

**GAO**

Report to the Chairman and Ranking  
Minority Member, Subcommittee on  
Readiness and Management Support,  
Committee on Armed Services,  
U.S. Senate

---

November 2000

# DEFENSE ACQUISITIONS

## Prices of Navy Aviation Spare Parts Have Increased



**G A O**

Accountability \* Integrity \* Reliability

---



---

# Contents

---

---

Letter		3
Appendixes		
	Appendix I: Scope and Methodology	24
	Appendix II: Budgeting and Price-setting Process for Fiscal Year 2000	29
	Appendix III: Federal Supply Groups	30
	Appendix IV: Repair Cost Change Distribution	31
	Appendix V: Comments From the Department of Defense	32
	Appendix VI: GAO Contact and Staff Acknowledgments	36

---

---



**United States General Accounting Office**  
**Washington, D.C. 20548**

November 6, 2000

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

This is the third in a series of reports responding to your request that we review allegations of significant price increases in Department of Defense (DOD) weapon system spare parts.<sup>1</sup> In particular, some military services have raised concerns about increases in the prices of spare parts and the adverse impact escalating prices have had on the readiness of military forces. In response to these concerns, you requested that we examine trends in the prices of aviation parts managed by the Navy to (1) determine whether prices were increasing over time and (2) identify the reasons for the price increases. In addition, we examined the effect such price changes were having on customers.

This report focuses specifically on “reparable” spare parts the Navy and the Marine Corps use to maintain their aircraft and helicopters.<sup>2</sup> These parts are aircraft components that can be economically repaired when they fail to perform properly. Spare parts are repaired at either military depots or contractor facilities. Over 90 percent of the time when requisitioning parts, customers turn in an item that is broken, but that can be repaired, to the defense logistics system. In 1999, customers spent about \$1.7 billion on these types of requisitions.

Navy spare parts are managed under the Navy Working Capital Fund. This is a revolving fund that relies on revenues generated from parts and services sold to customers to finance subsequent operations. It is expected to generate sufficient revenue to cover the full costs of operations and operate on a break-even basis over time—that is, not to make a profit or

---

<sup>1</sup>Earlier this year, we issued reports entitled *Defense Acquisitions: Prices of Marine Corps Spare Parts Have Increased* (GAO/NSIAD-00-123, July 31, 2000) and *Defense Acquisitions: Price Trends for Defense Logistics Agency’s Weapon System Parts* (GAO-01-22, Nov. 3, 2000).

<sup>2</sup> The Marine Corps’ aviation spare parts are managed by the Navy.

---

incur a loss. Customers order parts from the Navy's supply system and pay the working capital fund from their appropriations. The Navy establishes spare parts' prices each fiscal year by either increasing or decreasing them so that they are in line with the customers' aggregate budgeted amounts. This concept, in theory, ensures that customers, in the aggregate, have sufficient funds budgeted to buy their anticipated requirements of spare parts.

The process for setting prices for parts begins 2 years before the fiscal year in which prices take effect. Prices are developed to recover estimated costs for storage, distribution, and other overhead costs incurred in the delivery of spare parts to customers. To recoup these costs, the Navy adds a surcharge rate to the latest repair cost of the parts to derive the customer's price.<sup>3</sup> As part of this process, the Navy also sets an annual price change rate, that is, an overall percent change in prices that customers can expect to pay in the upcoming fiscal year. This rate drives customers' funding, with the goal of ensuring that customers' budgets will be sufficient to cover the cost of the parts they expect to buy.

We analyzed price trends for about 60,000 of the 70,000 spare parts managed by the Navy from fiscal year 1994 through 1999. We also analyzed trends for (1) parts that were sold to customers at any point during the analysis period (about 20,000 items); (2) parts in frequent demand, that is, those that experienced sales in each of the analysis years (about 5,000 items); and (3) parts unique to select weapon systems. To perform these analyses, we calculated year-to-year percent changes in customer prices as well as the annual change in surcharge rates and repair costs. We also looked at the price change distributions from year to year. We took several steps to address data quality; however, we did not validate or verify the pricing data provided by the Naval Inventory Control Point.<sup>4</sup> Appendix I contains detailed information on our scope and methodology.

---

<sup>3</sup> This price is referred to as the net price. The Navy charges customers a higher price, referred to as a standard price, when a broken part is not turned in or when the customer procures new parts for initial provisioning. This report focuses on net price trends. "Repair cost" refers to the price the Navy pays a depot or commercial contractor to repair spare parts.

<sup>4</sup> We recently testified on long-standing problems with DOD's ability to accumulate and report on the value of its inventories. *Department of Defense: Progress in Financial Management Reform* (GAO/T-AIMD/NSIAD-00-163, May 9, 2000).

---

---

## Results in Brief

Prices for all Navy-managed parts increased at an average annual rate of 12 percent from 1994 to 1999. However, prices for parts with high sales volume increased substantially more, at an average annual rate of 27 percent. In addition, prices for parts unique to three weapon systems—the CH-53 Sea Stallion transport helicopter, the F/A-18 Hornet fighter and attack aircraft, and the AV-8 Harrier attack aircraft—also increased more significantly than the overall average. Moreover, from year-to-year, there were very strong fluctuations in prices, indicating substantial price instability.

Several factors have contributed to price increases. First, the cost of repairing an item has generally increased over time. Second, the surcharge that is charged to customers also has increased over time. The surcharge has also fluctuated dramatically from year to year, driving the instability in the prices charged to customers. Over 70 percent of the price changes (increases and decreases) from fiscal year 1994 through 1999 can be accounted for by surcharge fluctuations. Among other factors, these fluctuations were caused by DOD's and the Navy's attempt to strengthen the financial viability of the working capital fund, make up for past deficits and surpluses, and account for savings from efficiency improvements.

The Navy has sought to alleviate customer concerns about high surcharge rates by moving certain overhead costs from the surcharge to repair costs. However, this approach merely reallocated the overhead costs, rather than reducing them. Further, the Navy has not allocated condemnation costs—that is, the cost to replace items that can no longer be repaired—to the specific items incurring the costs. Spreading these costs among all items may hinder managers' incentives to reduce costs.

Lastly, we found that problems in the price-setting process could cause problems with customer funding. Specifically, the projected price changes used to set customer budgets have fallen short of actual price changes. With sales prices based on assumptions that are made as long as 2 years before the prices go into effect, some variance between expected and actual prices is inevitable. Navy officials attributed mismatches between actual needs and forecasted requirements to unanticipated developments that occur after the projected overall price change was established, such as unexpected delays in developing a new weapon system and the availability of new, but costlier, material for parts. As a result of these discrepancies, the Navy has found itself in situations where it has had to seek supplemental appropriations and delay procurements of needed parts.

---

The Navy has recognized the need to control spare part prices in order to enhance readiness and plans to further investigate the underlying causes of the increases. The Navy plans to (1) identify specific reasons for increases in repair costs (such as labor or material cost increases and differences with commercial repair costs); (2) examine whether certain weapon systems are driving repair cost changes at the aggregate level; (3) assess the effect of increased demand on repair cost; (4) ascertain how changes in the mix of parts in the inventory over time might lead to repair cost increases; and (5) determine how individual surcharge elements contribute to overall surcharge rate changes.

We are making recommendations that build on the Navy's planned studies to increase oversight and visibility over efforts to reduce and stabilize spare part prices and surcharges. In written comments on a draft of this report, DOD generally agreed with our recommendations and discussed alternative approaches for viewing price trends.

