

June 1996

WEAPONS ACQUISITION

Warranty Law Should Be Repealed





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

**National Security and
International Affairs Division**

B-259383

June 28, 1996

Congressional Committees

This report addresses the use of major weapon system warranties required by 10 U.S.C. 2403 and discusses whether weapon system warranties (1) provide the expected benefits to the government and (2) are compatible with the weapon systems acquisition process. This report contains recommendations to the Secretary of Defense and a recommendation to the Congress, both of which are intended to improve weapon system warranty policies and processes. We conducted this review under our basic legislative responsibilities.

We are sending this report to you because of your Committees' interest in these issues. Copies are also being sent to the President of the Senate; Speaker of the House of Representatives; Secretaries of Defense, the Air Force, the Army, and the Navy; and the Director of the Office of Management and Budget. We will also make copies available to others upon request.

This report was prepared under the direction of Louis J. Rodrigues, Director, Defense Acquisitions Issues, who may be reached on (202) 512-4841 if you or your staff have any questions concerning this report. Other major contributors are listed in appendix III.

A handwritten signature in black ink that reads "Henry L. Hinton, Jr." with a stylized flourish at the end.

Henry L. Hinton, Jr.
Assistant Comptroller General

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List of Congressional Committees

The Honorable Strom Thurmond
Chairman
The Honorable Sam Nunn
Ranking Minority Member
Committee on Armed Services
United States Senate

The Honorable Floyd Spence
Chairman
The Honorable Ronald Dellums
Ranking Minority Member
Committee on National Security
House of Representatives

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Executive Summary

Purpose

As part of the 1985 Department of Defense (DOD) Authorization Act, Congress enacted legislation requiring DOD to obtain cost-effective warranties on weapon systems. The warranties were expected to improve weapon system reliability by providing a mechanism to hold contractors liable for poor performance. Past reviews by GAO¹ and others concluded that DOD was not properly managing its warranty program. This report assesses whether the warranties being obtained for weapon systems provide the expected benefits to the government and whether warranties, as required by 10 U.S.C. 2403, are compatible with weapon system acquisitions.

Background

The warranty provisions contained in the 1985 DOD Authorization Act and codified as 10 U.S.C. 2403 changed DOD's approach to administering weapon system warranties. The legislation requires warranties on weapon systems that have a unit cost of more than \$100,000 or an expected total procurement cost of more than \$10 million. The law requires the prime contractor to guarantee that the item will (1) conform to the design and manufacturing requirements delineated in the contract, (2) be free from all defects in materials and workmanship at the time it is delivered to the government, and (3) comply with the essential performance requirements delineated in the contract.

DOD, in 1992, proposed repealing the warranty law. In 1993, the Acquisition Law Advisory Panel also recommended that Congress repeal the warranty law, citing the heavy administrative burden the law imposes and DOD's failure to realize expected warranty benefits. The Federal Acquisition Streamlining Act of 1994 (P. L. 103-355) deleted the requirement for an annual waiver report to Congress, but continued to require waiver notifications to the defense committees. It also directed the Office of the Secretary of Defense to establish guidelines for obtaining cost-effective warranties and seeking waivers when necessary.

Results in Brief

Requiring the use of warranties in weapon system acquisitions is not practical and does not provide the government much in the way of benefits. GAO estimated that the military services spend about \$271 million annually for weapon system warranties. These expenditures have resulted in a financial return of approximately 5 cents for every dollar spent. Congress expected that warranties would ensure that contractors provide

¹DOD Warranties: Improvements Needed in Implementation of Warranty Legislation (GAO/NSIAD-87-122, July 21, 1987) and DOD Warranties: Effective Administration Systems Are Needed to Implement Warranties (GAO/NSIAD-89-57, Sept. 27, 1989).

quality weapon systems to DOD or be held accountable and would provide an incentive for contractors to improve the weapon systems. However, having DOD obtain warranties, in practice, is an expensive method of resolving product failures with the contractor.

