

April 1996

# C-17 AIRCRAFT

## Cost of Spare Parts Higher Than Justified







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

National Security and  
International Affairs Division

B-259369

April 17, 1996

The Honorable Charlie Rose  
House of Representatives

Dear Congressman Rose:

As you requested, we reviewed the pricing of selected spare parts for the C-17 aircraft. Our review concentrated on a limited number of spare parts that experienced significant price increases when McDonnell Douglas decided to manufacture the parts at its St. Louis plant rather than buying them from outside vendors. The results of our work cannot be projected to the universe of spare parts being procured for C-17 aircraft. However, DOD officials acknowledge that the issues we identified are not limited to the specific parts we reviewed, but may have broader applicability.

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## Background

The C-17 is being developed and produced by McDonnell Douglas. The Congress has authorized procurement of 40 C-17 aircraft through fiscal year 1996. As of October 1, 1995, McDonnell Douglas had delivered 22 production aircraft to the Air Force. In November 1995, the Department of Defense (DOD) announced plans to buy an additional 80 C-17 aircraft.

In addition to procuring the aircraft, the Air Force is purchasing spare parts to support the C-17. The Air Force estimates the total cost for initial spares—the quantity of parts needed to support and maintain a weapon system for the initial period of operation—for the first 40 C-17s to be about \$888 million.

In January 1994, we reported that the Air Force had frequently ordered C-17 spare parts prematurely.<sup>1</sup> We noted that premature ordering occurred because the Air Force used inaccurate and outdated information, bought higher quantities than justified, or did not follow regulations governing the process. As a result, DOD revised its guidance to limit the initial procurement of spares, and the Air Force canceled orders for millions of dollars of C-17 parts.

Initial spares for the C-17 are being procured under two contracts. Some are being provided under the C-17 development contract through interim contractor support. That support, which started in mid-1993, involves

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<sup>1</sup>C-17 Aircraft Program: Improvements in Initial Provisioning Process (GAO/NSIAD-94-63, Jan. 21, 1994).

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providing spares and technical support for two C-17 squadrons through June 1996. As of May 31, 1995, the Air Force had spent about \$198 million for interim contractor support.

The remaining initial spares are being procured under contract F33657-81-C-2109 (referred to in this report as contract-2109). Under this contract, the Air Force, as of May 31, 1995, had obligated \$120 million for initial spares, but negotiated prices for only about \$29 million of the spares. The \$91 million balance was the amount obligated for parts ordered on which prices had not been negotiated.

McDonnell Douglas produces some spare parts in its facilities at the Transport Aircraft Division at Long Beach, California, where the C-17 is being produced, or at other locations, such as its Aerospace-East Division at St. Louis. It also subcontracts for the production of parts. The subcontractors may be responsible for all aspects of part production or McDonnell Douglas may furnish materials or complete required work.

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## Results in Brief

Our review indicates that the Air Force paid higher prices for spare parts than is justified. First, for 33 selected spare parts formerly procured under subcontracts, we found that costs are from 4 to 56 times higher after McDonnell Douglas moved the work in-house. For example, McDonnell Douglas paid an outside vendor \$389 to machine a door hook that it subsequently machined in-house at its St. Louis Division at an estimated cost of \$8,842.

Second, costs for some spare parts are higher than justified because McDonnell Douglas used outdated pricing data that overstated its proposed prices. We found that in developing the proposed costs of selected spare parts, McDonnell Douglas used outdated labor variance factors, which resulted in prices being overstated by 34 percent (\$117,000) for 37 parts.

Third, the profits awarded on some orders under contract-2109 appear higher than warranted. The contracting officer used Defense Federal Acquisition Regulation Supplement (DFARS) guidelines to calculate profit objectives and negotiate profit rates with the contractor that are documented in a memorandum of agreement. The contracting officer developed the government's objectives based on the risks of a fixed-price contract. However, most costs were known when the order prices were negotiated; therefore, the contractor's risks were lower than in a

fixed-price environment. Also, the contracting officer used a higher performance risk factor than appears appropriate when McDonnell Douglas is buying spare parts from subcontractors. Based on profit rates that our calculations suggest could have been justified, McDonnell Douglas would have received less profit.

As we discussed our findings with DOD officials during our review, they began taking actions to address those findings. For example, the Defense Contract Management Command's (DCMC) Defense Plant Representative Office (DPRO) at McDonnell Douglas calculated that the overpricing of spare parts was \$182,000 and recovered that amount from McDonnell Douglas in December 1995. Also, DOD stated that other actions are being taken to prevent these overpricing problems on other spare parts.

## Higher Costs for Parts Made In-House

The Air Force paid higher prices for 33 spare parts than appears reasonable when compared to McDonnell Douglas' historical costs. The 33 spare parts were ordered under contract-2109 and manufactured by McDonnell Douglas' St. Louis Division. The Long Beach Division had previously purchased them from subcontractors for production aircraft at much lower costs. The St. Louis Division's estimated costs were from 4 to 56 times greater than the prices that Long Beach had paid outside vendors several years earlier. The parts were in sections of the C-17 assembled by the Long Beach Division for the first four aircraft, but assembled by the St. Louis Division for subsequent aircraft. For 10 parts, McDonnell Douglas had previously purchased the complete part from a subcontractor. For the other 23 parts, it had furnished material to a subcontractor that manufactured the part.