---

## Background

The Navy owns and operates about 4,000 aircraft. When any of the components on these aircraft fail to perform properly, or reach the end of their service life, they must be replaced with repaired or newly purchased parts. There are about 70,000 types of aviation repairable parts. These parts include airframes and airframe accessory equipment such as landing gear assemblies, aircraft engines and engine accessory equipment (e.g., fuel pumps and generators), aircraft instruments, and test equipment. These components, in turn, are manufactured using thousands of individual parts.<sup>5</sup> Naval aviation depots and commercial contractors perform maintenance on airframes, engines, and components requiring major overhaul or modification. In fiscal year 1999, the average price paid by customers for a repaired part was about \$7,000, but it went as high as \$1.4 million per unit. Customers paid less than \$5,000 per unit for about 80 percent of the parts.

Pricing spare parts is a 2-year process that involves customers as well as a number of Navy entities and the Office of the Under Secretary of Defense (Comptroller). During this process, prices are set based on projected customer requirements as well as anticipated repair and overhead costs.

---

<sup>5</sup> These include other repairable parts as well as "consumable" parts, i.e., those items that cannot be cost-effectively repaired. Most consumable parts are managed by the Defense Logistics Agency.



Appendix II describes the budgeting and price-setting process in greater detail.

## Spare Part Prices Have Increased With Dramatic Fluctuations From Year to Year

Prices for all Navy-managed parts we analyzed increased at an average annual rate of 12 percent from fiscal year 1994 through 1999. However, prices for parts actually sold and for parts in frequent demand—that is, sold every year—increased substantially more. Prices for parts unique to three weapon systems, which accounted for 34 percent of total sales in 1999, also grew more substantially. Moreover, from year to year there were very strong fluctuations in prices, indicating considerable price instability.

## Spare Part Prices Have Increased for All Parts Managed

Prices for all Navy-managed parts—which included about 60,000 items—increased at an average annual rate of 12 percent from fiscal year 1994 through 1999. Many of these items did not have sales activity during the analysis period. As noted in table 1, sharp price increases were experienced in 1995 and 1998.

**Table 1: Percent Price Changes—All Navy-managed Parts**

	Fiscal year					Average annual change
	1995	1996	1997	1998	1999	
Annual percent change in price	32.2	-15.0	9.3	38.1	-4.5	12.0

Hypothetically, if a part cost \$100 in fiscal year 1994, by fiscal year 1999 the same part would cost \$162.

## Parts Sold to Customers Experienced Substantial Price Growth

Of the approximately 60,000 Navy-managed spare parts included in our review, 35 percent were sold to customers at least once from fiscal year 1994 through 1999. About 8 percent were in frequent demand, experiencing sales in each of the 6 years. For each of these two categories of parts, we calculated the average annual price change and an expenditure-weighted average annual price change. The latter approach places greater emphasis on price changes for those parts with higher sales volume.<sup>6</sup>

The first category—parts sold at least once—experienced more substantial price growth than the overall population of parts, increasing at an average annual rate of 16.7 percent versus 12 percent. As shown in table 2, parts with higher sales volume (expenditure-weighted analysis) experienced even higher price increases, growing at an average annual rate of 22.6 percent. Using the weighted average, a part costing \$100 in fiscal year 1994 would cost \$258 by fiscal year 1999.

**Table 2: Percent Price Changes—Parts Sold**

	Fiscal year					Average annual change
	1995	1996	1997	1998	1999	
Annual price change	46.2	-13.0	11.5	36.5	2.1	16.7
Expenditure-weighted annual price change	50.2	0.5	9.7	46.0	6.8	22.6

The second category—parts in frequent demand—also experienced more substantial price increases. As noted in table 3, the average annual price increase was 19 percent and, when expenditure-weighted, the increase was 27 percent.

<sup>6</sup> See app. I for details on expenditure-weighted calculations.

**Table 3: Percent Price Changes—Parts in Frequent Demand**

	Fiscal year					Average annual change
	1995	1996	1997	1998	1999	
Annual price change	50.2	-11.5	13.8	37.5	4.6	18.9
Expenditure-weighted annual price change	53.3	2.5	20.5	52.0	6.1	26.9

**Parts Unique to Select Weapon Systems Have Experienced Significant Price Growth**

For illustrative purposes, we examined price trends for parts unique to three aircraft and their engines: the CH-53 Sea Stallion transport helicopter, the F/A-18 Hornet fighter and attack aircraft, and the AV-8 Harrier attack aircraft. In fiscal year 1999, over \$500 million in revenue—over 30 percent of total sales—was generated for parts unique to the CH-53 Sea Stallion transport helicopter and the F/A-18 Hornet fighter and attack aircraft and their engines. Because Marine Corps officials had expressed concern about substantial price increases for parts on the AV-8 Harrier attack aircraft, we also included this aircraft and its engine in the analysis. Parts unique to the AV-8 Harrier represented about 5 percent of total sales in fiscal year 1999.

As shown in table 4, parts unique to all three aircraft and two of the engines experienced price increases exceeding the 12-percent annual average for parts managed. For example, the F/A-18 Hornet and the AV-8 Harrier and their engines showed price increases about 1.5 times higher than all parts managed. These increases were driven by substantial price increases in 1995, when prices increased by 68 percent for the F/A-18 Hornet, and in 1998, when prices jumped by 70 percent and more for the AV-8 Harrier and its engine.

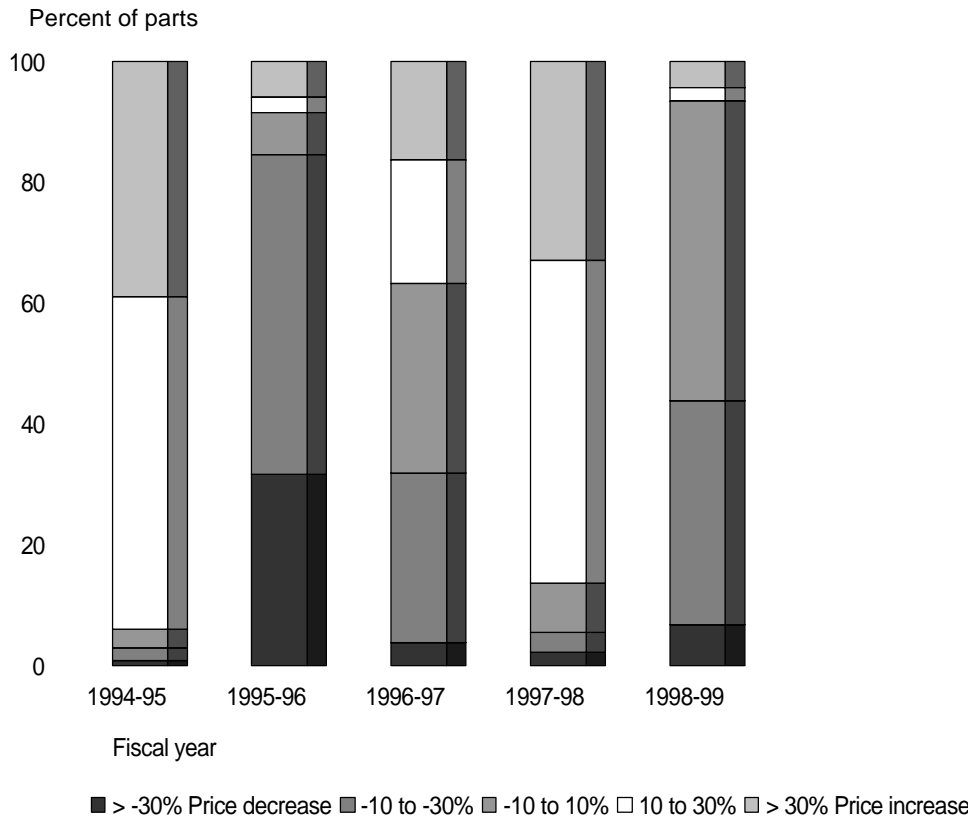
**Table 4: Percent Price Changes for Selected Aircraft and Engines**

	Fiscal year					Average annual change
	1995	1996	1997	1998	1999	
AV-8 Harrier	37.5	-18.9	-4.2	70.0	1.4	17.2
Engine (F402)	39.8	-19.4	-5.8	77.8	6.5	19.8
CH-53 Sea Stallion	39.4	-19.4	7.3	41.0	1.1	13.9
Engine (T64)	43.8	-19.8	-9.0	32.9	6.7	10.9
F/A-18 Hornet	68.2	-23.9	5.8	39.5	-1.4	17.6
Engine (F404)	43.5	-20.0	0.2	44.8	9.7	15.6

### Spare Part Prices Showed Strong Fluctuations From Year to Year

While parts' prices generally increased over the analysis period, there were also strong fluctuations in price. As shown in figure 1, in 1995 and 1998, over 85 percent of approximately 60,000 Navy-managed parts showed price increases exceeding 10 percent while in 1996, prices for 84 percent of parts managed dropped by 10 percent or more. In any given year, between 3 and 50 percent of the parts showed less than a 10-percent price change. These extreme price changes from year to year indicate substantial price instability.