Although Congress never intended for DOD to obtain warranties that were not cost-effective, and provided authority in the law for waivers, program officials are discouraged from seeking waivers by a statutory waiver process which has become burdensome and protracted. Consequently, warranties are almost always obtained. Further, the services are not generally conducting post-award assessments, which could provide the basis for deciding whether or not to obtain future warranties.

Even though DOD is moving toward a more commercial acquisition system, it retains many methods to validate the quality of weapon systems. It is often involved in designing the system and approving the production and quality assurance processes used by the manufacturer. It is these methods that, while not always successful, focus on developing and producing a high quality weapon system. A warranty simply provides a way to obtain repairs or monetary compensation from the contractor, after a problem has occurred, without necessarily contributing to the overall quality of the product.

The government has traditionally self-insured because its large resources make protection against catastrophic loss unnecessary. Further, it is often the only buyer for a product and cannot share the insurance cost with other buyers. As a result, a contractor cannot allocate the cost of insuring against the risk of failure among multiple buyers. DOD will bear the entire estimated cost. Also, DOD program officials told GAO that warranties do not motivate contractors to improve the quality of their products. As a result, requiring the use of warranties in weapon system acquisition is not practical and does not provide the government much in the way of benefits. GAO believes the warranty law should be repealed and the decision to obtain a warranty, in appropriate cases, should be left to the program manager.

Principal Findings

DOD's Warranty Costs Exceed Benefits

Based on the contracts GAO reviewed, DOD's costs for warranties have greatly exceeded any financial return it has received. For contracts on

which DOD could provide both price and claim data, GAO estimated that DOD received about \$1 in direct benefit for every \$19 paid to a contractor for a warranty. One cause of this negative return is the low submission rate for warranty claims.

Conceptually, warranties provide unquantifiable benefits such as prepaid maintenance support and a mechanism for resolving product performance disputes. For example, under a warranty, a contractor performs repairs and charges them against the warranty. In the end, however, the contractor profits by keeping the difference between actual claims and the warranty price, a total of \$89 million for the eight contracts GAO reviewed that had both price and claims data. In addition, although some military service officials said that repairs were performed quicker under a warranty, others said the reverse was true and contractors routinely contested warranty claims.

Waiver Process Is Not Used as Expected

Obtaining a waiver of the warranty requirement is not considered a viable alternative by the majority of acquisition officials GAO interviewed. Under 10 U.S.C. 2403, only the Secretary of Defense or an Assistant Secretary of Defense or a military service can waive the warranty requirement if the warranty is (1) not cost-effective or (2) not in the interest of national defense. In addition, congressional defense authorization and appropriations committees must be notified before a waiver is granted for major weapon systems.² Both requirements discouraged program officials from seeking waivers, even when a cost-effectiveness analysis clearly showed that a warranty was not in the best interest of the government.³ Since 1985, only 21 waivers have been requested DOD-wide, and 15 were approved.

Cost-Benefit Analysis Are Not Adequate

DOD regulations require that a cost-benefit analysis be performed and documented in the contract file to determine if the warranty is cost-effective. The Navy conducted only one cost-benefit analysis in the contracts reviewed by GAO. For the Air Force and Army contracts we reviewed, GAO found the cost-benefit analyses that were conducted were inadequate because (1) warranties were sometimes not separately priced, thereby omitting a major cost; (2) the analyses failed to account for the

²For 10 U.S.C. 2403, a major weapon system is one subject to the Selected Acquisition Reports in 10 U.S.C. 2432.

³Prior to the Federal Acquisition Streamlining Act of 1994, DOD also had to submit an annual warranty waiver report for waivers that were not covered by the notification requirement.

government's administrative costs; (3) the analyses often assumed that all potential defects would be identified and claims submitted; and (4) the services did not conduct present value analyses, which allow the comparison of current expenses with future benefits.

