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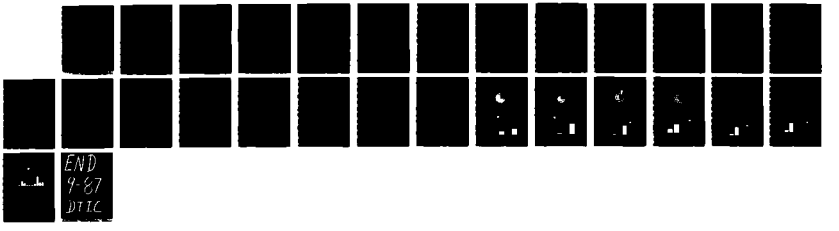

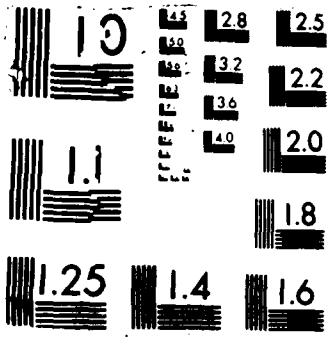
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The Naval Supply Systems Command (NAVSUP) is currently fielding a second-generation, bar code-based retail Electronic Point-of-Sale System (EPOS II) for inventory control at its worldwide chain of SERVMART retail supply stores. That system, unlike the earlier EPOS I, uses standard bar codes that are applied in accordance with the Military Marking Standard (MIL-STD-129J). The designers of EPOS II assumed that most material arriving at SERVMART stores will be adequately coded for use by the system, thus minimizing the need for on-site bar code labeling.

We have found that this is not the case. Less than 30 percent of the line items stocked arrive with coded labels adequate for immediate use. The major reasons for this are poor compliance with standards by major suppliers, packages that are properly labeled but contain multiple units of issue, and local changes to units of issue to satisfy local customer demand. Even if all suppliers complied with MIL-STD-129J, the unit-of-issue problems would still require that many items be coded on-site. For these reasons, we believe that SERVMART stores will be required to label large quantities of incoming material indefinitely. The few usable codes that do arrive will still provide a significant savings in relabeling costs over current procedures.

We recommend that currently planned configurations of bar code labeling equipment be fielded so that all SERVMART stores with EPOS II have the capability to affix a large number of labels. We further recommend that each SERVMART store use techniques (such as label menu books for unmarked, easily recognizable stock and more efficient local units of issue) to reduce labeling costs. Stores should also verify the quality of incoming bar codes, and then use them. Since each usable bar code received represents a significant cost savings, we recommend that NAVSUP aggressively seek improved bar code labeling in accordance with MIL-STD-129J by major SERVMART wholesale suppliers. We recommend that NAVSUP address packaging vs. unit-of-issue differences as soon as possible. Finally, we recommend a minor change in EPOS II software to handle uncoded receipts more easily.

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IMPROVED SERVMART BAR CODE LABELING

Report NA606R1

January 1987

John B. Handy
Harry H. Moore, Jr.

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Executive Summary

IMPROVING SERVMART BAR CODE LABELING

The Naval Supply Systems Command (NAVSUP) is currently fielding a second-generation, bar code-based retail Electronic Point-of-Sale System (EPOS II) for inventory control at its worldwide chain of SERVMART retail supply stores. That system, unlike the earlier EPOS I, uses bar codes that are applied in accordance with the Military Marking Standard (MIL-STD-129J). The designers of EPOS II assumed that most material arriving at SERVMART stores would be adequately coded for use by the system, thus minimizing the need for on-site labeling.

We have found that not to be the case. Fewer than 30 percent of the line items stocked arrive with coded labels adequate for immediate use. The major reasons are poor compliance with standards by major suppliers, packages that (although properly labeled) contain multiple unlabeled units of issue, and local changes to units of issue to satisfy local customer demand. Even if all suppliers complied with MIL-STD-129J, the unit-of-issue problems would still require that many items be coded on-site. We believe that SERVMART stores will be required to label large quantities of incoming material indefinitely. The usable codes that do arrive, however, will provide a significant savings in relabeling costs.

We recommend that currently planned configurations of bar code labeling equipment be fielded so that all SERVMART stores with EPOS II have the capability to affix a large number of labels. We further recommend that each SERVMART store use techniques (such as scanning a book of labels at the checkout counter to identify unmarked, easily recognizable stock, and using fewer local units of issue) to reduce labeling costs. Stores should also verify the quality of incoming bar codes and use as many of them as possible. Since each usable bar code received represents a significant cost savings, we recommend that NAVSUP aggressively seek improved bar code labeling in accordance with MIL-STD-129J by major SERVMART wholesale suppliers. Finally, we recommend that EPOS II software be modified to simplify the handling of uncoded receipts.

CONTENTS

CHAPTER 1

INTRODUCTION

Since completion of the Logistics Applications of Automated Marking and Reading Symbols (LOGMARS) Joint Steering Group Final Report[1] in September 1981, the Military Services and the Defense Logistics Agency (DLA) have undertaken a program to ensure that bar-code technology is used in applications for which it is cost effective. To coordinate system development and testing, a DoD LOGMARS Coordinating Group (LCG) representing all the Services, DLA, the General Services Administration (GSA), and the Office of the Assistant Secretary of Defense for Manpower, Reserve Affairs and Logistics [OASD(MRA&L)] was formed in 1982, with the U.S. Army representative serving as permanent chairman and executive agent.

Under auspices of the LCG and as a direct result of recommendations made in the LOGMARS Joint Steering Group Final Report, the requirement to apply standard bar code markings to DoD shipments was contained in a change to MIL-STD-129J (Military Standard: Marking for Shipping and Storage). To meet that standard, all unit packs, that is, the first tie, wrap or container applied to an item, procured after the effective date of the change by DoD activities must be marked with the bar coded National Stock Number (NSN) of the contents. Each element of DoD was then strongly encouraged to utilize the codes in the development of its own logistics systems.

The Electronic Point-of-Sales (EPOS II) system, an early application developed for the Naval Supply Systems Command (NAVSUP), utilizes the bar coded unit pack. Its purpose is to provide state-of-the-art automation support for the Navy's worldwide chain of SERVMART retail stores. In support of this system, the Logistics Management Institute (LMI) has been tasked to determine whether suppliers' compliance with MIL-STD-129J is adequate to support EPOS II and if it is not, what the economic impact would be on SERVMART, what alternative stock

[1] U.S. Department of Defense, Final Report of the Joint Steering Group for Logistics Applications of Automated Marking and Reading Symbols, 1 Sepetmeber 1981.

labeling actions are available, and what actions NAVSUP should take to improve the efficiency of SERVMART stores that use EPOS II.

Our approach to the tasking was to take a random sample of on-the-shelf items to provide a statistically valid portrayal of the quality of bar code labeling as well as a measure of the quantity of stocks received from various sources. The sampling was conducted in five separate SERVMART stores located at the Naval Shipyard (NSY) in Philadelphia and at the Naval Supply Centers in Charleston, San Diego (two stores), and Bremerton. We also conducted extensive interviews with SERVMART management at all levels.

