

## PREFACE

In the spring of 1998, the Army established a Credit and Pricing Integrated Product Team (CPIPT) to recommend a price and credit policy for Single Stock Fund, an initiative to streamline the Army's financial management system for spare parts. The team was composed of representatives from both the Office of the Deputy Chief of Staff for the Army (Logistics and Financial Management) and the Office of the Secretary of the Army (Financial Management and Comptroller).

The CPIPT developed several alternative price and credit policies. RAND Arroyo Center was asked to evaluate these policies under the aegis of the ongoing project "Using Price and Credit Policies to Facilitate Process Improvement," sponsored by LTG John Coburn, Deputy Chief of Staff for Logistics. This documented briefing presents the results of our analysis of the proposed price and credit policies. It was briefed to the GO/SES Level Maintenance (Worldwide) Conference on October 8, 1998.

The research documented here is being conducted in the Military Logistics Program of RAND's Arroyo Center, a federally funded research and development center sponsored by the United States Army. The Military Logistics Program is directed by John Dumond.

Related logistics research is documented in other RAND publications listed in the bibliography. Army readers interested in RAND publications listed there should contact RAND Distribution Services, 310/451-7002 [voice], 310/452-6915 [fax], or e-mail at [order@rand.org](mailto:order@rand.org).

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## SUMMARY

To streamline its financial management system for spare parts, the Army is planning to implement a major initiative called Single Stock Fund (SSF). As part of this implementation, important decisions must be made on the adoption of new price and credit policies for spare parts. The purpose of stock funding is to set up a buyer-supplier relationship between operating units and the Army's wholesale supply system. Logistics customers in operating units receive an Operations and Maintenance Army (OMA) budget to buy spare parts from the wholesale supply system, and they receive credits when they return parts to the wholesale supply system for repair and/or restocking. The Army's wholesale supply system is financed by the Army Working Capital Fund (AWCF).<sup>1</sup> It must cover the cost of maintaining wholesale inventories with the income it receives from sales of parts to logistics customers and maintain a positive cash balance. Thus, price and credit policies affect the supply and repair decisions of logistics customers, as well as the financial health of the wholesale supply system.

In the spring of 1998, the Army established a Credit/Pricing Integrated Product Team (CPIPT) to recommend several alternative pricing and credit policies and a set of criteria by which to assess how these alternatives would affect key Army processes. RAND Arroyo Center was asked to conduct the assessment of these alternatives. This documented briefing presents the results of RAND's analysis of the CPIPT price and credit policy alternatives. We focus on two quantitative criteria. First, the new price and credit policy should enable logistics customers to maintain their current operating tempo (OPTEMPO) without significantly increasing their OMA budget for spare parts. Second, the new policy should not significantly increase the AWCF's costs to replenish wholesale inventories through repair and procurement. An increase in inventory replenishment costs without an equivalent increase in sales revenue would jeopardize the AWCF's ability to break even and maintain its cash balance.

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<sup>1</sup>Currently, AWCF supply management operations are split between the Retail Stock Fund (RSF) and the Wholesale Stock Fund (WSF). The first phase of Single Stock Fund will merge the two stock funds, including installation-level inventories and repair programs currently controlled by the RSF, and incorporate OMA-funded inventories held for redistribution at the installation level.

## CURRENT PRICE AND CREDIT POLICY

Under the Army's current price and credit policy, the price of an Army-managed item is set at the Latest Acquisition Cost (LAC) plus a surcharge to cover supply management operating and overhead costs. The credit an OMA-funded logistics customer receives from the RSF for the return of an item depends on the condition of the item (serviceable or unserviceable),<sup>2</sup> average repair and replacement costs by MATCAT (Materiel Category), and whether the item is needed elsewhere on the installation.<sup>3</sup>

For example, when a serviceable Field-Level Repairable (FLR)<sup>4</sup> is needed elsewhere on the installation, the credit is 100 percent of the original purchase price. If the same FLR is unserviceable and there is a local need for it, the credit is 80 percent. However, if the FLR is not needed in local inventory, the credit is only 5 to 15 percent, regardless of its condition. Thus, a broken item may receive 65 to 75 percent more credit than a usable item, depending on local need at the time the item is returned. For serviceable consumables, OMA customers get 100 percent credit if the item is needed locally, but only 5 to 15 percent credit if it is not.

In general, Depot-Level Repairables (DLRs) garner more credit: 100 percent credit for serviceable DLR returns when the item is needed locally, and 45 to 55 percent credit for both serviceable and unserviceable DLRs when the item is not needed. However, DLRs are usually the most expensive category of stock, and such a large difference in credit (45 to 55 percent of the original purchase price of the

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<sup>2</sup>A "serviceable" item is in working condition and can be issued to another customer. An "unserviceable" item must be repaired before it can be returned to inventory.

<sup>3</sup>Technically, the credit is determined by the net asset position (NAP) of the item, as recorded in SARSS (Standard Army Retail Supply System) by RIC-GEO (Routing Identifier Code–Geographical Area), but most installations have only one RIC-GEO. If the NAP (the number of items of that type in inventory) is below the retention limit, the customer receives a much higher credit than if the NAP is above the retention limit.

<sup>4</sup>Items are categorized as Depot-Level Repairables (DLRs), Field-Level Repairables (FLRs), or consumables. DLRs are defined as items that can only be fully repaired at the wholesale, or depot, level. FLRs are repaired at installations in General Support (GS) or Direct Support (DS) maintenance facilities. Consumables are items that are consumed in use, and cannot be repaired. In practice, however, there are some gray areas between these categories. There are some maintenance tasks on DLRs that can be performed at the GS or DS level, and some items categorized as consumables that are being repaired at installations.

DLR) can have a big impact on the customer's budget (frequently, thousands of dollars).

Current price and credit policies are motivating logistics customers to engage in behavior that saves OMA funds but may not reduce total costs to the Army. For example, the averaging of credit rates by MATCAT (e.g., all tank and automotive equipment) causes installations to select items with below-average repair costs for local repair programs, although local repair costs may not be lower than wholesale repair costs. As a result of these changes in customer behavior, the Army decided to explore the feasibility of implementing improved price and credit policies as part of its Single Stock Fund initiative.

## ALTERNATIVE PRICE AND CREDIT POLICIES

RAND Arroyo Center was asked to evaluate five alternative price and credit policies developed by the CPIPT to address some of the problems with current policy. These alternatives can be summarized as follows:

1. **Dual price.** An exchange pricing system under which the customer would pay the difference between the price and the credit for a purchase accompanied by a return, based on item-by-item repair costs, or full price for a purchase without a return. No credit would be given for unmatched returns (returns without a purchase).
2. **Reduced credit.** Prices and credits would be reduced in parallel, maintaining a net price (price minus credit) equal to repair cost plus surcharge, to reduce the amount of credit issued to customers.
3. **Market price.** A single price would be set for purchases, whether or not they are accompanied by a return, based on market prices for comparable private-sector services. No credit would be given for returns.
4. **Interim policy.** Similar to the current policy, except that credits would be based on item-by-item repair costs and on national need rather than local need.
5. **Dual price+.** Exchange pricing would be implemented as in Dual price, but customers would receive credit for unmatched returns based on condition and item-by-item actual repair costs.