Warranty Post-Award Assessments Are Generally Not Being Performed

Post-award assessments are required by each of the services' regulations. These include an in-process assessment required by all the services, and a final payoff assessment only required by the Army. These assessments are used to determine whether the warranty costs are commensurate with the benefits received and to identify the advantageous and disadvantageous warranty provisions for future contracts. The military services, however, conducted post-award assessments for only 3 of the 38 contracts GAO reviewed.

Weapon Acquisitions Seldom Benefit From Warranties

Conceptually, a warranty in weapon system acquisitions may provide three functions: insurance, assurance-validation, and incentivization.⁴ These functions have distinct purposes; however, none of them have really worked to DOD's advantage and GAO did not find any cases that justified the expense of buying a warranty to perform one of these functions.

- The insurance function protects a buyer against catastrophic financial loss or excessive operating costs as well as the risks of repair or replacement costs. This concept is flawed in weapon system acquisitions because insurance is based on the principle of shared risk. However, the government is usually the only purchaser of a weapon system and the contractor cannot allocate the cost of insuring against that risk among multiple buyers. The complete cost for the estimated risk must be borne by the sole buyer or absorbed by the contractor. If it is borne by the buyer it becomes the price of the warranty. If it is absorbed by the contractor, then it is a cost that must be covered by the price of the system. In both cases the buyer, DOD, pays. In addition, even a large, key defense contractor would most likely be unable to absorb a catastrophic loss and would be protected by the government from going out of business in attempting to pay that loss.
- The assurance-validation function ensures that all the products conform to the design, quality, and performance levels specified in the contract. However, DOD is extensively involved in creating the design, approving the production processes, and conducting tests and inspections of the weapon

⁴Robert E. Kuenne, Paul H. Richanbach, Frederick R. Ridell, and Rachel Kaganoff, Warranties in Weapon System Procurement: Theory and Practice, Westview Press, (1988).

system. The only potential benefit this warranty function appears to provide the government is protection against the failure of these processes.

- The incentivization function theoretically motivates a contractor to improve product quality, thereby minimizing any repair costs. However, the vast majority of procurement officials GAO interviewed do not believe they induce the contractors to improve the quality of weapon systems. Contractors calculate the cost of projected failure rates and repair costs and include these costs in the warranty price.

The only real benefit that a warranty seemed to provide is to extend beyond acceptance the period in which DOD can determine that a product does not conform to contract specifications and requirements and require the contractor to make repairs.

Recommendations to the Secretary of Defense

GAO recommends that the Secretary of Defense establish an expedited waiver process that will limit the disincentives inherent in the current process. GAO also recommends that the Secretary of Defense revise DOD's acquisition policies to adequately manage those warranties that the military services determine should be obtained. Consideration should be given to (1) requiring that all weapon system warranties be separately priced in order to allow meaningful cost-benefit analyses; (2) improving cost-benefit analyses through more realistically reflecting the likelihood of claim submission, performing present value analyses, and including the government's administrative costs; and (3) ensuring that the services enforce the regulations requiring post-award assessments of weapon system warranties so that the services will know why these warranties were or were not beneficial to the government. GAO also recommends that the Secretary of Defense direct the Secretaries of the Air Force and the Navy revise their regulations to specifically require a final payoff assessment for weapon system warranties as the basis for purchasing more beneficial follow-on warranties and building institutional knowledge for procuring and administering effective warranties.

Recommendation to Congress

The administrative problems that GAO has identified appear to be unintended consequences of the warranty law due to the *de facto* mandatory nature of warranties. Attempts to administratively correct the problems have not been very successful. Since DOD continues to have problems administering weapon system warranties and the warranties provide minimal benefits for the costs incurred, Congress should

repeal 10 U.S.C. 2403. Were the warranty requirement repealed, DOD and the services would still have management flexibility to obtain warranties for major weapon systems when deemed appropriate. As was done prior to the warranty law, DOD and the services would rely on the Federal Acquisition Regulation and their own policies to determine when it is appropriate to obtain a weapon system warranty. The decision should be documented as part of the system acquisition strategy.

