



United States General Accounting Office  
Washington, DC 20548

May 21, 2003

The Honorable C.W. Bill Young  
Chairman  
Committee on Appropriations  
House of Representatives

The Honorable Jerry Lewis  
Chairman  
Subcommittee on Defense  
Committee on Appropriations  
House of Representatives

*Subject: Defense Inventory: Air Force Item Manager Views of Repair Parts Issues Consistent With Issues Reported in the Past*

Since 1990 we have consistently identified the Department of Defense's (DOD) management of secondary inventory (spare and repair parts, medical supplies, and other items to support the operating forces) as a high-risk area because inventory levels were too high and management systems and procedures were ineffective. In addition, DOD has attributed readiness problems to parts shortages. Previously, we reported on the wide variety of reasons for inventory of spare parts being above or below the levels needed to satisfy current inventory requirements.<sup>1</sup> This is one in a series of reports addressing defense inventory vulnerabilities to fraud, waste, and abuse. You asked that we specifically obtain the views about defense inventory imbalances from item managers, i.e., those who are responsible for maintaining the right amount of inventory.<sup>2</sup> This report

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<sup>1</sup> U.S. General Accounting Office: *Air Force Inventory: Parts Shortages Are Impacting Operations and Maintenance Effectiveness*, [GAO-01-587](#) (Washington, D.C.: June 27, 2001); *Army Inventory: Parts Shortages Are Impacting Operations and Maintenance Effectiveness*, [GAO-01-772](#) (Washington, D.C.: July 31, 2001); *Navy Inventory: Parts Shortages Are Impacting Operations and Maintenance Effectiveness*, [GAO-01-771](#) (Washington, D.C.: July 31, 2001); *Defense Logistics: Much of the Inventory Exceeds Current Needs*, [GAO/NSIAD-97-71](#) (Washington, D.C.: Feb. 28, 1997); and *Air Force Supply: Management Actions Create Spare Parts Shortages and Operational Problems*, [GAO/NSIAD/AIMD-99-77](#) (Washington, D.C.: Apr. 29, 1999).

<sup>2</sup> Item managers perform materiel management functions such as worldwide item distribution and redistribution, materiel requirements determinations, budget estimates, cataloging, repair programs, and other related functions.

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responds to your request, and other work is being done for you under separate reports that address related issues. Our objective was to obtain from Air Force item managers their views on the reasons for and operational impacts of having repaired parts either above or below the levels needed to satisfy current inventory requirements, and compare them with the reasons and impacts found in our previous reports.

We chose the Air Force for this review because of the large dollar value of repair parts in that service. To respond to your request, we conducted a survey of item managers overseeing 150 sample items—75 items we found to be below requirements (shortage) and 75 items we found to be above requirements (excess)—at the Air Force’s three air logistics centers (ALC) in Ogden, Utah; Oklahoma City, Oklahoma; and Warner Robins, Georgia. We then compared our results with those in our previous reports to determine whether there were any consistencies between the results regarding the reasons for imbalances and their operational impacts. The scope and methodology for our review is discussed at the end of this report.

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## Summary

We found that the reasons and operational impacts item managers cited for our sample items being either above or below the levels needed to satisfy current inventory requirements were similar to the reasons and impacts cited in our prior reports. For shortages, item managers often cited the lack of component parts and repair shop capacity/process problems. In our 1999 report, we discuss the Air Force’s effectiveness in providing inventory items to its customers, and identified component parts shortages as the most frequent cause of aircraft repair work not being done on time.<sup>3</sup> For causes of excess items, the managers often cited a buildup of inventory to support a new program, or for an aircraft retrofit, modification, upgrade, or replacement. In 1997, we reported that a similar reason for inventory items being in excess—purchases made to support a system before it was activated—was common.<sup>4</sup> The operational impacts cited by item managers were also similar to those given in our past work. As in the past, shortages were often cited as a contributing factor to reduced mission capability of aircraft or delays in planned maintenance. In addition, excesses were often cited as contributing to the consumption of warehouse space and related storage costs.

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<sup>3</sup> [GAO/NSIAD/AIMD-99-77](#).

<sup>4</sup> [GAO/NSIAD-97-71](#).

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## Background

Maintenance and repair services for military aircraft are provided by the Air Force's three ALCs in Ogden, Utah; Oklahoma City, Oklahoma; and Warner Robins, Georgia. These centers manage the supply of certain repair parts as well as provide the primary source of repair for broken items that can be repaired and returned to service. As supply managers, the three ALCs manage almost 25,000 different reparable items. Repairs are performed either by the center managing the item, by or with another center, by a contractor, or by another military service. From those 25,000 reparable items, we identified nearly 9,500 items where the same center was both the supply manager and the primary source of repair for an item, and formed the basis for our sample items mentioned above.