BACKGROUND

SERVMART Stores

A SERVMART "store" is actually a retail supply issue point serving a designated installation. It generally carries high-volume, low-cost items such as office and cleaning supplies, small hand tools, and mess items. Those items are ordered in bulk by the SERVMART through normal supply channels and then issued to the store's "customers" in the much smaller quantities they require. SERVMART customers are usually the individual military activities located on or in the vicinity of the installation and served by the installation's central supply facility (often a Naval Supply Center.)

The customer activity, represented by one of its members acting as a "shopper," requests its supplies by use of a simple "shopping list" signed by the responsible authority in the activity. After the shopper's identity is verified and the shopping list is checked for completeness, the shopper is admitted to the SERVMART's storage area, which is arranged like a commercial retail store. The shopper then roams the aisles at will, drawing items from available stocks. Depending on local policy, the shopper may also make reasonable substitutions for out-of-stock items. After completing the shopping, the shopper brings the selections to the check-out counter where the cost of the items is tallied; this transaction is then forwarded through normal financial channels. No further supply documentation is required.

The SERVMART gains its cost-effectiveness by eliminating the administrative overhead normally associated with the requisitioning process. The central supply activity, which manages the SERVMART, treats the store as a retail customer and

does not maintain stock records of its inventory. Thus, instead of many thousands of small individual supply requests, the central activity need only process a few larger requests to replenish SERVMART stock. Since the issuing procedure at the SERVMART is much more streamlined than that necessary to support the much larger and more diverse central supply activity, the cost of processing a large volume of requests through a SERVMART store is much less than the cost of processing them through the central supply activity.

SERVMARTs provide increased responsiveness to customer needs. Because issuing procedures are streamlined, the time required for the customer to acquire a needed item is cut drastically. Also, since the direct relationship between the ultimate customer and the central supply activity is purely financial, military and other government activities not supported by the central supply activity may (and do) utilize the SERMART through a simple funds transfer.

There are, however, some major problems in managing a SERVMART, the worst of which is inventory management. Because a SERVMART stocks only high-volume items (and has a stated out-of-stock goal of only 6 percent), the SERVMART inventory is extremely dynamic. As an example, the SERVMART at NSC Charleston, South Carolina, has average monthly sales of more than 145,000 line items from an inventory of 3,600 lines—an average of about 40 sales per line per month, often in multiple quantities. Since the lack of abundant floor space and the desire to conserve funds dictate that only limited inventory may be stocked, the availability of accurate and timely information on sales and stockage levels is critical in successfully managing the flow of replenishment requisitions.

Another problem in managing a SERVMART is the need to provide efficient service at the check-out line. The success of a SERVMART depends, at least in part, on the satisfaction of its customers. Long lines at the check-out counter waste the time of the shoppers and erode the value of the SERVMART to their respective activities. However, several very important functions must be performed at the check-out counter, including the accurate preparation of the customers' invoices and the capture of critical sales and inventory-management data. In addition, some stores screen their customers' shopping lists to assure that unauthorized items are not purchased. In short, at the check-out counter, the needs of the customer often conflict with the needs of the SERVMART manager.

Originally, operations at all SERVMART stores were manual. Inventory was managed through standard stock record cards, and receipts were tallied at an ordinary cash register. Sales and inventory levels were reconciled by hand, and most items required a manually applied price sticker. All low-volume SERVMART stores are still managed in that manner.

EPOS Systems

The Navy soon recognized that in higher-volume stores the information dissemination and check-out problems could only be overcome in a cost-effective manner through the use of automated support. The EPOS I system was designed to provide that automation. That system, installed at 10 SERVMARTs, consisted of a data collector connected to check-out counter terminals.

When the SERVMART stock is purchased, a bar coded label containing the item's NSN, unit of issue, and price is automatically read by a scanner at the check-out counter. The transactions are then captured by the system, which produces a daily tape to update the SERVMART inventory data base on the NSC's mainframe computer.

The EPOS I system has produced large gains in productivity and effectiveness, and has validated the effectiveness of electronic point-of-sales technology in the SERVMART. However, it has a severe drawback that becomes more and more apparent over time: The system relies upon a nonstandard bar coding technology unique to the manufacturer (NCR). This unique technology has led to several acute problems:

- First, it is necessary to laboriously relabel each item of SERVMART stock with this unique code when it is received; the SERVMARTs are unable to take advantage of the standard bar coded labels that have begun to appear on unit packages.
- Second, reliance on this unique technology makes the SERVMART totally dependent on the availability of NCR's nonstandard printing and scanning equipment. As the equipment has aged, NCR service support has deteriorated. Downtime caused by the lack of replacement parts has caused serious backlogs in SERVMART operations. Unfortunately, no alternative support is available to repair the now-obsolete EPOS I equipment and by the end of 1985, NCR indicated that it was unwilling to continue supporting EPOS I.

- Finally, the bar code scheme used by EPOS I is a technological dead-end. As the equipment has gone out of production, no replacements are available for worn-out items, leading inevitably to the collapse of the system (notably at NSC Puget Sound) because of lack of operational equipment. Obviously, it is also impossible for the system to evolve new, more-effective capabilities over time.

The EPOS II system is designed in such a way as to optimize the advantages of electronic point-of-sales technology and vastly improve the timeliness and effectiveness of SERVMART management without suffering the disadvantages of EPOS I. For example, EPOS II is based on commonly available "off the shelf" hardware. It also utilizes standard equipment interfaces to facilitate equipment replacement and upgrade, and to discourage premature obsolescence. It is scheduled not only to replace all existing EPOS I systems but to be used at many smaller sites as well.

UTILIZING STANDARD LABELS

The most important design feature in the EPOS II system is its approach to stock item identification based on military standard bar code labeling. Under this approach, all local data, such as price, is maintained on the inventory data base and is not marked on the item itself. The label is used merely as a "license plate" to identify the item in order to access the appropriate inventory data base records.

For this reason, the system can make effective use of unit pack bar codes applied by SERVMART's suppliers. A shipment of SERVMART items in the correct unit of issue and properly marked in accordance with MIL-STD-129J can be moved directly from the receiving dock to the store shelves without relabeling. If all items sold at SERVMART are properly marked at receipt and the relabeling function is thus eliminated, up to 50 percent of the total man-hours spent in stock handling can be saved. In addition, inventory accuracy can be significantly improved, receipt processing time can be reduced and further cost savings can possibly be realized in the area of equipment procurement (especially for label printers). In short, utilizing unit pack labels has the potential for significantly improving both the effectiveness and efficiency of SERVMART operations.

However, the following important questions must be answered to determine the extent to which these bar coded labels are useful:

- Is the use of unit pack bar codes in SERVMARTs cost-effective? Are there hidden costs, such as additional packaging requirements, or hidden benefits?
- What proportion of shipments is being received with usable codes?
- Does the unit packaging being received reflect the unit of issue that is actually being sold?
- Who is responsible for missing and faulty codes? What can be done about them?
- What should be done about uncoded receipts? Should they be relabeled? Where? At what cost?

