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## Testimony

Before the Subcommittee on National Security,  
Veterans Affairs, and International Relations,  
Committee on Government Reform,  
House of Representatives

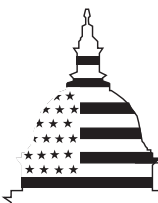
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# MILITARY AIRCRAFT

## Cannibalizations Adversely Affect Personnel and Maintenance

Statement of Neal P. Curtin, Director, Defense Capabilities  
and Management



GAO

Accountability \* Integrity \* Reliability

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<b>Abstract</b> We are pleased to be here today to share the preliminary results of our ongoing work regarding the military services practice of cannibalization, which is the removal of a working component from one aircraft to install it on another. In January 2001, we reported on the major performance and accountability challenges facing the Department of Defense and identified inventory management as a high-risk area because the Department continues to maintain levels of inventory that are too high, and its management systems and procedures are ineffective. 1 This means that in some instances, excessive quantities of some parts may be procured and held in stock, while in other instances, quantities are insufficient. We warned that if this condition persists, the Department risks having key items, including spare aircraft parts, not available when needed, impairing aircraft and other equipment readiness. To compensate for logistics shortfalls, all the military services Army, Air Force, Navy, and Marine Corpshave resorted to the inefficient maintenance practice of cannibalization.		<b>Monitoring Agency Acronym</b>
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Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to share the preliminary results of our ongoing work regarding the military services' practice of cannibalization, which is the removal of a working component from one aircraft to install it on another. In January 2001, we reported on the major performance and accountability challenges facing the Department of Defense and identified inventory management as a high-risk area because the Department continues to maintain levels of inventory that are too high, and its management systems and procedures are ineffective.<sup>1</sup> This means that in some instances, excessive quantities of some parts may be procured and held in stock, while in other instances, quantities are insufficient. We warned that if this condition persists, the Department risks having key items, including spare aircraft parts, not available when needed, impairing aircraft and other equipment readiness. To compensate for logistics shortfalls, all the military services—Army, Air Force, Navy, and Marine Corps—have resorted to the inefficient maintenance practice of cannibalization.

Our testimony today is based on the work we performed in response to your request that we analyze cannibalizations by the services over the last 5 years. We determined the extent to which the services rely on cannibalizations, the effects of cannibalizations, the reasons for cannibalizations, and the actions that the Department of Defense and the services are taking to reduce cannibalizations.

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## Summary

All the military services use cannibalization extensively as a routine aircraft maintenance strategy. In fiscal years 1996 through 2000, the Navy<sup>2</sup> and the Air Force reported about 850,000 cannibalizations, requiring over 5 million maintenance hours. These numbers, however, do not include the Army's cannibalizations,<sup>3</sup> and the Navy reportedly understates its data by as much as 50 percent. As a result, neither the Department of Defense nor the services know the overall magnitude of the practice.

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<sup>1</sup> See *Performance and Accountability Series: Major Management Challenges and Program Risks: Department of Defense* (GAO-01-244, Jan. 2001).

<sup>2</sup> Navy data includes the Marine Corps because it is consolidated at the headquarters level.

<sup>3</sup> While information is available for the Army at the installation level, the Army does not collect servicewide data; therefore, we could not include Army totals in our statistics.

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Cannibalizations have several adverse impacts. They increase maintenance costs by increasing workloads, may affect morale and the retention of personnel, and sometimes result in the unavailability of expensive aircraft for long periods of time. Cannibalizations can also create unnecessary mechanical problems for maintenance personnel. As shown by a recent survey, over half of all aircraft maintenance personnel work more than 50 hours a week (some work 70 hours or more) compared with the average of 40 hours. A Navy study notes that the additional work generated by cannibalizations adversely affects morale and lowers reenlistment rates. However, because the services do not keep track of all the maintenance hours they spend on cannibalizations, they cannot assess all of the consequences.