**Figure 1: Distribution of Percent Change in Prices**



## Surcharge Rate Was Main Driver of Price Fluctuations

As noted earlier, the price that customers pay for spare parts is composed of a repair cost and a surcharge rate. Both components generally increased over the analysis period. However, on average, over 70 percent of the price changes (increases and decreases) from fiscal year 1994 through 1999 can be accounted for by changes in surcharge. In addition, surcharge rates have fluctuated considerably year-to-year. These fluctuations drove the swings in customer prices over the 6 years.

## Repair Costs and Surcharge Rates Increased

The repair cost represents the price the Navy pays to naval aviation depots or commercial contractors to repair parts. This price consists of labor and

overhead costs at the repair facilities, as well as the cost of individual parts that are used to refurbish the reparable parts. As noted in table 5, repair costs increased at an average annual rate of 11.8 percent from fiscal year 1995 through 1999.<sup>7</sup>

**Table 5: Percent Change in Repair Costs**

	Fiscal year					Average annual change
	1995	1996	1997	1998	1999	
Annual change in repair costs	16.7	18.0	-2.1	15.2	11.0	11.8

Hypothetically, a part costing \$50 in 1994 would cost \$86.20 by 1999 based on these percent changes in costs.

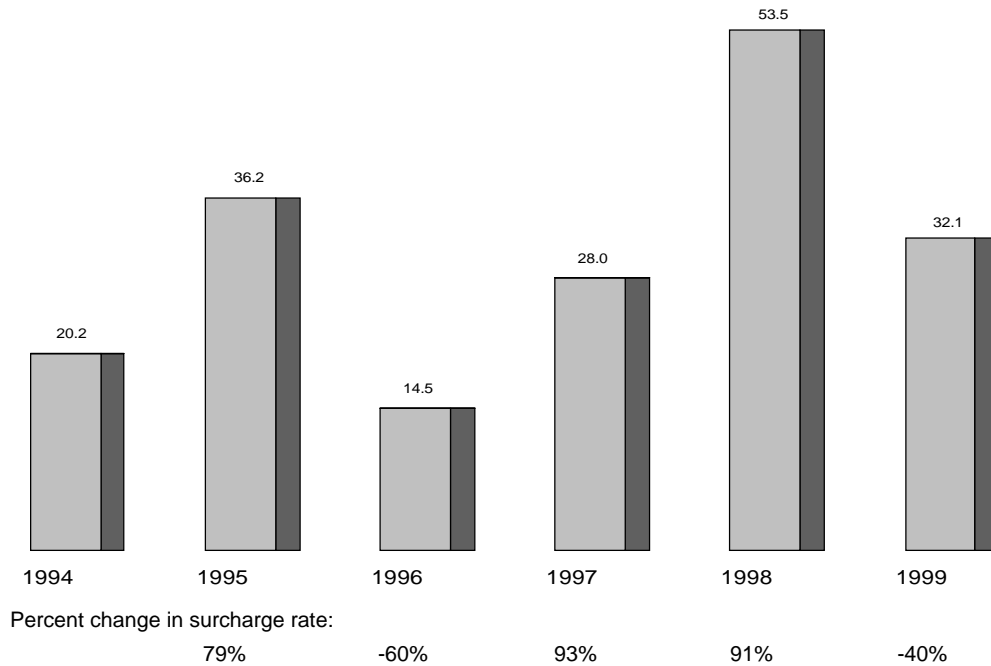
The surcharge rate is applied to an item’s repair cost to recover operating costs such as

- supply operations support costs (labor, benefits, and supplies);
- condemnation (the cost of replacing parts that can no longer be repaired);
- shipping and transportation;
- depreciation;
- prior year gains and losses; and
- inflation.

The surcharge rate is derived by dividing the estimated cost of operations by projected sales. When the cost of operations increases and sales decrease, increases in the surcharge rate are more dramatic. Figure 2 shows the surcharge rates for 1994 to 1999 and the percent change from year to year.

<sup>7</sup> See app. IV for repair cost change distribution.

**Figure 2: Surcharge Rates**



To provide an illustrative example, if the repair cost of a spare part was \$100, customers would pay \$120 based on the 1994 surcharge rate of 20.2 percent. Assuming the repair cost remained the same, customers would have paid \$136 for the part at the higher 1995 surcharge rate of 36.2 percent. As shown in figure 2, surcharge rates increased from the 1994 rate in every year except 1996.

### Surcharge Fluctuations Drove Price Changes

Surcharge rates fluctuated dramatically over the analysis period, as shown in figure 2. For instance, the surcharge rate increased by 91 percent in 1998, but dropped by 40 percent in the following year. We compared the year-to-year dollar change in repair costs and surcharge amounts as a proportion of the dollar change in customer prices<sup>8</sup> and found that changes in surcharge

<sup>8</sup> See app. I for methodology.

---

amounts accounted for a larger portion of the price fluctuations (increases and decreases). On average, over the analysis period, 73 percent of the dollar change in prices was attributable to changes in the surcharge amount.

---

### Several Factors Contributed to Surcharge Fluctuations

One reason that surcharges increased substantially in fiscal years 1995 and 1998 was that the Office of the Under Secretary of Defense (Comptroller) directed the Navy to recoup \$375 million and \$167 million, respectively, to improve the financial viability of the working capital fund. These funds were recouped by increasing the surcharge rate.

Another reason for the surcharge fluctuations was adjustments for prior year accumulated gains and losses.<sup>9</sup> Defense regulations require the military services to use accumulated operating results in determining the prices to charge customers, with the goal of operating the supply fund on a break-even basis over time. Large swings in the accumulated operating result indicate that, from fiscal year 1994 through 1999, the Navy ran a surplus in some years and large deficits in other years. In a surplus situation, the surcharge rate is lowered; in a deficit situation, the rate is increased.

A third reason for the surcharge fluctuations was surcharge reductions made from 1995 through 1997. These reductions were implemented to capture savings anticipated from more efficient operations under the working capital fund. Although the surcharge was lowered in 1996 and 1997, the savings ended in 1998, contributing to the increased rate that year.

A fourth reason for the fluctuations was that the Navy's sales base declined in 1998. This drop in sales contributed to the high surcharge rate that year. According to Navy documents, this was largely due to a DOD program that required the military services to transfer responsibility for most consumable spare parts to the Defense Logistics Agency.

---

### Navy Shifted Costs Out of Surcharge Rate

According to officials at the Office of the Secretary of Defense and the Navy, increases in the surcharge have become a significant concern among operating units. The high surcharge rate in 1998, in particular, caused an

---

<sup>9</sup> This difference between revenue and expenses over a period of time longer than a year is referred to as the accumulated operating result.



---

avalanche of customer complaints. In an effort to reduce the surcharge rate and respond to customer complaints, the Navy shifted costs related to transportation, condemnation, and obsolescence (the reduced value of assets whose use is precluded by a change in technology or operations) from the surcharge rate to repair costs.

