DEFENSE DEPOT MAINTENANCE

DOD Shifting More Workload for New Weapon Systems to the Private Sector

March 1998

GAO/NSIAD-98-8
Congressional Requesters

The Department of Defense (DOD) has a policy calling for greater reliance on the private sector for maintenance of its weapon systems. This policy includes a preference for contractors to provide total logistics support for new weapon systems within the limits of existing legislative requirements. As requested, this report addresses (1) DOD’s policy and implementation plans for allocating depot-repair workloads for new and upgraded weapon systems between the public and private sectors and (2) the process it uses to make source-of-repair decisions.

Background

This is one in a series of reports (see related GAO products at the end of this report) addressing DOD’s depot maintenance policies, outsourcing plans, depot closures, and the allocation of work between the public and private sectors. This report analyzes the process DOD is using to determine depot maintenance repair strategies for its new weapon systems and major upgrades.

Depot maintenance is a key part of the total DOD logistics system that helps to support the readiness and sustainability requirements of thousands of major weapon systems and millions of equipment items. Depot maintenance requires extensive shop facilities, specialized equipment, and highly skilled technical and engineering personnel to perform major repairs, overhauls, and modifications of weapons and components. In fiscal year 1997, DOD spent a reported $12 billion on depot maintenance, which is done by both public military depots and private sector contractors.

Congress and DOD have had an ongoing debate concerning the size, composition, and allocation of depot maintenance workload between the public and private sectors. DOD’s management policies and plans continue to evolve as it seeks to make greater use of private sector repair capabilities while responding to congressional direction. Provisions included in the National Defense Authorization Act for Fiscal Year 1998 provided further guidance from Congress regarding how DOD’s depot maintenance program should be conducted. Finally, the recently
announced Defense Reform Initiatives are likely to further impact DOD’s management of this program.¹

Depot Maintenance Policy Debate

In recent years, DOD advisory groups and officials have called for contracting out more depot maintenance work to the private sector. In its May 1995 report, “Directions for Defense,” the Commission on Roles and Missions (CORM) recommended that DOD move away from its current reliance on public depots, in part, by outsourcing all work on new weapon systems. The Defense Science Board (DSB), in a series of studies,² also called for increased outsourcing, noting that DOD should get out of the materiel management, distribution, and repair business by expanding contractor logistics support to all fielded weapon systems.

The CORM and DSB studies estimated that outsourcing in a competitive environment could reduce depot maintenance costs by 20 to 40 percent. Based on findings of these reports, DOD has opted for a greater use of private sector capabilities as a vehicle for achieving savings in support operations that could be used for weapon system modernization. Our reviews of these studies have found that, while there are opportunities to reduce the costs of DOD’s logistics programs through such competitions, projected cost savings by the CORM and DSB were overstated.³

In March 1996, DOD issued a new regulation⁴ containing the policies and procedures for buying and supporting new weapon systems. The regulation stated that new systems and major upgrade programs “shall maximize the use of contractor provided, long-term, total life-cycle logistics support that combines depot-level maintenance along with wholesale and selected retail materiel management functions.” The regulation further stated that program officials must obtain a waiver if

¹Reform initiatives call for (1) reengineering support activities to adopt best private sector business practices, (2) consolidating defense management and support organizations, (3) eliminating excess infrastructure through base closure and privatization, and (4) competing many more business functions now performed in-house.


⁴DOD 5000.2-R, “Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs.”
they wanted to use public support facilities. The regulation was revised in October 1997 to remove the waiver requirement.

In April 1996, DOD issued its Policy Report Regarding Performance of Depot-Level Maintenance and Repair. This report, which was developed and submitted to Congress as required by the National Defense Authorization Act for Fiscal Year 1996, set forth DOD’s plans to support new and upgraded weapon systems in the private sector. The 1996 Authorization Act directed DOD to develop comprehensive depot policies with the goal of eliminating legislative restrictions related to depot maintenance workload allocations. DOD’s report endorsed the repeal of the provision in 10 U.S.C. 2466, which at the time limited private-sector depot maintenance funding to 40 percent of total annual depot maintenance funding (a provision commonly referred to as the 60/40 rule). DOD’s report also envisioned a reduction in workloads needed to retain public depot core capabilities as required by 10 U.S.C. 2464. Core is defined by DOD as the capabilities that DOD depots must retain to ensure a ready and controlled source of repair to meet certain essential wartime demands, promote competition, and sustain institutional expertise.

Congress did not respond favorably to DOD’s report. The House National Security Committee noted that the report did not go far enough in identifying core capabilities and, therefore, what must absolutely remain in-house. The Senate Armed Services Committee found DOD’s report was not responsive to congressional requirements and that the section in the March 1996 regulation regarding depot support for new weapon systems was inconsistent with current law and possibly inconsistent with national security interests. The committees also criticized DOD for not allowing public depots to compete for non-core work. Congress did not repeal the 60/40 requirement at that time.

Fiscal Year 1998 Authorization Act Contains Changes to Depot Maintenance Legislation

The 1998 Defense Authorization Act provides changes to various depot maintenance requirements. In summary, the act:

- Provides for a new section 2460 in title 10 of the U.S. Code, which for the first time would establish a statutory definition of depot-level maintenance and repair. The definition includes depot-level work performed under interim and contractor logistics support arrangements, other similar

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contractor support arrangements, the installation of some modifications and upgrades, and certain software maintenance. It excludes the procurement of major system upgrades and safety modifications.

- Amends 10 U.S.C. 2464 to provide for a DOD-maintained core logistics capability that is required to be government owned and operated. The provision requires that the core capability include the capabilities that are necessary for repairing new systems identified as requiring a core capability (except special access programs, nuclear carriers, and commercial items) within 4 years of the system's achieving initial operational capability.
- Amends 10 U.S.C. 2466 to allow DOD to use up to 50 percent of its depot maintenance funds for private sector performance of the work.
- Provides for a new section 2469a in title 10 of the U.S. Code containing special processes and procedures to be used in conducting competitions for depot maintenance workloads at the closing San Antonio, Texas, and Sacramento, California, depots.
- Provides for a new section 2474 in title 10 of the U.S. Code requiring the Secretary of Defense to designate DOD depot-level activities as centers of industrial and technical excellence, adopt best business practices to improve their efficiency and cost-effectiveness, and provide for public-private partnerships at these activities.