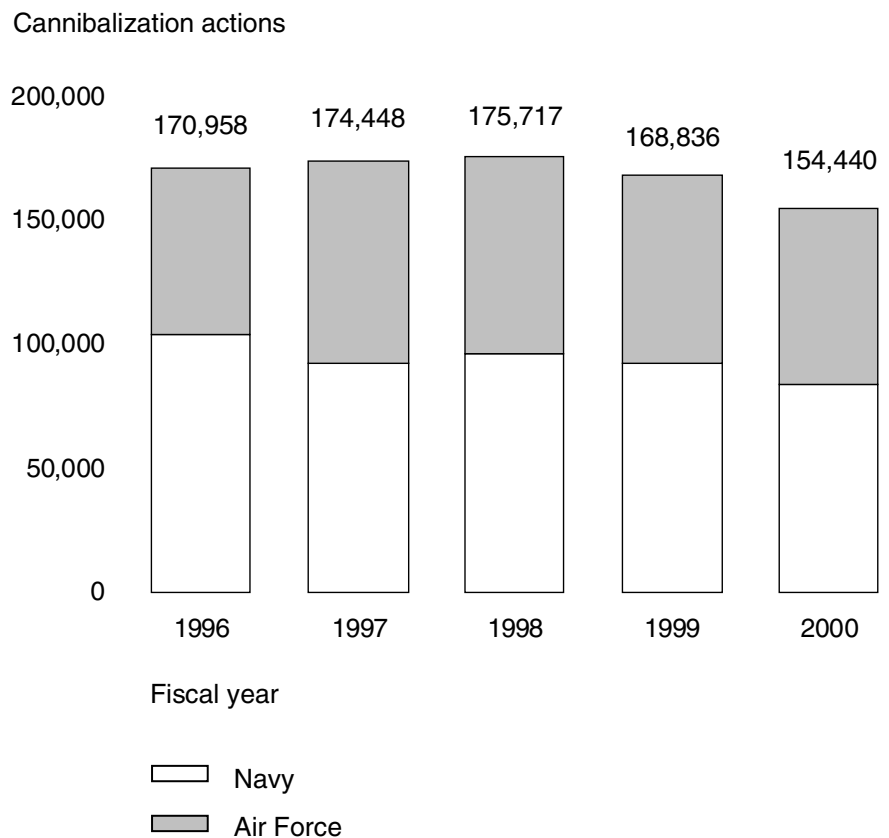
The services have many reasons for cannibalizing aircraft and strong incentives for continuing to do so. With the exception of the Navy, the services do not consistently track the specific reasons for cannibalizations; as a result, much of the information on causes is anecdotal. In the broadest sense, cannibalizations are done because of pressures to meet readiness and operational needs and the shortcomings of the supply system. When parts are not available and an aircraft needs to fly a mission, cannibalization becomes the answer. In addition, a Navy study found that cannibalizations are sometimes done because mechanics are not trained well enough to diagnose problems or because testing equipment is either not available or not working.

Although the services have undertaken some initiatives to reduce cannibalizations, none of them have developed a specific strategy to reduce the maintenance hours associated with cannibalizations. Because they view cannibalization as a symptom of spare parts shortages, they have not closely analyzed other possible causes or made concerted efforts to measure the full extent of the practice. A number of working groups have been asked to address cannibalization, but they have had very limited success in determining how to reduce it. Neither the Department of Defense nor the services can accurately determine (1) which cannibalizations are necessary and what alternatives, if any, are available to reduce the number of those that are not; (2) what specific improvements or changes need to be implemented to effectively limit the adverse effects of cannibalizations; and (3) to what extent reducing the workload associated with cannibalizations would increase morale and retention rates. Furthermore, they cannot make sound economic decisions concerning the relative costs of alternatives, such as changes to stockage levels or storage locations.

## Cannibalizations Are Extensive, but Full Magnitude Is Unknown

In fiscal years 1996-2000, Air Force and Navy units reported a total of about 850,000 cannibalizations and annual figures ranging between 154,000 and 176,000 (see fig. 1). The actual numbers, however, may be considerably higher because of underreporting by the Navy and the Air Force and the lack of servicewide data for the Army.

**Figure 1: Total Navy and Air Force Cannibalizations Reported in Fiscal Years 1996-2000**



Source: Navy and Air Force.

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In 1998, a Navy group studying aviation readiness noted that as many as half of all cannibalizations may go unreported, and the Navy's Inspector General has reported that cannibalizations are consistently unreported.<sup>4</sup> In addition, a 1998 review conducted by the Air Force Audit Agency on the Air Force's maintenance analysis program noted that maintenance technicians did not always report cannibalizations.<sup>5</sup>

According to Army officials, only a small portion of Army cannibalizations are reported—for serial-numbered parts. The Army does not track cannibalizations servicewide and does not require subordinate commands to do so. Several Army headquarters officials we talked to agreed that cannibalizations should be tracked so as to provide an overall picture of the degree to which units are performing cannibalizations.

