

ABC ANALYSIS CURVES



APPENDIX H

SAMPLE AVERAGE TRANSACTION SIZE TABLEAUS

NOMENCLATURE = MT-4667/U
***** STK NBR = 001341305 *****

AVG CASREPT REQN SIZE IS	1.00	FOR	2	REQUISITIONS.
AVG UNPLANNED(AFLOAT) REQN SIZE IS	1.40	FOR	5	REQUISITIONS.
AVG UNPLANNED(OTHER) REQN SIZE IS	2.09	FOR	43	REQUISITIONS.
AVG PPR(INCOMPLETE) REQN SIZE IS	17.73	FOR	496	TRANSACTIONS.
AVG PPR(COMPLETE) REQN SIZE IS	1.84	FOR	88	TRANSACTIONS.
AVG NON-REQN RELEASE SIZE IS	1.90	FOR	58	AUTHORIZATIONS.
AVG NON-RELEASE ISSUE SIZE IS	2.07	FOR	83	ISSUES.

AVG OVERALL TRANSACTION SIZE IS	12.05
TOTAL 3 YEAR BUSINESS VOLUME IS	775

NOMENCLATURE = CU-937/UR
***** STK NBR = 009649673 *****

AVG CASREPT REQN SIZE IS	1.03	FOR	115	REQUISITIONS.
AVG UNPLANNED(AFLOAT) REQN SIZE IS	1.19	FOR	115	REQUISITIONS.
AVG UNPLANNED(OTHER) REQN SIZE IS	1.09	FOR	231	REQUISITIONS.
AVG PPR(INCOMPLETE) REQN SIZE IS	1.98	FOR	49	TRANSACTIONS.
AVG PPR(COMPLETE) REQN SIZE IS	0.67	FOR	3	TRANSACTIONS.
AVG NON-REQN RELEASE SIZE IS	1.16	FOR	233	AUTHORIZATIONS.
AVG NON-RELEASE ISSUE SIZE IS	1.26	FOR	145	ISSUES.

AVG OVERALL TRANSACTION SIZE IS	1.19
TOTAL 3 YEAR BUSINESS VOLUME IS	891

NOMENCLATURE = AS-177B/UPX

***** STK NBR = 004705364 *****

AVG CASREPT REQNSIZE IS	1.20	FOR	10 REQUISITIONS.
AVG UNPLANNED(AFLOAT) REQN SIZE IS	1.89	FOR	9 REQUISITIONS.
AVG UNPLANNED(OTHER) REQN SIZE IS	2.00	FOR	48 REQUISITIONS.
AVG PPR(INCOMPLETE) REQN SIZE IS	2.27	FOR	581 TRANSACTIONS.
AVG PPR(COMPLETE) REQN SIZE IS	1.48	FOR	62 TRANSACTIONS.
AVG NON-REQN RELEASE SIZE IS	2.99	FOR	134 AUTHORIZATIONS.
AVG NON-RELEASE ISSUE SIZE IS	1.87	FOR	128 ISSUES.

AVG OVERALL TRANSACTION SIZE IS	2.24
TOTAL 3 YEAR BUSINESS VOLUME IS	972

NOMENCLATURE = CU-714/SRA-22

**** STK NBR = 007891987 ****

AVG CASREPT REQN SIZE IS	1.13	FOR	134 REQUISITIONS.
AVG UNPLANNED (AFLOAT) REQN SIZE IS	1.16	FOR	98 REQUISITIONS.
AVG UNPLANNED (OTHER) REQN SIZE IS	1.12	FOR	233 REQUISITIONS.
AVG PPR (INCOMPLETE) REQN SIZE IS	0.0	FOR	0 TRANSACTIONS.
AVG PPR (COMPLETE) REQN SIZE IS	0.0	FOR	0 TRANSACTIONS.
AVG NON-REQN RELEASE SIZE IS	1.25	FOR	377 AUTHORIZATIONS.
AVG NON-RELEASE ISSUE SIZE IS	1.22	FOR	387 ISSUES.