Provisions in the 1998 Authorization Act could significantly affect the issues discussed in this report. A DOD team has begun evaluating potential changes to core policies and depot workload allocations required by the act. These could include revising the definition and composition of workloads required to be maintained in the public depots as well as the methodology for allocating specific maintenance workloads between the public and private sectors. At the same time, DOD continues to propose policy initiatives calling for increased use of contractor logistics support for the life of new systems and fewer depot maintenance activities performed in-house.

Results in Brief

Overall, our work shows that DOD is moving to greater reliance on the private sector for depot support of new weapon systems and major upgrades. This condition reflects DOD’s shift from past policies and practices, which generally preferred the public sector. DOD officials say that the Department is doing this within the framework of existing legislative requirements, while seeking legislative changes that would allow it to make greater use of the private sector. We found that in those programs where source-of-repair decisions have been made or where a
specific source of repair is being strongly favored, these determinations were not always well supported. Further, weaknesses existed in guidance for implementing the decision-making process.

Specifically, our work shows that:

- Of 71 new system acquisition programs reviewed, 46 programs, or about 65 percent, have made a source-of-repair decision or are strongly leaning toward one sector or the other. Of the 46 programs, 33 (about 72 percent) are selecting the private sector for most repairs and 13 are selecting the public sector. The other programs reviewed have either selected a mixed workload utilizing both public and private sectors (12 programs) or are undecided (13 programs).

- Uncertainty and unresolved issues related to DOD policy guidance, core capabilities (workloads that must be kept in the public depots), and DOD’s belief there may be changes in legislation relating to depot workload allocation have caused several of the large acquisition programs to defer long-term support decisions. In lieu of making a decision, these programs were opting for some type of interim contractor support arrangement that places initial support responsibilities with the original equipment manufacturers. For example, the C-17 has deferred life-cycle support decisions until 2003 or later and will rely on the prime contractor for almost all logistics support and systems management tasks until then.

- Significant weaknesses exist in DOD’s implementation of the decision-making process for determining depot-maintenance strategies for new systems. Our review of programs where source-of-repair decisions have been made showed that key factors were not always taken into account during the decision process nor, when they were, were they always consistently applied across programs. For example, cost comparisons between public and private support options were not always done as required or were inconclusive. Also, many managers were unsure how or whether to consider other factors, particularly core capability requirements. Further, programs differed in the extent to which they coordinated with logistics officials, who are responsible for logistics operations once the systems are fielded. Inconsistencies in the decision-making process are partly attributable to changing and contradictory guidance for making source-of-repair decisions and uncertainties regarding public depot core capability requirements. DOD revised its primary guidance in October 1997 and continues to examine other possible changes.
Greater Use Is Being Made of Private Sector Capabilities, but Some Major Decisions Are Still Pending

Survey results from 71 new and upgraded weapon systems showed that, consistent with DOD’s policy change, programs are deciding or leaning toward having the private sector perform most of the depot maintenance. The policy change is a clear shift from past experience, where programs leaned more toward public-sector maintenance strategies. Also, source-of-repair decisions for a number of new major programs, such as the C-17, F-22, and F/A-18E/F aircraft and the Comanche helicopter, have not been finalized or are pending. These are large acquisition programs and therefore represent large future depot maintenance workloads regardless of whether they are performed in the public or private sector.

Planning Leans Toward Greater Use of the Private Sector

As a general rule, life-cycle maintenance costs for new systems are estimated at twice the system’s acquisition cost. We initially inquired about the depot support plans for the 88 new weapon systems and major upgrades that are generally the largest in DOD in terms of estimated acquisition cost. Based on responses to our inquiry, our analysis focuses on the plans for 71 of these programs as summarized in table 1. (Of the remaining 17 programs, we did not receive responses from 8; 7 other programs are expected to have no or negligible depot maintenance, according to DOD officials; and plans were not yet developed for 2.)

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6Eighty-four programs were classified by DOD as major defense acquisition programs as of October 28, 1996. A program is designated as major when estimated by the Under Secretary of Defense for Acquisition and Technology to eventually cost more than $355 million for research, development, test, and evaluation or more than $2.135 billion for procurement (in fiscal year 1996 constant dollars), or when so designated by the Under Secretary. Four programs were designated as pre-major programs that may eventually become major defense acquisition programs.

7Six of the eight programs that did not respond were among the smaller programs in terms of total acquisition cost. Two of the 8—the LPD-17 assault ship and the Theater High Altitude Defense System—were among the higher cost programs but not in the top 10.
Table 1: Reported Major Systems Source of Repair Decisions (as of June 1997)

<table>
<thead>
<tr>
<th>Service</th>
<th>Firm or leaning to public sector</th>
<th>Mixed public and private sectors</th>
<th>Firm or leaning to private sector</th>
<th>Undecided</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Army</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Navy</td>
<td>2</td>
<td>4</td>
<td>13</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>Air Force</td>
<td>4</td>
<td>3</td>
<td>13</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>DOD/BMDO(^a)</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Total programs</td>
<td>13</td>
<td>12</td>
<td>33</td>
<td>13</td>
<td>71</td>
</tr>
</tbody>
</table>

Percent of total 18% 17% 47% 18%

Note: In this table, we define “firm or leaning to” as meaning that a program has officially decided or has indicated a decided preference for either the public DOD depots or private contractor sources for the clear preponderance (two-thirds or more) of its depot workload. This does not mean that a program will rely exclusively on that sector.

\(^a\)“Mixed” means a program plans to place significant workloads in both sectors or indicated such but did not provide sufficient detail to determine whether one sector will predominate.

\(^b\)DOD/BMDO programs are centrally managed by DOD or the Ballistic Missile Defense Organization (BMDO).

As shown above, 33 of the 46 programs that have made firm source-of-repair decisions, or are strongly leaning toward either the public or private sector, have selected the private sector for most repairs. If Army programs are not considered, 31 of 37 Navy, Air Force, DOD, and BMDO programs have decided or are strongly leaning toward the private sector. In contrast, the Army data suggests that it plans to support relatively more programs in its depots. More of the Army programs involve upgrades to existing systems and officials reported that they generally plan to use current sources of support. We note, however, that during the periods of modification, the Army currently plans to have the contractors do much of the depot maintenance concurrent with the upgrade programs.