We found that selected aircraft—which the services depend on the most to accomplish their mission—had relatively high reported cannibalization rates. In addition, some of these aircraft experienced a significant increase in the number of cannibalizations from fiscal year 1996 to 2000.

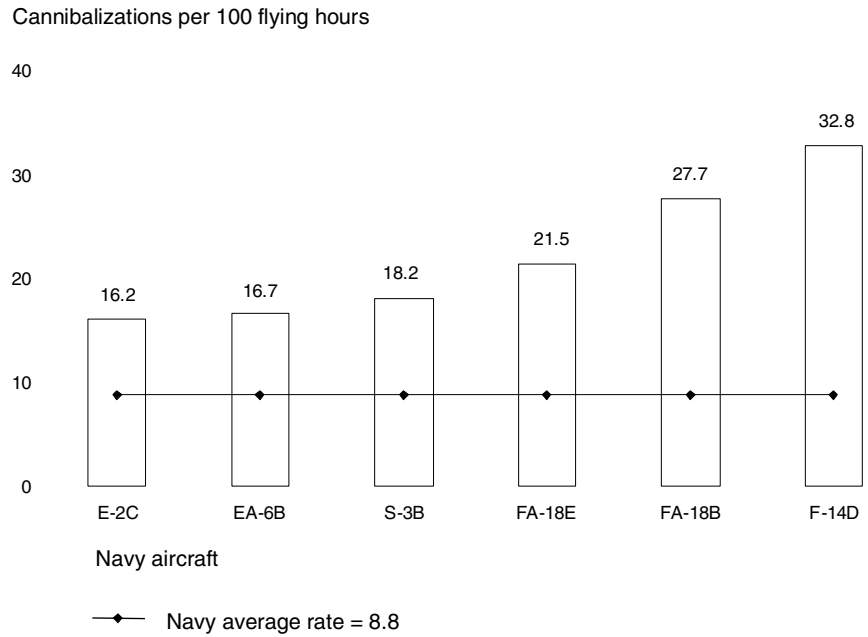
The Navy measures cannibalization rates as the number of cannibalizations per 100 flying hours. In the 5-year period under study (fiscal years 1996-2000), the Navy's average cannibalization rate ranged from a high of 9.6 in fiscal year 1997 to a low of 8.8 in fiscal year 2000. However, in fiscal year 2000, 4 of the 63 aircraft types reporting cannibalizations had more than twice the service's average rate of 8.8, while 2 aircraft types had rates that were almost twice the average. (See fig. 2.)

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<sup>4</sup> See Final Report of Naval Aviation Spares and Readiness, Naval Inspector General (Apr. 28, 2000).

<sup>5</sup> See Report of Audit on Maintenance Analysis Program, Air Force Audit Agency (July 31, 1998).