AVG OVERALL TRANSACTIONS SIZE IS	1.20
TOTAL 3 YEAR BUSINESS VOLUME IS	1229

APPENDIX I

ITEM, INVENTORY MANAGER AND UNPLANNED COST LISTING

Nomenclature	National Stock Number	Inv. Mgr. (LRC)	Total Nbr. Trans.	Nbr. Unplan. Trans.	Avg.Nbr. Units Unplan.	NSN Std. Price	Total Unplan. Price
T-616B/SRT	5820-00-102-1380	2200	120	43	1.63	$ 454	$ 31,775
TS-2232A/UCC-IC(V)	6625-00-486-8558	2200	33	15	3.33	1,710	85,517
AN/UCC-ID 1-4R	5805-00-933-1696	2200	83	1	1.00	6,120	6,120
TS-2232/UCC-1(V)	6625-00-933-5063	2200	21	9	2.89	612	15,900
T-616A/SRT	5820-00-949-3356	2200	21	14	1.21	454	7,718
RT-695/PRC-41	5820-00-082-4066	2300	44	27	1.33	2,500	89,925
AN/PRC-41A	5820-00-104-0351	2300	30	23	1.78	9,280	380,109
AN/GRR-23	5820-00-123-3937	2300	33	8	2.13	612	10,422
AN/GRR-24	5820-00-123-3945	2300	55	13	4.85	612	38,562
AN/GRT-22	5820-00-123-3952	2300	47	39	16.03	1,690	1,056,284
AN/SRA-22	5985-00-543-1861	2300	68	54	1.31	5,570	394,467
CU-714/SRA-22	5985-00-789-1987	2300	1,229	852	1.17	4,720	4,711,504
AN/GRC-164	5820-00-881-0901	2300	30	17	1.29	3,680	80,702
AN/PRC-41	5820-00-889-3997	2300	409	134	1.63	5,610	1,228,197
C-2698/SRA-22	5985-00-897-5501	2300	186	121	1.21	816	119,299
MK-706/PRC-41	5820-00-987-9020	2300	145	40	1.10	2,040	89,821

APPENDIX J

INVENTORY MANAGER AND HIGH VOLUME

ITEM LIST

Local Routing Code (LRC)	Number of Items	Total Number Transactions	Number Unplanned Transactions	Total Unplanned Price($)
XBA00	3	61	28	88,200
XBB00	0	0	0	0
XBC00	1	21	7	58,800
XBD00	1	28	3	24,480
XB100	1	124	123	1,016,840
XB200	3	83	28	75,840
XB300	0	0	0	0
XB400	0	0	0	0
XB500	2	67	5	901,480
XB600	16	2,448	1,764	7,094,410
XB700	22	1,998	1,149	1,340,760
XC200	11	1,634	274	2,376,270
XC300	10	2,445	427	1,820,720
XC400	9	3,521	621	470,430
XC500	7	837	266	2,837,900
XC600	3	916	55	416,400
X1100	7	740	317	4,935,500
X1200	18	2,431	809	4,413,050
X1300	21	3,112	1,757	9,173,220
X1400	16	3,102	1,778	4,225,840
X1500	2	57	26	569,050

X1600	0	0	0	0
X2100	13	1,841	958	7,594,300
X2200	5	278	82	147,030
X2300	11	2,276	1,328	8,199,290
X2500	5	190	89	1,819,160
TOTALS	187	28,210	11,894	$59,598,970

APPENDIX K

CLARIFICATION OF THE TERM "END ITEMS"

An end item has been defined as "a final combination of end products, component parts, and/or materials which is ready for its intended use, e.g., ship, tank, mobile machine shop, aircraft." [12] However, end items are also capable of independent use and may be more simple in construction than the examples given above. When considering the more basic distinction between items of supply, namely principal and secondary items, this fact is of special significance.