ASSUMPTIONS

At the outset of the study we assume that the EPOS II system fielding is in the best interests of the Navy and that solutions will be measured by how effectively they enhance the EPOS II system capabilities. In addition, the study was constrained to recommend only procedural changes that will not materially delay EPOS II fielding and to recommend only changes that can be justified by cost savings and are in accord with the stated objectives and policies of NAVSUP.

CHAPTER 2

FINDINGS

In investigating the issue of SERVMART labeling, we have made several significant findings that are examined in detail in this chapter. These findings include:

- Items currently being received by SERVMARTs are usually not marked in accordance with MIL-STD-129J.
- GSA is the wholesale source of a large majority of SERVMART items and provides most of the items that have bad or missing labels.
- The Naval Publications and Forms Center (NPFC) provides no coded labels but provides nearly 8 percent of SERVMART stockage lines.
- While all major suppliers are guilty of providing material not marked in accordance with the standard, some types of material are particularly bad.
- Current SERVMART unit-of-issue policies cause additional marking requirements.
- Improving bar code labels received from SERVMART suppliers will have a significant economic impact.

For our assessment, we took random samples of SERVMART stocks at five SERVMART stores. The samples were structured to have a calculated precision of no worse than ± 10 percent at a confidence level of 90 percent. The individual results for the samples are given in Appendix A.

According to sample results, on the average, only 37 percent of the material stocked in SERVMARTs is properly labeled in accordance with MIL-STD-129J. This figure does not take into account the fact that the sampled items were only inspected visually; no attempt was made to detect technical faults in the codes themselves, which would make them unusable. Thus, the proportion of usable codes received is probably somewhat lower. A previous LMI study conducted at NSC Norfolk indicated that up to 29 percent of unit pack codes received were faulty. That value

would suggest that the overall proportion of usable codes in our sample was less then 30 percent.

Overall, the results of the samples are consistent. The proportion of good codes observed varies from a high of 41 percent in the SERVMART at NSC Puget Sound to a low of 27 percent at NSC Charleston. We believe that this small variation reflects a high degree of commonality of SERVMART stocks from store to store and suggests that corrective action concentrated on a relatively few NSNs can achieve dramatic Navy-wide improvement. This conclusion is further supported by the large number of duplicate NSNs randomly sampled from different stores.

GSA was shown to be the largest individual source of material throughout the SERVMART chain. (The overall breakout of material in our sample is given by source of supply in Table 1). While the absence of bar codes on GSA unit labels is not significantly worse on a proportional basis than those of other suppliers, the sheer volume of material establishes GSA as the largest single source of faulty labels.

TABLE 1-1

SOURCES OF SUPPLY OF SERVMART STOCK SAMPLED

Source of Supply	Proportion of Stock Sampled
GSA	74.2%
DLA	16.9%
NPFC	7.7%
Other	1.2%

The NPFC provides no bar codes on the SERVMART items it supplies because publications and forms are currently exempted from MIL-STD-129J requirements. That exemption has made it necessary to relabel all NPFC items, causing a labeling requirement far out of proportion to its representation in inventory; NPFC provides only 8 percent of lines stocked but over 12 percent of the uncoded lines.

Another problem identified by the sample is the worse-than-average unit-of-issue labeling of the material in certain Federal Supply Classes (FSCs) (Table 1-2).

Of particular note are FSC 51xx (77.2 percent missing labels) and FSC 73xx (58.3 percent missing labels).

TABLE 1-2

INCIDENCE OF BAD/MISSING BAR-CODE LABELS

(By FSC; Greater than 20 Observations)

FSC	Percent Faulty	Number of Observations
75xx	56.5%	147
51xx	77.2%	145
79xx	47.1%	34
80xx	22.6%	31
53xx	40.7%	27
73xx	58.3%	24

In combination with the sample, we interviewed SERVMART management and operations personnel at all the sites visited. We established that two other factors – a systemic unit pack vs. unit of issue discrepancy and the establishment of ad hoc local units of issue – also contributed to an increased requirement to relabel incoming stock on the SERVMART receiving floor.

While SERVMART items are usually sold in formal units of issue, suppliers often do not find it desirable to individually package one unit of issue of an item. Thus, the unit pack that bears the critical bar coded label may contain anywhere from one to literally hundreds of individual units of issue. This approach forces the SERVMART to relabel (and often repackage) each of the items in the unit pack individually.

Local ad hoc unit-of-issue policies also contribute to the relabeling requirement. Because the SERVMART specializes in meeting the precise needs of its customers, local commanders and SERVMART managers often sell partial units of issue as single items. Thus, even if the unit pack arrives properly marked and contains a single unit of issue, the items must be relabeled in their new units. Clearly, the SERVMART has surrendered a certain degree of efficiency in favor of greater perceived effectiveness.

The final question addressed by the study is the economic impact of bar code labeling. Given the prevailing conditions at NSC San Diego and taking into account the local contract-specified wage rates, productivity estimates, relabeling volume and the cost of label stock, we estimate the cost of applying labels at that location to be approximately 2.7 cents per label. This estimate is roughly in accord with previous figures published in the LOGMARS Joint Steering Group Final Report and with unofficial estimates of other government agencies, and it seems to be somewhat conservative.

Not included in the 2.7 cents is the cost of repackaging those items that cannot be properly labeled. To be readable, a bar code label must be applied to a reasonably flat, regular surface. When the SERVMART receives an item that does not offer such a surface, it must repackage that item on-site, usually in a plastic bag. We estimate that the requirement to repackage effectively doubles the cost of labeling. The sample identified approximately 12 percent of the stocked items as having been repackaged.

Overall, our sample shows that even using conservative figures, relabeling and repackaging costs for SERVMARTs are very high; we estimate that those costs at NSC San Diego in CY 1986 will be well in excess of $120,000. (That estimate is based on a volume of 4 million labels, utilizing nearly 100 percent relabeling under EPOS I.) Overall costs at other SERVMARTs will depend on sales volumes.

While the proportion of bar coded labels being received from the supply system is low, even this limited number may bring significant cost savings. Even if only 20 percent of incoming codes are usable under EPOS II, NSC San Diego, for example, may be able to avoid over $20,000 per year in relabeling costs. Most larger SERVMARTs, however, are contractor operated, and these savings may not be realized until the contracts are renegotiated.

CHAPTER 3

RECOMMENDATIONS

RECOMMENDED LOCAL ACTIONS

The local SERVMART management can take several actions to reduce the impact of labeling problems. These actions include using "menu books," exercising control over local units of issue, and making maximum use of those codes that are available.

Use Menu Books

Menu books are currently used by nearly all automated SERVMARTs for unmarked, easily recognized stock. The book is kept at the checkout counter and is simply a looseleaf binder that contains bar coded labels for certain designated items. Instead of scanning each item individually, the cashier identifies the items visually and scans the appropriate label in the book. Thus, one label can be used to identify all the stock carried under a particular NSN, and the requirement to label each item can be eliminated.

We recommend that menu books be adopted wherever possible because of the reduced labeling requirement and the associated reduction in costs. This technique is only limited by the ability of the cashier to identify the item correctly and to find the correct label in the book. Cashier training and experience is critical since an experienced cashier can handle far more items in a timely manner. Because only about 100 NSNs can be efficiently managed in this fashion, the greatest savings can be achieved by using this technique only to manage extremely high-volume lines that would otherwise generate a large labeling requirement.