**Figure 2: Reported Cannibalization Rates of Six Navy Aircraft, Fiscal Year 2000**

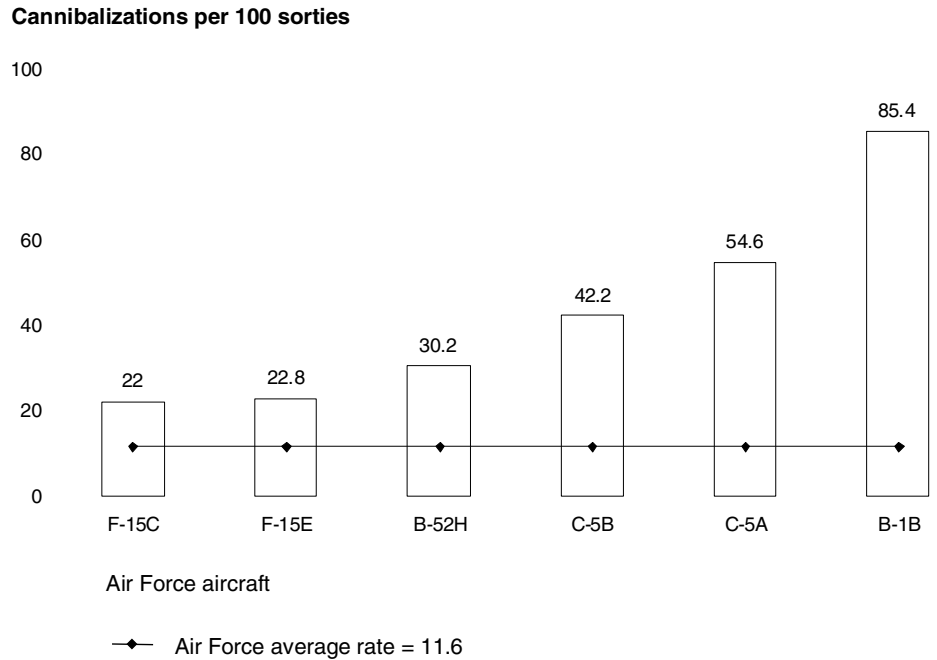


Source: Navy.

Of the 31 Air Force aircraft types reporting cannibalizations in fiscal year 2000, 4 accounted for over half the service's total. They included three fighter aircraft (F-16C, F-15C, and F-15E) and the B-1B bomber. From fiscal year 1996 to 2000, the Air Force reported a 100-percent or more increase in the number of cannibalizations of several aircraft, including the A-10A, OA-10A, F-15B, E-3C, and F-117A. Unlike the Navy, the Air Force measures cannibalization rates in terms of cannibalizations per 100 sorties (flights). The Air Force's average cannibalization rate during the 5-year period ranged from a low of 10.6 in fiscal year 1996 to a high of 12.7 in fiscal year 1997. However, in fiscal year 2000, the rates of the B-52H, C-5B, C-5A, and B-1B were all well over twice the average rate of 11.6. Cannibalization rates for these aircraft ranged between 30 and 85 per 100 sorties. The rates of the F-15C and F-15E were almost twice the average at 22 and 23, respectively. (See fig. 3.)



**Figure 3: Reported Cannibalization Rates of Six Air Force Aircraft, Fiscal Year 2000**



Source: Air Force.

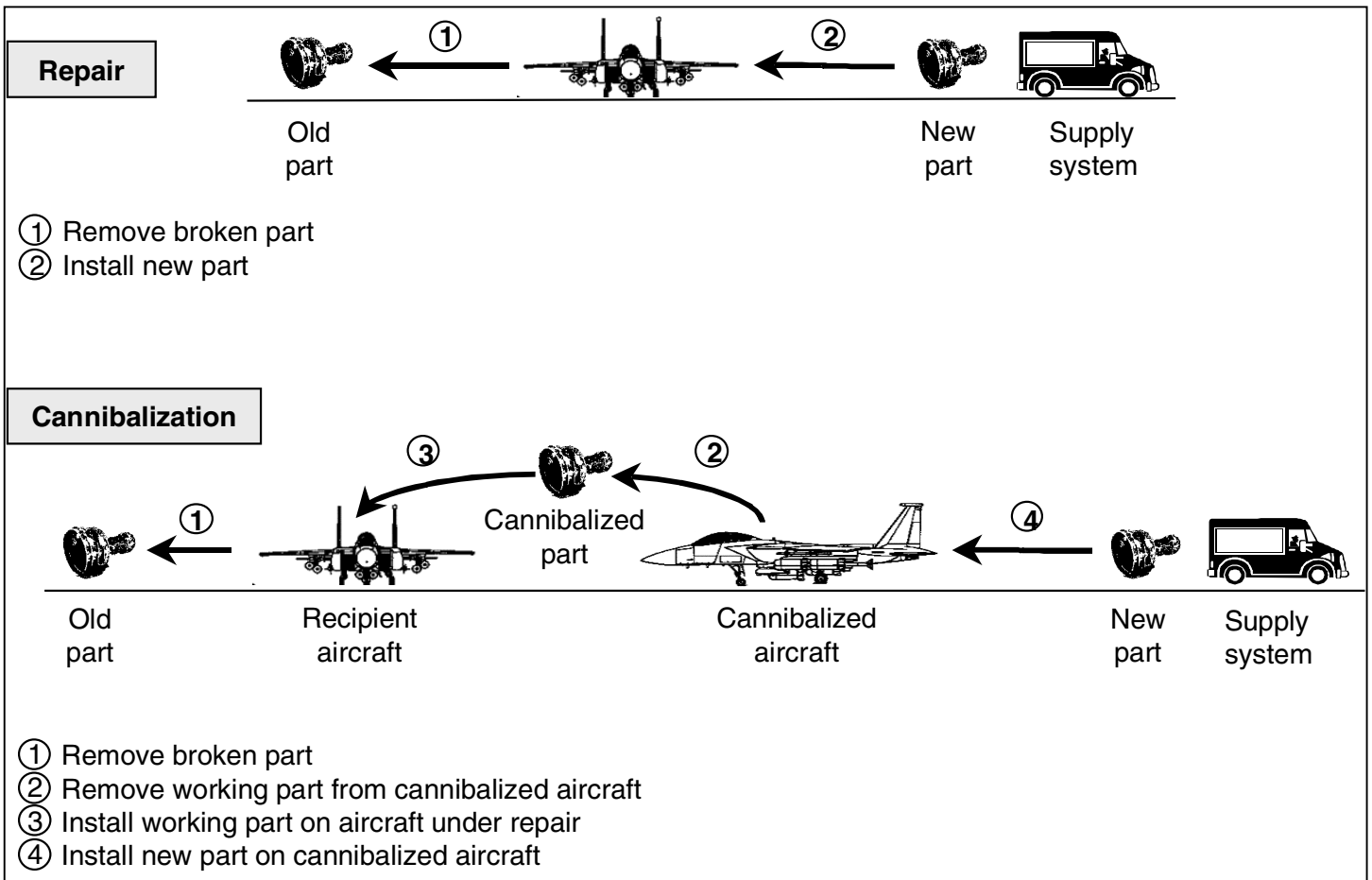
## Cannibalizations Have Many Negative Effects