Principal items are specifically designated by CNO and are characterized by the following management and material considerations:

(1) Requirements determined on a planned basis by the cognizant SYSCOM;

(2) Requirements based solely on planned end-use allowances and planned reserve/retention requirements;

(3) Separate budget formulations through Materiel Planning Studies and Principal Item Stratifications;

(4) Procurements financed exclusively with appropriated/investment funds;

(5) Attrition based solely on major/total destruction, intended destructive use, or planned retirement;

(6) Issues to end-use strictly limited to SYSCOM-established allowances or special SYSCOM-approved authorizations.

Secondary items are those items not classified as principal items and exhibit the following characteristics:

(1) Requirements determined by the cognizant ICP;

(2) Requirements based either on estimated/observed demands or non-demand based insurance levels;

(3) Budget formulations based upon standard levels-setting techniques and standard Secondary Item Stratification projections;

(4) Procurements financed either with investment funds or stock funds, as governed by such factors as unit price and recoverability;

(5) Attrition based primarily on normal in-service wear-out or consumption;

(6) Issues to end-use subject to limitation on the basis of established allowances but more typically limited only on the basis of quantitative validations.

It is obvious that an end item could be a secondary item. Therefore, it follows that end-items can be subject to widely varying management and, in actuality, have less in common with each other as a group than they have with other items which are similarly classified as either principal or secondary items. [7]

APPENDIX L

"AN/" EQUIPMENTS WITH BUSINESS FREQUENCY OF
10 OR MORE AND QUANTITY OF 12 OR MORE

NOMENCLATURE	NATIONAL STOCK NUMBER	EDICT DATE	PERCENT NRD BUSINESS
AN/URC-4	5820-00-665-3538	00000	12.4%
AN/URA-17	5820-00-474-3975	00000	61.6
AN/SRA-22	5985-00-543-1861	00000	17.5
AN/UPM-97	6625-00-580-3771	00000	40.0
AN/WRT-2	5820-00-673-3770	59167	17.1
AN/URQ-9	5820-00-799-8840	60284	21.4
AN/UPN-12C	5825-00-803-3187	62073	29.4
AN/SRC-20	5820-00-987-6601	62354	62.7
AN/SRC-21	5820-00-987-6602	62354	46.5
AN/WRT-1A	5820-00-066-4594	63266	32.7
AN/WLR-1C	5895-00-884-1937	65067	93.0
AN/VRC-46	5820-00-892-0871	65075	45.8
AN/URA-17B	5820-00-999-6374	65075	96.3
AN/URC-9	5820-00-612-6681	65334	54.7
AN/URT-23V *	5820-00-945-4221	66096	80.3
AN/URA-38 *	5985-00-926-0266	66096	54.5
AN/WRC-1B *	5820-00-948-3407	66110	52.7
AN/SRA-42	5825-00-951-9126	66187	60.0
AN/URQ-10A	5820-00-933-6373	66264	35.9
AN/SLA-10A	5895-00-917-6730	67032	73.2
AN/UCC-1D	5805-00-933-1696	67112	99.0
AN/SRA-49	5985-00-899-0716	67119	94.5