In fiscal year 1999, the first year that transportation costs were removed from the surcharge rate, about \$100 million was shifted and spread across repair costs. In 2000, about \$200 million in condemnation and obsolescence costs were applied to repair costs. According to Navy budget documents, the initiative to remove these costs from the surcharge rate preserves the basic tenet of full cost recovery under the working capital fund, while not changing the customer price. In fact, the Navy stated that applying transportation costs to repair costs better reflects the cost of goods sold and standard industry practice. The Navy also stated that the transfer of condemnation and obsolescence costs was done to be consistent with other services.

However, shifting these elements out of the surcharge rate to the repair costs did not reduce the Navy's overhead costs; it transferred them to a different category. While in theory the customer's price remains the same, this change masks the cost of supply operations by making it appear that the overhead costs have dropped, when in reality they have merely been reallocated. In addition, condemnation costs (the cost of procuring new items to replace those that can no longer be repaired) are spread across all spare parts, rather than being allocated to the specific parts or groups of parts being replaced.<sup>10</sup> As a result, all customers are paying for these costs, regardless of whether they are buying the parts that incur condemnation charges. In addition, because these costs are spread across all spare parts, they are not reflected in the specific parts that are condemned. As such, this action may actually reduce the incentive for managers to cut costs for certain items.

---

<sup>10</sup>The Air Force applies condemnation costs to the groups of spare parts actually incurring the costs. See *Air Force Supply Management: Analysis of Activity Group's Financial Reports, Prices, and Cash Management* (GAO/AIMD/NSIAD-98-118, June 8, 1998).

---

---

## Inaccurate Price Change Projections Can Lead to Customer Funding Shortfalls

As part of the price-setting process, the Navy and DOD project an overall percent change in prices that customers can expect to pay in the next budget year. Since customers' budgets are based on this number, it is critical that it be accurate and in line with the actual prices that are eventually set for individual items. In recent years, however, there have been discrepancies between projected and actual prices. Unanticipated developments, such as the availability of new, costlier material, can result in a mismatch between forecasted requirements and actual needs. These differences, in turn, can cause customers to seek supplemental appropriations or delay procurement of the parts they need.

---

## Customer Budgets Are Based on Projected Price Changes

The projected price change, which the Navy refers to as the annual price change rate, is the means of ensuring that customers' budgets are balanced, in the aggregate, with the prices of the spare parts they plan to buy. As mentioned earlier, the process of setting this projection, which is subject to approval from the Office of the Under Secretary of Defense (Comptroller), begins 2 years prior to the start of a fiscal year.<sup>11</sup> If actual prices are set higher than the projected level, customers may not have sufficient funds to buy the items they need. When funding falls short, customers must (1) reprogram and/or transfer funds from other accounts, (2) seek supplemental appropriations, or (3) delay procurement of the parts they need.

The following examples further illustrate how customer funding—at the command, activity, and field unit level—is tied to the projected price change.

- In fiscal year 1998, spare part prices, which became effective on October 1, 1997, in a process that began in the summer of 1996, were expected to increase by 24.7 percent. This projected increase meant that Navy customers, as a whole, would have to increase their spare parts budget by 24.7 percent from 1997 funding levels to sufficiently cover spending requirements for spares.
- After the aggregate projected rate was established, the Naval Inventory Control Point provided Navy commands with projected price changes by weapon system. This information is provided each year to help activities distribute their funding so that field units will have the funds

---

<sup>11</sup> See app. II for a time line depicting the 2-year process.

they need to buy the parts for which they projected a requirement in the budget process. Factors such as projected demand, repair cycles, and system modifications affect the rate at the weapon system level.

- For some weapon systems, the projected price change can be significantly higher than for others. For example, in the aggregate, prices were expected to increase by 24.7 percent in 1998. However, the projected price change for parts unique to the S3 Viking aircraft was 15.5 percent, while the price change for its engine, the TF 34, was 70.9 percent.

Over the past several years, the overall projected price change has fluctuated considerably. As shown in table 6, projected price changes were highest in fiscal years 1995 and 1998. In fiscal years 1999 and 2000, projected price changes were more moderate. However, in fiscal year 2001, the projected price change again increased significantly. This was partly due to a modeling error that was made in setting the 1999 price change rate. Specifically, transportation costs were not captured and material escalation costs were understated, resulting in a deficit for the working capital fund. Collection of these costs began in fiscal year 2001, causing the annual price change rate to increase to 14.3 percent for that year.

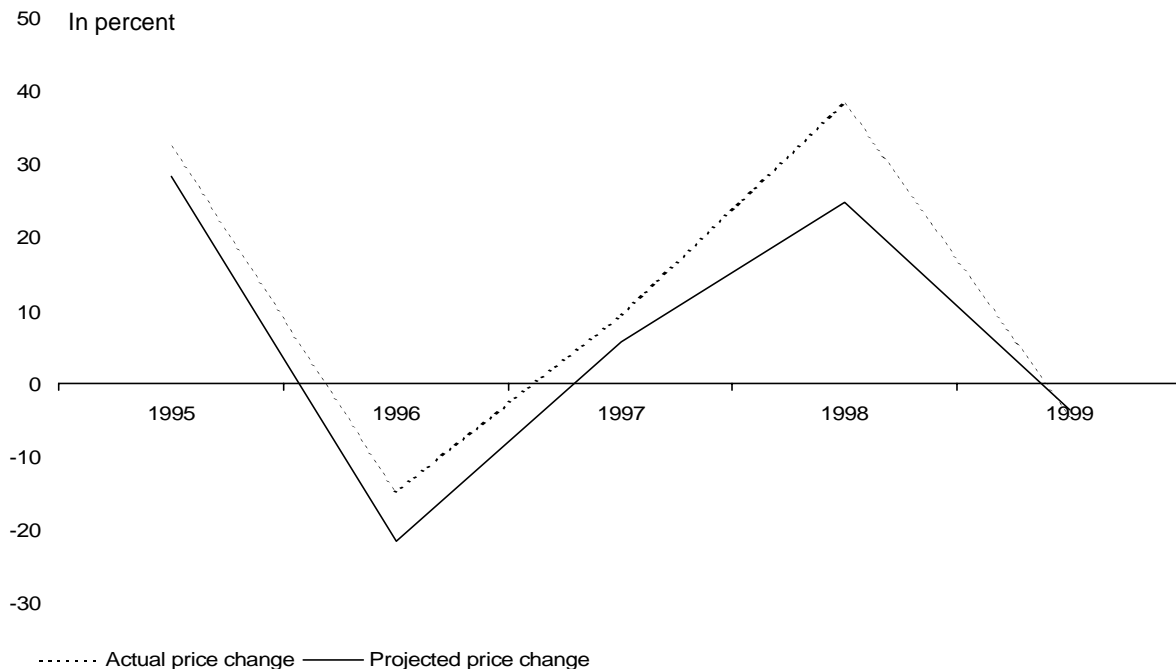
**Table 6: Navy's Projected Annual Price Changes**

	Fiscal year							
	1994	1995	1996	1997	1998	1999	2000	2001
Projected annual price changes (percent)	6.3	28.3	-21.6	5.7	24.7	-3.6	-2.9	14.3

### Unanticipated Developments Can Cause a Mismatch Between Actual and Projected Prices

We compared actual price changes with the Navy's projected price changes from fiscal years 1994 through 1999 and found that the Navy's projected changes fell short of actual price changes in 4 of the 5 years, as shown in figure 3. Again, because customer funding is tied to the projected change, such discrepancies can lead to funding shortfalls and possibly affect readiness.