Manage Local Units of Issue

While a flexible unit-of-issue policy best meets the needs of the customer, it can be extremely expensive if an entire shipment of otherwise correctly marked stock must be relabeled piece by piece. (Obviously, where the stock is not already marked,

the unit of issue in which it is sold makes little difference if the incremental increase in labeling requirement is small.) The EPOS II system is currently capable of recognizing only two distinct units of issue per NSN; local insistence on more than two will cause a large increase in costs because of the necessity for off-line processing. We therefore recommend that SERVMART managers use caution in choosing those items to be sold at other than the standard unit of issue.

Use Available Codes

We strongly recommend that the received codes be verified for quality and be utilized. In the short run, it may appear simpler to merely relabel everything; however, that procedure does not train receiving personnel to visually evaluate incoming labels for code quality, it does not train cashiers to read codes not produced in-house, and it does not provide on-going feedback to suppliers as to code quality. In short, it does not integrate standard supplier-provided bar code labels with EPOS II in such a way as to improve SERVMART cost effectiveness. Unless this integration is accomplished, SERVMART bar code utilization will never live up to its enormous potential.

RECOMMENDED NAVAL SUPPLY SYSTEMS COMMAND ACTIONS

Several major actions are available to NAVSUP to improve the efficiency of SERVMART operations. Those actions include improving incoming bar code quality, providing adequate labeling capability to SERVMARTs, resolving the unit-pack vs. unit-of-issue problem, and adding a key-code capability to EPOS II system software.

Improve Incoming Bar Codes

More than 98 percent of SERVMART stock comes from three major wholesale suppliers, and one of those suppliers, NPFC, is a NAVSUP activity. In terms of the obvious and immediate cost savings, we recommend that NAVSUP require NPFC to bar code at least those forms and publications commonly found in SERVMARTs.

The large majority of SERVMART stock comes from GSA and a much lesser amount from DLA. Since the number of different NSNs commonly stocked at SERVMARTs is somewhat limited, a program of labeling improvement by these two agencies aimed at these NSNs could provide a large payback for a relatively small effort. We recommend that NAVSUP vigorously pursue the cooperation of these

agencies in improving the quality of bar code labels supplied to SERVMART. Efforts to gain cooperation should accentuate the fact that good bar codes applied by suppliers can save the Navy thousands of dollars.

Provide Adequate Labeling Capability

The EPOS II system will multiply the number of bar code printers in SERVMART stores, and some cost savings may be realized by reducing the number of printers fielded. We strongly recommend that this not be done.

The problems we have identified cannot generally be solved by the SERVMART manager and will not be solved quickly in any case. Each SERVMART store has a definite need for effective labeling capability on the receiving floor for the indefinite future. In order to be effective, each SERVMART must also have the flexibility to adjust units of issue locally when the manager determines that is in the best interests of the SERVMART and the customer. The current EPOS II system provides the proper number of bar code printers where they are needed.

NSC San Diego deserves special mention because of its unique central receiving facility. While printing capability located at the central receiving site and also at the individual stores appears to be redundant, it is not. Applying bar code labels at the central receiving site provides for economy of scale, and should be continued; however, the lack of space there will continue to force some central receiving activities to take place directly at the retail stores. In the past, under the EPOS I system, this has caused numerous delays at some stores because of the lack of on-site bar code capability. We recommend that under the EPOS II system each store retain at least a minimal on-site capability as is currently planned.

Resolve Unit Pack vs. Unit of Issue

The discrepancy between Unit Pack vs Unit of Issue is a very large obstacle to effective utilization of package bar codes. This is, however, a much larger issue with considerations beyond the scope of this study, and can only be solved by a change in current DoD-wide policy. However, successful resolution of this problem will greatly benefit SERVMART and should be pursued.

Add Key-Code Capability

We recommend that key-code capability be added to the EPOS II system. Key-code is a simple concept but one that could provide substantial cost savings at SERVMARTs. Its use is similar to the use of a menu book, except that instead of scanning a bar code label in a book, the cashier keys into the computer a two-to-five digit locally assigned code. That code identifies the item's NSN, and processing proceeds as before. The key-code concept has several advantages:

- Like the menu book, it can be used without labeling to dramatically reduce the labeling requirement for selected high-volume stock.
- Unlike the menu book, it may utilize labeling to reduce the need for cashier experience in identifying items. The key code can be marked on items with a simple, cheap, old-style labeler of the type formerly used to mark prices.
- Because a key-code label need not be machine-readable and can be much smaller than a bar code label, it can be applied to items whose configuration would normally necessitate repackaging. While bar code labels are much more efficient overall and should be used in most cases, key-code labels may be used to avoid the need for expensive repackaging for small items that cannot be bar code labeled efficiently.
- The number of NSNs a key-code system can handle is limited only by the number of digits in the code. For simplicity, we recommend three, yielding a capacity of 1,000 lines. If necessary, a coding scheme can be chosen to minimize data-entry errors.
- Key coding is functionally compatible with the present EPOS II system function and configuration.

The key-code procedure is currently being successfully used in retail industry outlets. It requires only a relatively minor software change in the EPOS II system, and has the potential to provide dramatic improvements in productivity with minimal investment.

APPENDIX

SURVEY RESULTS

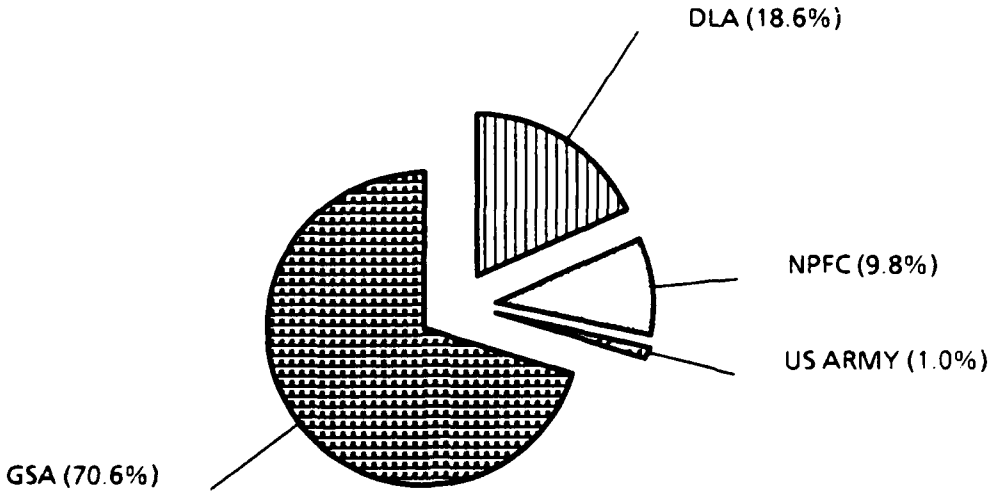

FIG. A-1. SERVMART SOURCES OF SUPPLY, NSC CHARLESTON (102 OBSERVATIONS)