Agency Comments and GAO's Evaluation

In commenting on a draft of this report, DOD stated that it “strongly supports” GAO’s recommendation that Congress should repeal 10 U.S.C. 2403. Since 1992, DOD has supported the need for congressional repeal of the weapon system warranty law. DOD only partially concurred with the recommendations to the Secretary of Defense, stating that the solution to the problems cited by GAO is repeal of the law. DOD indicated that it will ask the military departments to review their warranty waiver process. DOD noted, however, that in order to remove the disincentives and streamline the waiver process it needs relief from the congressional notification requirement and the warranty waiver approval level.

DOD stated that it did not see the need to separately price warranties because it has insight into warranty costs through cost reporting and can project warranty cost from actual claim data. Although DOD currently has insight into warranty costs, GAO found that this information is often not used in the cost-benefit analyses. Therefore, GAO believes that separately pricing the warranty would permit DOD to perform better warranty cost-benefit analyses.

DOD stated that all the military departments have in place regulations that require post-award assessments, but acknowledged that the military departments were not fully complying with existing regulations. DOD stated that it would reiterate the importance of such assessments in a memorandum to the military departments. GAO’s review indicated, however, that only the Army’s regulation specifically requires a final pay-off assessment to determine the economic benefit derived from a warranty. GAO believes that the Air Force and the Navy regulations should be revised to explicitly require final payoff assessments.

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Abbreviations

FAR	Federal Acquisition Regulation
DFARS	Defense Federal Acquisition Regulation Supplement
DOD	Department of Defense
GAO	General Accounting Office

Introduction

In the 1970s and the 1980s, Congress received numerous reports about problems with the weapon acquisition process, namely that weapon systems often failed to meet their military missions, were operationally unreliable, and had defects in materials or workmanship. To address manufacturing deficiencies and performance shortcomings, Congress began requiring the Department of Defense (DOD) to obtain written warranties on all production contracts for weapon systems costing over \$100,000 per unit or whose eventual acquisition cost is more than \$10,000,000.¹ Congress expected that obtaining cost-effective warranties would enable DOD to hold contractors accountable for the performance of their systems and that the risk of financial consequences would encourage contractors to improve the quality and reliability of the systems.

In 1984, when the warranty provision was first enacted, many DOD and industry officials criticized the law as being impractical, unworkable, and potentially costly. An amended version enacted in the 1985 DOD Authorization Act and codified as 10 U.S.C. 2403, was intended to correct the problems.

For most non-weapon system purchases, the Federal Acquisition Regulation (FAR) prescribes the procedures and purposes of obtaining a warranty. Under the FAR, the use of a warranty is not mandatory. The FAR allows contracting officers to require contractors to provide warranties on products sold to the government. The decision is based on a determination that a warranty would be in the government's best interest. In addition, the Defense Federal Acquisition Regulation Supplement (DFARS) provides additional guidance on when it is appropriate to obtain a weapon system warranty.

Warranty Law Requirements

Under 10 U.S.C. 2403, an agency head is prohibited from entering into a production contract for a weapon system with a per unit cost greater than \$100,000, or a total system cost over \$10 million, unless the prime contractor provides a warranty. The prime contractor must warrant that items provided under the contract (1) conform to the design and manufacturing requirements delineated in the contract, (2) are free from all defects in materials and workmanship at the time of delivery, and (3) meet the essential performance requirements delineated in the

¹The statute uses the term guarantee. However, warranty is the more commonly used term to describe the extended contractual relationships envisioned by the law, so we will use that term in this report.

contract.² Contractors are not required to provide a warranty on government-furnished equipment.