Excluding the 13 undecided programs, table 1 also shows that program managers for more than three-fourths (45 of 58) of new major systems and upgrades have decided or are leaning toward having the private sector handle most maintenance or are employing mixed (both private and public) sources of repair. Relatively few programs —13 of 58— plan to rely on DOD depots for the bulk of support.

It should be noted that our analysis above represents numbers of new systems, not the dollar value of their depot workloads. In most cases, programs did not provide sufficient detail to quantify projected future
workloads. Quantifying the size of the workloads may produce a different perspective on DOD’s plans. The distribution of dollar workloads between the public and private sectors is, of course, crucial to determining future compliance with the 10 U.S.C. 2466 statute.

Major Decisions Pending

The 13 programs that have not yet officially decided on a support strategy include programs with some of the largest estimated acquisition costs in DOD’s acquisition programs. These programs include the C-17 transport aircraft, the F-22 fighter aircraft, F/A-18E/F fighter and attack aircraft, and the Comanche helicopter. Several program officials told us that they were delaying final support decisions, in part, because of the uncertain status of DOD depot and core policies and what they viewed as the potential for changes to the legislative requirements relating to the workload mix between the public and private sectors. In the meantime, officials plan to rely on interim contractor support or similar arrangements.

The C-17 program is an example. Despite several comprehensive studies over a number of years, Air Force senior managers could not decide upon a long-term support strategy because of uncertainties about the future public depot structure, core capability requirements, privatization initiatives, and the 60/40 provision—which as previously discussed was changed to 50/50 by the 1998 Defense Authorization Act. In addition, cost estimates did not identify significant differences between public and private options; estimates were within 10 percent of each other and both options were considered viable. As a result, the C-17 program office is using an interim flexible sustainment strategy and has awarded a contract making the prime contractor responsible for almost all logistics support and systems management tasks. Lifetime support decisions will be deferred until 2003 or later for depot workloads other than the engine. Officials decided that contractor support for the engine was clearly cost-effective and would be competed in the private sector. The C-17 engine is a commercial derivative with existing private sector repair sources.

Depot officials noted, however, that they believe the flexible sustainment decision on the C-17 is not so flexible and will by necessity lead to life-cycle support by the prime contractor. On this program, as well as on past interim contractor support programs we have reviewed, we note that by not acquiring or budgeting for the technical data and other depot support resources required to establish an organic depot capability, that
DOD may in fact be making the decision to leave life-cycle maintenance support with original equipment manufacturers.

<table>
<thead>
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<th>Past Plans Preferred Organic Performance</th>
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<td>The data for the 71 new systems reflect a marked shift from past policies and practices, which generally preferred the public sector. Officials from all three services told us that, in the past, public depots were generally the first option considered. A review of service data from about 10 years ago showed that most systems were to be supported by DOD depots. Of a total of 56 major systems with known depot-repair requirements, 75 percent of Army systems, 76 percent of Air Force systems, and 74 percent of Navy systems were to be supported mainly in public depots. The remainder were to be supported by the private sector or a mix of public and private sources. Figure 1 combines this data from the three services and contrasts with current plans for new systems as summarized in table 1.</td>
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Acquisition program managers are primarily responsible for making source-of-repair decisions on new weapon systems. These decisions not only drive billions of dollars in life-cycle operating and support costs but also affect near-term investments for support equipment, repair parts, training, and technical data (engineering drawings, technical manuals, etc.) and can vitally impact future force readiness and sustainability. DOD policies and standard business practices require such important decisions to be justified through rigorous, comprehensive business case analyses.

DOD guidance and service implementing instructions generally provide that the analyses should consider factors such as relative costs of public and private support options, mission essentiality, core depot requirements, existing public and private capabilities, and customer (operating command) requirements.
Our review of programs where source-of-repair decisions have been made or where one source of support is favored showed that key factors were not always taken into account during the decision-making process or were not always consistently applied across programs. We found that cost analyses comparing public and private support options were not always done or were done inconsistently and that core capabilities were not often considered. We also found that programs differed in the extent to which acquisition officials coordinated with logistics officials (who are responsible for logistics operations once the systems are fielded) and in their plans to acquire the technical data needed to compete workloads. Service officials attributed these problems, in large part, to the current guidance, which they believe is inadequate, unclear, and sometimes contradictory. Officials also cited related issues, including the continuing depot debate, potential changes in legislation, and base closure actions as contributing to difficulties and inconsistencies in making source-of-repair decisions.

Inadequate Cost Comparisons

Service instructions on source-of-repair decisions require that the relative costs of public and private sector options be assessed. Service regulations on cost analyses prescribe analytical techniques and requirements for conducting cost assessments. We found that many programs were not planning to assess costs and that, for programs that did, cost assessments varied in comprehensiveness and how they were used to support repair decisions.

Cost Comparisons Not Performed

Managers for 23 (40 percent) of the 58 programs that had made or were leaning toward a source-of-repair decision (public, private, and mixed workloads from table 1) responded that they did not plan to do a cost comparison or else did not provide sufficient information for us to determine the answer. Some officials questioned the need to accomplish comprehensive studies given DOD’s outsourcing initiatives. Some programs determined from the outset that they would use one source of support over another based on other decision factors and, because of that, felt cost analyses were unnecessary. For example, Army acquisition officials had already decided that software of the type employed on the Forward Area Air Defense Command and Control System would be supported in-house. Conversely, the Navy’s Strategic Sealift program procures commercial ships that are operated and maintained by the private sector. Public sector maintenance is not an option and cost comparisons are therefore inappropriate, according to Navy officials.
Inconsistent Cost Comparisons

Managers for 35 (60 percent) of the 58 programs that had made or were leaning toward a source-of-repair decision responded that they had or planned to compare costs between the public depots and the private sector. In some programs, very in-depth cost studies were performed, while others were more rudimentary. Some program officials felt it appropriate to disregard certain costs in their analyses, while others thought it important to include a wide range of cost factors. Results of such cost estimates vary widely depending on the assumptions made and factors considered. For example, cost analysts on the B-1B Conventional Mission Upgrade Program did several cost estimates, the varying results of which could be used to justify performing all work in the public sector or, conversely, nearly all in the private sector, depending on assumptions about overhead, over and above repairs, equipment reliability rates, and other factors.