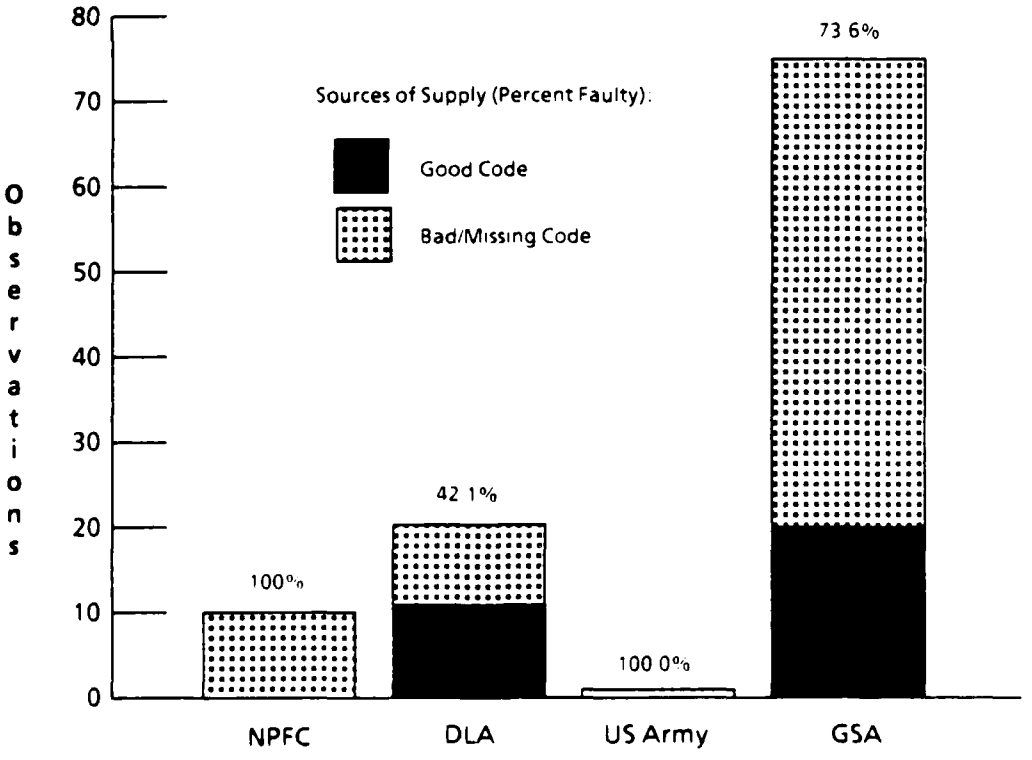

FIG. A-2. SERVMART NSC CHARLESTON, SC, SAMPLE RESULTS (102 OBSERVATIONS)

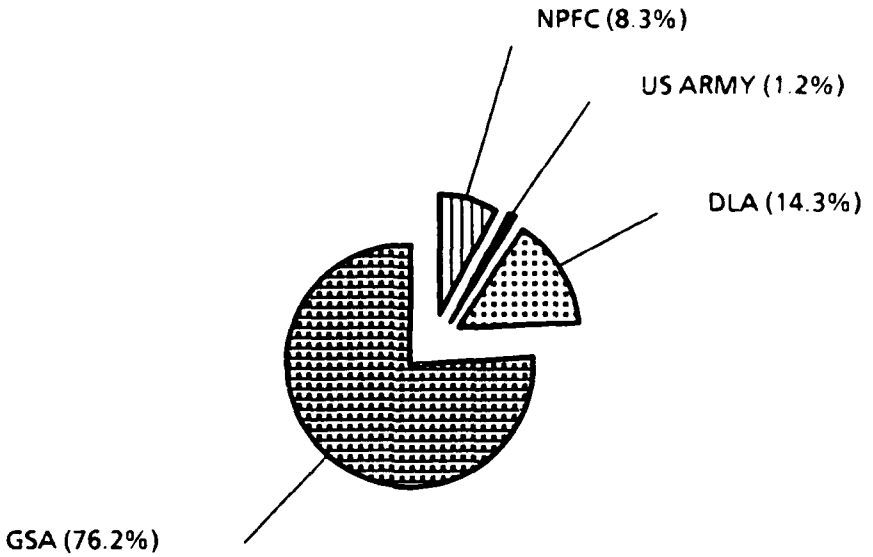

FIG. A-3. SERVMART SOURCES OF SUPPLY, NSY PHILADELPHIA (168 OBSERVATIONS)

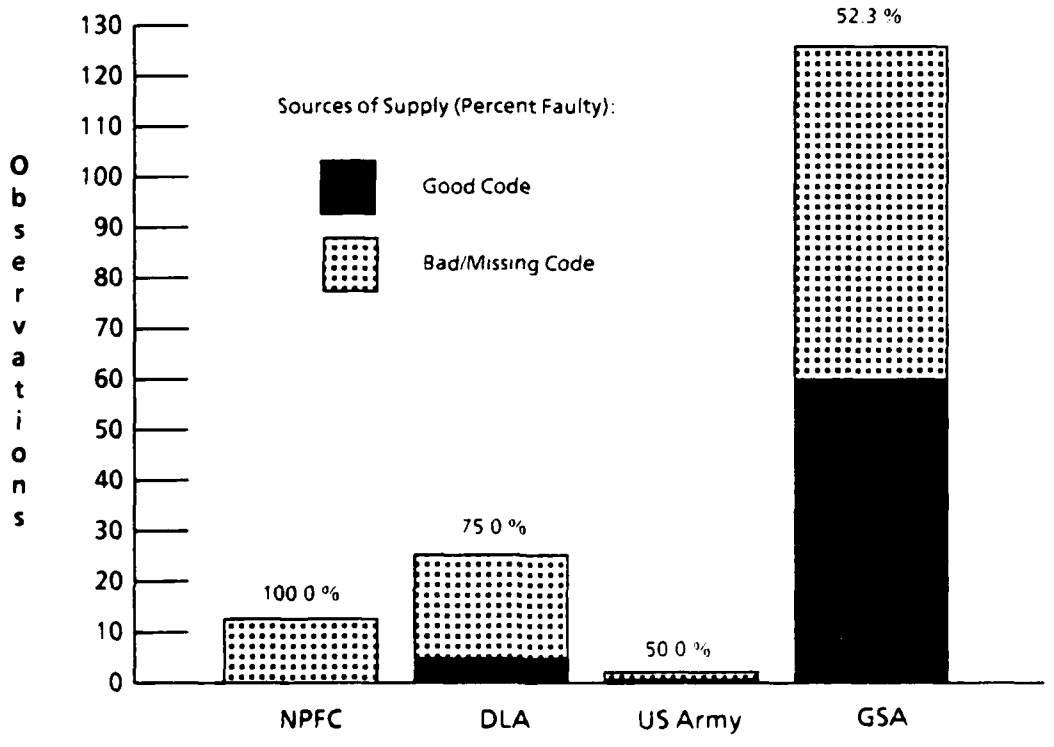

FIG. A-4. SERVMART NSY PHILADELPHIA, SAMPLE RESULTS (168 OBSERVATIONS)