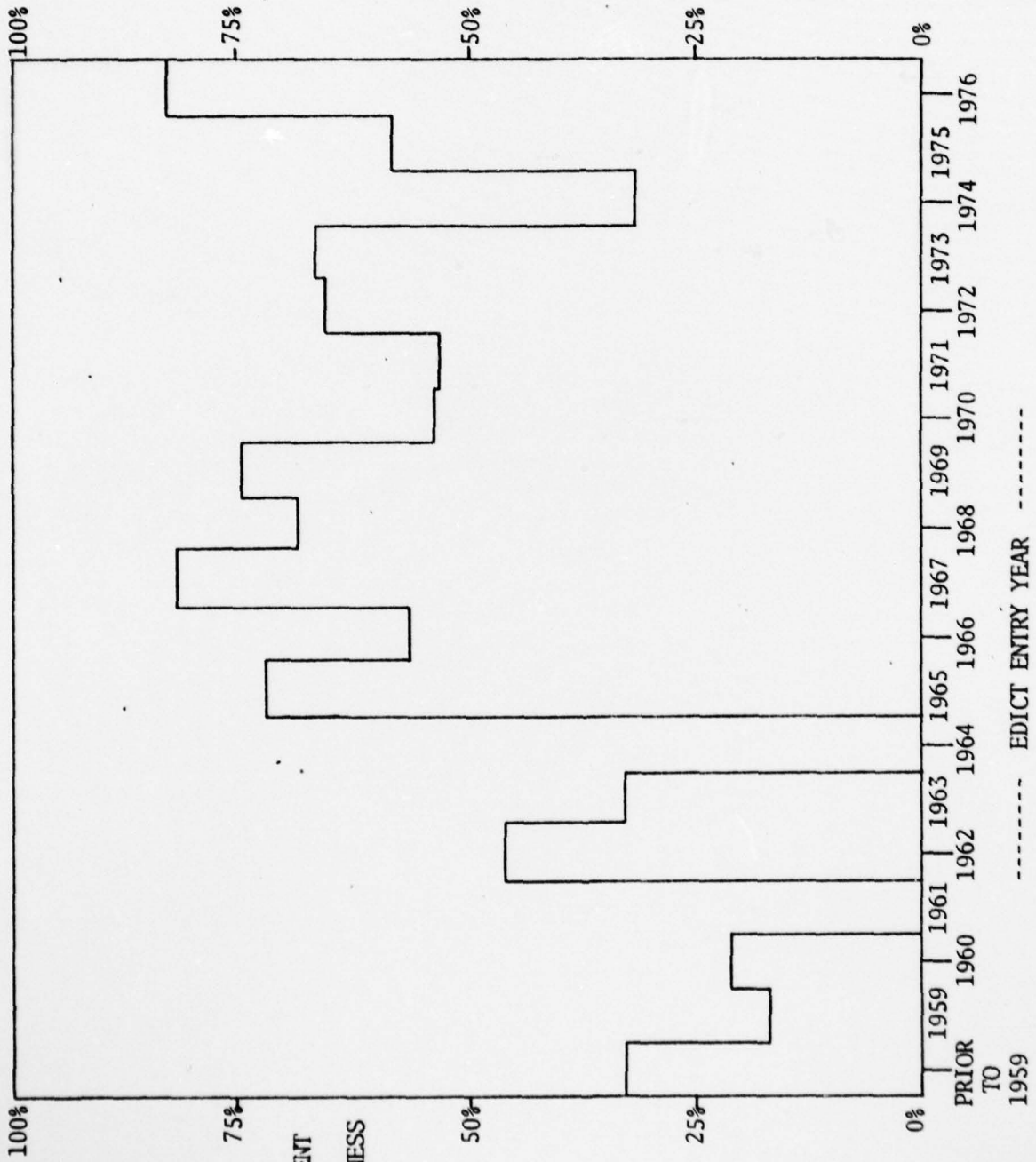
*Equipments associated with AN/WRC-1 Family Radio