We also noted that cost comparisons often did not indicate a clear advantage for either sector. In the past, this would usually have resulted in selecting a public depot to perform maintenance based on core requirements and the perceived lower risk in using a public depot as a ready and controlled source of repair. However, our data indicates that such comparisons are being used in a few recent cases to support outsourcing decisions and to justify delays in making final determinations for other new systems. For example, the Navy decided to outsource work on the T406 engine even though the cost comparison showed outsourcing to be about 4 percent more expensive than the estimated cost of public support, about $204 million higher over a 56-year life cycle. The engine is similar, however, to commercial engines with existing private-sector repair sources, and the Navy hopes to negotiate a lower repair price after the first 5 years of operation. The C-17 and F-22 programs also conducted extensive cost studies that did not identify significant cost differences between public and private sector performance and therefore deferred selecting sources of repair.

Inconsistent Core Capability Considerations

Core capabilities are those that the public depot system is required by law to maintain in order to ensure a ready and controlled source of repair for mission essential weapon systems. The 10 U.S.C. 2464 statute and DOD policy require that core depot requirements be identified and the requisite capabilities maintained in the public depots. The 1998 Defense Authorization Act amended section 2464 to clarify core depot requirements and added specific direction that the capability to repair
mission-essential systems and equipment required in military contingency plans be identified and maintained in public depots.

Service implementing instructions also require that workloads for new weapon systems be assessed for core requirements and considered in making source-of-repair decisions. In January 1996, DOD revised its methodology for computing core requirements to include an assessment of private sector capability and the risks of outsourcing mission essential workloads. Since that time, the Office of the Secretary of Defense (OSD) and the services have continued to refine the new methodology and to use it in assessing workloads.

Regarding core considerations, only 13 (22 percent) of the 58 programs that had finalized decisions or were leaning toward a decision had assessed or definitely planned to assess core requirements. For the other 45 programs, program managers (1) did not plan to assess core and were moving ahead without a core determination, (2) were unsure of their plans, or (3) were uncertain about how or whether to consider core. Several program officials felt it was the responsibility of higher command levels to take core considerations into account, and not theirs, and had no plans to do so. Some officials said they were not sure what the term “core” meant. Some programs made support decisions without a core assessment. For example, according to a Navy official, the AIM-9X Sidewinder Missile program did not initially consider core and did an “after-the-fact” study to satisfy the requirement.

Where core was considered, it was sometimes not a decisive factor in the final determination, while in other cases, the fact that a system was considered core dictated that depot repairs be handled in-house. Some programs reported receiving mixed messages from logistics officials regarding whether a system was core, contributing to delays and confusion in finalizing support plans. Logistics officials project commandwide core requirements and can assist acquisition officials with specific core determinations on new systems.

Even for programs planning to consider core, the assessments on new systems and how they contribute to the total core requirements of the services may not be completed for some time because the services are assessing first the workloads for weapon systems currently in the DOD inventory. For example, the Air Force first began assessing the workloads for the closing San Antonio and Sacramento Air Logistics Centers. It will then move on to other existing workloads and lastly assess new systems.
An Air Force official said it may be late 1998 before existing workloads are completed. The Army and Navy have not yet determined when they would complete their work. Navy officials charged with conducting core assessments said naval offices were struggling with the new methodology and that core and risk determinations invoked very complex problems. They expected the process to be long and drawn out and were not sure when all new systems would be assessed.

Establishing and justifying firm core requirements is a fundamental prerequisite for determining minimum public depot workloads. Without these determinations, decisionmakers for new systems are left without clear direction on whether the work associated with their systems should in fact be outsourced. However, determinations as to what total core capabilities should be and, therefore, what work should remain in the public depots, are still pending. Contributing to the delay and confusion about core is the still evolving core definition and methods for computing core requirements. An OSD official said that major changes in DOD procedures for determining core requirements will probably have to be made to comply with the new provisions added in the 1998 Authorization Act.

Inconsistent Consideration of Logistics Support Issues

DOD acquisition regulations require that logistics support plans and requirements be identified and well integrated with the development and production of a new system. Logistics officials are supposed to work closely with program officials to provide technical input and expertise on the supportability and maintainability of new systems. Logistics officials also project commandwide core capability requirements, ensure that legislative provisions governing workload allocations are complied with, prescribe and assist on source-of-repair procedures, and can help assess core requirements for new systems. Logistics officials are also responsible for managing the DOD depot system and support of fielded weapon systems.

Weapon system program offices, in making source-of-repair decisions, are using different approaches in how they coordinate with logistics officials. There were cases where program officials coordinated well and relied substantially on the expertise of logistics officials; other cases where program officials did not consult them at all; and others where the working relationships were strained and there were disagreements and dissatisfaction expressed with the degree and quality of interaction. For example, several Army helicopter programs and the Air Force’s B-1B
program regularly consulted command logisticians. On the other hand, Bradley officials did not plan to extensively seek input from logistics officials at the depot and some C-17 program officials said that logistics advice was not always forthcoming and that they were still unclear about the status and results of core determinations made by logisticians.

Because logistics officials have major responsibilities for supporting systems once they are fielded, they historically have had the primary role in making, or at least providing substantial input into, source-of-repair decisions. Several command-level officials we spoke with, however, believe the logistics community involvement in and influence over these decisions is much less than in the past. Revised acquisition guidance has concentrated authority for program decisions within the acquisition chain of command (specifically, the individual program management team and the acquisition executive offices) and has given the program manager more latitude in determining whether and when to involve the logistics community. Logistics officials expressed concerns that source-of-repair decisions can be made and, in some cases, have been made without any real say by those who must deal with the decisions once they are made.

For example, an Army Materiel Command (AMC) official wrote to his superiors that the acquisition guidance “basically removes AMC from the depot support equation for new weapon systems” and questioned the command’s role and future relevance. Believing that the logistics community needs to be heard in this discussion, he argued that his command needed to examine the issues on outsourcing, management, and funding responsibilities; assess their cumulative impacts on depot operations and where the new policy direction is leading; and establish the new roles, responsibilities, relationships, and business rules guiding depot maintenance. Air Force and Navy logistics officials voiced similar concerns, saying that the current guidance and how policies are sometimes implemented inhibit and constrain the logistician’s role and voice in the support planning process.