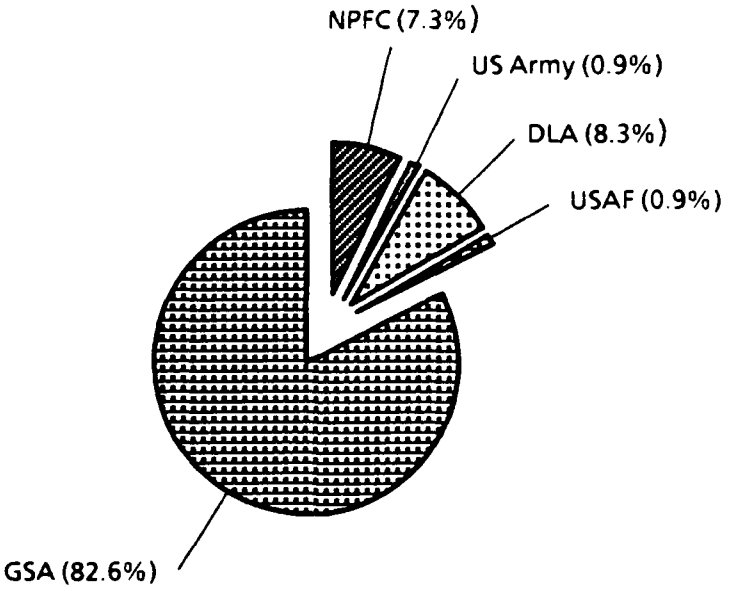

FIG. A-5. SERVMART SOURCES OF SUPPLY. NSC PUGET SOUND (109 OBSERVATIONS)

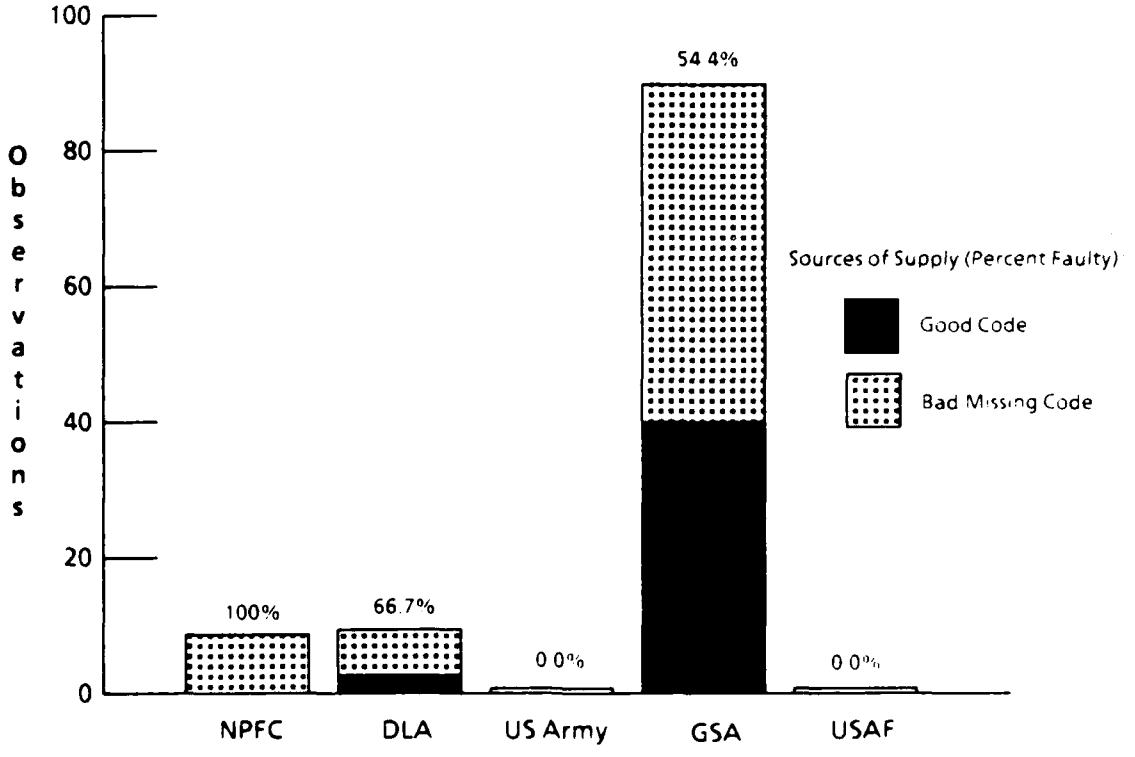

FIG. A-6. SERVMART NSC PUGET SOUND SAMPLE RESULTS (109 OBSERVATIONS)

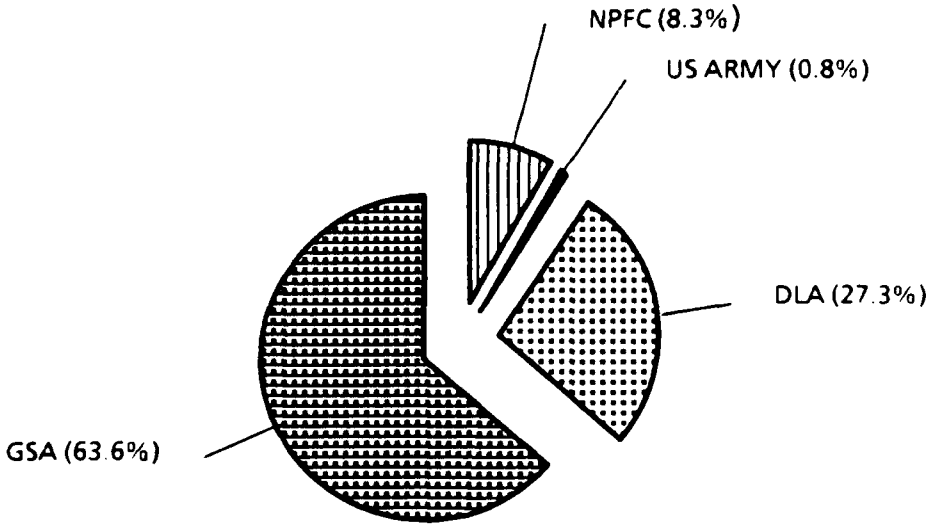

FIG. A-7. SERVMART SOURCES OF SUPPLY, NSC SAN DIEGO/NAVSTA (121 OBSERVATIONS)