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## Reasons for and Impacts of Spare Parts Imbalances Cited by Item Managers Similar to Previously Reported Problems

Item managers responding to our survey provided multiple reasons and operational impacts for our sample items being either above or below the levels needed to satisfy current inventory requirements that were similar to the reasons and impacts cited in our prior reports. Item managers' reasons for spare parts shortages were similar to past problems, and in roughly the same order of magnitude as previously reported. The reasons for spare parts excesses, and the operational impacts of spare parts imbalances, were also similar to those identified in our previous reports.

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## Item Managers' Reasons for Spare Parts Shortages Reflect Similar Problems of the Past

Item managers provided similar reasons for shortages among our sample items in about the same order of magnitude as we have previously reported. Table 1 lists categories of the most frequently cited reasons provided by item managers for inventory shortages among our sample items. Many of the reasons shown in the table may be caused by unanticipated demands for parts, which is one of the primary reasons for parts shortages cited in our 2001 report on the reasons for and impacts of spare parts shortages on three selected Air Force systems.<sup>5</sup>

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<sup>5</sup> [GAO-01-587](#).

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**Table 1: Item Manager Reasons for Repairable Parts Shortages**

<b>Reason</b>	<b>Number of responses<sup>a</sup></b>
Lack of component parts to complete the repairs	42
Repair shop process and/or capacity problems	41
Higher than expected condemnation rates of the part	9
Broken items in the field not turned in to depot for repairs	7
Rarely used item	4
Funding constraints	4

Source: GAO survey of Air Force item managers.

<sup>a</sup>The response total exceeds the 75 shortage sample item total due to multiple reasons received from item managers.

### Lack of Component Parts

Air Force item managers, along with our prior work, indicate that the most frequent reason for repair parts shortages is the lack of component parts. These are the individual parts used to fix other spare parts. For example, item managers cited a shortage of rotors and backing plates needed to fix the brakes for the KC-135 and C-130 aircraft. Similarly, in our 1999 report discussing the Air Force's effectiveness in providing inventory items to its customers, we found that component parts shortages were the major cause of aircraft repair work not being done on time.<sup>6</sup> We noted in that report that there was a lack of several component parts, sometimes for more than a year, for two radio band transmitters used in the B-1B aircraft. Also, our 2001 report indicated that unanticipated demands for a machine bolt on an aircraft engine caused a lack of component parts.

### Repair Shop Process and/or Capacity Problems

Parts shortages due to various shop process and/or shop capacity problems were noted by both the item managers in our current review as well as being an issue in prior reports. Shop process problems include broken machines, a lack of personnel or experienced personnel, or the process repaired the part the wrong way. For example, an inoperable machine held up the repair of a high-pressure turbine rotor used in aircraft engines. In another example, the existing repair process presented safety issues and a new process was being developed to replace it. Shop capacity problems are generally related to space constraints—such as for the lack of space needed to repair an F-15 aircraft wing assembly—or for competing demands for the same equipment or space. Furthermore, item managers indicated that 13 of our selected 75 sample items had both shop

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<sup>6</sup> [GAO/NSIAD/AIMD-99-77](#).

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process and shop capacity problems. For example, the repair of an F-15 countermeasure receiver was delayed due to a lack of testing equipment (shop capacity) as well as a lengthy repair process that was being reviewed to cut down on the repair time (shop process). Similar issues, such as the lack of testing equipment and limited repair facility capacity, were reported in our 2001 report.

As mentioned above, the most frequently cited reason for repair parts shortages in the 2001 report was unanticipated demands, such as the sudden demand for a part after no demands for 7 years. Two of the sample items that item managers identified from our current sample as having shop process and capacity issues had these problems due to unanticipated demands. For example, an electronic countermeasure control device for the B-52 and C-130 aircraft experienced a surge in demands after the September 11, 2001, terrorist attacks. The repair facility did not have the floor space to keep up with demand for this part.

#### Higher Than Expected Condemnation Rates

Both the current review and prior reports contained instances of either higher than expected condemnation rates or component reliability problems that created parts shortages. Repair parts can only be repaired so many times before they can no longer be repaired, and then they are “condemned” as beyond repair. Anticipated condemnation rates are formed from either engineering estimates or repair records.