Technical Data Not Always Purchased

Technical data generally consists of the engineering drawings, technical manuals, and other information that provide details on an item’s design and how it is repaired. DOD policies, outsourcing proponents, and logistics officials generally agree that government access to this data is important. Without it, the government is limited in its ability to compete maintenance work among different contractors. Top DOD officials, as well as the CORM and DSB studies, say competition is key to achieving the savings envisioned
by outsourcing. Moreover, lack of data rights limits the government’s ability to bring the work into public depots if repair prices charged by an original equipment manufacturer are too high or if a contractor later decides it does not want to handle the work.

Our review of the programs found that many do not plan to buy the technical data that could help them avoid sole-sourcing maintenance work to the contractors that developed the system. Of the 33 programs that plan to rely on private sector repair capabilities, at least 14 (42 percent) do not plan to buy the technical data for their weapon systems. Of these 14 programs, 12 (86 percent) intend to use the system’s prime contractor or the original equipment manufacturers as their sources of repair. Of the other 19 programs relying on contractor support, 12 plan to buy at least part of the data and 7 had not yet decided one way or the other.

Our discussions with program officials showed that they had varying reasons for not buying the data. For example, because of plans to rely on the prime contractor or the original equipment manufacturers for repairs of military-unique items, four program officials said they saw no reason to spend the extra money on technical data. Several others thought the prices were exorbitant and unaffordable. Five program officials acquiring commercial off-the-shelf technologies felt that buying the technical data for these commercial items was unnecessary. On the other hand, six program managers and most logistics officials we talked to said it was essential to acquire the data in order to protect the government’s interest and to control future support costs.

Not buying technical data for new weapon systems may, therefore, result in higher life-cycle support costs and difficult logistics decisions in the future. Our prior work shows that much of the depot maintenance currently contracted to the private sector was awarded sole source (usually to the prime contractor and/or original equipment manufacturer) and that the justification for sole source most often cited was that competition was not possible because DOD did not own the technical data rights for the items to be repaired. Command officials told us that DOD would have to make costly investments in order to promote full and open competition for many of its weapon systems.8 DOD officials also told us that steadily escalating prices are typical of sole-source arrangements.

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Inadequate, Unclear, and Contradictory Guidance

**DOD** Regulation 5000.2-R provides the primary policy guidance on source-of-repair decisions. Issued in March 1996, it stated that long-term contractor support is the preferred approach for new and modified systems. An approved waiver from the acquisition management authority was required before a public depot could perform the work, justified in cases where, for example, contractors were unwilling to perform support or where there was a clear, well-documented cost advantage. The regulation discussed the need to retain limited core capabilities in public depots, but it also pointed to life-cycle costs and use of the manufacturer’s existing production capabilities as key considerations. After congressional criticism, OSD officials revised DOD 5000.2-R in October 1997 to place more emphasis on core and remove the requirement for a waiver.

Logistics officials responsible for prescribing source-of-repair guidance have expressed concern that, despite the October revision, DOD 5000.2-R does not require a deliberative weighing of factors in making source-of-repair decisions. In commenting on the regulation in 1996, the Air Force noted that the regulation assumed contractor support is the most cost-effective option. The Air Force disagreed with this assumption and commented that the regulation should require a detailed analysis to determine the most cost-effective approach. The DOD working group that reviewed these comments disagreed with the Air Force’s position, however, saying that the new regulation was consistent with the Department’s privatization initiatives, CORM recommendations, and DOD policy on core.

Many program and logistics officials we talked to said they interpreted the revised guidance and the emphasis on related outsourcing initiatives to mean that contracting with the prime contractor was the top priority. As a result, even though the waiver was dropped and core requirements reemphasized, many officials still thought it would be difficult to get approval to place work in the public depots. Service logistics officials also said the regulation did not provide adequate guidance for considering core capability requirements, contractors’ past performance, compliance with the then existing 60/40 rule, customer requirements, and cost impacts on existing workloads in the public depot system.

DOD Directive 4151.18 “Maintenance of Military Materiel,” dated August 12, 1992, and the services’ more detailed implementing instructions require managers to employ a more deliberative, business case analysis process in deciding whether to support new weapon systems and subsystems in the public depots or on contract. This guidance was historically used by
program managers in making source-of-repair decisions. It required considering factors such as cost, mission essentiality, core requirements, existing public and private capabilities, and customer (operating command units) requirements. While we noted that some past decisions did not always follow this guidance, it nonetheless established a more comprehensive analytical approach to making support decisions in contrast with the original and revised 5000.2-R.

Service officials said there was confusion over how to apply what appeared to them to be conflicting guidance. They questioned whether 5000.2-R superseded 4151.18 and service instructions; 5000.2-R neither references that directive nor rescinds it, creating doubts about whether its requirements are still in force. Service guidance is not always helpful in clearing up the ambiguity. The services have revisited their existing guidance to meet the changes contained in 5000.2-R and in the revised core methodology. The revised Army and Air Force instructions are still in draft, however, while the Navy has directed program offices to use either its old guidance, which was rescinded some time ago, or to apply portions of DOD’s new methodology for determining core requirements. The Air Force acquisition office instructed programs to use 5000.2-R for direction, while Air Force Materiel Command—home to program offices and logistics officials—told them to also use the Command’s draft internal instructions, which prescribes a decision logic process consistent with DOD Directive 4151.18.

An OSD policy official said that DOD Directive 4151.18 is still in effect, that there is ambiguity surrounding the several sets of guidance, and that DOD has started to address these issues. This official further stated that the provisions on public depot core capabilities and weapon system support plans contained in the 1998 Defense Authorization Act require that the department review and possibly revise policies and processes for making source-of-repair decisions based on consideration of the revised core language.

Program officials and cost analysts also said better DOD and service guidance on how to perform cost analyses is needed. According to these officials, more explicit instruction on how to do the analyses, the specific cost factors and weights to use, and the types of assumptions to be made would help ensure consistency among programs and better justify source-of-repair decisions. Accordingly, the results from cost analyses can vary widely depending on the factors considered and assumptions made, as previously discussed on the B-1B upgrade program.
In the area of technical data, DOD guidance in 5000.2-R states that programs are to “provide for long-term access to data required for competitive sourcing of systems support throughout its life cycle.” Our discussions with program officials, however, showed that such direction is less clear-cut when taken together with other DOD guidance on source-of-repair decisions and acquisition initiatives.