The CPIPT also proposed a set of criteria to evaluate the proposed alternatives. These included financial criteria, such as the impact of

price and credit policies on OMA budgets and AWCF cash balance, and behavioral criteria, such as customer incentives to make appropriate use of installation versus depot repair, local purchase, and redistribution of spare parts outside the AWCF.

This documented briefing focuses on the financial criteria that could be evaluated with available Army data on purchases, returns, and inventories. We estimate the OMA funds that would be needed under each alternative in each of two cases: (1) holding purchases and returns constant and (2) assuming a modest behavioral change by customers. We also estimate changes in AWCF inventory replenishment costs, assuming some behavioral change by customers. (If there is no change in the number of items purchased or returned, AWCF inventory replenishment costs would not change.)

We are not able to estimate the effects of the alternative price and credit policies on the individual behavioral criteria, because Army data do not allow us to estimate potential behavioral changes on an item-by-item basis, nor are detailed data available on the costs of non-AWCF transactions, such as local purchase and redistribution. However, the use of behavioral criteria to develop an optimal price and credit policy is discussed in a forthcoming RAND report entitled *Right Price, Fair Credit: Criteria to Improve Financial Incentives for Army Logistics Decisions*, MR-1150-A, forthcoming.

## RESEARCH RESULTS

Among the CPIPT alternatives, we found that Dual price+ is preferred based on its estimated effects on OMA budgets and AWCF inventory replenishment costs. Its relatively generous credit policy, based on the condition of the item and actual repair and restocking costs at the installation and wholesale levels, reduces the amount of OMA funds needed to make the same purchases and returns observed in the data. When potential behavioral changes by customers are taken into account, OMA budgets are further reduced, even though total purchases increase, because returns are also increasing. The availability of returns is also crucial in keeping AWCF inventory replenishment costs close to their current level, despite increased demands. When serviceable returns are available to redistribute, and unserviceable returns are available to repair, the Army can avoid costly procurements.

The Interim policy is also a viable alternative, in the sense that it requires a lower OMA budget than the current price and credit policy

and it results in only slightly higher AWCF inventory replenishment costs. However, it does not perform as well as Dual price+ because of three important distinctions. First, it bases credits for unserviceable FLRs on wholesale repair costs, which are generally higher than installation repair costs, resulting in higher OMA budgets than Dual price+. Second, it gives no credit for consumables, resulting in higher OMA budgets and higher procurement costs. Third, it gives no credit for items in long supply at the national level, resulting in higher OMA budgets and creating financial incentives for customers to repair and redistribute these items outside the AWCF.

The Dual price and Market price alternatives result in both higher OMA budgets and higher AWCF replenishment costs because of the lack of credits for unmatched returns. Customers require more OMA funding to make up for the lack of credit, and procurement costs increase because returns are not available for repair and redistribution. The Reduced credit alternative does not require higher OMA budgets, because prices and credits are reduced in parallel, but the reduction in credit for unmatched returns is likely to lead to higher procurement costs, because fewer returns will be available for repair and redistribution.

The Army has chosen to implement a modified version of the Interim policy as its initial credit policy for SSF because of concerns about the potential financial impacts of exchange pricing on the AWCF and the cost of developing a system to match purchases with returns.<sup>5</sup> However, a variant of Dual price+ with separate price and credit transactions instead of exchange pricing could be implemented (with current systems) to avoid these problems. The Army could thus get most of the benefits of Dual price+ with implementation costs similar to those for the Interim policy.<sup>6</sup>

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<sup>5</sup>Within the Army there is much disagreement about the field's response to exchange pricing. Many believe that fewer carcasses will be returned if exchange pricing is implemented and that the Army will not be able to recover the price difference between the exchange price and the full price. Others point to the division comptroller's office, where unmatched "recoverables" are carefully monitored. In today's Army, if a carcass is not returned, the installation OMA account is negatively affected. Under exchange pricing, if a carcass were not returned and the price difference not recovered from the OMA account, the AWCF would be negatively affected.

<sup>6</sup>Some members of the Army financial community have expressed concern that the higher credits offered under Dual price+ would deplete AWCF cash balances rather than bringing more transactions back into the AWCF. These concerns could be addressed

The Army could then make a separate decision about whether to implement Dual price+ with exchange pricing as a future SSF price and credit policy. Exchange pricing has the additional advantages of reducing the number of financial transactions and simplifying unit-level financial management. However, its effects on AWCF cash balances and its implementation costs would have to be analyzed.

Finally, some additional refinements to either Interim policy or Dual price+ could increase the benefits to the Army of implementing a new price/credit policy.

Under SSF once wholesale and retail stocks are combined, new policies for identifying and managing items in long supply will be required. These policies should be tailored to the individual item. For example, if the Army has many unserviceable items and few serviceable items of a particular type in its wholesale inventories, the price and credit should be set to encourage customers to return serviceable items in local inventories that can be used as a source for filling demands before unserviceable carcasses are repaired.

Items that are currently being repaired in the field at the GS level should be reviewed to determine if that is the appropriate level for repair. In addition, items being repaired at the Army's depots or by contractors should be studied to determine whether they can be repaired more economically elsewhere.

As will be discussed in the forthcoming *Right Price, Fair Credit: Criteria to Improve Financial Incentives for Army Logistics Decisions*, the Army should review each component of the surcharge and consider direct funding those components not directly related to Army supply management activities. The inclusion of costs that do not vary with supply and repair transactions distorts customers' supply and repair decisions by making the wholesale logistics system seem more expensive than it actually is. In addition, costs that vary on an item-by-item basis, such as transportation and restocking costs, condemnation rates, or losses and obsolescence, should be allocated to individual prices or credit rates on an item-by-item basis, rather than as a percentage of the purchase price.

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by pilot projects that adjusted credits for groups of items to assess the impacts on demands and returns.



## ABBREVIATIONS

ABF	Asset Balance File
ADP	Automated Data Processing
AMC	U.S. Army Materiel Command
AMCOM	U.S. Army Aviation and Missile Command
AMDF	Army Master Data File
ASL	Authorized Stockage List
AWCF	Army Working Capital Fund
BASOPS	Base Operations
CPIPT	Credit/Pricing Integrated Product Team
CTASC	Corps/Theater ADP Service Center
DLA	Defense Logistics Agency
DLR	Depot-Level Repairable
DS	Direct Support
DWCF	Defense Working Capital Fund
EMIS	Executive Management Information System
FEDLOG	Federal Logistics Data
FLR	Field-Level Repairable
FMMC	FORSCOM Materiel Management Center
FORSCOM	U.S. Army Forces Command
FY	Fiscal Year
GS	General Support
GSA	General Services Administration
ILAP	Integrated Logistics Analysis Program
ISM	Integrated Sustainment Maintenance
LAC	Latest Acquisition Cost
MATCAT	Materiel Category

MRC	Materiel Recovery Code
NAP	Net Asset Position
NSN	National Stock Number
NSNMDR	National Stock Number Master Data Record
OMA	Operations and Maintenance, Army
OPTEMPO	Operating Tempo
RIC-GEO	Routing Identifier Code–Geographical Area
RO	Requirements Objective
RPI	Reduced Price Initiative
RSF	Retail Stock Fund
RX	Reparable Exchange
SARSS	Standard Army Retail Supply System
SC	Surcharge
SMA	Supply Management Army
SSF	Single Stock Fund
STARFIARS	Standard Army Financial Inventory Accounting and Reporting System
TRADOC	U.S. Army Training and Doctrine Command
WSF	Wholesale Stock Fund

## Evaluating Five Proposed Alternative Price and Credit Policies for the Army's Credit and Pricing IPT

To streamline its financial management system for spare parts, the Army is planning to implement a major initiative called Single Stock Fund (SSF). As part of this implementation, important decisions must be made on the adoption of new price and credit policies for spare parts. Because price and credit policies influence the behavior of logistics customers in the Army's operating units, they can affect the success of logistics initiatives such as the realignment of local inventories (known as authorized stockage levels, or ASLs), changes in repair programs such as Integrated Sustainment Maintenance (ISM),<sup>7</sup> and the reduction of excess inventories at the wholesale level.