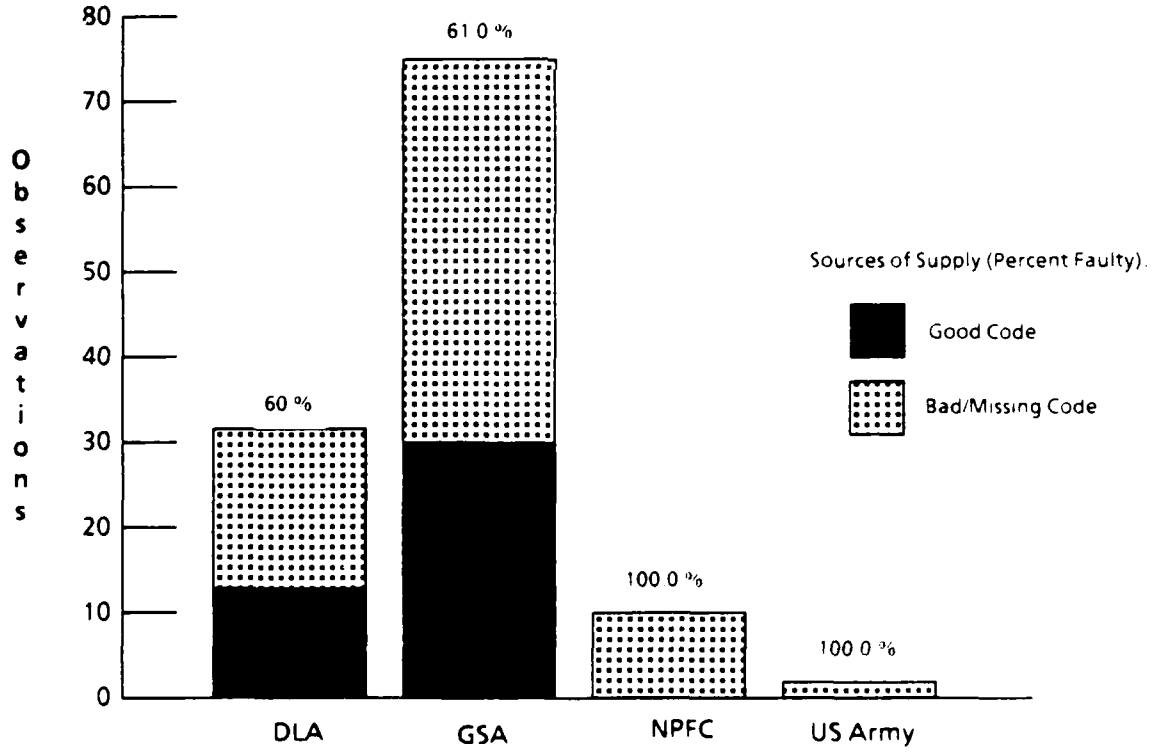

FIG. A-8. SERVMART NSC SAN DIEGO (NAVAL STATION), SAMPLE RESULTS (121 OBSERVATIONS)

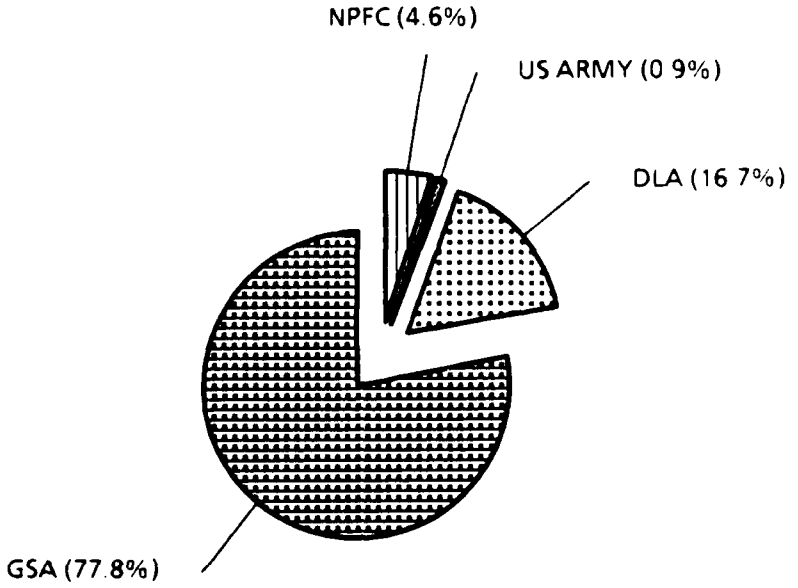

FIG. A-9. SERVMART SOURCES OF SUPPLY, NSC SAN DIEGO (NORTH ISLAND) (121 OBSERVATIONS)

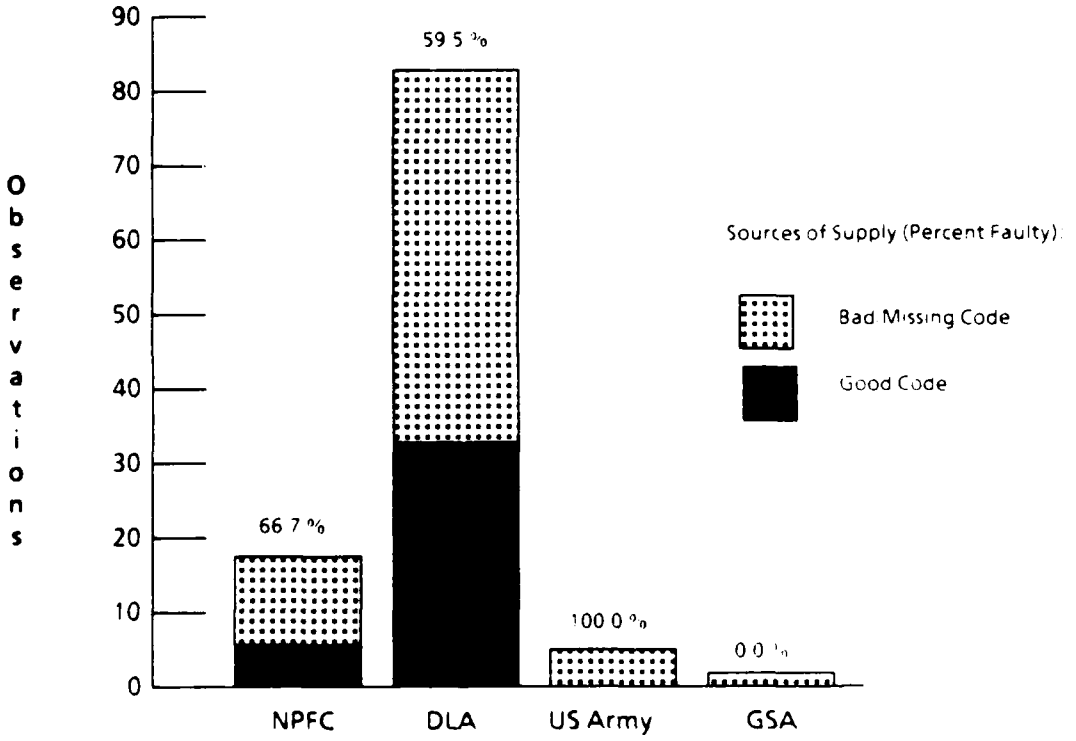

FIG. A-10. SERVMART NSC SAN DIEGO (NORTH ISLAND), SAMPLE RESULTS (121 OBSERVATIONS)