For example, guidance places increased emphasis on keeping costs down, and it encourages programs to use long-term contractor support. As previously discussed, some program officials did not plan to spend the extra money on data since they expected to contract out repairs to the prime contractors or the original equipment manufacturers. DOD acquisition policies and initiatives provide managers with more flexibility in determining what support resources should be acquired and also press programs to give contractors more configuration control over their weapon systems, that is, giving them more freedom to change the design of subsystems and components. According to logistics officials, continually changing designs can make buying the associated technical data costly. Program offices may decide that it is easier and cheaper to let the contractor handle support and forgo buying the data altogether.

Conclusions

The policy debate continues between DOD and Congress regarding how to allocate defense depot maintenance between the public and private sectors to achieve national security goals. Within this policy debate, the decision-making process for determining source of repair for new weapon systems continues. Data from program offices indicates DOD’s new policy of making greater reliance on contractor capabilities for maintenance is starting to result in program offices more frequently choosing to rely on contractor supported maintenance than they did previously.

However, the data also shows that source-of-repair maintenance decisions regarding several of the largest dollar value acquisition programs are yet to be made. Consequently, it is uncertain whether the maintenance workloads for these systems will ultimately be done in the public or private sector or partially in both sectors. Because these workloads are relatively large, where they are ultimately done will have a significant impact on the percentage of maintenance performed in the public and private sectors. The services will have to manage these decisions within the 50/50 legislative requirement.
Lastly, the process for making source-of-repair decisions has changed several times due to legislation and revisions to relevant DOD regulations and directives. At the current time, program offices are unclear how certain DOD regulations and guidance are to be applied in the source-of-repair decision-making process. Consequently, workload decision analyses are not being made consistently. Some include detailed analysis relating to cost and military capability factors, while others do not. This situation could lead to uneconomical and ineffective source-of-repair decisions. Provisions in the 1998 Defense Authorization Act may also require DOD to substantially revise policies and procedures for determining public depot core capabilities, workload allocations, and support plans for mission-essential weapon systems.

**Recommendations**

To provide for consistent and comprehensive source-of-repair decisions, we recommend that the Secretary of Defense direct that action be taken to clarify the inconsistencies among DOD Regulation 5000.2-R, DOD Directive 4151.18, service implementing instructions, and provisions in the 1998 Defense Authorization Act. In taking this action, at a minimum, the approach for analyzing core, cost, readiness, and sustainability factors for making source-of-repair decisions should be clearly defined. We also recommend that the Secretary of Defense direct that the service secretaries assess the adequacy of the analyses supporting source-of-repair decisions made over the last 2 years. These reviews should be done based on the previously recommended clarifications to the decision-making approach. Where weaknesses in the analysis are identified, new analyses should be done and adjustments made to the source-of-repair decisions where appropriate and feasible.

**Agency Comments**

DOD officials commented on a draft of this report. They concurred with the report and with our first recommendation to clarify inconsistencies in guidance. DOD concurred, in part, with our second recommendation that the service secretaries assess the adequacy of the analyses supporting source-of-repair decisions made over the last 2 years and, where weaknesses are identified, make new analyses as appropriate and feasible. DOD stated that the services draw their guidance for these reviews from existing DOD policy and that the service secretaries will determine whether previous decisions must be revisited when there are changes in guidance. They further stated that the services continually assess weapon system programs and make changes in depot repair decisions to improve affordability and to maintain depot capability and efficiency.
We acknowledge that acquisition programs are periodically reviewed by top management and that source-of-repair decisions may be reassessed and changed during an individual system’s life cycle. DOD’s required management reviews and subsequent reassessments of logistics support decisions made as a result of new legislation and internal policy changes would meet, in part, the objectives of our recommendation. However, our review of 71 new programs found so much confusion about guidance and widely disparate approaches to decision-making that we believe analyses of recent decisions are warranted. Analyses of individual programs could be accomplished concurrently and as an integral part of DOD’s standard acquisition program management reviews. If weaknesses are identified and reassessments required, the life-cycle savings resulting from good support decisions should more than pay for the additional up-front costs of the new analyses.

Appendix I describes our objectives, scope, and methodology. Appendix II lists the systems we surveyed. Agency comments are contained in appendix III. We made several technical corrections to address their comments and suggestions.

We are sending copies of this report to the Secretaries of Defense, the Army, the Navy, and the Air Force and to interested congressional committees. Copies will be made available to others upon request.

Please contact me at (202) 512-8412 if you or your staff have any questions concerning this report. Major contributors to this report are listed in appendix IV.

David R. Warren, Director
Defense Management Issues
List of Congressional Requesters

The Honorable James M. Inhofe
Chairman
The Honorable Charles S. Robb
Ranking Minority Member
Subcommittee on Readiness
Committee on Armed Services
United States Senate

The Honorable Neil Abercrombie
The Honorable Saxby Chambliss
The Honorable Tillie K. Fowler
The Honorable James V. Hansen
The Honorable John N. Hostettler
The Honorable Ernest J. Istook
The Honorable Walter B. Jones, Jr.
The Honorable Solomon P. Ortiz
The Honorable Norman Sisisky
The Honorable J. C. Watts, Jr.
House of Representatives
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Abbreviations
AMC         Army Materiel Command
BMDO        Ballistic Missile Defense Organization
CORM        Commission on Roles and Missions
DOD         Department of Defense
DSB         Defense Science Board
OSD         Office of the Secretary of Defense
The Chairman and Ranking Minority Member of the Senate Armed Services Readiness Subcommittee asked us to review the Department of Defense’s (DOD) current policy on depot maintenance for new weapon systems. Subsequent to that request, members on the House National Security Committee and other House members asked us to evaluate the effects on cost, depot responsiveness, and readiness from DOD’s decision to outsource maintenance on new systems. For this report, we addressed (1) DOD’s policy and implementation plans for allocating depot-repair workloads for new and upgraded weapon systems between the public and private sectors and (2) the decision-making process it used to make source-of-repair decisions.

To perform our review, we visited or obtained information from

- the Office of the Secretary of Defense; the Joint Staff; and Army, Navy, and Air Force headquarters, all in the Washington, D.C., area;
- Air Force Materiel Command headquarters at Wright-Patterson Air Force Base, Ohio, and its subordinate depot operations at Oklahoma City Air Logistics Center, Tinker Air Force Base, Oklahoma, and Warner Robins Air Logistics Center, Robins Air Force Base, Georgia;
- Army Materiel Command headquarters in Alexandria, Virginia, and its two subordinate commands, Aviation and Troop Command, St. Louis, Missouri, and Tank-Automotive and Armaments Command, Warren, Michigan;
- Naval Air Systems Command in Arlington, Virginia, and its subordinate depot operations at Jacksonville Naval Aviation Depot, Jacksonville, Florida;
- Naval Sea Systems Command, Arlington, Virginia;
- the Joint Depot Maintenance Analysis Group, Wright-Patterson Air Force Base, Ohio; and
- major DOD system acquisition offices (see app. II).