In the spring of 1998, the Army established a Credit/Pricing Integrated Product Team (CPIPT)<sup>8</sup> to recommend several alternative price and credit policies as well as a set of criteria by which to assess their effects

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<sup>7</sup>Under ISM, installation repair facilities bid to become Centers of Excellence for the repair of specific items. The winning installation performs all repairs on that item for other installations in the same region. ISM is intended to reduce the costs and improve the quality of repairs.

<sup>8</sup>The representatives to the CPIPT are listed in Appendix G.

on key Army processes. RAND Arroyo Center was asked to conduct the assessment of the alternatives.

This briefing presents RAND Arroyo Center's evaluation of the proposed pricing and credit policy alternatives. We used the CPIPT criteria to assess how well each alternative supports logistics initiatives, improves business processes, and makes more efficient use of logistics resources.

## In 1992, the Army Changed Its Logistics Financial Management System

- Before 1992**
- Installations did not have to pay for major reparable parts
  - Supply managers received budgets for procurement and repair

- After 1992**
- Installations now receive budgets to buy parts
  - Supply managers must use income from installations to pay for procurement and repair

- 1995**
- The Army adopted Velocity Management
  - Some performance deficits of key logistics processes were traced to financial management

- 1996**
- Financial Management Process Improvement Team (PIT) was chartered to examine how financial policies influence logistics behavior

- 1997**
- The Defense Business Operations Fund was replaced by four working capital funds, one of which is the Army Working Capital Fund (AWCF)

In FY92 both the Army and the Air Force made fundamental changes in the way major reparable parts were provided to operating forces.<sup>9</sup> The purpose of the change was

to create a customer-provider relationship between military operating units and support organizations. This relationship is designed to make managers of support organizations funded through DWCF [Defense Working Capital Fund] and decision-makers at all levels more concerned with the costs of goods and services. Requiring the operating forces to pay for support they receive provides increased assurance that services supplied and paid for are actually needed.<sup>10</sup>

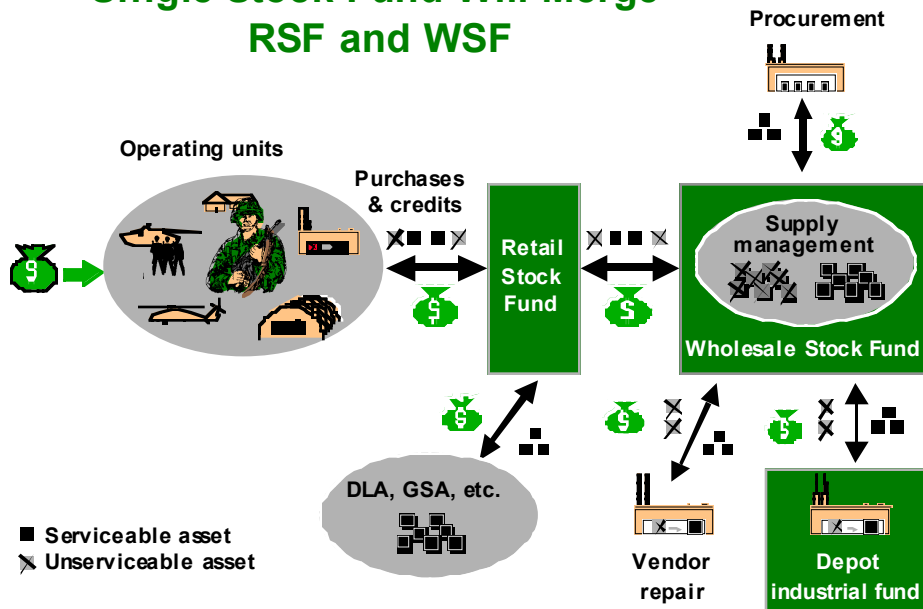
In FY97, DoD decided to give the services and DoD-wide agencies responsibility for their own cash management in separate working capital funds, one of which is the Army Working Capital Fund (AWCF). All these changes in logistics and financial management

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<sup>9</sup>The Navy had adopted a similar funding mechanism in the early 1980s.

<sup>10</sup>*DoD Financial Management Regulation*, Vol. 2B, Chapter 9, "Defense Working Capital Funds Activity Group Analysis," July 1998, p. 9-1.

have significantly affected the way operating units conduct their daily business.

## Single Stock Fund Will Merge RSF and WSF



Under the Army’s implementation of working capital funds, logistics customers in operating units receive a budget for spare parts as part of their Operations and Maintenance, Army (OMA) budget. They use these funds to purchase parts from wholesale suppliers, such as U.S. Army Materiel Command (AMC), the Defense Logistics Agency (DLA), and the General Services Administration (GSA). They receive credits when they return parts in need of repair (unserviceable returns), or parts in working condition that are not needed in local inventories (serviceable returns).

Currently, all parts transactions between OMA-funded logistics customers and wholesale suppliers pass through the Retail Stock Fund (RSF).<sup>11</sup> Purchases pass through the RSF at the same price charged by the wholesale source of supply. However, the RSF issues credits immediately to OMA customers while it awaits credit from wholesale suppliers, and it offers different credit rates than it receives from

<sup>11</sup>Each of the Army’s Major Commands (MACOMs)—such as U.S. Army Forces Command (FORSCOM), U.S. Army Training and Doctrine Command (TRADOC), and U.S. Army Europe (USAREUR)—controls a branch of the RSF. Each installation has a RSF office that maintains an accounting record of all its RSF transactions.

wholesale suppliers. The RSF holds some inventories of supplies to support repair programs and nondivisional logistics customers,<sup>12</sup> and it partially finances installation-level Repairable Exchange (RX) and ISM repair programs.

The Wholesale Stock Fund (WSF) finances AMC's wholesale inventories of depot-level repairables (DLRs), field-level repairables (FLRs), and Army-unique consumables.<sup>13</sup> It uses revenues from sales of spare parts to maintain demand-supported wholesale inventories of parts, by procuring replacements or buying repairs from commercial vendors or from the Army's maintenance depots. Its sales revenues must also cover AMC's operating and overhead costs associated with supply management.