**Figure 3: Projected Price Change Rate Compared to Actual Price Change**



With sales prices based on assumptions that are made as long as 2 years before the prices go into effect, some variance between expected and actual costs is inevitable. Weapon system managers and other Navy officials noted that unanticipated developments can result in a mismatch between actual needs and forecasted requirements. For example:

- DOD may initiate logistics engineering changes that call for replacing selected items with more reliable or easily maintained substitutes. These modifications, while initially costly, are intended to improve the performance and value of the weapon system from a total life-cycle perspective. However, the Navy has found that implementing such changes has cost more than originally anticipated. According to a Navy document, customers have had insufficient resources allotted in the budget process to pay for the new, improved items.
- Unexpected delays in developing a new system may occur. The annual price change is based on the forecasted availability of the system, but if

---

it is not ready when projected, the Navy must continue to pay higher costs to maintain the old system that it is replacing.

- New and improved material is available, but its cost was not built into the projections established 2 years prior. Thus, customers have insufficient funds to pay for the material. For example, during the price-setting process for fiscal year 1998, the Navy estimated that it would require modifications to a high-pressure turbine rotor—a major component of the F 402 engine on the AV-8B aircraft. However, it did not anticipate having to replace all of the blades on the rotor with new material, a situation that occurred because the old and new materials could not be intermingled on the rotor. This unexpected extra work and the cost of new material for all of the blades drove up the price of the rotor from an estimated price of \$30,350 to an actual price of \$853,890—a 2,713-percent increase. Because the higher price was not reflected in the projected 1998 annual price change rate, the Navy fleet's budget had not been adjusted to cover the repair costs. Thus, the Navy Working Capital Fund absorbed the cost so as not to adversely affect the fleet's budgets. In 1999, the customers' price reflected the higher cost.

Customers can experience funding problems when forecasted budgetary needs are inaccurate. According to DOD officials, funding in 1997 was insufficient because flying hour projections were too low. These inaccurate estimates, in turn, resulted in an understated projected price change and underfunded customer budgets. As a result, customers lacked the funds necessary to pay for aircraft spare parts, and the Navy could not collect sufficient revenue to pay for the spare parts their customers needed. To address this problem, the Navy allocated \$116 million of a fiscal year 1999 supplemental appropriation to purchase aviation spare parts. These funds were used to buy parts that had been deferred in 1997 and to reduce subsequent backlogs in repair work.

---

## Navy Studies Focus on Pricing-Related Problems

The Navy has recognized that increasing and unstable prices can affect readiness and has conducted studies to determine the causes of the price increases and recommend improvements. A 1998 report on Naval Aviation Maintenance and Supply Readiness identified price increases for aviation spares as a key concern that could affect readiness. The Navy has identified 100 specific parts as cost drivers—those with the highest price increases and the most demand. The report noted that decreasing the cost and/or improving the reliability of these components would significantly enhance readiness. The report also stated that difficulties in accurately projecting flying hour costs has led to underfunding, which, in turn, could have caused

---

a decline in readiness. The report concluded that improving the accuracy of budget forecasting would help address this problem.

According to a recent study update, engineering and design changes and other modifications have increased the reliability and stability of prices for several of the items. However, current price trends were expected to continue for other items. The Navy also noted that gathering detailed demand and repair cost data at the item level is a very labor-intensive process.

In October 1999, the Deputy Chief of Naval Operations (Logistics) directed a study group to review aviation repair pricing processes, determine the extent of pricing problems, and recommend corrective actions. Further, in a July 2000 report, the Center for Naval Analyses found that aviation spare part costs have grown rapidly since the early 1990s. The Center is undertaking a series of follow-on studies that include assessing

- the effect of certain weapon systems on cost changes at the aggregate level,
- the impact of increased demand on cost,
- the effect of changes in the mix of parts in the inventory over time on cost increases,
- the differences between commercial and naval aviation depot repair costs for similar items,
- the price impact of the “consumable” material—that is, parts that are consumed in use—on aviation spares part costs, and
- the effect of changes in the surcharge elements on overall surcharge change.

---

## Conclusions

Aviation spare parts prices—especially those in frequent demand—have experienced substantial increases. Moreover, there were dramatic price fluctuations from year to year, largely due to surcharge rate changes. The Navy’s plans to further study the underlying causes of price increases appropriately focus on answering questions such as what are the reasons behind repair cost increases, which weapon systems drive aggregate cost changes, what effect does increased demand have on prices, and what elements are driving surcharge rate changes. Nevertheless, it will be important for DOD to ensure that the Navy follows through on the study results by identifying and implementing appropriate corrective actions. In addition, the Navy has sought to alleviate customer concerns about high surcharge rates by moving certain overhead costs from the surcharge to

---

repair costs. However, this approach merely reallocated the overhead costs, rather than reducing them. Also, condemnation costs, now part of the repair costs, continue to be spread among all spares rather than allocated at the item level, potentially reducing managers' incentive for controlling these costs.

---

## Recommendations for Executive Action

We recommend that the Secretary of Defense ensure that the Navy follows through on the results of its planned studies by identifying and implementing solutions to reduce and stabilize prices and surcharge rates. We also recommend that the Secretary of Defense direct the Navy to allocate condemnation costs to the specific parts or groups of parts incurring the costs. If this allocation cannot be achieved, we recommend that condemnation costs be reflected in the surcharge rate. Finally, we recommend that the Secretary of Defense report to the Congress on the Navy's progress in (1) reducing and stabilizing prices and surcharge rates and (2) allocating condemnation costs at the item level.

---

## Agency Comments and Our Evaluation

In written comments on a draft of this report, DOD generally agreed with our principal findings and recommendations. DOD noted that certain approaches to cost analysis, such as studies of unit cost trends (the subject of this report) or cost per flight hour (the subject of recent studies by the Center for Naval Analyses), may overlook reliability improvements that are intended to reduce total costs. We do not disagree with this assertion. However, we believe it is important to continue to track unit price increases as part of assessments regarding the effectiveness and efficiency of reliability improvements.

DOD agreed with our recommendation that the Department carry out planned studies concerning the reduction and stabilization of prices and the surcharge rate. The agency, however, asserted that our report implies that the surcharge rate is the primary driver of price escalation. This statement is incorrect. Our report states that the surcharge rate was the primary driver of price fluctuation (both increases and decreases), not price escalation alone.

Regarding our recommendation to allocate condemnation costs to the specific parts or groups of parts incurring the costs, DOD stated that it had begun to allocate these costs beginning in fiscal year 2001. DOD plans to refine its cost allocation methodology to raise the level of attention on

---

items with low survival rates and drive reliability improvements where possible.

DOD agreed to report to Congress, using traditional means such as the President's budget submission. We believe that the President's budget submission would be a reasonable vehicle for reporting to Congress on the results of the Navy's ongoing studies and on the Department's progress in reducing and stabilizing prices and surcharge rates. However, if this mechanism is used, these topics should be highlighted in a separate section and discussed in detail.

The Department's comments appear in appendix V.

---

We are sending copies of this report to the appropriate congressional committees; the Honorable William S. Cohen, Secretary of Defense; the Honorable Richard Danzig, Secretary of the Navy; General James L. Jones, Commandant of the Marine Corps; and the Honorable Jacob J. Lew, Director, Office of Management and Budget.

GAO contacts and major contributors to this report are listed in appendix VI.

A handwritten signature in black ink that reads "David E. Cooper". The signature is written in a cursive style with a large, stylized initial "D".

David E. Cooper, Director  
Acquisition and Sourcing Management



---

---

---

# Scope and Methodology

---

To evaluate trends in Navy aviation spare part prices, we obtained repair, net, standard, and procurement price data for the approximately 70,000 Navy-managed depot level aviation reparable parts from the Naval Inventory Control Point-Philadelphia. This information was obtained from the Navy's Master Item File—a database containing reparable prices and other technical data. The Naval Inventory Control Point also provided us with billing records extracted from the Billing History File. Furthermore, we collected information about the aviation reparable budgeting and pricing cycle and reviewed Department of Defense (DOD) and Navy financial management and budget regulations and our reports.