Cannibalizations are done to meet operational and readiness needs, but they come at a high cost. Cannibalizations have increased the workload of maintenance personnel by millions of hours since fiscal year 1996—costly time that could have been spent more productively. Evidence shows that increasing the workload of maintenance personnel has a negative effect on morale. Cannibalizations also take expensive aircraft out of service, sometimes for long periods of time, and can create unnecessary mechanical problems. Nevertheless, it is difficult to gauge the precise effects of cannibalizations because the services do not know how many they are performing, what the specific reasons are for performing them, or how much time and money they are spending on them.

## Effects on Workload

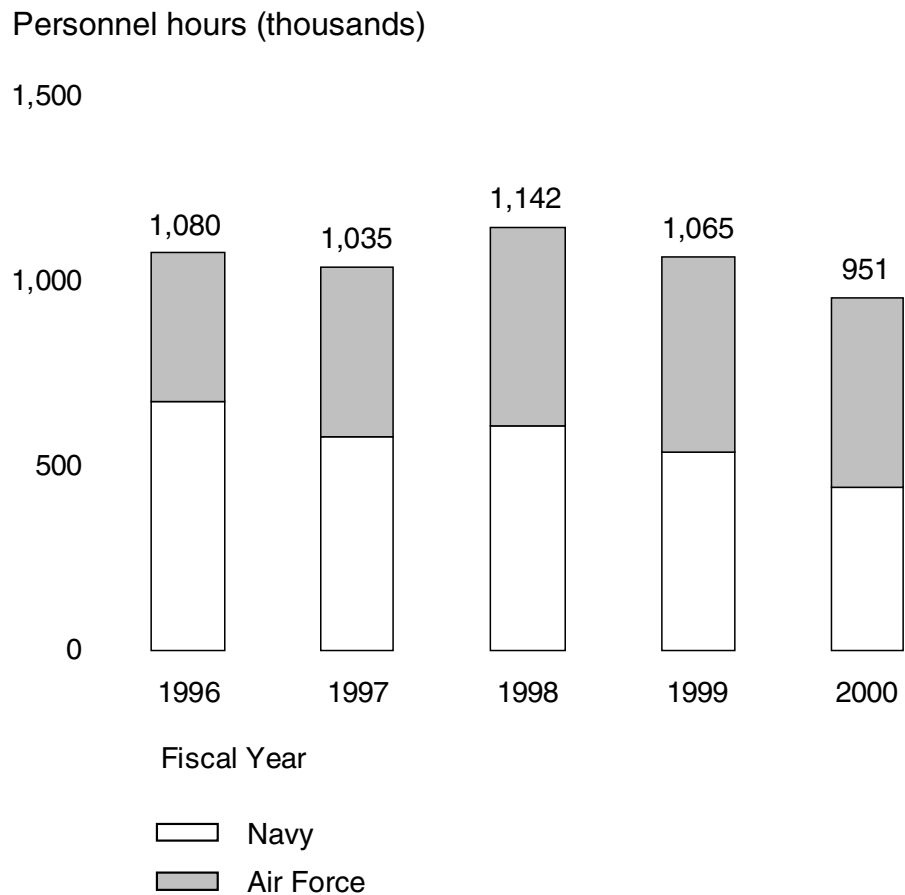
Cannibalizations require at least twice the maintenance time of normal repairs because they involve removing and installing components from two aircraft instead of one (see fig. 4).