While our examination of price increases was limited to 33 spare parts, an Air Force-sponsored should-cost review<sup>2</sup> identified potential savings of \$94 million for the C-17 program if work is moved from McDonnell Douglas' St. Louis Division to outside vendors or other McDonnell Douglas facilities. Air Force officials said that the \$94 million savings related only to components for production aircraft. They said that the savings would be higher if spare parts were included.

## Parts Purchased Complete

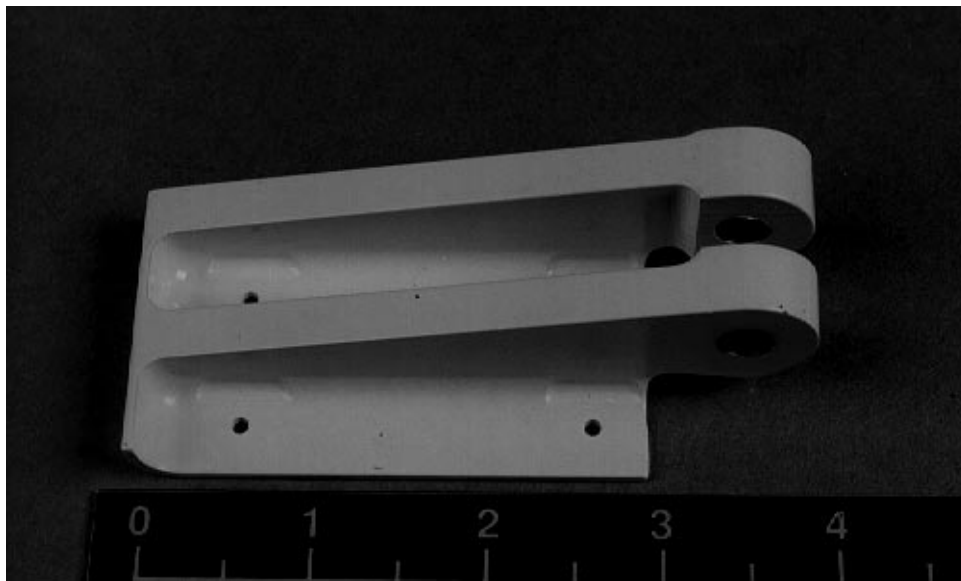
We identified 10 parts—7 hinges on the air inlet door to the C-17's air conditioning system, 2 cargo door hooks, and a door handle on the C-17's

<sup>2</sup>A specialized cost review designed to promote improvements in contractor's operations by challenging such things as existing workforce, methods, materials, and facilities and quantifying their impact on price proposals.

vertical stabilizer access door—that McDonnell Douglas had previously purchased complete from a subcontractor at much lower costs. Information on previous purchase costs, McDonnell Douglas' manufacturing costs, and the price that the Air Force paid for each of these spare parts are included in appendix I. Details on one of the hinges follow.

The Air Force paid \$2,187 for one hinge on the air inlet door to the C-17's air conditioning system. The hinge (see fig. 1) is aluminum, about 4 inches long, 2 inches wide, and ranges from about 1/16 of an inch to 1-3/8 inches thick.

Figure 1: Hinge



Source: McDonnell Douglas.

The Long Beach Division, which assembled the air conditioning inlet door for initial production, purchased 14 of these hinges from a subcontractor in 1988 for use on production aircraft at \$30.60 each. It had also paid the vendor \$541 for first article inspection and \$2,730 for reusable special tooling. These costs, however, would not have been incurred on future orders.

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In 1992, McDonnell Douglas transferred the air conditioning inlet door assembly work to its St. Louis Division and that division made the hinge for production aircraft and for the spare part order. The estimated cost for the spare hinge was \$1,745, and, with overhead, profit, and warranty factors, the Air Force paid \$2,187 for it. The fact that the subcontractor had made the hinge from a special casting while the St. Louis Division machined the hinge from bar stock could be one cause of the higher price.

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**Parts Where McDonnell  
Douglas Furnished  
Material**

We identified 23 parts—21 different cargo door hooks and 2 different hinge assemblies—where McDonnell Douglas had previously furnished material to a subcontractor who produced the parts at much lower costs. Information on previous purchase costs and McDonnell Douglas manufacturing costs are included in appendix II. Details on one of the door hooks follow.

The Air Force paid \$12,280 for one of the hooks. The hook (see fig. 2) is made of steel and is about 7 inches high, 3-1/2 inches wide, and about 4-1/2 inches thick.

Figure 2: Hook



Source: McDonnell Douglas.

For the early production aircraft, the Long Beach Division had furnished material valued at \$715 to an outside vendor in 1992 who manufactured this hook for \$389 (exclusive of the material value). After initially using hooks for production aircraft provided from the Long Beach Division's inventory, the St. Louis Division made them starting with production aircraft number 12. For the spares order under contract-2109, the St. Louis Division estimated "in-house" manufacturing costs (exclusive of material costs) at about \$8,842.