Depot maintenance is financed by the depot maintenance industrial fund. The prices paid by the WSF for depot repairs cover the depot's labor, parts, and overhead costs. The Army's stock funds and industrial funds are collectively known as the Army Working Capital Fund (AWCF). The RSF and the WSF make up the Supply Management Army (SMA) business area of the AWCF. Each business area must be budgeted to break even over the budget period, and the AWCF as a whole must maintain a cash balance to cover 7–10 days of operating expenses (\$1.5 to \$2.1 billion) and 4–6 months of capital disbursements (\$0.5 to \$0.9 billion).<sup>14</sup>

In its first phase, Single Stock Fund (SSF) will combine the operations of the RSF and the WSF, and eliminate the purchase and credit transactions between the two entities. It will also take over OMA-funded inventories of items that are currently held at the installation level for redistribution. AMC will become the owner of the inventories currently financed by the RSF and the inventories held in OMA retention warehouses, and it will reimburse installations for RX and ISM repairs.

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<sup>12</sup>Operating units that form part of the Army's divisions typically have OMA-funded inventories to support their operations. Nondivisional units, such as engineers and military police, are currently supported directly by the installations' RSF.

<sup>13</sup>DLRs are defined as items that can only be fully repaired at the wholesale, or depot, level. FLRs are repaired at installations in General Support (GS) or Direct Support (DS) maintenance facilities. Consumables are items that are consumed in use and cannot be repaired. In practice, however, there are some gray areas between these categories. There are some maintenance tasks on DLRs that can be performed at the GS or DS level, and some items that are categorized as consumables are being repaired at installations.

<sup>14</sup>*DoD Financial Management Regulation*, Vol. 11B, p. 54-16.



The advent of SSF creates an opportunity for the Army to improve its price and credit policies at the interface between OMA-funded customers and AWCF-funded suppliers.

## **Current Price and Credit Policy Needs Improvement**

- ò **Current policy**
  - û **Prices are based on latest acquisition cost (LAC) and surcharge**
  - û **Credits to OMA customers are based on the condition of the item, average repair costs, and local need for the item**
- ò **Customer perspective**
  - û **Customers seek alternative sources of supply and repair**
  - û **Customers redistribute items outside the AWCF**
- ò **Supplier perspective**
  - û **Credits are seen as a source of revenue to OMA customers and a drain on the AWCF**
  - û **AWCF sales decline**
  - û **Cash balances difficult to predict**

Under the Army's current price and credit policy, the price of an Army-managed item is set at the Latest Acquisition Cost (LAC) plus a surcharge to cover supply management operating and overhead costs. The credit an OMA customer receives from the RSF for the return of an item depends on the condition of the item (serviceable or unserviceable), average repair costs by MATCAT (Materiel Category), and whether the item is needed elsewhere on the installation.<sup>15</sup>

Setting credits on the basis of average repair costs over a broad range of items instead of the specific repair costs for the item creates a financial incentive for OMA customers to select items with below-average repair costs for installation repair programs, and to return items with above-average repair costs to the wholesale system.

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<sup>15</sup>Technically, the credit is determined by the Net Asset Position (NAP) of the item, as recorded in SARSS (Standard Army Retail Supply System) by RIC-GEO (Routing Identifier Code-Geographical Area), but most installations have only one RIC-GEO. If the NAP (the number of items of that type in inventory) is below the retention limit, the customer receives a much higher credit than if the NAP is above the retention limit.

Basing credits on local need creates uncertainty for OMA customers. When a serviceable FLR is needed elsewhere on the installation, the credit is 100 percent of the original purchase price. If the same FLR is unserviceable and there is a local need, the credit is 80 percent. However, if the FLR is not needed in local inventory, the credit is only 5 to 15 percent, regardless of its condition. Thus, a broken item may receive 65 to 75 percent more credit than a usable item, depending on local need at the time the item is returned. For serviceable consumables, OMA customers get 100 percent credit if the item is needed locally, but only 5 to 15 percent credit if it is not.

In general, DLRs garner more credit: 100 percent credit for serviceable DLR returns when the item is needed locally, and 45 to 55 percent credit for both serviceable and unserviceable DLRs when the item is not needed. However, DLRs are usually the most expensive category of stock, and such a large difference in credit (45 to 55 percent of the original purchase price of the DLR) can have a big impact on the customer's budget (frequently, thousands of dollars).

Current price and credit policy encourages OMA customers to seek alternative sources of supply and repair and to redistribute items among themselves rather than return them to the AWCF. For example, the ISM program has enabled installations to share their GS repair capabilities and capacities, and to repair more items that would previously have been returned to the wholesale supply system. When DLRs are repaired in the ISM or RX program, customers receive 80 percent credit (when the item is needed locally) rather than 45 to 55 percent credit when DLRs are repaired by the wholesale system.<sup>16</sup> In addition, most installations have set up OMA-funded redistribution centers, which enable them to hold serviceable items no longer needed by one OMA customer for resale to other OMA customers (at 100 percent of the purchase price) rather than returning them to the AWCF for lower credit.<sup>17</sup> Although these activities save OMA funds at the local level, it is not clear that they are cost-effective from an Army-wide

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<sup>16</sup>Many items categorized as DLRs have GS-level repair tasks that can be performed in installation repair facilities if the capability and capacity are available. The alternative is to send the item back to the wholesale supply system for a depot-level overhaul and to buy a replacement.

<sup>17</sup>The OMA savings generated by reselling items through OMA retention facilities typically remain within the division and can be redistributed among units. However, SARSS has been modified to allow redistribution between installations and billing of the receiving customer.

perspective, because installations may be duplicating supply and repair capacity that already exists in the wholesale system.

The expanded repair and redistribution activities by OMA customers cause sales to the AWCF to decline. Since the surcharge is collected as a percentage of sales, it becomes more difficult for the AWCF to recover its operating costs and maintain its cash balance. OMA customers often engage in entrepreneurial behavior to reduce purchases or increase credits, because they can use the additional funds to supplement their OMA budget in chronically underfunded areas, such as Base Operations (BASOPS).

## **We Use CPIPT Performance Criteria to Evaluate the Five Alternatives**

### **Quantitative criteria**

- ò **Impact on OMA budgets**
- ò **Impact on AWCF inventory replenishment costs**

### **Qualitative criteria**

- ò **Customer incentives to make appropriate use of:**
  - û **Installation vs. depot repair**
  - û **Local purchase**
  - û **Redistribution**
- ò **Customer ability to adjust local inventories**
- ò **Reduction of financial uncertainty**

The CPIPT proposed a list of criteria to evaluate the alternative price and credit policies. This briefing will focus on the quantitative criteria. First, the new price and credit policy should allow the Army's operating units to maintain their current operating tempo (OPTEMPO) without significantly increasing their OMA budgets for spare parts. To evaluate this criterion, we calculated the amount of OMA that operating units would need under each price and credit policy to buy the same items they currently buy. We also modeled the sensitivity of demands and returns to changes in prices and credits, and estimated the amount of OMA that would be needed if customers changed their demand patterns.<sup>18</sup>

Second, the new price and credit policy should allow the AWCF (specifically, the SMA business area) to continue to break even and maintain its cash balance. Because of data limitations, we were not able to simulate the day-to-day cash balances of the SSF, but we did estimate cash outflows that would be required to replenish AWCF inventories so that the supply system could continue to meet demands in the

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<sup>18</sup>Our analytic methodology is described in greater detail below.

future. A price and policy that significantly increased AWCF inventory replenishment costs without increasing revenues would make it difficult for the SSF to break even.