**Figure 4: Repairs Require Two Steps, Cannibalizations Four**



Through the 5-year period, the Navy and the Air Force reported spending about 5.3 million additional maintenance hours on cannibalizations—the equivalent of more than 500 aviation maintenance personnel working full-time for 5 years. The annual reported cannibalization hours ranged from a low of 951,000 to more than 1.1 million (see fig. 5). The Navy accounted for 2.8 million of the total hours, while the Air Force reported 2.4 million hours. A relatively small group of aircraft accounted for most of these maintenance hours. For example, in fiscal year 2000, six Navy aircraft (FA-18C, P-3C, S-3B, FA-18A, E-2C, and EA-6B) were responsible for about 45 percent of the Navy’s 441,000 cannibalization hours, while five aircraft (F-15C, F-15E, F-16C, B-1B, and KC-135R) accounted for 65 percent of the Air Force’s 510,000 hours.

**Figure 5: Total Cannibalization Personnel Hours, Fiscal Years 1996-2000**



Source: Navy and Air Force.

## Effects on Morale

Evidence suggests that cannibalizations have a negative effect on morale because they are sometimes seen as routinely making unrealistic demands on maintenance personnel. Cannibalizations may have to be performed at any time, day or night, and very quickly in order to meet operational commitments. In such cases, personnel must continue working until the job is done, regardless of how much time it takes.

To the extent that cannibalizations contribute to extensive overtime, morale and retention may be adversely affected, and additional costs may be incurred in recruiting and training new personnel. In April 2000, the Naval Inspector General reported that cannibalization is counterproductive and has a “huge” impact on morale. Our analysis of a

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1999 survey of active duty personnel showed that a significant portion of aviation maintenance personnel worked more than 50 hours a week, and that some worked 70 hours a week. In August 1999, we reported that the majority of factors cited by military personnel as sources of dissatisfaction and reasons for leaving the military were work-related circumstances such as the lack of parts and materials to successfully complete daily job requirements.<sup>6</sup>

One example of how cannibalizations may become the source of waste or frustration is the case in which a major component needed by an EA-6B aircraft to perform its mission was removed from or reinstalled on four different aircraft, for a total of 16 times in 6 days. In another case, an Air Force C-5 was missing 136 parts, 47 of which had been used to make another cannibalized aircraft operational.

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## Expensive Assets Unusable

Aircraft that are missing parts due to cannibalizations may remain grounded for long periods of time. These aircraft are not available for operations, denying the military the use of valuable assets. Air Force and Navy guidance states that, to the maximum extent possible, cannibalized aircraft should not remain grounded for more than 30 consecutive days. Yet we observed numerous cases in which aircraft were grounded for much longer periods. One wing we visited provided us a daily aircraft status report showing that 6 out of 28 aircraft downed for parts had not flown for 37 days or more. One of these aircraft had not flown for more than 300 days and, according to the Maintenance and Material Control Officer, was missing 111 parts. As a result, the Navy had been unable to use this multimillion-dollar asset for almost a year. He estimated it would take more than 1,000 maintenance hours to return the aircraft to flying status. In another example, four cannibalized FA-18 aircraft were missing so many parts that they were referred to as “wind chimes” (see fig. 6). According to Navy officials, the number of days these aircraft had not flown ranged between 903 and 1,756 when they were transported to a Navy depot in July 2000. As of May 2001, one of the aircraft, which had been missing over 400 parts, had been funded for assembly, while the remaining three were in storage waiting funding approval. The depot estimated reassembly costs for the funded aircraft at about \$568,000, if the squadron that owns the aircraft supplies all needed parts.