McDonnell Douglas officials said that the primary reason for moving various work from the Long Beach Division to the St. Louis Division was to recover from being behind schedule and that sufficient time was not available to procure parts from vendors. McDonnell Douglas officials also said that now that production deliveries are on schedule, they will be reviewing parts to identify the most affordable and effective



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manufacturing source and that 17 of the 33 parts have been identified as candidates to move out of St. Louis to achieve lower C-17 costs.

DOD advised us that DPRO officials at McDonnell Douglas had estimated the cost difference between production by McDonnell Douglas versus subcontractors for the 33 parts to be \$141,000 and, after further analysis,<sup>3</sup> had determined that \$65,000 was excessive. McDonnell Douglas refunded that amount in December 1995.

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## Data for Pricing Spare Parts

Our review of the data submitted to support the pricing of selected spare parts orders showed that McDonnell Douglas' St. Louis Division used outdated pricing information when proposing costs under intercompany work orders with the Long Beach Division for the C-17 spares. The St. Louis division used labor variance factors based on the second quarter of 1992 for proposing labor hours required for items produced in 1994. Most of these orders were negotiated with DCMC in mid-1994.

As of May 31, 1995, DCMC had negotiated prices for 95 contract items made by the St. Louis Division with a total negotiated value of about \$966,000. We reviewed data for 37 of these items with a negotiated total value of \$347,000. We reviewed only labor variance factors and did not address other rates and factors such as the miscellaneous production factor. We found that the selected items were overpriced by \$117,000, or about 34 percent of the negotiated value of the items reviewed.

For example, McDonnell Douglas, in developing the basic production labor hours estimate for a hinge assembly multiplied machine shop "target" hours by a variance factor of 2.33 and sheet metal target hours by a variance factor of 2.5. Data for the first quarter of 1994 showed a conventional machine shop variance of 1.26 and a sheet metal variance of 1.60. Because most work for this item took place in the first half of 1994 and the prices were negotiated in June 1994, the 1994 variance rates should have been used for pricing the item. Instead, McDonnell Douglas used rates based on the second quarter of 1992, which were higher. A price of \$42,587 was negotiated based on the 1992 data. Using the data for the first quarter of 1994, the price would have been \$26,458, a difference of \$16,129, or about 38 percent lower than the negotiated price.

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<sup>3</sup>DOD's further analysis included (1) eliminating an amount to be refunded because of another of our findings and (2) adjusting the earlier purchase prices used in our cost comparison to reflect what DPRO believed are more realistic outsourcing prices for McDonnell Douglas.

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After we brought these issues to the attention of DOD officials, they acknowledged that more current labor variance data should have been used and sought a refund. McDonnell Douglas made a refund of \$117,000 in December 1995.

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## Profit Under Spare Part Orders

Our review indicated that the profits awarded for some orders under contract-2109 appear higher than warranted. DFARS requires the use of a structured approach for developing a government profit objective for negotiating a profit rate with a contractor. The weighted guidelines approach involves three components of profit: contract type risk, performance risk, and facilities capital employed. The contracting officer is required to assess the risk to the contractor under each of the components and, based on DFARS guidelines, calculate a profit objective for each one and, thus, an overall profit objective. As a general matter, the greater the degree of risk to the contractor, the higher the profit objective. For example, the profit objective for a fixed-price contract normally would be higher than that for a cost-type contract because the cost risk to the contractor is greater under the former. Consequently, in its subsequent price negotiations, the government normally will accept a higher profit rate when a contractor is accepting higher risks.

The price of spare orders under contract-2109 were to be negotiated individually. However, rather than calculate separate profit objectives and negotiate profit rates for individual orders, DPRO and McDonnell Douglas negotiated two predetermined profit rates, documented in a memorandum of agreement, that would apply to subsequent pricing actions. The profit rates were 10 percent for parts that McDonnell Douglas purchased from subcontractors, and 15 percent for spare parts that McDonnell Douglas manufactured. Our review indicates that the use of these rates for many later-priced spares resulted in higher profits for the contractor than would have been awarded had objectives been calculated and rates negotiated when the orders actually were priced. Based on profit rates of 6 percent for purchased parts and 13 percent for parts made in-house, both of which could have been justified according to our calculations, McDonnell Douglas would have received less profit. For example, applying these lower profit rates to the \$29 million of negotiated spare part orders as of May 31, 1995, would have reduced the company's profit by \$860,000.

After we presented our information in October 1995, DCMC directed that the memorandum of agreement, which was scheduled to either expire or be extended on November 1, 1995, be allowed to expire and that future

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profit objectives be established on an order-by-order basis. DOD officials agreed that a single profit analysis should not be used for C-17 spare parts.

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## Contract Type Risk

In developing a profit objective for contract-2109, the contracting officer assigned a value for contract type risk based on firm, fixed-price contracts. However, negotiations of prices for spare part orders were conducted, in many cases, after the vendor or McDonnell Douglas had incurred all costs and delivered the spares. These conditions lowered the contractor's risk for those parts far below what normally would be expected for a firm, fixed-price contract. The risks were more like those that exist for cost-type contracts, for which the weighted guidelines provide lower profit objective values.