To determine current depot support plans and the allocation of workload between the public and private sectors, we sent structured interviews to 88 new acquisition and major upgrade programs (see app. II). Eighty-four of these programs were taken from DOD’s October 28, 1996, list of major defense acquisition programs and are generally the largest acquisition programs within DOD. At the suggestion of DOD officials, we also sent interviews to four other programs classified as “pre-major” programs (efforts that may eventually become major defense acquisitions). We asked the programs to respond to a series of questions on the decisions made, the process used to arrive at those decisions, the factors
considered, and other support-related issues. Eighty programs responded, for a 91-percent response rate. We do not believe that data from the nonresponding programs would materially affect the results of our analysis. Six of the eight programs that did not respond were among the smaller programs in terms of total acquisition cost. Two of the eight—the LPD-17 assault ship and the Theater High Altitude Defense System—were among the higher cost programs but not in the top 10.

The programs’ responses were supplemented by follow-up phone calls or in-person visits with more than half of these programs. We used this information to determine and quantify depot support plans for these systems. We did not independently verify all the information contained in the programs’ responses but did spot checks of portions of the information against other records.

We also obtained and summarized information on support plans and workload allocations from acquisition programs in 1987. Our purpose was to provide an historical perspective from which to compare and contrast current source of support plans and results with prior programs.

To evaluate the policies, factors considered, and decision-making processes used to decide whether to support new systems in the public or private sectors, we used information from the structured interviews and also visited 20 programs to gain more in-depth perspectives on how decisions were justified and to understand other issues that affect logistics support plans. The programs we visited are highlighted in appendix II. We studied numerous documents, including DOD regulatory guidance and other direction, comparing and contrasting past and present guidance at both the DOD and service level. Wherever possible, we supplemented this information from other GAO work in depot maintenance management, weapon system acquisition, and defense privatization.

We also spoke with officials from the Office of Secretary of Defense, the Joint Staff, service headquarters, and service acquisition and logistics commands. We obtained policy and programmatic materials to ascertain DOD’s strategic direction and future expectations about the public depots, top-level outsourcing initiatives, and responses to congressional criticism. We wanted to better understand the culture and operating environment that impacts policy implementation and the management of individual programs as well as the entire depot maintenance system.
Appendix I
Objectives, Scope, and Methodology

We conducted this review of depot support plans for new weapon systems from October 1996 to November 1997 in accordance with generally accepted government auditing standards.
Below is the list of programs that were included in our survey.\(^1\) The programs with asterisks are those we visited to obtain more in-depth information above and beyond the data provided through the questionnaire survey.

**Army**

- ATACMS-BAT—Army Tactical Missile System-Brilliant Anti-Armor Submunitions
- Comanche (RAH-66)—Light Helicopter\(^*\)
- Crusader (AFAS/FARV)—Advanced Field Artillery System/Future Armored Resupply Vehicle
- FOTT—Follow-on to TOW
- Javelin—Advanced Anti-Tank Weapon System - Medium
- JSTARS GSM—Joint Surveillance and Target Attack Radar System Ground Station Module\(^*\)
- MCS (ATCCS)—Maneuver Control System (Army Tactical Command and Control System)
- M1A2 Abrams Upgrade—Abrams Tank Upgrade\(^*\)
- AFATDS (ATCCS)—Advanced Field Artillery Tactical Data System (Army Tactical Command and Control System)
- ASAS (ATCCS)—All Source Analysis System (Army Tactical Command and Control System)
- ATACMS-APAM—Army Tactical Missile System/Anti-Personnel Anti-Materiel Blocks I/IA
- Black Hawk (UH-60L)—Utility Helicopter\(^*\)
- Bradley FVS Upgrade—Bradley Fighting Vehicle System Upgrade\(^*\)
- CSSCS (ATCCS)—Combat Service Support Control System (Army Tactical Command and Control System)
- FAAD C2I (ATCCS)—Forward Area Air Defense Command, Control and Intelligence (Army Tactical Command and Control System)
- FMTV—Family of Medium Tactical Vehicles
- Kiowa Warrior (OH-58D)—Armed OH-58D\(^*\)
- Longbow Apache—Radar-Based Target Acquisition and Fire Control System, including airframe modifications on the Apache helicopter\(^*\)
- Longbow Hellfire—Hellfire Missile System compatible with the Longbow Fire Control Radar
- SADARM—Sense and Destroy Armor
- SINCGARS—Single-Channel Ground and Airborne Radio System-VHF\(^*\)
- SMART-T—Secure Mobile Anti-Jam Reliable Tactical - Terminal

\(^1\)There were two additional programs that we examined more closely in person but were not included in our survey. They are the Air Force’s AC-130U Gunship and the Army’s Paladin programs.
Appendix II
Major New Acquisition Programs Surveyed

Navy

- AAV—Advanced Amphibious Assault Vehicle
- AIM-9X—Air-to-Air Missile Upgrade*
- F/A-18E/F—Hornet Naval Strike Fighter*
- JSOW—Joint Stand-Off Weapon
- LPD 17—Amphibious Assault Ship
- MIDS-LVT—Multi-Functional Information Distribution System-Low Volume Terminal
- NSSN—New Attack Submarine
- USMC H-1 Upgrades (4BW/4BN)—United States Marine Corps Midlife Upgrade to AH-1W Attack Helicopter and UH-1N Utility Helicopter (originally COBRA VENOM)
- V-22—Osprey Joint Advanced Vertical Aircraft*
- AN/SQQ-89—Surface Ship Antisubmarine Warfare System
- AOE 6—Fast Combat Support Ship
- AV-8B Remanufacture—Short Takeoff and Landing (V/STOL) Close Air Support Aircraft
- CEC—Cooperative Engagement Capability
- CVN 68—Nimitz Class Nuclear Powered Aircraft Carriers
- DDG 51—Guided Missile Destroyer, including basic ship and all variants
- E-2C Reproduction—Hawkeye Carrier-Based Early Warning Aircraft
- LHD 1—Amphibious Assault Ship
- MHC 51—Coastal Mine Hunter
- NESP—Navy Extremely High Frequency Satellite Communications Program
- SH-60R (LAMPS MK III Block II)—Multi-Mission Helicopter Upgrade
- SM 2 (Blocks I/II/III/IV)—Standard Surface-to-Air Missile
- SSN 21/AN/BSY-2—Seawolf Class Nuclear Attack Submarine/Combat System*
- Strategic Sealift—Naval Transport Ship
- T-45TS—Undergraduate Jet Pilot Training System
- Tomahawk—Sea Launched Cruise Missile
- Trident II Missile—Sea Launched Ballistic Missile
- UHF Follow-on—Ultra High Frequency Follow-on Communications Satellite