The remaining criteria could not be assessed quantitatively, because we do not have sufficient data to predict customer responses to price and credit changes on an item-by-item basis. Based on economic theory, however, customers will have the correct financial incentives to make appropriate use of installation versus depot repair, local purchase, and redistribution when prices and credits reflect the actual costs<sup>19</sup> of supply and repair in the Army's wholesale logistics system. When prices and credits reflect actual costs, customers will have a financial incentive to go outside the Army's wholesale logistics system only when it is less expensive from an Army-wide perspective. Thus, customers will be more likely to use the Army's supply and repair systems as they were designed, rather than developing new supply, repair, and redistribution channels. Keeping transactions within the Army's wholesale logistics system will also improve the financial health of the AWCF.

For example, if credits for unserviceable returns were based on actual repair costs on an item-by-item basis, rather than being averaged by MATCAT, customers would no longer have a financial incentive to develop repair capacity for items with below-average repair costs. The AWCF would also be more likely to break even, because its revenues would be better matched to its costs on an item-by-item basis.

Customers' ability to adjust local inventories depends on the credit policy for serviceable returns. The cost to the Army of a serviceable return is the shipping and handling required to return the item to inventory for reissue to another customer. Thus, the credit for a serviceable return should be the purchase price minus the shipping and handling costs. If credits are lower, customers may not be able to adjust their inventories to meet demands when it would be cost-effective from an Army perspective, and they will have a financial incentive to set up alternative redistribution channels.

Financial uncertainty is created by the current credit policy's dependence on local need for the item, which can change from day to day. Financial uncertainty can be reduced by making credit dependent on national need rather than local need, a basis that does not fluctuate so frequently.

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<sup>19</sup>An economist would call these marginal costs.

## CPIPT Designed Five Alternatives to Address Current Problems

Name	Description
1. Dual price	ò Pay repair cost + surcharge for requisition with return; pay full price for requisition without return; no credit for unmatched returns
2. Reduced credit	ò Lower prices and credits; no credit for consumables
3. Market price	ò Single sales price, no credit; surcharge costs are directly funded
4. Interim policy	ò Current wholesale prices and credits; no credit for consumables or items in long supply
5. Dual price+	ò Same as Interim policy with four modifications: RX repair costs for FLRs, credit for serviceable consumables, nonzero credit for reparable, dual pricing

**All have item-by-item credit and eliminate dependence on local need**

The CPIPT proposed five alternative price and credit policies to address some of the problems with current policy.

Each of the alternatives includes elements that should improve logistics decisionmaking, based on the qualitative criteria. They all base prices and/or credits on item-by-item repair costs rather than MATCAT averages. This policy change should improve OMA customers' repair-versus-buy decisions. The alternatives that offer credit (Reduced credit, Interim policy, and Dual price+) also eliminate the credit rate's dependence on local need and give higher credit for a serviceable return than for an unserviceable return. Greater financial certainty and better reflection of actual costs in credits (or penalties) should motivate OMA customers to return items to the wholesale supply system.<sup>20</sup>

The alternative price and credit policies for DLRs and FLRs are summarized below. (They are described in greater detail in Appendix A.) All of the alternatives retain the current pricing system for

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<sup>20</sup>Serviceable returns are an inexpensive replenishment source for the Army's supply system.

consumables,<sup>21</sup> many of which are non-Army-managed. No alternative except Dual price+ offers credit for consumable returns, whereas Dual price+ offers credit for consumables with a purchase price greater than \$50.<sup>22</sup>

**Alternative 1 (Dual price)**<sup>23</sup> sets the price for a requisition with a return equal to the wholesale repair cost plus the surcharge for DLRs or to the installation repair cost plus the surcharge for FLRs, and the price for a requisition without a return equal to LAC plus the surcharge. However, it gives no credit for serviceable or unserviceable returns without a matching requisition. (We call these “unmatched returns.”)

**Alternative 2 (Reduced credit)** lowers both the price for a requisition and the credit for a return in parallel, from a starting point where prices are based on LAC plus the surcharge and credits are based on LAC minus wholesale repair costs for DLRs and LAC minus installation repair costs for FLRs. The CPIPT envisioned a gradual adjustment process of small price and credit reductions over several years. Credits would be reduced over time in order to reduce the customer’s reliance on credit, and prices would also be reduced to prevent a build-up of cash in the AWCF. For our analysis, we assumed that the ending point of this process would be a reduction in both prices and credits of approximately 25 percent below current levels.

**Alternative 3 (Market price)** establishes a policymaking board to set a “market price” for each item, and offers no credit for returns.<sup>24</sup> It also provides for direct funding of the costs currently covered by the supply management surcharge. As a proxy for the market price, we used the current average of repair and replacement costs based on current return rates.<sup>25</sup> This policy should allow the AWCF to break even, assuming no change in customer behavior.

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<sup>21</sup>Under current policy, the price equals the latest acquisition cost (LAC) plus the surcharge.

<sup>22</sup>Low-value items are not likely to warrant the time, cost, and effort required to return them to the supply system. Thus, it is better to retain them locally for other customers, or dispose of them locally.

<sup>23</sup>Dual pricing is also sometimes referred to as “exchange pricing.”

<sup>24</sup>Wholesale repair prices would be determined by an impartial/independent cost board made up of Army and industry to be comparable with market prices for similar repairs (these prices should, by definition, include industry-standard overhead costs).

<sup>25</sup>In other words, if 80 percent of OMA customer purchases are currently requisitions with returns, and 20 percent are requisitions without returns, the Army could repair to



**Alternative 4 (Interim policy)** is based on the prices and credits that are currently exchanged between the Army's Wholesale and Retail Stock Funds (WSF and RSF). Prices are set at LAC plus the supply management surcharge. Credits are set at LAC for serviceables and LAC minus wholesale repair costs for unserviceable DLRs and FLRs, except for items in long supply at the wholesale level, which receive no credit. Alternative 4 has been proposed as an interim policy for the initial implementation of SSF, until the Army chooses and implements a permanent price and credit policy.

**Alternative 5 (Dual price+)** is similar to Alternative 1 (Dual price) in some respects, and to Alternative 4 (Interim policy) in others. It sets the price for a requisition with a return equal to the repair cost plus the surcharge, and the price for a requisition without a return equal to LAC plus the surcharge. However, it offers a credit of LAC for unmatched serviceable returns and a credit of LAC minus repair cost for unmatched unserviceable returns. It also offers a credit of the original price minus a surcharge (i.e., LAC) for serviceable consumables with a price greater than \$50.

Note that each of the alternatives except Alternative 4 (Interim policy) reduces the price a customer pays for a requisition when a return is expected and reduces the total amount of credit paid to the OMA customer. Reducing the selling price decreases both the amount of money needed in customers' OMA accounts and the cash balance required in the AWCF.