Of the 40 parts made in-house that we reviewed, McDonnell Douglas had delivered 25 (63 percent) of the parts at the time of price negotiations with the government. Five of the remaining 15 items were delivered during the month of price negotiations, and all were delivered within 3-1/2 months of price negotiations. Of the 55 "buy" spare parts we reviewed, McDonnell Douglas had established prices with its vendor for 45 (82 percent) of the parts. Using one order as an example, McDonnell Douglas (1) negotiated spare parts prices with its subcontractor on January 25, 1993; (2) negotiated prices with the government on April 11, 1994; and (3) scheduled the parts for delivery on May 27, 1994. Thus, for both make and buy items, a substantial portion of the contractor's costs had been known at the time of the price negotiations.

Section 217.7404-6 of DFARS requires that profit allowed under unpriced contracts reflect the reduced risk associated with contract performance prior to negotiations. Consistent with this requirement, the weighted guidelines section (215.971-3) requires the contracting officer to assess the extent to which costs have been incurred prior to definitization of a contract action and assure profit is consistent with contractor risk. In fact, the guidelines provide that if a substantial portion of the costs has been incurred prior to definitization, the contracting officer may assign a contract type risk value as low as zero, regardless of contract type.

A DPRO representative said that, in negotiating the memorandum of understanding, DPRO knew that the two profit rates for later application would not be perfect in every case. He said, however, that they were expected to be off in one direction as often as in the other, creating an overall fair agreement. The representative noted, for example, that while

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deliveries for the orders we reviewed were near the negotiation dates, the memorandum's rates also would apply to orders with deliveries more than 2 years in the future, where minimal costs have been incurred. In addition, the representative stated that a significant number of parts would be undergoing design changes because a baseline configuration for the C-17 did not exist. The representative explained that McDonnell Douglas is responsible for replacing spares affected by design changes until 90 days after reliability, maintainability, and availability testing, which was completed on August 5, 1995, and that any additional cost for such replacements would have to be absorbed by McDonnell Douglas. Finally, the representative noted that the minimal cost history on C-17 spares would indicate a higher than normal contract type risk.

We have no evidence to support the DPRO official's view that profits based on the rates in the memorandum of agreement would balance out over time. In fact, DCMC let the agreement lapse and will calculate profit objectives and negotiate profit rates on an order-by-order basis. In addition, we noted that McDonnell Douglas initially received a 2-percent warranty fee on contract-2109 orders to cover both the risk of design changes and provide a standard 180-day commercial warranty. Furthermore, the profit agreement stated that McDonnell Douglas could submit additional warranty substantiation at any time and, if the data supported a different percent for warranty, the government would consider adjusting the percentage. Thus, the warranty fee is the contract mechanism the parties agreed to use to address the risks of replacement parts because of design changes.

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## Performance Risk for Buy Orders

The contracting officer, in developing a profit objective for buy orders (complete spare parts purchased from an outside vendor) under contract-2109, used a higher rate for performance risks than was warranted.

The DFARS' weighted guidelines provide both standard and alternate ranges for the contracting officer to use in calculating performance risk, which is the component of profit objective that addresses the contractor's degree of risk in fulfilling the contract requirements. The standard range applies to most contracts, whereas the higher alternate is for research and development and service contracts that involve low capital investment in buildings and equipment. The guidelines provide that if the alternate range is used, the contracting officer should not give any profit for the remaining

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component, facilities capital employed, which focuses on encouraging and rewarding aggressive capital investment in facilities that benefit DOD.

DCMC officials said that the alternate range was used in calculating the performance risk component on contract-2109 because McDonnell Douglas' system could not provide an estimate to be used for purposes of calculating the facilities capital component. DPRO officials said that since the negotiation, McDonnell Douglas has developed the means to estimate facilities capital employed on its spares proposals. They said that using the standard range for performance risk and including facilities capital employed for spares orders yields a profit objective that is substantially the same as the profit objective calculated using the alternate range for performance risk. DOD concurred that DPRO should not have utilized the alternate range for performance risk, but repeated the DPRO's assertion that using the standard range and including facilities capital employed yields essentially the same results.

We reviewed DCMC's data and found that using the alternate range for the performance risk component does not result in a substantially similar profit objective to that calculated by applying a factor for facilities capital employed. The contracting officer's use of the alternate range for performance risk, combined with the use of a fixed-price value for contract type, led to the negotiation of a profit rate of 10 percent for the buy orders; in contrast, we calculated that using a cost-type contract risk factor, the standard range for performance risk, and McDonnell Douglas' estimate of facilities capital employed would have resulted in an overall profit objective of 6 percent for the buy orders.