In our review, item managers said that shortages of a C-130 aircraft ballscrew assembly stemmed from very high condemnations for the last 3 years. Sometimes the higher condemnation rate was for a component part of our sample item, and not the sample item itself. For example, item managers said that a piston in a retractable landing gear experienced a high condemnation rate, and, in another example, a roll pin encountering high condemnations created a shortage for a C-5 aircraft landing gear strut. Although our 2001 report did not indicate higher than expected condemnation rates that led to parts shortages, it did report that the life of some parts was shorter than the Air Force predicted. For example, a skid detector for the C-5 aircraft failed faster than expected, experiencing a 50-percent increase in failures that exhausted the parts in stock before they could be replaced.<sup>7</sup>

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<sup>7</sup> [GAO-01-587](#).

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## Other Reasons for Shortages

The remaining three reasons in the above table represent more of the variety of reasons contributing to parts shortages. In some cases, item managers indicated that units in the field would keep broken items to be used as spare parts to fix other broken parts. These broken items not turned in to the repair facility for repair involve different items, such as a circuit card assembly for a jammer in the F-15 aircraft, a turbine nozzle for aircraft engines, and a B-1B aircraft rudder. Rarely used items are those experiencing little or no demand, as in the case cited by an item manager of no demand in 2 years for a test system's circuit card assembly. Funding constraints represented another reason for parts shortages. For example, the lack of funds to increase the repair rate of an aircraft engine's compression rotors created a shortage of this item.

Our prior reports in 1999 and 2001 contained examples of unanticipated demands (for example, no demands since 1993) causing parts shortages, or repairs not being done when needed due to the lack of broken parts returned from units in the field. One issue reported to some degree by both our 1999 and 2001 reports that did not surface as an issue in our current review was the transfer of repair work to current Air Force repair facilities due to the closure of some Air Force repair facilities. Some operational, personnel, and productivity problems experienced during that closure were not specifically cited by item managers during our current review as a factor influencing parts shortages.

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## Reasons for Excess Parts also Identified in Previous GAO reports

Item managers provided a variety of reasons for repair parts excesses among our sample items that were similar to those identified in our previous reports. Table 2 lists categories of the most frequently cited reasons for inventory excesses.

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**Table 2: Item Manager Reasons for Repairable Parts Excesses**

Reason	Number of responses <sup>a</sup>
Buildup of repair parts to support a new program or for a retrofit, modification, upgrade or replacement	23
Foreign Military Sales program requirements	8
Low or decreasing demand for a part	6
Retirement or phasing out of an aircraft	5
Other	18

Source: GAO survey of Air Force item managers.

<sup>a</sup>The number of reasons is lower than our 75 excess sample items because a number of item managers responded that there were some items that were not in an excess condition.

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The predominant reason for excesses cited by item managers was the inventory buildup of repair parts to anticipate the future support for a new program or for major changes in an existing program. This is similar to our 1997 report where we reported that a common reason for inventory items being in excess was purchases made to support a system before it was activated.<sup>8</sup>

Foreign Military Sales program requirements or potential requirements are cited as a contributing factor for excesses eight times. Item managers told us that the Air Force stocks and services some reparable items that are used to support systems sold to or anticipated to be sold to other countries. These items include various radio items such as receivers and transmitters for the F-111, and disk brakes for the F-16. Our 1997 report indicated unneeded quantities in inventory for the wiring harness of an airborne radio communication system. Although demand for this harness decreased as modifications to the radio system were made, quantities were being retained to support the military services, the Coast Guard, and foreign military sales and to reconfigure other radios.

The most common reason cited in 1997—demands for an item decreased or did not materialize—echoes our third most commonly cited reason, low or decreasing demand for a part. Aircraft or system retirement was cited as the third most common reason for excesses in 1997 and is fourth in our current analysis.

Other reasons affecting only one or two of our sample items include a repair made that was not required, program changes, or an item becoming a throwaway item instead of one that would typically be repaired.

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### Impacts Cited by Item Managers Similar to Our Past Work

Item managers cited operational impacts from the inventory imbalances that were similar to impacts cited in our past reports. Sometimes there was more than a single impact for some individual items. Of the 75 shortage sample items, 38 had more than one impact cited by item managers and there was no impact cited for 16 items. Of the 75 excess sample items, item managers cited no impact for 40 items.

One of the most frequently cited (41 cases) operational impacts of repair parts shortages provided by item managers was some form of mission

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<sup>8</sup> [GAO/NSIAD-97-71](#).