We did not request data on the consumable spare parts that are still under the Navy's purview because we conducted a separate review of the Defense Logistics Agency's consumable spare part prices. About 95 percent of consumable spares are now managed by the Defense Logistics Agency.

We did not validate or verify the pricing data the Naval Inventory Control Point provided. However, we took several steps to address data quality. Specifically, we reviewed the data and performed various quality checks, which revealed some discrepancies in the data. We discussed these discrepancies with Inventory Control Point officials and where appropriate deleted the data from our analysis universe.

---

## Analysis Universe

Customers are charged the net price when they turn in a broken item to be repaired; otherwise they pay the higher, standard price. Because over 90 percent of the time customers pay the net price, we focused our analysis on this price. We excluded parts that did not have a National Item Identification Number (these parts have not been catalogued). These parts are classified as bachelors, family heads, or family members.<sup>1</sup> We limited our price trend analysis to bachelors and family heads in a particular year and excluded family members.

Preliminary percent change distributions revealed a small number of extreme price changes. Between fiscal year 1995 and 1999, about 99 percent of the parts experienced price changes under 500 percent. However, approximately 1 percent showed price changes from 500 percent

---

<sup>1</sup> Parts in the same family have a similar form, fit, and function. Prices for head and member parts in the same family are based on the repair cost resident with the family head, plus the surcharge rate.

to over 100,000 percent. Because these extreme values skewed our average annual price change, we set aside parts in the 1-percent tail ends of the percent change distribution from our price trend analysis. Table 7 shows the average price change with and without extreme values.

**Table 7: Average Price Change With and Without Extreme Values**

	Fiscal year					Average annual change
	1995	1996	1997	1998	1999	
Percent price change (all parts)	48.8	11.7	23.5	54.0	108.6	<b>49.3</b>
Percent price change (removed 1-percent tail ends)	32.2	-15.0	9.3	38.1	-4.5	12.0

After applying these filters, our analysis universe included about 51,000 to 52,000 of the approximately 70,000 Navy-managed spare parts in any given year. Over the analysis period, we examined about 60,000 parts. Since some spare parts have been removed or introduced to the Navy’s inventory over time, these 60,000 spare parts do not represent a market basket. All findings in this report are based on these modifications.

## Price Trend Analysis

To assess whether spare parts’ prices have increased, decreased, or remained the same over time, we calculated the year-to-year percentage change in prices for each of the approximately 60,000 parts and the average annual price change for each year. We also looked at the price change distributions. Because the price change distributions varied drastically from year to year, we chose the 10-percent change as a benchmark of relative price stability. Although we did not identify a comparable indicator to assess price changes in aviation spares, we used as a proxy the Bureau of Labor Statistics’ Producer Price Index commodity group “Intermediate Materials, Supplies, and Components/Materials and Components for Manufacturing.” Between 1994 and 1999, prices for materials used in the production of goods in this index changed between –0.2 and 1.6 percent and averaged 0.3 percent over this period.

---

Parts sold to customers

We used billing records to identify spare parts sold to customers and the dollar value of total sales.<sup>2</sup> The Naval Inventory Control Point sold approximately 10,000 to 12,000 types of spare parts each year.<sup>3</sup> Since customers buy different types of spare parts from year to year, we do not have a market basket of spares. Over the analysis period, customers bought about 21,000 different types of parts (35 percent of the parts examined). We calculated the average annual percent change in prices and expenditure-weighted average annual percent change in prices for this subset of parts. Under this latter approach, parts with higher sales received larger weights and greater emphasis. Weights were calculated by dividing total sales for each spare part into total sales for a given year. These weights were applied to percent changes for parts sold to determine the expenditure-weighted price changes. In addition to parts sold, we calculated the average annual percent change and the expenditure-weighted average annual percent change for frequent-demand parts – those sold in all 6 years of our analysis period. There were about 5,000 frequent-demand parts.

Aircraft and federal supply groups

We calculated the annual average price change for various subsets of parts by selecting parts unique to the F/A-18 Hornet, the CH-53 Sea Stallion, the AV-8 Harrier, and their engines (F404, T64, and F402). To identify these parts, we used weapon system codes. We also examined price trends for the five federal supply groups that had the highest sales in fiscal year 1999. To identify these groups of parts, we used the federal supply group, a component of each part's national stock number.

---

Analysis of Repair Costs and Surcharge Contributions to Price Change

The price that customers pay for spare parts is repair cost plus the surcharge amount. Theoretically, the change in repair cost plus the change in surcharge amount equals the new price. To determine how much the repair component and the surcharge component were contributing to price trends, we calculated the change in repair costs and the change in surcharge amount as a proportion of the change in price (increases and decreases). Table 8 is an example of the calculation used.

---

<sup>2</sup> See section on billing transaction analysis for more information about transactions retained for this analysis.

<sup>3</sup> We limited parts sold to bachelors and family heads.

**Table 8: Example of Calculation Used to Determine Percentage of Price Change Attributable to Repair Versus Surcharge**

Servocylinder (part unique to the F/A-18 Hornet)	Fiscal year					
	1994	1995	1996	1997	1998	1999
Repair component	\$5,380	\$5,483	\$4,846	\$5,929	\$6,917	\$6,108
Surcharge component	1,090	1,987	704	1,661	3,703	1,962
<b>Price</b>	<b>\$6,470</b>	<b>\$7,470</b>	<b>\$5,550</b>	<b>\$7,590</b>	<b>\$10,620</b>	<b>\$8,070</b>
Dollar change in repair <sup>a</sup>		\$103	(\$637)	\$1,083	\$988	(\$809)
Dollar change in surcharge		897	(1,283)	957	2,042	(1,741)
<b>Dollar change in price</b>		<b>\$1,000</b>	<b>(\$1,920)</b>	<b>\$2,040</b>	<b>\$3,030</b>	<b>(\$2,550)</b>
Percent of price change attributable to repair <sup>b</sup>		10	33	53	33	32
Percent of price change attributable to surcharge		90	67	47	67	68

<sup>a</sup>Dollar change is the price in the current year subtracted from the prior year.

<sup>b</sup>The percentage of change attributable to repair is the change in repair divided by the change in price and then multiplied by 100.

We did not examine the direction of change, that is, whether prices increased or decreased. Our primary interest was to determine which component had a larger effect on the observed price fluctuations. This calculation was performed for the approximately 60,000 parts that were bachelors and family heads.

## Billing Transactions Analysis

We used the Navy's Billing History File to identify parts sold to customers and total sales for parts sold. We performed several data checks and excluded transactions from the billing data that met the following criteria.

- Transactions for consumable parts.
- Transactions that did not have a National Item Identification Number (customers normally are not billed for these parts).
- Transactions where customers were charged a price that did not appear in the Master Item File in any of the 6 years.
- Transactions, which totaled about \$100 million in 1998, that had been mistakenly coded as standard sales rather than net sales due to a computing error. We moved this \$100 million into our fiscal year 1998 net sales.

- 
- Transactions for family member parts.
  - Transactions where sales summed to a negative number (i.e., credits exceeded bills for a requisition in a given year).

All analyses requiring billing information were based on this modified database.