Under the current policy and under Alternative 4 (Interim policy), an OMA customer pays the full price (LAC plus surcharge) for a requisition, and must wait to receive a credit for the return of a matching unserviceable. Under dual pricing (Alternatives 1 and 5), the customer pays the difference between the price and the credit for a requisition with a return, and there is no further financial transaction unless the customer fails to return the carcass within the allowed time period, in which case the customer is assessed a penalty equivalent to the credit. For example, with separate price and credit transactions, an OMA customer might purchase a \$100,000 part, then return an unserviceable carcass and receive a credit of \$50,000 a month later. The customer would have to have the full \$100,000 available in his OMA account and could not spend the \$50,000 credit until the credit

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meet 80 percent of demands, but would have to procure to meet the other 20 percent of demands. The proxy market price, set to reflect average AWCF repair and replacement costs, would be  $.8 * \text{wholesale repair cost} + .2 * \text{LAC}$ . Since we have no data on market repair costs, we use AWCF wholesale repair costs as a proxy.

transaction had closed. Under dual pricing, the customer would only need \$50,000 in his OMA account to pay for a requisition with a return, and there would be no further financial transactions (except a \$50,000 penalty if the carcass was not returned in time). The cash balance in the AWCF would also be lower under dual pricing, because the AWCF would be receiving \$50,000 instead of \$100,000, but it would not have to pay the \$50,000 credit back to the customer.

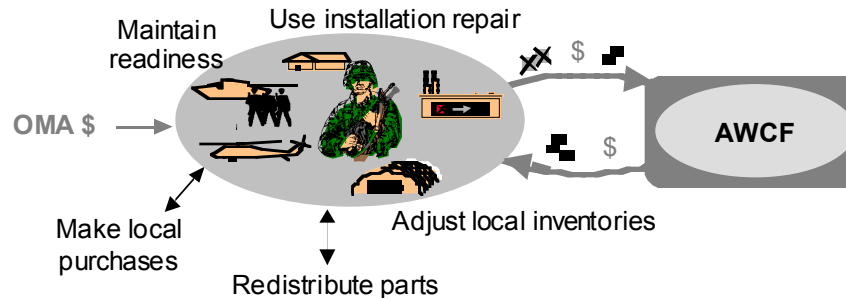
## Research Questions

- ò **How should quantitative criteria be evaluated?**
- ò **Which CPIPT alternatives perform best?**
- ò **How should the best CPIPT alternative be implemented?**

The remainder of this briefing is organized around three research questions. First, we examine how financial policies affect the logistics decisions of OMA customers as well as AWCF cash flows, and discuss how our analysis identifies these effects. Second, based on the results of our analysis, we identify the best CPIPT alternative from the perspective of both the OMA customer and the AWCF. Third, we discuss how the preferred alternative could be implemented but include suggestions for an optimal price and credit policy, which is developed in the forthcoming publication *Right Price, Fair Credit: Criteria to Improve Financial Incentives for Army Logistics Decisions*.

The Appendices contain detailed additional information on the price and credit policies, data sources, OMA expenditures for each alternative, effects on AWCF repair and procurement costs, sensitivity of results of assumptions and data, and simulation model.

## Price and Credit Policies Influence Materiel Flows Through OMA Customer Behavior



- ò If prices increase, customers likely to buy fewer items
- ò If credits decrease, customers likely to return fewer items

As discussed above, OMA customers receive funds to buy spare parts and repairs as part of a broader OMA budget that has an overall objective of maintaining the readiness of troops and equipment and the quality of life for soldiers and their families. Thus, if customers can reduce purchases or increase credits from the AWCF-funded logistics system by finding alternative sources of supply or repair, they can spend these additional OMA funds on training, BASOPS, or other needs.

Many of the OMA customers' transactions with the AWCF-funded supply system are "exchanges," i.e., the purchase of a serviceable item accompanied by the return of an unserviceable item of the same type. In effect, the customer is buying a "repair" from the AWCF. For some items, customers have the capability to repair the item in the installation's repair facilities instead, and may change the types of items they repair in response to price or credit changes.

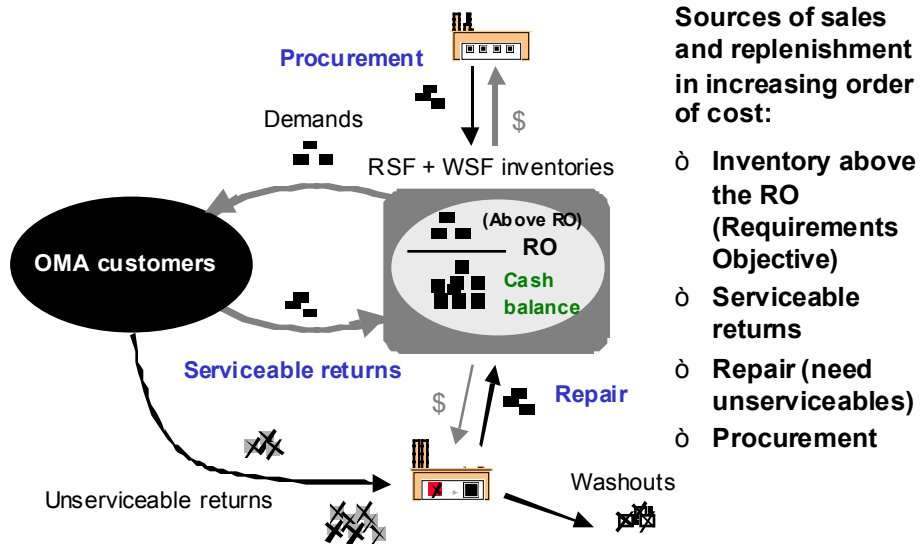
However, because of equipment changes, the need to adjust local inventories to reflect changes in demands, and other reasons, customers also make unmatched purchases, serviceable returns, and unserviceable returns. For consumables, there will only be unmatched purchases and returns, by definition. If items have commercial

equivalents, OMA customers may be able to buy supplies or repairs from local vendors instead of purchasing from the AWCF. If the AWCF offers low credit for serviceable returns, customers may redistribute items between units on the same installation, through the FORSCOM Materiel Management Center (FMMC), or between installations using a new capability that was recently added to SARSS, the Standard Army Retail Supply System.

When OMA customers have alternative sources of supply and repair and other pressing demands on their OMA budgets, they are likely to change their behavior in response to changes in prices and credits offered by the AWCF. Generally speaking, when the price of a particular item goes up, customers are likely to buy fewer of that item. Similarly, when the credit for an item falls, customers will return fewer of that item.<sup>26</sup>

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<sup>26</sup>For a discussion of how Air Force customers have responded to the price and credit policy used in the Air Force Working Capital Fund, see Laura H. Baldwin and Glenn A. Gotz, *Transfer Pricing for Air Force Depot-Level Reparables*, Santa Monica, CA: RAND, MR-808-AF, 1998. This document also has an excellent review of the economics and accounting literature on internal transfer prices.