If the Secretary of Defense determines that a warranty is not in the interest of national defense or that a warranty will not be cost-effective, he may waive all or part of the warranty requirement. The Secretary cannot delegate the waiver authority below the level of an Assistant Secretary of Defense or of a military department. The Secretary must also notify the Senate Committee on Armed Services and the House Committee on National Security before granting a waiver for a major weapon system.³

Types of Warranties

Generally, warranties require that the contractor repair or replace noncomplying or defective goods covered by the warranty without cost to the government and/or pay the government's costs of correcting the defective condition. Warranted defects or deficiencies may be caused by poor design, faulty manufacturing processes, or the use of materials that do not meet contract specifications. The cost and coverage of warranties are negotiated on a contract-by-contract basis.⁴ Typical weapon system warranties fall into one of the following three categories: failure-free, threshold, and systemic.

When a system is covered by a failure-free warranty, the contractor is obligated to correct all defects that occur during the warranty period. Although a failure-free warranty is easy to implement, it is associated with high costs due to the higher risks assumed by the contractor. A threshold warranty requires a contractor to remedy a defect when a threshold, such as a predetermined number of part or system failures, is exceeded. This type of warranty recognizes that all weapon systems malfunction to some degree, and the warranty only requires action if the weapon system does not meet the agreed-upon reliability levels.

A systemic warranty covers a system against a defect that occurs with regularity throughout a production lot or fleet. In the case of systemic warranties, the government must prove that the defects are occurring regularly by either conducting its own investigation or supervising an

²As defined in the statute, "essential performance requirements" are the operating capabilities or maintenance and reliability characteristics of the system that the Secretary of Defense determines are necessary for the system to fulfill the military requirement for which it is designed.

³For 10 U.S.C. 2403, a major weapon system is one subject to the Selected Acquisition Reports of 10 U.S.C. 2432.

⁴Negotiable items include the duration of the warranty and the maximum financial exposure of the contractor under the warranty.

investigation by the contractor. Once the government proves that a systemic defect exists, the contractor is responsible for replacing or repairing all of the items produced under the circumstances that caused the defect. Some systemic warranties also require the contractor to redesign warranted items if the defect is the result of a design problem.

A DOD weapon system may be covered by multiple types of warranties. For example, an item may be covered by a failure-free warranty until it is transferred to a unit, and then covered by a systemic warranty.

Prior Reviews

In 1987, we reported⁵ that the military services were obtaining warranties without assessing cost-effectiveness. We also found that warranty terms and conditions were not clearly stated in most contracts. Also, many warranties did not delineate whether redesign was a remedy if performance requirements were not met. We concluded that this situation could result in warranty administration problems.

In 1989, we reported⁶ that (1) the Office of the Secretary of Defense was not actively overseeing warranty administration by the services; (2) the services had not established a fully effective warranty administration system; (3) the procurement activities had problems performing cost-effectiveness analyses; and (4) the services, therefore, did not know whether they should seek warranty waivers. We concluded that DOD had little assurance that warranty benefits were being fully realized.

DOD's Director for Defense Procurement, in 1992, proposed repealing the warranty law. This initiative was included as Section 620 of DOD's Legislative Program for the 103rd Congress.

In a January 1993 report,⁷ DOD's Acquisition Law Advisory Panel, referred to as the Section 800 Panel, recommended repealing the warranty law based upon two reviews⁸ that highlighted significant problems with the

⁵DOD Warranties: Improvements Needed in Implementation of Warranty Legislation (GAO/NSIAD-87-122, July 21, 1987).

⁶DOD Warranties: Effective Administration Systems Are Needed to Implement Warranties (GAO/NSIAD-89-57, Sept. 27, 1989).

⁷DOD's Acquisition Law Advisory Panel, Streamlining Defense Acquisition Laws (Jan. 1993), pp. 2-113 to 2-119.