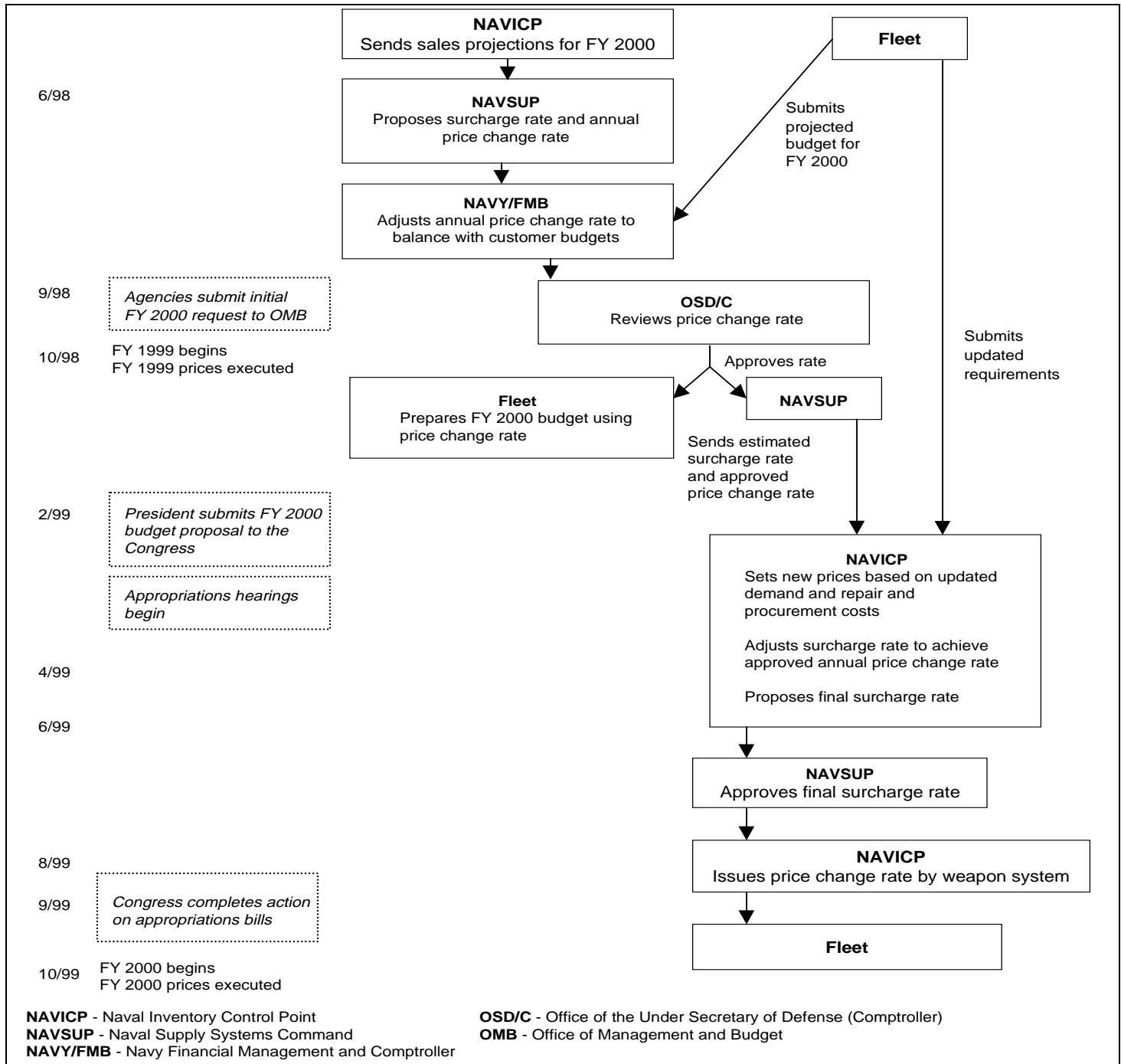
---

## **Reasons for Surcharge Fluctuations**

To determine possible reasons for changes in the surcharge rate, we reviewed financial management regulations, the Navy's budget guidance, and Working Capital Fund budget estimate justifications. We also interviewed Office of the Under Secretary of Defense (Comptroller) and Navy officials. We used price data to verify that surcharge rates were consistently applied.

We performed our review at the Office of the Under Secretary of Defense (Comptroller)/Revolving Fund Directorate, Washington, D.C.; the Under Secretary of Defense (Comptroller)/Program Analysis and Evaluation, Washington, D.C.; the Navy/Financial Management and Comptroller, Crystal City, Virginia; the Chief of Naval Operations/Air Warfare Division, Washington, D.C.; the Naval Supply Systems Command, Mechanicsburg, Pennsylvania; the Naval Inventory Control Point-Philadelphia, Pennsylvania; the Naval Aviation Depot, Cherry Point, North Carolina; and the 2nd Marine Air Wing, Cherry Point, North Carolina. We conducted our review from February 1999 through August 2000 in accordance with generally accepted government auditing standards.

# Budgeting and Price-setting Process for Fiscal Year 2000



# Federal Supply Groups

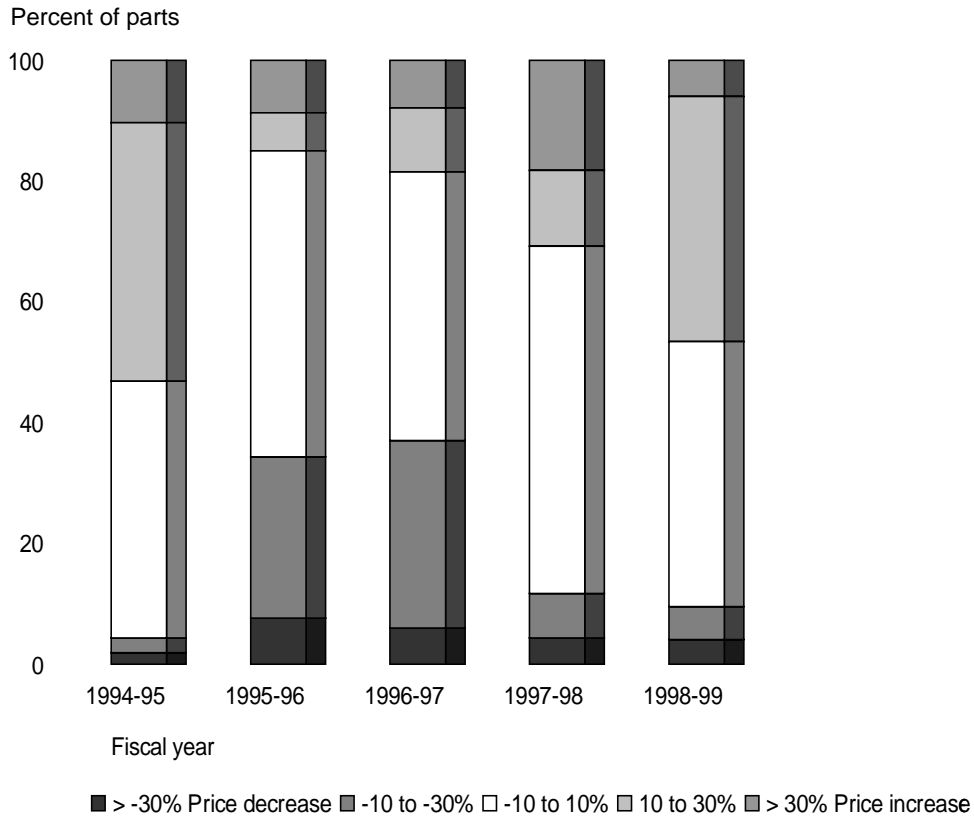
The Department of Defense uses a two-digit federal supply group code to categorize and manage its spare parts, in addition to a unique nine-digit national item identification number. Table 9 summarizes the average annual price change for the five supply groups with the highest sales.

**Table 9: Annual Percent Change in Prices by Federal Supply Group**

	Fiscal year					Average annual change
	1995	1996	1997	1998	1999	
Electrical and electronic equipment components	31.7	-20.3	7.9	33.9	-5.7	9.5
Communication, detection, and coherent radiation equipment	33.9	-13.9	7.3	35.5	-5.1	11.5
Instruments and laboratory equipment	31.1	-12.9	9.7	39.7	-4.0	12.7
Aircraft components and accessories	37.0	-12.0	9.9	43.7	-1.6	15.4
Engine, turbines, and components	29.0	-5.4	16.6	41.9	-4.9	15.4
All other federal supply groups	31.0	-13.0	10.7	41.1	-3.9	13.2



# Repair Cost Change Distribution



Note: Repair cost is one component of the customer's price.