## Materiel Flows Affect AWCF Inventory Replenishment Costs



The alternative price and credit policies must also be evaluated from the perspective of the AWCF. The AWCF begins the fiscal year with an inventory of serviceable and unserviceable assets for each National Stock Number (NSN) and a cash balance. To model the first phase of SSF, we combined the inventories currently held by the WSF and RSF on each installation, and also added together the desired inventory levels, or Requirements Objectives (ROs).<sup>27</sup>

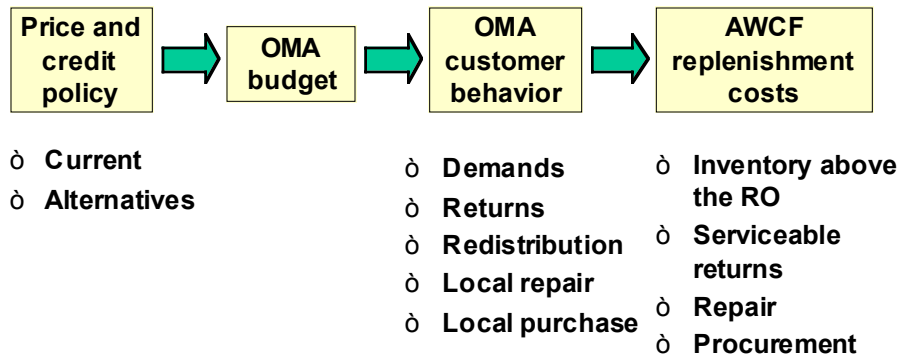
Based on demands, serviceable returns, and unserviceable returns from OMA customers, as well as the starting inventory, the AWCF will have to replenish its inventories. Using up inventories above the RO is the least expensive source of sales, since these inventories do not need to be replenished. Next, the AWCF can resell serviceable returns at a very low net cost to the Army. Third, the AWCF can repair unserviceable assets until it runs out of carcasses. Finally, its most expensive source of replenishment is procurement.

<sup>27</sup> In practice, the Army will probably want to adjust ROs to reflect the better asset visibility that will be available as a result of SSF.

Cash flows to and from OMA customers in the form of sales and credits, together with replenishment costs, determine the net operating result and the cash balance of the AWCF.<sup>28</sup>

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<sup>28</sup>Our analysis estimates only total annual cash flows, rather than weekly or monthly cash balances in the AWCF. Additional data would be required to estimate real-time cash balances, because demands would have to be matched with unserviceable returns under the alternatives using dual pricing.

## Price and Credit Policy Determines Materiel Flows and Replenishment Costs



To summarize, price and credit policies, together with the OMA budget, influence the behavior of the OMA customer. The OMA customer's decisions about when to make demands and returns to the AWCF-funded supply system, and when to use OMA redistribution channels, local repair, and local purchase, determine the materiel flows seen by the AWCF. The AWCF's starting inventory and materiel flows to and from OMA customers then determine the AWCF's repair and procurement costs.



## Army Data Was Used to Quantitatively Evaluate OMA Costs and AWCF Replenishment Costs

### ò OMA costs

- û Used one year of requisitions and returns (OMA-AWCF transactions)
- û Applied price and credit policy

**OMA cost = price \* # requisitions û credit \* # returns**

### ò AWCF replenishment costs

- û Asset balance files show serviceable and unserviceable assets
- û Returns from customers are added to serviceable and unserviceable inventories
- û Requisitions to OMA customers are filled from (in order of preference)
  1. serviceable inventory if available
  2. repair of unserviceable inventory if available
  3. purchase
- û Ending inventory was the same for each alternative

**AWCF repl. cost = LAC \* # purchased + repair cost \* # repaired**

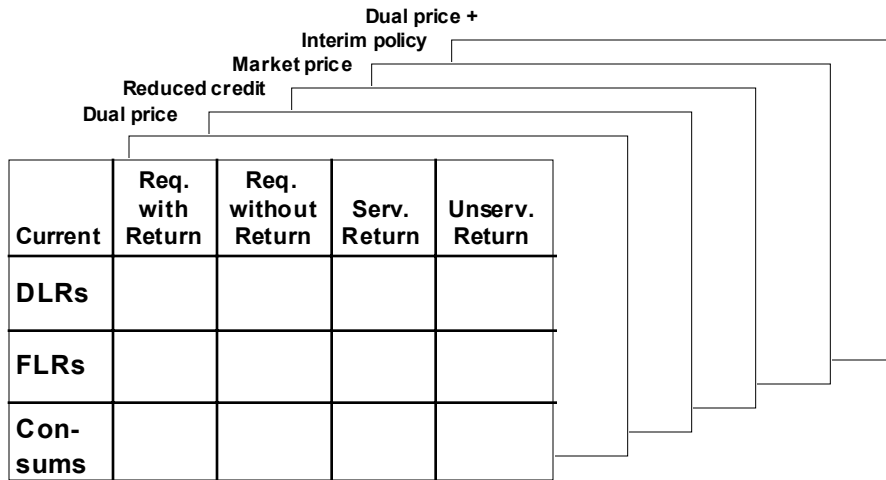
Ideally, each of the alternative price and credit policies should be evaluated quantitatively based on its effects on unit readiness, parts redistribution, local purchases, local inventory, installation repair, etc. However, with available Army data, it was only possible to calculate the required OMA funding levels and the AWCF stockage replenishment costs.

To calculate the required OMA funding levels, we used one year (FY98) of actual requisitions and returns recorded in the Army's supply system—OMA to AWCF transactions. For each alternative, the OMA cost was the sum across all NSNs of the price of the requisitioned NSN multiplied by the total number of requisitions for that NSN minus the credit for the returned NSNs multiplied by the total number of returned items.

The details of calculating the AWCF replenishment costs are a bit more complicated because they require calculating inventory levels and then the quantity of NSNs to be purchased or repaired. These details are fully described in the following pages. However, once the quantities have been determined, the formula for calculating the AWCF replenishment cost is very straightforward. Like the OMA costs, these costs are summed across all NSNs. For each NSN the cost was equal to

the LAC multiplied by the quantity of that NSN that would have been purchased plus the repair cost times the quantity of that NSN that would have been repaired.

## We Calculated the Net OMA Cost of Transactions Under Each Alternative

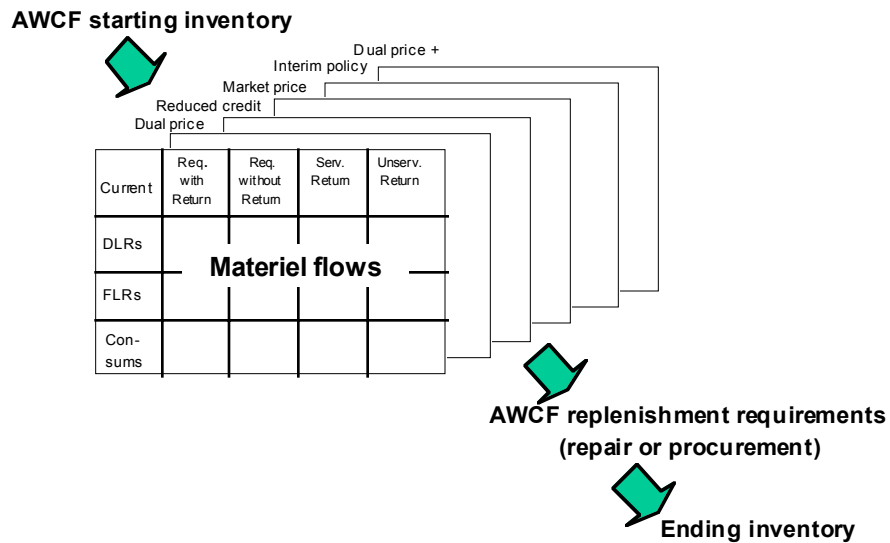


For our analysis, we divided OMA-AWCF transactions into four categories: requisitions with matching unserviceable returns, requisitions without matching returns, serviceable returns, and unserviceable returns without a matching requisition. We also divided NSNs into three categories: DLRs, FLRs,<sup>29</sup> and consumables. (Some category/item combinations are empty, e.g., there are no requisitions with matching unserviceable returns for consumables.)