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impairment at one time or another that kept a weapon system from performing its mission. For example, the previously mentioned shortage of rotors and backing plates needed to fix the brakes for the KC-135 and C-130 aircraft due to a lack of component parts caused both aircraft to be unavailable for flying. Although in our 2001 report we selected all sample items from three Air Force systems because each item caused mission capability problems, the causes of many of these problems—such as unanticipated demands, parts production problems, or component reliability—were similar.<sup>9</sup>

Item managers cited 14 parts shortages that led to delays in planned maintenance. For example, one ALC was always behind in providing C-5 aircraft retractable landing gears for the scheduled maintenance lines. In our 1999 report, repairs not being done when needed were cited as an impact of component parts shortages.<sup>10</sup> In 54 cases, item managers cited unfilled or empty stock levels resulting from parts shortages, thus contributing to the ALC's inability to meet the stocking requirements for the aircraft or system it serviced. For example, one center had no shelf supply of a retractable landing gear for the B-52 bomber.

Air Force item managers did not cite nearly as many impacts of parts excesses. However, in 28 cases item managers cited the consumption of warehouse space for parts that were in excess of inventory requirements. While some item managers cited space problems, others cited the related costs associated with storing excess items. Among a number of items in these categories are engine blades and shafts, landing gear pistons, C-141 aircraft rear access doors, and B-52 bomber electronic warfare circuit cards. What is not clear from item manager survey responses, however, is how these warehousing space and cost issues would be any different if the quantities of the item had not exceeded repair requirements.

Eight other items contained miscellaneous impacts, such as two items needing fewer repairs than expected, namely the ignition component of an aircraft engine and the F-16 aircraft's radar signal processor.

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## Agency Comments

In written comments on a draft of this report, DOD stated that it generally concurred with the draft report. DOD's comments can be found in enclosure I.

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<sup>9</sup> [GAO-01-587](#).

<sup>10</sup> [GAO/NSIAD/AIMD-99-77](#).

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## Scope and Methodology

To identify reasons repaired parts are in a short or excess condition (by comparing available worldwide assets to worldwide requirements at one point in time), we selected 25 items of each type from those repair parts both supplied and repaired at each of the following ALCs: Ogden, Ogden, Utah; Oklahoma City, Oklahoma City, Oklahoma; and Warner Robins, Warner Robins, Georgia. For each group of 25 items, we selected 20 items from among the highest dollar value of shortages or excesses. The other five items in each group were selected randomly. Using a structured questionnaire, we held on-site discussions for this 150-item sample with 86 item managers to identify reasons for and operational impacts of the excesses and shortages, among other points. We looked at collaborating data obtained via the questionnaire to assure ourselves that other factors, such as production data and procurement history, did not conflict with the reason and impact data. We did not independently verify the responses we received from item managers. We also reviewed our past work to determine if similar reasons were previously identified for shortages and excesses.

We also met with officials of the Air Force Materiel Command, Wright Patterson Air Force Base, Dayton, Ohio.

We performed our work from November 2001 through February 2003 in accordance with generally accepted government auditing standards.

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We are sending copies of this report to the Honorable Donald Rumsfeld, Secretary of Defense, and interested congressional committees. The report will also be available at no charge on GAO's Web site at <http://www.gao.gov>.

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We appreciate the opportunity to be of assistance. If you or your staff have any questions regarding this letter, please contact me at (202) 512-8365 or Lawson “Rick” Gist, Jr., Assistant Director, at (202) 512-4478. Other key contributors to this review were Gerald Thompson, Jay Willer, and R.K. Wild.

A handwritten signature in black ink, appearing to read "W. Solis". The signature is fluid and cursive, with a large initial "W" and a distinct "S" at the end.

William M. Solis, Director  
Defense Capabilities and Management

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# Enclosure I: Comments from the Department of Defense

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DEPUTY UNDER SECRETARY OF DEFENSE FOR  
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MAY 13 2003

Mr. William Solis  
Director, Defense Capabilities  
and Management  
U.S. General Accounting Office  
441 G Street, N.W.  
Washington, DC 20548

Dear Mr. Solis:

This is the Department of Defense (DoD) response to the GAO draft report, "DEFENSE INVENTORY: Air Force Item Manager Views of Repair Parts Issues Consistent With Issues Reported in the Past," dated May 6, 2003 (GAO Code 350115/GAO-03-684R). The DoD generally concurs with the draft report.

The DoD appreciates the opportunity to comment on the draft report.

Sincerely,

  
for Diane K. Morales



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