# Comments From the Department of Defense



COMPTROLLER  
(Program/Budget)

OFFICE OF THE UNDER SECRETARY OF DEFENSE  
1100 DEFENSE PENTAGON  
WASHINGTON, DC 20301-1100

OCT 24 2000

Mr. David E. Cooper  
Associate Director  
Defense Acquisition Issues  
National Security and International  
Affairs Division  
U.S. General Accounting Office  
Washington, D.C. 20548

Dear Mr. Cooper:

This is the Department of Defense response to the General Accounting Office (GAO) draft report on Defense Acquisitions, "Prices of Navy Aviation Spare Parts Have Increased," dated September 15, 2000 (GAO Code 707458, OSD Case 2084). The Department generally concurs with the recommendations contained in the draft report.

Specific comments on the recommendations contained in the GAO draft report are provided in the enclosure. The Department appreciates the opportunity to comment on the draft report.

Sincerely,

A handwritten signature in cursive script, appearing to read "Bruce A. Dauer".

Bruce A. Dauer  
Deputy Comptroller  
(Program/Budget)

Attachments  
As Stated

---

**Appendix V**  
**Comments From the Department of Defense**

---

GAO DRAFT REPORT DATED September 15, 2000  
(GAO Code 707458) OSD Case 2084  
“Prices of Navy Aviation Spare Parts Have Increased”

DEPARTMENT OF DEFENSE COMMENTS

**General Comments:**

Whether looking at aggregated cost data by average unit cost as in the GAO study, or cost per flight hour as in the Center for Naval Analysis and other Navy studies, reasons for cost escalation are never fully portrayed. This leads to a tendency to conclude that unit cost trends are due to general inflationary reasons, paying more for basically the same repair. This problem is illustrated for the two approaches:

**--Unit cost trends (used in the GAO study)**

Reliability improvements such as Engineering Change Proposals, Logistics Engineering Change Proposals and replacement versus repair decisions typically result in substantial average unit cost increases but greatly increased reliability. Then, from a unit cost perspective, costs have increased, but total costs are actually reduced.

**--Cost per flight hour**

As we increasingly shift more maintenance work load from being performed at the base or organization level to the central maintenance depot, more costs are shifted to the flying hour program leading to higher Aviation Depot Level Repairable cost per flight hour. However, overall costs are lower since we do not have to buy and maintain as much intermediate level capability. Another factor is the impact on unit costs of upgrades to systems. An example is the added capability such as the SH-60 Forward Looking Infrared Radar or the P-3 Anti-Surface Warfare Improvement Program. Adding more technologically complex systems increases the cost per hour but also provides added capability.

Because of the inherent problems with both approaches, efforts to accurately and definitively categorize the reasons for price increases has forced us to move away from an aggregate approach and look at each component individually. Using this approach, we have found that changes in the mix of Components (more or different systems) and the impact of aging aircraft (more frequent failures and more extensive repairs), account for a large percentage of the price increases.

**Recommendation 1:** *We recommend that the Secretary of Defense insure that the Navy follow through on the results of its planned studies by identifying and implementing solutions to reduce and stabilize prices and surcharge rates.*

**Response: Concur with comment.** The surcharge rate and the reduction/stabilization of prices has been and will continue to be the focus of many DoD/DoN studies. For example: the Aviation Maintenance Supply Readiness Group focused its efforts on price escalation and determined that, although the surcharge rate drove price variation over time, it was not the primary driver in price escalation. The most recent study, performed by the Center for Naval Analysis, concluded that higher repair costs are the primary underlying cause of general price escalation. The Center for Naval Analysis study, covering a 7-year period (FY 1992 through FY 1999), found that the surcharge contributed to only 12 percent of total Aviation Depot Level Repairable cost change. While we agree that changes in the surcharge, largely driven by cash considerations rather than supply system operation cost changes, substantially contribute to price fluctuations from year to year, it is not, as implied in the GAO audit report, the primary driver of the price escalation.

**Recommendation 2:** *In addition, we recommend that the Secretary of Defense direct the Navy to allocate condemnation costs to the specific parts or groups incurring the costs. If this cannot be achieved, we recommend that condemnation costs be reflected in the surcharge rate.*

**Response: Concur with comment.** The recommendation is substantially implemented now. Beginning on October 1, 2000, the condemnation costs are allocated to groups of parts incurring the costs through a tiered pricing methodology. The Naval Supply System Command moved the condemnation costs to better allocate them to the proper pricing tier. This approach was established as a method of allocating total ownership costs by component, with the goal of understanding the distinct cost drivers and reducing them. This initiative has been implemented in FY 2001 by allotting condemnation costs discretely. This is the first attempt to allocate costs by survival rate—that is, those items with very low survival rates will bear the majority of the cost burden. Recognizing this process is new in FY 2001, efforts will continue to refine this cost allocation methodology with the intent of becoming even more discrete over time. The intent is to raise the level of attention on the low survival rate items and drive reliability improvements, if possible, resulting in reduced costs.

**Recommendation 3:** *Finally, we recommend that the Secretary of Defense report to the Congress on the Navy's progress in (1) reducing and stabilizing prices and surcharge rates and (2) allocating condemnation costs at the item level.*

**Response: Concur with comment.** Senior Department and Service officials routinely brief members of Congress and congressional staffs on efforts to reduce prices and distribute costs appropriately to the supply system customers. In addition, the President's budget submission provides detailed information about actual execution and plans for the budget years.

Furthermore, through its efforts to reduce costs, and to properly allocate discrete costs to the applicable cost drivers, the Navy has been successful in stabilizing surcharge rates. The Naval

---

**Appendix V**  
**Comments From the Department of Defense**

---

Supply Systems Command has established and is meeting a cost recovery rate goal of less than or equal to 30 percent.

As in the past, the Department will continue to ensure that Congress is informed of supply operations and costs, but the Department does not agree that there is a requirement for additional reporting beyond the normal process.

# GAO Contact and Staff Acknowledgments

---

---

## GAO Contact

Karen S. Zuckerstein (202) 512-6785

---

## Acknowledgments

In addition to those named above, Michele Mackin, Yeewan Tom, and Charles Perdue made key contributions to this report. Gregory E. Pugnetti served as advisor.

---

---

## Ordering Information

The first copy of each GAO report is free. Additional copies of reports are \$2 each. A check or money order should be made out to the Superintendent of Documents. VISA and MasterCard credit cards are accepted, also.

Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.

***Orders by mail:***

U.S. General Accounting Office  
P.O. Box 37050  
Washington, DC 20013

***Orders by visiting:***

Room 1100  
700 4th St. NW (corner of 4th and G Sts. NW)  
U.S. General Accounting Office  
Washington, DC

***Orders by phone:***

(202) 512-6000  
fax: (202) 512-6061  
TDD (202) 512-2537

Each day, GAO issues a list of newly available reports and testimony. To receive facsimile copies of the daily list or any list from the past 30 days, please call (202) 512-6000 using a touchtone phone. A recorded menu will provide information on how to obtain these lists.

***Orders by Internet:***

For information on how to access GAO reports on the Internet, send an e-mail message with "info" in the body to:

[info@www.gao.gov](mailto:info@www.gao.gov)

or visit GAO's World Wide Web home page at:

<http://www.gao.gov>

---

## To Report Fraud, Waste, or Abuse in Federal Programs

***Contact one:***

- Web site: <http://www.gao.gov/fraudnet/fraudnet.htm>
- e-mail: [fraudnet@gao.gov](mailto:fraudnet@gao.gov)
- 1-800-424-5454 (automated answering system)





---

**United States  
General Accounting Office  
Washington, D.C. 20548-0001**

**Official Business  
Penalty for Private Use \$300**

**Address Correction Requested**

---

<p><b>Bulk Rate Postage &amp; Fees Paid GAO Permit No. GI00</b></p>
---