Using SARSS issues and receipts records, we determined the quantities of demands and returns in each of the four categories for each NSN. We then evaluated the resulting sales and returns under the current price and credit policy and each of the five alternatives. This gives us the total net OMA cost of each alternative.

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<sup>29</sup>Under SSF's National Maintenance Management concept, item managers will determine which NSNs are repaired in installation-level GS repair facilities (FLRs) and which NSNs are repaired at the wholesale level (DLRs). To model this policy, we classified NSNs that are currently repaired in installation-level GS facilities as FLRs, even though some of them are currently coded as DLRs or consumables based on their Materiel Recovery Code (MRC) in the Army Master Data File (AMDF).

## We Simulated Materiel Flows and Calculated AWCF Replenishment Costs for Each Alternative



To calculate the AWCF replenishment costs of each alternative, we used the September 1997 Budget Stratification as the AWCF starting inventory. We subtracted demands and added serviceable returns to the serviceable inventory, and added unserviceable returns to the unserviceable inventory of each NSN under each alternative. We calculated AWCF replenishment costs by first selling inventory above the RO without replacement, then reselling serviceable returns, then repairing unserviceable assets, and finally procuring (after unserviceable carcasses were exhausted).

To compare the alternatives fairly, we required each alternative to reach the same ending inventory of serviceable assets. For each NSN, the ending inventory had to be equal to the starting inventory or the RO, whichever was lower. We used this conservative replenishment policy because some of the ROs were very high relative to the starting serviceable inventories, and it would have been unrealistically expensive to replenish up to these ROs. We also analyzed a more aggressive replenishment policy, but it did not change the ranking of the alternatives (see Appendix D).

## **Cautions on Interpretations of Data and Analysis**

- ò **Using supply data for transactions, not financial data**
- ò **Data from 11 CTASC sites does not represent all demands**
  - û **Missing most TRADOC transactions**
  - û **Missing local purchase, credit card transactions, DLA Electronic Mall**
  - û **Doesn't include National Guard**
- ò **Definition of FLRs**
- ò **Uncertainty with which past behavior predicts future behavior**
- ò **No data or analysis on AWCF cash flows/balance**
- ò **Inventory limited to WSF and RSF assets**

The analysis reported in this document is indicative of the types of changes in OMA customer behavior, OMA budgets, and AWCF inventory replenishment costs that might occur as a result of changes in price and credit policies. (Appendix H describes the simulation model used in the analysis.) However, our results should not be interpreted as total estimates of future OMA and AWCF expenditures, because of a number of shortcomings in the data<sup>30</sup> and resulting limitations on the analysis.

First, our analysis is based on transactions observed in automated supply systems rather than in financial systems. There are a number of reasons why the total number of supply transactions reported in SARSS differs from the total number of financial transactions reported by the RSF. The eleven SARSS CTASC (Corps/Theater ADP Service Center) sites used for our analysis do not represent total Army-wide demands and returns, because many TRADOC installations had converted to SARSS only recently and did not have a year's history of supply transactions in their CTASC records. SARSS does not record

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<sup>30</sup>Appendix B describes the data used in the analysis.

some types of financial transactions, such as local purchases, credit card transactions, and purchases from the DLA Electronic Mall Web site. National Guard transactions are not recorded in either SARSS or the RSF totals, since the National Guard has not yet converted to SARSS, and it transacts directly with the WSF. Since the inventory records from the FY97 Budget Stratification and SARSS ABFs (Asset Balance Files) are likely to be more comprehensive than the supply transaction data, and since we use the least expensive sources of inventory replenishment first, AWCF replenishment costs would be likely to increase more than proportionately if demands were more representative of Army-wide totals.

Second, we define FLRs based on what is currently being repaired in installation RX programs. Some of these items are currently coded as either DLRs<sup>31</sup> or consumables in the AMDF. Under Single Stock Fund, item managers will have greater visibility of the relative costs of repair at the wholesale and installation levels, and they may redefine which items are DLRs, FLRs, and consumables. Any changes in costs or reliability resulting from changes in repair policy cannot be captured by our analysis.

Third, the supply transactions used for the analysis represent a “snapshot” of OMA customer demands and returns. As equipment densities, OPTEMPO rates, and customer behavior change over time, this set of demands and returns becomes less representative of future demands and returns. In particular, we test a variety of assumptions about aggregate changes in customer behavior, but we cannot predict changes in customer behavior on an item-by-item basis, which would be needed for an accurate forecast of OMA budgets and AWCF replenishment costs.

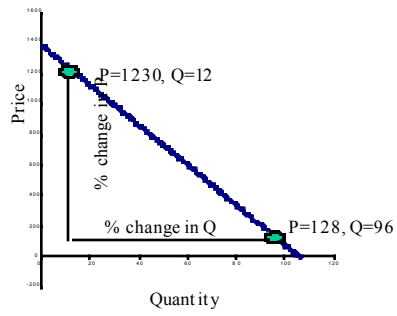
Fourth, our analysis estimates OMA expenditures and AWCF inventory replenishment costs on the basis of total annual transactions. A much more detailed, time-based analysis would be needed to examine AWCF cash flows and cash balances on a monthly or weekly basis. A time-based analysis would require additional data on the timing of OMA purchases and returns and AWCF repair, procurement, and operating costs, and the ability to match purchases and subsequent returns from the same customers to evaluate the alternatives that incorporate dual pricing.

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<sup>31</sup>Installations are permitted to perform certain GS-level repair tasks on items coded as DLRs if they have the capability and the capacity to do so.

Finally, we combine WSF and RSF assets and ROs for this analysis. This represents most of the first stage of implementation of SSF.<sup>32</sup> When these inventories have been combined, the Army is likely to want to adjust SSF ROs and to redefine which items are in long supply relative to combined WSF and RSF inventories, demands, and returns. In future stages, the assets in Authorized Stockage Lists (ASLs) will also be incorporated into SSF, resulting in a different point of sale, a different set of relevant demands and returns, and a more comprehensive inventory included in SSF.

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<sup>32</sup>After this analysis was completed, the Army decided to combine Milestones 1 and 2 of its SSF plan, so that both RSF inventories (Milestone 1) and OMA-funded retention inventories (Milestone 2) would be included in the first stage of implementation.

## Our Analysis Accounts for Assumptions About Customer Behavior



ò Elasticity is defined as:  
% c