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## Agency Comments and Our Evaluation

In commenting on a draft of this report, DOD said that it had taken appropriate action to address our finding of overpricing. In addition to recovering \$182,000, DOD indicated that DPRO at McDonnell Douglas will now screen all spares orders containing items to be made in-house to (1) look for possible conversion to buy items and (2) ensure that labor data is correct for all items made in the St. Louis Division. Moreover, DOD stated that DPRO no longer relies on a single profit analysis and, by completing a separate analysis for each order, DPRO will address the contract risk associated with each order.

DOD acknowledged that it is possible to take issue with the contracting officer's selection of risk factors and that DPRO should not have used the alternative range for performance risk in its profit analysis. However, DOD

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asserts that it would be misleading to infer that unjustified profits were paid to the contractor. We do not infer that the contractor received \$860,000 in unjustified profits. Determining the appropriate amount of profits is a matter to be negotiated between DPRO and the contractor. However, we noted that (1) lower rates were justified under the weighted guidelines and (2) rates of 6 percent for purchased parts and 13 percent for parts made in-house could be justified. While the results of our review cannot be projected to all C-17 spare parts, using the lower profit rates for the \$29 million of negotiated spare parts orders as of May 31, 1995, would have reduced the company's profit by \$860,000.

Our subsequent analysis raises some questions about the DOD statement that DPRO, by making a separate profit analysis for each order, will address the contract type risk associated with each order. Our review of an order negotiated in January 1996 based on a separate profit analysis indicated that the DPRO's profit analysis continues to not reflect the reduced risk when most costs have been incurred prior to price negotiations. While the negotiated profit rate was 8.6 percent, or 1.4 percent lower than the previously negotiated rate, the amount of profit allowed for contract type risk continues to appear higher than justified by the weighted guideline and DFARS. In this regard, DPRO noted that McDonnell Douglas' cost "amounts to only 46 hundredths of one percent" and "you are being paid all your costs and the parts have already been shipped, thereby reducing your risk to a very low degree." However, the contract risk factors were at the midpoint range and higher for a firm, fixed-price contract. The stated reason for this was that the design could change, necessitating a recall. While DPRO discontinued using the memorandum of understanding profit rates, we remain concerned that the negotiated profit rates may not reflect the reduced contract type risk when essentially all costs have been incurred.

DOD's comments are reprinted in their entirety in appendix III.

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## Scope and Methodology

To select spare parts for our review, we analyzed reports developed by McDonnell Douglas' data system that included historical and current information on spare parts orders—for example, the negotiation date, negotiation amount, and delivery date on current/previous orders. For our review, we only considered spare parts orders for which prices had been negotiated as of May 31, 1995. As of that date, prices for orders involving 696 spare parts had been negotiated, with a value of about \$29 million.

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We selected spare parts for a more detailed review based on current/previous cost, intrinsic value, and nomenclature. Our selection of parts was judgmental and our results cannot be projected to the universe of C-17 parts. We reviewed the contractor's and the DPRO's contract and pricing files, and discussed the pricing issues with selected contractor and DCMC officials. As a result of rather significant cost increases for a number of spare parts that had the manufacturing/assembly effort transferred to the contractor's plant in St. Louis, we obtained additional documentation from the contractor's plant in St. Louis and DPRO.

We reviewed the DFARS guidance relating to the use of weighted guidelines in establishing a profit objective. We also reviewed the memorandum of agreement that was negotiated by DPRO for contract-2109 and discussed the basis for the negotiated profits with DOD and DPRO officials. In assessing the value assigned to contract type risk, we reviewed data on 95 spare parts with a total negotiated price of about \$3 million out of 696 spare parts with a total negotiated price of about \$29 million, or about 14 percent of the parts. Our review of selected spare parts cannot be projected to all C-17 spare parts. However, to illustrate the potential effect of lower profit rates, we calculated a potential reduction using spare parts orders negotiated as of May 31, 1995.

We conducted our review between November 1994 and September 1995 in accordance with generally accepted government auditing standards.

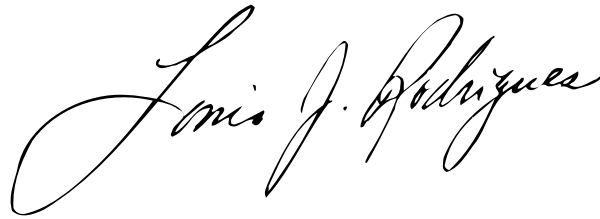
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As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after its issue date. At that time, we will send copies to the Secretaries of Defense and the Air Force; the Director, Office of Management and Budget; and other interested parties. We will make copies available to others upon request.

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If you or your staff have any questions about this report, please contact me on (202) 512-4841. The major contributors were David Childress, Larry Aldrich, Kenneth Roberts, and Larry Thomas.

Sincerely yours,

A handwritten signature in black ink that reads "Louis J. Rodrigues". The signature is written in a cursive style with a large, looping initial "L".