Air Force

- ABL—Airborne Laser
- B-1 CMUP-DSUP—Lancer Penetrating Bomber Conventional Mission Upgrade—Defensive Systems Upgrade (formerly ECM upgrade)*
- EELV—Evolved Expendable Launch Vehicle
- F-22—Advanced Tactical Fighter*
Appendix II
Major New Acquisition Programs Surveyed

- JASSM—Joint Air-to-Surface Standoff Missile (TSSAM replacement)
- JDAM—Joint Direct Attack Munitions
- JTHDS—Joint Tactical Information Distribution System
- MILSTAR—Satellite and User Equipment
- SBIRS—Space-Based Infrared System Program, efforts include SBIRS (high) and SBIRS (low) (formerly known as Space Missile Tracking System)
- Titan IV—Space Booster
- AMRAAM—Advanced Medium Range Air-to-Air Missile
- AWACS RSIP (E-3)—Airborne Warning and Control System Radar Systems Improvement Program
- B-1 CMUP—Computer Upgrade—Lancer Penetrating Bomber Conventional Mission Upgrade - Computer Upgrade*
- B-1 CMUP JDAM—Lancer Penetrating Bomber Conventional Mission Upgrade/Joint Direct Attack Munitions*
- B-2—Stealth Bomber*
- C-17A—Globemaster III Advanced Cargo Aircraft*
- C-130J—Cargo Plane
- CIGS (JSIPS)—Common Imagery Ground/Surface; Joint Services Imagery Processing System
- CMU—Cheyenne Mountain Upgrade
- DMSP—Defense Meteorological Satellite Program
- DSP—Defense Support Program Satellite System
- JPATS—Joint Primary Aircraft Training System
- JSTARS—Joint Surveillance and Target Attack Radar System (Aircraft)
- Minuteman III GRP—Guidance Replacement Program
- Minuteman III PRP—Propulsion Replacement Program
- NAS—National Airspace Traffic Control System
- NAVSTAR GPS—Global Positioning System (includes satellites and user equipment)
- SFW—Sensor Fused Weapon

DOD Defense Acquisition Board
- Chemical Demilitarization—Chemical Demilitarization Program, consisting of both the stockpile and non-stockpile programs
- JSF—Joint Strike Fighter
- NPOESS—National Polar-Orbiting Operational Environmental Satellite System
Appendix II
Major New Acquisition Programs Surveyed

Ballistic Missile Defense Organization

- Patriot PAC3—Patriot Advanced Capability
- Navy Area TBMD—Navy Area Theater Ballistic Missile Defense
- NMD—National Missile Defense
- THAAD—Theater High Altitude Area Defense

Pre-Major Defense Acquisition Programs—Unmanned Aerial Vehicles

- Outrider
- DarkStar
- Global Hawk
- Predator
Mr. David Warren  
Director, Defense Management Issues  
National Security and International Affairs Division  
U.S. General Accounting Office  
Washington, DC 20548

Dear Mr. Warren:


The detailed DoD comments on the report recommendations are provided in the enclosure.

Roy R. Willis  
Acting Deputy Under Secretary of Defense (Logistics)

Endorsement:  
As stated
Appendix III
Comments From the Department of Defense

GAO DRAFT REPORT - DATED FEBRUARY 23, 1998
(GAO CODE 709199) OSD CASE 1549

"DEFENSE DEPOT MAINTENANCE: DOD SHIFTING MORE WORKLOAD FOR
NEW WEAPON SYSTEMS TO THE PRIVATE SECTOR"

DEPARTMENT OF DEFENSE COMMENTS TO THE RECOMMENDATIONS

RECOMMENDATION 1: The GAO recommended that the Secretary of Defense direct that
action be taken to clarify the inconsistencies among DoD Regulation 5000.2-R, DoD Directive
4151.18, Service implementing instructions and provisions of the 1998 Defense Authorization
Act. In taking this action, at a minimum, the approach for analyzing core, cost, readiness, and
sustainability factors for making source of repair decisions should be clearly defined.
(p. 33/GAO Draft Report)

DOD RESPONSE: Concur. There is an extensive and continuing effort to update
DoD 5000.2-R which is the DoD’s major policy directive for the development and acquisition of
major weapons systems programs. To the extent that there are inconsistencies among
DoD 5000.2-R, the law, and other DoD directives or instructions in matters of workload
allocation among the private and public sectors, then action will be taken to correct these
inconsistencies.

RECOMMENDATION 2: The GAO recommended that the Secretary of Defense direct that
the Service Secretaries assess the adequacy of the analyses supporting source of repair decisions
made over the last 2 years. These reviews should be done based on the previously recommended
clarifications to the decision-making approach. Where weaknesses in the analysis are identified,
new analyses should be done and adjustments made to the source of repair decisions where
appropriate and feasible. (pp. 33-34/GAO Draft Report)

DOD RESPONSE: Concur in part. The focus for conducting these types of reviews lies with
the Service Secretaries. The Services draw their guidance for these reviews from existing
DoD policy. When there are changes in guidance, the Service Secretaries will determine whether
previous decisions must be revisited. The Services do continually assess and make changes in
the source of depot repair for weapon systems, both to improve individual program affordability
and to maintain depot capability and efficiency.
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Related GAO Products


Defense Outsourcing: Challenges Facing DOD as It Attempts to Save Billions in Infrastructure Costs (GAO/T-NSIAD-97-110, Mar. 12, 1997).


Related GAO Products


Aerospace Guidance and Metrology Center: Cost Growth and Other Factors Affect Closure and Privatization (GAO/NSIAD-95-60, Dec. 9, 1994).


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