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<sup>6</sup> See *Military Personnel: Perspectives of Surveyed Service Members in Retention Critical Specialties* (GAO/NSIAD-99-197BR, August 16, 1999).

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**Figure 6: Cannibalized Navy FA-18 Aircraft**



Source: Navy.

A Navy squadron within 30 days of a major exercise reported that 6 of its 13 assigned aircraft had not flown for 30 or more days—2 of them because the squadron’s wing directed that parts be given to other squadrons. A Navy training squadron we visited had 20 of its 29 aircraft down for parts or maintenance—6 of them were cannibalized aircraft. In 2000, the same squadron reported an average of 113 cannibalizations a month.

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## Potential for Mechanical Side Effects

In order to remove a component, mechanics often have to remove other parts or components as well. This increases the risk of collateral damage to the aircraft and components involved. Substantial anecdotal evidence indicates that cannibalizations do indeed cause these types of problems because they involve two aircraft rather than one and are often performed under very rushed conditions. Furthermore, cannibalizations do not replace a broken part with a new part, but with a used one. According to a December 2000 study,<sup>7</sup> cannibalizations do not restore a component to its full projected life expectancy but rather increase the chance that the same component will break down again prematurely.

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<sup>7</sup> *Analysis of Aircraft Maintenance Cannibalization With Respect to Aging Aircraft Within the EA-6B Community*, Thesis, Naval Postgraduate School, Monterey, California, Daniel C. Worra (Dec. 2000).

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## Services Cannibalize for Many Reasons

The services have many reasons for cannibalizing aircraft and strong incentives for continuing to do so. They are operating with aging aircraft, a high operational tempo, and continued spare parts shortages. As aircraft age, they tend to break more often, take longer to inspect and maintain, and are less available for training and operations.<sup>8</sup> The combination of these factors, along with intense readiness requirements, creates an environment that encourages cannibalization. But it is impossible to know why a particular aircraft or system is cannibalized because, with the exception of the Navy, the services do not record the reasons for cannibalizations. This lack of information makes it difficult to develop strategies to reduce cannibalizations.

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## Supply System Problems

Service officials believe that the shortage of parts is the major reason for cannibalizations and claim that they must cannibalize if parts are not available in the right place at the right time. Given the current logistics shortfalls, officials also believe that cannibalizations must continue in the foreseeable future. In a recent report to the Congress, the Department of Defense identified aviation readiness as one of its major problems and expressed concern about parts shortages and maintenance issues.<sup>9</sup>

The Comptroller General recently testified that for years, the Department of Defense has had equipment readiness problems because of a lack of key spare parts. He also said that the insufficiency of spare parts has been recognized as a major contributor to aircraft performing at lower mission capable rates than expected.<sup>10</sup> Our ongoing work shows that the failure of service logistics systems to deliver parts in a timely manner is caused by a number of different reasons, including parts production problems, lower reliability of parts than predicted, inadequate initial procurement of spares, and unanticipated demand for an item. The services will sometimes cannibalize aircraft for “convenience”—when it is faster to cannibalize than wait for a part to be delivered from across the base or town. A Navy study group estimated that these actions may account for as many as half of all Navy cannibalizations.

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<sup>8</sup> See *Tactical Aircraft: Modernization Plans Will Not Reduce Average Age of Aircraft* (GAO-01-163, Feb. 2001).

<sup>9</sup> See *Department of Defense Quarterly Readiness Report to the Congress*, January–February 2001.

<sup>10</sup> See *Major Management Challenges and Program Risks: Departments of Defense, State, and Veterans Affairs* (GAO-01-492T, Mar. 7, 2001).

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## Readiness and Operational Demands

Readiness and operational demands put heavy pressure on the supply system to provide parts immediately and wherever they may be needed. Local commanders are willing to do whatever is necessary to keep readiness ratings high, even if this requires cannibalizing aircraft constantly and having personnel routinely work overtime.

The services believe that cannibalizations allow them to better perform their operational missions. Information is not available to determine to what extent cannibalizations contribute positively to readiness. But two Army studies concluded that readiness would be significantly degraded if cannibalizations were not performed. A 2000 study cited cannibalization among the reasons for maintaining readiness rates at acceptable levels and concluded that readiness would suffer if units were not allowed to cannibalize. A 1987 study of similar helicopter units found that readiness rates dropped more than 25 percent when units were forced to stop cannibalizations as part of a controlled experiment, and readiness rates rose back to previous levels when cannibalizations resumed. The Army has not repeated the experiment elsewhere.