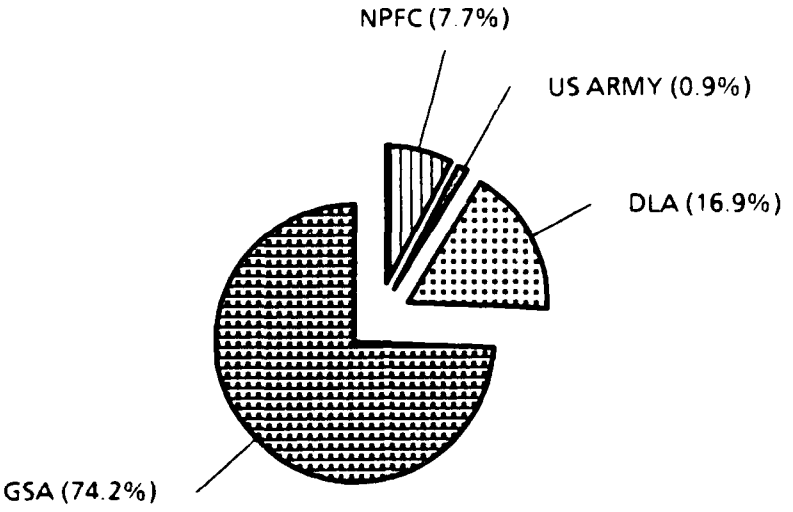

FIG. A-11. SERVMART SOURCES OF SUPPLY SUMMARY (608 OBSERVATIONS)

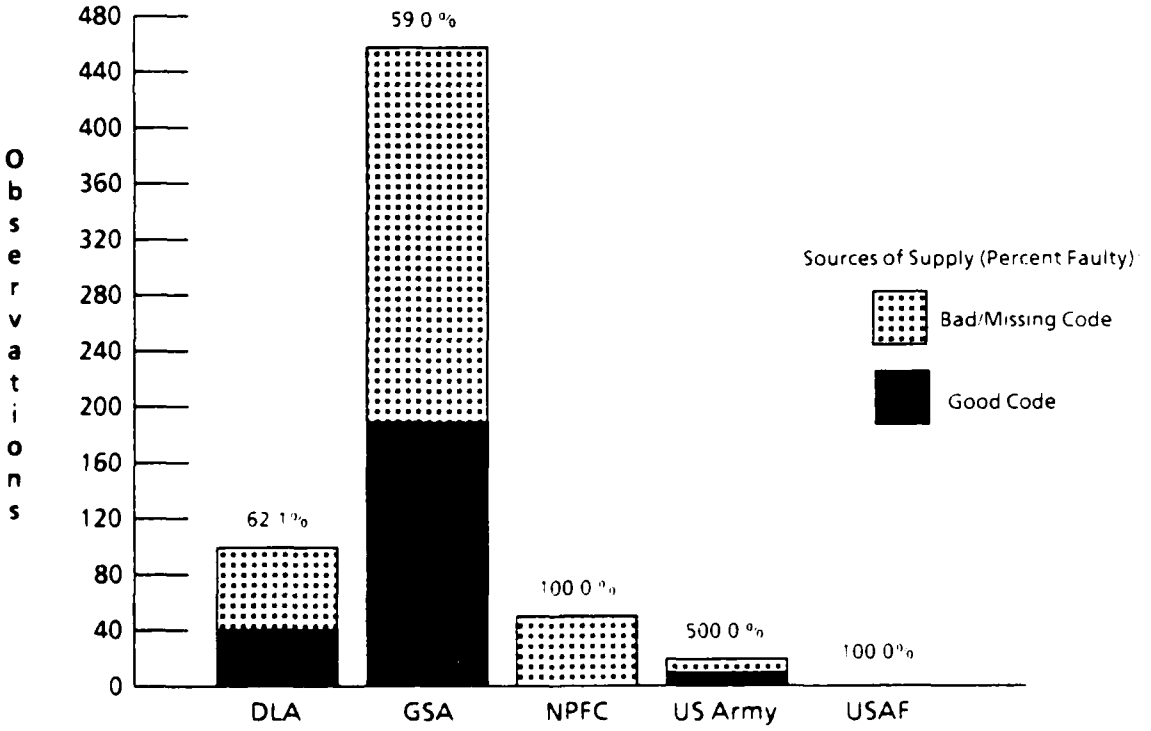

FIG. A-12. OVERALL SAMPLE RESULTS (608 OBSERVATIONS)

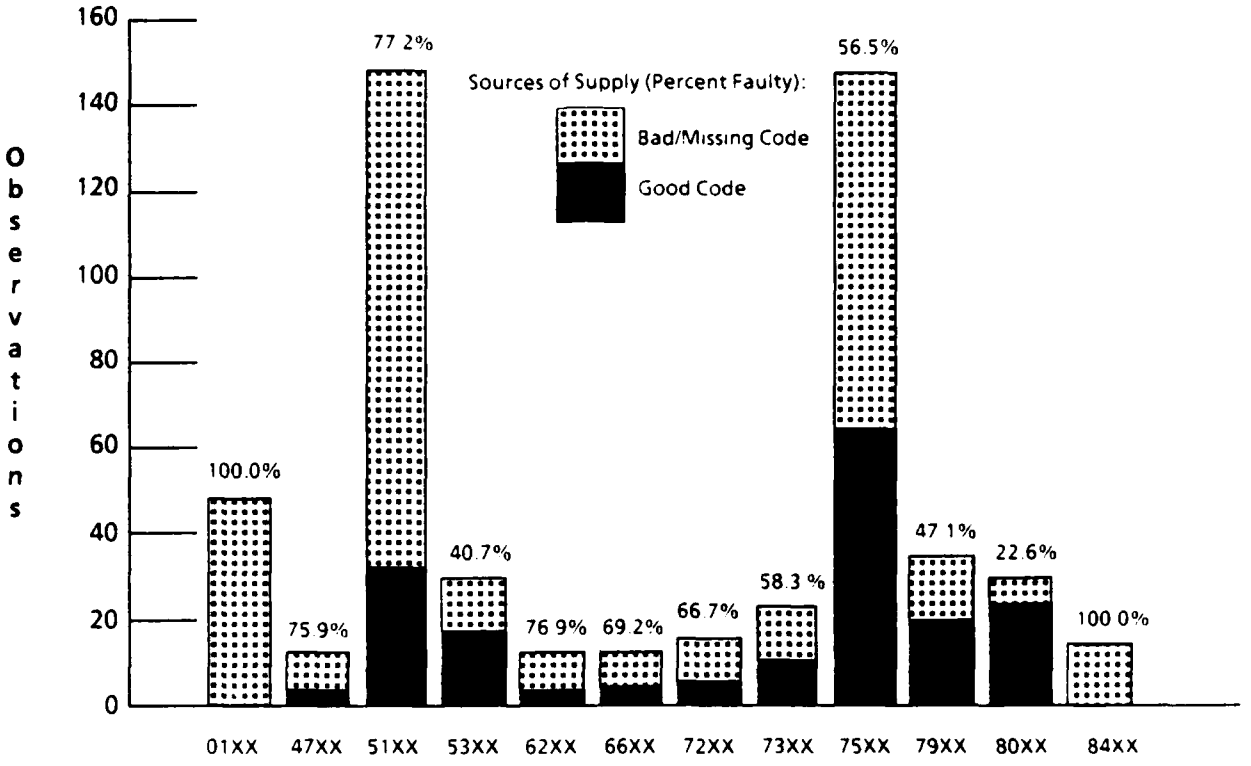

FIG. A-13. STRATIFICATION BY FEDERAL STOCK CLASS (10 OR MORE OBSERVATIONS)

END

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