Louis J. Rodrigues  
Director, Defense Acquisition Issues



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# Contents

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Letter	1
Appendix I Comparison of Costs and Price for Parts Previously Purchased Complete From Subcontractor	18
Appendix II Comparison of Costs for Parts With Material Furnished by McDonnell Douglas	19
Appendix III Comments From the Department of Defense	20
Figures	
Figure 1: Hinge	4
Figure 2: Hook	6

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## Abbreviations

DCMC	Defense Contract Management Command
DFAR	Defense Federal Acquisition Regulation Supplement
DOD	Department of Defense
DPRO	Defense Plant Representative Office

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# Comparison of Costs and Price for Parts Previously Purchased Complete From Subcontractor

<b>Part name</b>	<b>Cost to buy from subcontractor</b>	<b>McDonnell Douglas' estimated cost</b>	<b>Price to Air Force</b>
Hinge, inlet door	\$31	\$1,745	\$2,187
Hinge, access door	31	1,716	2,151
Hinge, access door	47	862	1,091
Hinge, access door	45	1,169	1,447
Hinge, access door	45	1,498	1,855
Hinge, access door	82	1,339	1,664
Hinge, access door	90	1,421	1,783
Hook, cargo door	1,763	6,992	9,937
Hook, cargo door	1,763	7,003	9,951
Handle, door	60	946	1,206

# Comparison of Costs for Parts With Material Furnished by McDonnell Douglas

<b>Part name</b>	<b>Cost to manufacture by subcontractor<sup>a</sup></b>	<b>Cost to manufacture by McDonnell Douglas<sup>a</sup></b>
Hook, cargo door	\$369	\$1,356
Hook, cargo door	369	1,553
Hook, cargo door	369	1,512
Hook, cargo door	369	1,595
Hook, cargo door	369	1,471
Hook, cargo door	369	3,286
Hook, cargo door	369	2,420
Hook, cargo door	369	2,507
Hook, cargo door	369	1,553
Hook, cargo door	369	1,553
Hook, cargo door	369	1,575
Hook, cargo door	369	1,471
Hook, cargo door	269	3,305
Hook, cargo door	269	1,463
Hook, cargo door	269	3,677
Hook, cargo door	269	3,677
Hook, cargo door	389	8,630
Hook, cargo door	389	8,842
Hook, cargo door	200	1,424
Hook, cargo door	389	2,493
Hook, cargo door	369	2,256
Hinge assembly, spoiler	4,998	22,638
Hinge assembly, spoiler	4,998	21,661

<sup>a</sup>Excludes cost of material.

# Comments From the Department of Defense



ACQUISITION AND  
TECHNOLOGY

DP/CPF

## OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON  
WASHINGTON DC 20301-3000

February 29, 1996



Mr. Louis J. Rodrigues  
Director, Defense Acquisitions Issues  
National Security and International  
Affairs Division  
United States General Accounting Office  
Washington, DC 20548

Dear Mr. Rodrigues:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "C-17 AIRCRAFT: Cost of Spare Parts Higher Than Justified," dated January 1996 (GAO Code 705082/OSD Case 1035). The Department partially concurs with the report.

The DoD has taken appropriate action to address the findings of overpricing of C-17 Airlifter spare parts. The contractor, McDonnell Douglas Corporation (MDC), has refunded \$117,000 on 37 spare parts that were overpriced due to use of an outdated pricing variance factor identified by the GAO. An additional \$65,000 has been refunded by MDC on 33 spare parts whose manufacture had been moved in-house as a result of schedule concerns.

With regard to the pre-negotiation profit analysis performed for spare parts orders placed under Air Force contract F33657-81-C-2109, we agree with GAO that the Defense Plant Representative Office (DPRO) at McDonnell Douglas should not have utilized the alternate range for performance risk merely because the contractor did not propose facilities capital cost of money (FCCOM). However, the DPRO indicates that MDC is now including FCCOM in its spares proposals, and that use of the standard range for performance risk in conjunction with a factor applied to FCCOM yields profit objectives similar to those that resulted from the previous use of the alternate range.

We generally agree with the GAO that a profit analysis based on projected costs should not be applied to efforts where most of the costs are known. The DoD nevertheless does not concur with the GAO's conclusion that unwarranted profits were paid on C-17 spares parts orders as a result of the use of an average factor for contract risk, as the DPRO has indicated that its analysis took into consideration other risk factors that tend to offset



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

the reduced contract risk associated with the existence of actual costs. The DPRO no longer relies on a single profit analysis for all spares orders. By completing a separate profit analysis for each order, the DPRO will address the contract risk associated with each order.

Thank you for the opportunity to comment on the subject draft report. Detailed comments on the report findings are provided in the enclosure.

Sincerely,



Eleanor R. Spector  
Director, Defense Procurement

Enclosure

GAO DRAFT REPORT  
JANUARY 1996

"C-17 AIRCRAFT: COST OF SPARE PARTS  
HIGHER THAN JUSTIFIED"

(GAO CODE 705082) OSD CASE 1035

DEPARTMENT OF DEFENSE COMMENTS

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FINDINGS

**FINDING A: Higher Costs For Parts Made In-House.** The GAO reported that the Air Force paid higher prices for 33 spare parts than appears reasonable when compared to McDonnell Douglas historical costs. The 33 spare parts were ordered under contract F33657-81-C-2109 and manufactured by McDonnell Douglas, St. Louis Division. The Long Beach Division had previously purchased them from subcontractors for production aircraft at much lower costs. The St. Louis Division's estimated costs were from 4 to 56 times greater than prices that Long Beach had paid outside vendors several years earlier. The parts were in sections of the C-17 assembled by the Long Beach Division for the first four aircraft, but assembled by the St. Louis Division for subsequent aircraft. For 10 parts, McDonnell Douglas had previously purchased the complete part from subcontractors. For the other 23 parts, it had furnished material to subcontractors that manufactured the part.