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## Other Reasons

According to feedback provided through a Navy internet tracking system, the reasons for cannibalizations also include parts-related issues such as vendor production problems, depots without the necessary parts to fix a repairable component, and delays from vendors. For its part, the Navy Inspector General has cited three other reasons for cannibalizations related to maintenance deficiencies: (1) lack of experience and insufficient training on the part of maintenance personnel, (2) outdated maintenance manuals and (3) lack of testing equipment.<sup>11</sup> In other words, cannibalizations are sometimes done to diagnose a problem or to identify which component is not working properly. By removing a suspect part and replacing it with one that is known to be working, a mechanic can identify where a problem lies.

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## Services Have Not Developed Specific Strategies to Reduce Cannibalizations

The services have not developed servicewide strategies to reduce cannibalizations. Services consider cannibalization a symptom of logistics shortfalls and are trying to improve logistics support, especially through the application of best inventory management practices. Although the services have not established or identified specific strategies for reducing cannibalizations, each has taken some initiative to deal with the issue. But

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<sup>11</sup> See *Final Report of Naval Aviation Spares and Readiness*, Naval Inspector General, (Apr. 28, 2000).

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until they develop an overall reduction plan, the services will not be in a position to significantly reduce cannibalizations or to alleviate their negative effects.

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## Air Force

The Air Force is undertaking an initiative to minimize cannibalizations at bases in Langley, Virginia, and Elmendorf, Alaska. The bases have instituted a “consolidated” cannibalization program, referred to as the Cannibalization Dock Program. The program centralizes cannibalization management, whereby each of the squadrons in the wing provides a “donor” aircraft and a cadre of maintenance personnel on a rotating basis. The program is designed to ensure that as few aircraft as possible are cannibalized and that the cannibalized parts are better controlled. While these efforts are localized, they have reduced the number of cannibalized aircraft and the amount of time that aircraft remain cannibalized, minimized the number of personnel performing cannibalizations, and improved quality control over the process. Although Air Force policies allow cannibalizations to meet urgent operational requirements, the policies also state that such actions should be minimized because they tend to adversely affect morale and aggravate the very same supply problems that they are meant to overcome.

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## Navy

According to Navy policy, cannibalization is a manifestation of a logistics or maintenance support system failure and its reduction or elimination should be of prime concern to management. In March 1998, the Navy established an Aviation Maintenance-Supply Readiness Study Group to recommend specific actions to reduce overall Navy aviation maintenance and supply costs and increase readiness. Noting the fleet’s increasing concern over cannibalization, the Study Group included the practice among the primary issues. As a result of the Group’s findings and recommendations, the Navy initiated actions to better identify the specific causes of cannibalizations and increase the visibility of items that are being cannibalized extensively. Beginning in June 2001, the Navy will also implement the requirement that more specific reasons be reported for each cannibalization. Although a requirement that reasons be reported is currently in place, the new requirement increases the number of reasons that can be considered, so that causes can be better captured. In addition, a website has been established to better highlight the items frequently cannibalized and to provide an avenue for maintainers, program managers, and inventory control personnel to comment on problems and track progress in resolving issues. Logistic program managers within the Naval Air Systems Command also maintain lists of top cannibalization items in the weapon systems for which they are responsible. In addition, a new



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reporting system is being implemented which, according to Navy officials, should improve reporting accuracy.

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## Army

The Army has taken the least formal approach to addressing cannibalization. Its actions so far have been limited to the two studies mentioned above, which concluded that cannibalizations are a good tool for commanders to use and that command involvement is adequate for preventing abuse. Although Army policy limits cannibalizations to whenever a needed item is not available through the supply system, it allows commanders at installation levels and below to use their discretion as to whether and how much to cannibalize.

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Mr. Chairman and Members of the Subcommittee, this concludes our statement. We appreciate the opportunity to have it placed in the record. Our report on this work will be out this summer with a series of recommendations for the services to address this issue.

### **Contacts and Acknowledgments**

For future contacts regarding this statement, please contact Neal Curtin at (757) 552-8111 or William Meredith at (202) 512-4275. Individuals making key contributions to this statement included Harry Taylor, Hugh Brady, Douglas Mills, Janine Cantin, and Stefano Petrucci.