AN/SRA-51	5985-00-995-4709	67139	63.8
AN/URA-17C	5820-00-042-7837	68157	58.8
AN/UPX-23	5895-00-781-7209	68201	90.4
AN/SLR-12A	5865-00-116-5623	68290	83.3
AN/UGA-5	5805-00-931-4911	68292	26.3
AN/SRN-12	5825-00-117-3725	68305	86.1
AN/URA-38A *	5985-00-486-8589	69183	67.5
AN/URT-24 *	5820-00-411-6144	69260	77.8
AN/URC-35A *	5820-00-411-6145	69260	63.7
AN/URT-23(V)1	5820-00-248-2054	69295	88.0
AN/URC-9A	5820-00-450-3855	70014	55.6
AN/SRC-20A	5820-00-450-3856	70021	64.7
AN/SRC-21A	5820-00-450-3857	70021	58.8
AN/URT-23(V)3 *	5820-00-450-1664	70028	71.0
AN/URT-23(V)5 *	5820-00-450-1666	70028	26.3
AN/SLM-1A	5895-00-401-0720	70028	47.4
AN/GRT-21	5820-00-123-3938	71006	40.0
AN/GRT-22	5820-00-123-3952	71006	14.2
AN/GRR-23	5820-00-123-3937	71066	64.1
AN/GRR-24	5820-00-123-3945	71066	77.8
AN/URA-17D	5820-00-067-9058	71348	73.3
AN/URC-35B *	5820-00-181-5921	72004	34.6
AN/URT-24A *	5820-00-181-5922	72004	92.8
AN/UCC-1D	5805-00-451-6564	72026	75.2
AN/UAT-2B	5850-00-409-1552	72032	68.5

AN/UPM-137A	6625-00-086-1215	72046	65.8
AN/BRM-2	6625-00-412-8627	72189	86.4
AN/UPM-98B	6625-00-403-7990	72228	30.8
AN/WRN-5(V)2	5825-00-198-5572	72291	96.0
AN/TPM-36	6625-00-482-7195	72291	53.8
AN/UPA-57	5895-00-110-5644	72305	81.8
AN/URQ-10	6625-00-884-2116	72340	39.0
AN/WSC-3	5895-00-110-8472	73023	100.0
AN/UPA-61(V)1	5895-00-110-8611	73030	91.8
AN/BRN-7	5825-00-217-8233	73058	71.0
AN/GPA-123	5895-00-411-3565	73079	41.7
AN/UPM-136	6625-00-148-8056	73114	75.1
AN/URC-80(V)5	5820-00-135-0499	73219	55.8
AN/URN-3A	5825-00-790-8141	73303	35.0
AN/UPX-27	5895-00-135-1539	73309	85.7
AN/URT-23A(V)1 *	5820-00-134-0276	73317	55.0
AN/URT-23A(V)2 *	5820-00-134-0278	73317	35.1
AN/VRC-49	5820-00-892-0865	73324	94.1
AN/BRT-1 CH29	5820-00-385-1707	74043	22.3
AN/BRT-1 CH27	5820-00-398-9977	74050	22.9
AN/BRT-1 CH31	5820-00-398-9982	74050	27.3
AN/BRT-1 CH25	5820-00-398-9985	74050	27.5
AN/UGM-10	6625-00-138-8059	74337	58.0
AN/WRR-7	5820-00-138-8055	75014	58.3
AN/UPM-137	6625-00-264-2249	76027	83.3

APPENDIX M

AVERAGE NRD BUSINESS VERSUS EDICT ENTRY YEAR
FOR "AN/" EQUIPMENTS



APPENDIX N

PARENT EQUIPMENT AND SECONDARY ITEM SUMMARY DATA TABLE

TABLE N-1

	Parent Equipments (AN/)	Field Changes, Radiac, Portable Radios	Other Secondary Items	Total (All items)
Number of items	51	53	83	187
Average number of transactions per quarter:				
RANDOM	3.04	7.64	5.20	5.30
TOTAL	8.40	15.70	13.20	12.55
Average number of units requested per transaction:				
RANDOM	2.03	15.03	2.05	7.34
TOTAL	1.76	11.25	2.45	5.43
Average number of units requested per quarter:				
RANDOM	6.16	114.78	10.68	38.92
TOTAL	14.78	175.92	32.28	68.25

LIST OF REFERENCES

1. Assistant Secretary of the Navy for Installations and Logistics, Publication P-1500, Navy Policy and Standards for Supply Management, Department of the Navy, Washington, D.C., May 1968 (Revised).