The GAO indicated that McDonnell Douglas officials said that the primary reason for moving various work from the Long Beach Division to the St. Louis Division was to recover from being behind schedule, and that sufficient time was not available to procure parts from vendors. McDonnell Douglas officials also said that, now that production deliveries are on schedule, they will be reviewing parts to identify the most affordable and effective manufacturing source and that 17 of the 33 parts have been identified as candidates to move out of St. Louis to achieve lower C-17 costs.

The GAO also indicated that DPRO officials at McDonnell Douglas concurred that the prices for the 33 parts warranted further review. The officials said that McDonnell Douglas has agreed to make a voluntary refund or equitable adjustment based on the results of a further DPRO review.

**DOD RESPONSE: Concur.** The DPRO at McDonnell Douglas has reiterated that schedule considerations were the principal factor

ENCLOSURE



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

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driving the contractor's decision to make the spare parts in question rather than procure them from outside vendors. At the time the parts were ordered the C-17 program was struggling with severe problems and thousands of parts shortages.

The DPRO has acknowledged that those efforts to meet schedule requirements appear, in retrospect, to have resulted in parts prices that look high when taken out of context. However, the DPRO contends that the unit prices used by GAO for comparison purposes do not result in a reasonable comparison. The DPRO indicates that McDonnell Douglas would not have been able to obtain prices from vendors at or near the prices cited by the GAO, because the vendor prices were quoted in the 1988 time frame and were for parts that had in many cases undergone design changes, and because of the smaller quantities and schedule requirements. Some of the vendor prices used by the GAO were from vendors who never made acceptable deliveries. Moreover, because of the small quantity of parts in question and the frequent design changes, McDonnell Douglas elected not to purchase forgings or castings, but instead produced the parts through the more expensive process of machining each part. In sum, while we do not believe that the prices used by the GAO for comparison purposes were truly comparable, we nevertheless agree that the McDonnell Douglas cost of making the items in-house would undoubtedly exceed the cost of outsourcing.

The GAO did not provide an estimate of the cost impact for the make versus buy decision on the subject parts, but the DPRO estimates the cost impact to be \$141,000. Of this amount, \$50,000 is accounted for by the use of an incorrect variance factor, which has been refunded by the contractor as a result of GAO Finding B, to be discussed below. Another \$26,000 is attributed by the DPRO to unrealistically low purchased parts prices cited by GAO for comparison purposes. For reasons previously noted, the DPRO asserts there is little firm basis to support a conclusion that those old purchase order prices, mostly dating from 1988, could be expected to be paid at the time of the spares orders in question. Based upon further DPRO review and comparison to more current prices negotiated for production quantities of these parts, the remaining \$65,000 was deemed excessive by the DPRO and refunded by the contractor in December 1995.

While make items constitute only a small percentage of the spares being ordered, the DPRO is now screening all make items for possible conversion to buy items.

**FINDING B: Data for Pricing Spare Parts.** The GAO review of the data submitted to support the pricing of selected spare parts

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

orders showed that McDonnell Douglas St. Louis Division used outdated pricing information when proposing costs under intercompany work orders with the Long Beach Division for C-17 spares. McDonnell Douglas use of outdated labor variance factors resulted in prices being overstated by 34 percent (\$117,000) for 37 parts.

**DOD RESPONSE:** **Concur.** A voluntary refund of \$117,000 was obtained by the DPRO from McDonnell Douglas in December 1995. The DPRO now screens all spares orders containing St. Louis make items to ensure that labor data is correct.

**FINDING C: Profit Under Spare Parts Orders.** The GAO review indicated that profits awarded for some orders under contract F33657-81-C-2109 appear higher than warranted. The GAO noted that the price of spares orders under that contract were to be negotiated individually. However, rather than calculate separate profit objectives and negotiate profit rates for individual orders, the DPRO and McDonnell Douglas negotiated two predetermined profit rates, documented in a memorandum of agreement, that would apply to subsequent spares pricing actions. The profit rates were 10 percent for parts that McDonnell Douglas purchased from subcontractors, and 15 percent for parts that McDonnell Douglas manufactured.

The GAO review indicated that the use of these rates for many later-priced spares resulted in higher profits for the contractor than would have been awarded had objectives been calculated and rates negotiated when the orders were actually placed. The GAO conclusion is based on the observation that negotiations of prices for spares orders were conducted, in many cases, after the vendor or McDonnell Douglas had incurred all costs and delivered the spares. These conditions lowered the contractor's risk for those parts far below what normally would be expected for a firm fixed price contract. The risks were more like those that exist for cost-type contracts, for which the weighted guidelines provide lower profit objective values. The GAO cited DFARS 215.971-3 and 217.7404-6, which require that profit allowed on unpriced contracts reflect the reduced risk associated with contract performance prior to negotiations.