2. Chief of Naval Material Instruction 4440.37C, Stock Coordination Responsibilities for Navy Inventories; Policy Concerning, 7 February 1973.

3. Naval Material Command UNCLASSIFIED Letter Serial 043:TAB, Subject: Stock Coordination, 9 July 1976.

4. Naval Material Command UNCLASSIFIED Letter Serial 0432:LC, Subject: Draft NAVMATINST 4440.37D, Subject: Stock Coordination Responsibilities for Navy Inventories; Policy Concerning, 7 April 1978.

5. Pettersen, A.J. and Casey, M.W., Inventory Migration from the Naval Electronic Systems Command to the Ships Parts Control Center, *M.S. Thesis, U.S. Naval Postgraduate* School, Monterey, 1978.

6. McCarthy, J.D., Quinn, J.T. and James, W.B., An Analysis of Unplanned Requirements and their Impact on the Naval Electronic Systems Command, M.S. Thesis, U.S. Naval Postgraduate School, Monterey, 1976.

7. Aviation Supply Office UNCLASSIFIED Letter Serial SDB4-5: DJC/4000, Subject: Stock Coordination, 24 March 1977.

8. Naval Supply Systems Command Publication 437, Military Standard Requisitioning and Issue Procedures (MILSTRIP), Washington, D.C.

9. Inventory Manager's Manual, Introduction, Levels, Demand, Leadtime, Fleet Material Support Office, Mechanicsburg, Pennsylvania.

10. Ships Parts Control Center UNCLASSIFIED Memorandum Serial 720/hmd/458,7300, Subject: FY 1978 Material Budget Execution Plan, 14 December 1977.

11. Inventory Manager's Manual, Stratification, Mechanicsburg, Pennsylvania: CACI, Inc., April 1974.

12. Joint Chiefs of Staff Publication 1, Dictionary of Military and Associated Terms, Washington, D.C.

INITIAL DISTRIBUTION LIST

		No. Copies
1.	Defense Logistics Studies Information Exchange (DLSIE) Fort Lee, Virginia 23801	1
2.	Defense Documentation Center Cameron Station Alexandria, Virginia 22314	2
3.	Library, Code 0142 Naval Postgraduate School Monterey, California 93940	2
4.	Department Chairman, Code 54 Department of Administrative Sciences Naval Postgraduate School Monterey, California 93940	1
5.	LT Robert N. Seebeck 1225 Alcova Street Monroe, Georgia 30655	1
6.	Commander, Naval Logistic Command U.S. Pacific Fleet ATTN: LT Michael W. Casey Box 49 Pearl Harbor, Hawaii 96860	1
7.	Commanding Officer U.S. Naval Air Facility, Sigonella ATTN: LT Alan J. Pettersen FPO New York 09521	1
8.	Professor A. W. McMasters Code 54Mg Naval Postgraduate School Monterey, California 93940	9
9.	CDR J. Shiels Code 54Sc Naval Postgraduate School Monterey, California 93940	1
10.	Commander, Naval Electronic Systems Command Code ELEX 504 Naval Electronic Systems Command Washington, D.C. 20360	9

11. Commanding Officer — 3
Code 347
Navy Ships Parts Control Center
Mechanicsburg, Pennsylvania 17055

12. Commanding Officer — 1
Code 340A
Navy Ships Parts Control Center
Mechanicsburg, Pennsylvania 17055

13. Commanding Officer — 1
Naval Electronic Systems Engineering Center
San Diego, California 92138

14. Chief of Naval Material — 1
Code 043
Headquarters, Naval Material Command
Washington, D.C. 20360

15. Commander, Naval Supply Systems Command — 1
Code 0423
Naval Supply Systems Command
Washington, D.C. 20376

16. Commander, Naval Supply Systems Command — 1
Code 04A
Naval Supply Systems Command
Washington, D.C. 20376