In addition to the contract risk factor assigned by DPRO in its weighted guidelines analysis, the GAO also took issue with the DPRO use of the weighted guidelines' alternate range for performance risk. The GAO observed that the standard range applies to most contracts, whereas the higher alternate is for research and development and service contracts that involve low capital investment in facilities and equipment. The weighted guidelines provide that if the alternate range is used, the

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

contracting officer should not give any profit for the remaining component, facilities capital employed.

DPRO officials advised GAO that the alternate range was used in calculating the performance risk component on contract -2109 because McDonnell Douglas' estimating system could not at that time provide an estimate to be used for calculating the facilities capital component. The DPRO advised the GAO that, since the negotiation of the profit rates for spares, the contractor has developed the means to estimate facilities capital employed on its spares proposals. The DPRO said that using the standard range for performance risk and including facilities capital employed for spares yields a profit objective substantially the same as the profit objective calculated using the alternate range for performance risk.

The GAO performed its own calculation of profit objectives using a contract risk factor appropriate for cost-type contracts, the standard range for performance risk, and the McDonnell Douglas estimate of facilities capital employed, and arrived at an overall profit objective of 6 percent for buy orders and 13 percent for parts made in-house. The GAO asserts that use of these rates, in lieu of the 10 and 15 percent rates used by DPRO, would have resulted in McDonnell Douglas receiving \$860,000 less in profit on the \$29 million of negotiated spare parts orders as of May 31, 1995.

**DOD RESPONSE:** Partially concur. Use of a single weighted guidelines profit analysis for a series of spares orders, in lieu of completion of an individual weighted guidelines analysis for each order, is acceptable if, as noted in DFARS 215.903(b)(4), the variable conditions that underlie the single profit analysis are not expected to change. However, the GAO noted that the DPRO's single profit analysis assigned a value for contract type risk (3 percent) appropriate for firm-fixed price contracts, even though, for most of the orders reviewed by the GAO, the contractor had incurred most if not all costs and delivered the spares by the time they were finally priced.

The DPRO has defended the assignment of 3 percent (versus GAO's use of 0.5 percent) for contract type risk because it believed that other risk-related factors offset the fact that substantial costs would have been incurred at the time some of the orders were finally priced. While the DFARS indicates that the value assigned for contract type risk may be as low as 0 percent, it is not directive, as the GAO implies. Offsetting risk factors cited by the DPRO include the fact that minimal cost history was available at the time the first spares orders were being negotiated, considerable economic uncertainty existed as to C-17 quantities and the future of the C-17 program overall, and that

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

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30 to 50 percent of the spares bought under the contract were experiencing repricing due to a high volume of design changes. Thus, use of a 3 percent factor for contract risk was considered reasonable by the DPRO because its single profit analysis was being used for a variety of spares pricing activity, including orders with significant cost risk, not just for spares orders where actual costs were available.

We acknowledge that it is possible to take issue with the contracting officer's selection of risk factors. The selection of the risk factor is a matter of contracting officer judgment of the overall risk associated with each individual order. Accordingly, we concur with the GAO finding that the underlying variables associated with pricing C-17 spares orders were not stable enough to support use of a single profit analysis that could be validly applied to all spares orders. However, we do not agree with the GAO's analysis because it also applies the same contract type risk factor, 0.5 percent, to all \$29 million of spares orders to arrive at its estimate of \$860,000 in unwarranted profits. We do not think it can be assumed that the contracting officer should have, in every case, selected a 0.5 percent factor. As noted by the GAO, the DPRO allowed its agreement to use the standard profit factors to expire without renewal on November 1, 1995, and is now performing a separate profit analysis for each order.

The GAO assertion that \$860,000 less in profit on \$29 million in spares orders was justifiable leads to a logical inference that the DPRO profit analysis resulted in \$860,000 in unjustified profit being paid to the contractor. Such an inference, if taken, would be based on a misreading of the role of DoD's weighted guidelines. Weighted guidelines are a structured approach to developing the profit element of an overall pre-negotiation price objective; they reflect the contracting officer's integrated assessment of the risks associated with contract performance. While we agree with the GAO observations regarding the incorrect use of the alternate range for performance risk, discussed below, the DPRO otherwise completed a weighted guidelines analysis in accordance with DoD profit policy guidance. We do not believe that a difference of opinion regarding the selection of the contract type risk factor is sufficient to support an assertion that unwarranted profits were paid.

We concur with the GAO finding that the DPRO should not have utilized the alternate range for performance risk in its profit analysis simply because the contractor's proposal methodology did not include identification of facilities capital employed. The alternate range was designed for use with contractors who have no need to engage in significant amounts of facilities investment.

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

The DPRO indicates that the contractor's spares proposals now include an identification of facilities capital employed, and so profit analyses now reflect use of the standard range, plus an appropriate factor for facilities investment. The DPRO asserts that the latter approach is yielding substantially the same results as use of the alternate range.

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