⁸The reviews were MKI, Inc., Warranty Guidebook Research Summary, Defense Systems Management College (1992) and Office of the Deputy Director for Defense Systems Procurement Strategies, Report on the Administration of Department of Defense Weapon System Warranties (Sept. 1992).

administration and effectiveness of the law. These reviews found that (1) waiver requests were not seriously considered, (2) the use of waivers had been “virtually nil,” (3) contractor expenses for warranty repairs were less than the negotiated price for the warranty in four out of five cases, (4) only two out of seven threshold warranties ever reached the threshold, (5) no claims had been made on systemic warranties reviewed, and (6) service regulations requiring post-award reviews of warranty cost-effectiveness were not enforced. The Panel’s alternate recommendation was to revise 10 U.S.C. 2403 to address the implementation problems. The Section 800 Panel sought greater flexibility in implementing and tailoring warranties, as well as limiting warranties to major weapon systems. Furthermore, the Section 800 Panel recommended that the waiver approval authority be lowered from the Assistant Secretary level and that a policy statement be issued encouraging the use of waivers when a warranty is not cost-effective.

Congress did not repeal the warranty law. Instead, the Federal Acquisition Streamlining Act of 1994 (P.L. 103-355) modified the congressional notification requirement so that an annual report of waivers granted is no longer required, although the defense committees are still to be notified before a waiver is granted for a major weapon system. The act also required DOD to issue guidance on negotiating cost-effective warranties and on waivers. In response, DOD revised subpart 246.7 of DFARS to stress that the use of weapon system warranties may not be appropriate in all situations and that a waiver should be obtained if a warranty is not cost-effective or in the interest of national defense.

Objectives, Scope, and Methodology

Our objectives were to determine whether the warranties being obtained for weapon systems provide the expected benefits to the government, and to assess whether the use of warranties, as required by law, is compatible with the acquisition of weapon systems. We analyzed the warranty legislation, DOD and service policy guidance and regulations, and procurement activity guidelines governing the use of warranties in weapon system acquisitions. To obtain insight into the types of issues faced in managing a warranty program, we gathered warranty information from 22 ongoing acquisition programs and reviewed the results of warranty studies performed by the DOD Inspector General, the Office of Defense Procurement, the Acquisition Law Advisory Panel, and others. We selected systems based on the contract value and the type of weapon system for contracts awarded between 1984 and 1994. Our report focuses on the use of warranties for DOD major weapon systems and does not cover the use of

warranties on commercial subcomponents in weapon systems or commercial items. In some instances, the information available in contract files was limited because the services had not collected the information or there was a lack of centralized documentation.

Our work was performed primarily at the six commands responsible for managing the major acquisition programs we selected for our review. The following are the procurement commands visited:

Air Force

Air Force Material Command

Army

Aviation and Troop Command

Missile Command

Tank-Automotive and Armaments Command

Navy

Naval Sea Systems Command

Naval Air Systems Command

At the procurement commands, we reviewed contract files, including basic contract information, warranty and inspection clauses, cost-effectiveness studies, and correspondence. We supplemented the information by interviewing program management, as well as defense contracting, policy, and legal officials. We also held discussions with officials from the Office of the Secretary of Defense and the Defense Systems Management College. In addition, we contacted selected contractor and professional association officials to obtain their viewpoints on the advantages and disadvantages of using warranties in major weapon system acquisitions.

We performed our review from November 1994 through February 1996 in accordance with generally accepted government auditing standards.

Weapon System Warranties Are Expensive and Have Provided Little Benefit

DOD is obtaining weapon system warranties that are not cost-effective because it does not use waivers as expected by Congress and does not perform adequate cost-benefit analyses or post-award assessments to ensure that the decisions to obtain or not to obtain a warranty are based on a valid foundation. Congress did not intend for DOD to obtain warranties that were not cost-effective. Therefore, the warranty law allows the Secretary of Defense to waive the use of a warranty if the Secretary determines that it would not be cost-effective.¹ However, none of the warranties we reviewed, where claim and price data was available, were cost-effective. We found that the government paid \$94 million and collected \$5 million on these weapon system warranties. We also calculate that the military services spend approximately \$271 million annually to pay for warranties.² Further, this cost is only the warranty price paid to the contractor. It does not include the additional costs to the government of negotiating and administering warranties. Reviews by others have also found that weapon system warranties are generally not cost-effective.

Weapon System Warranties Are Not Cost-Effective

Warranties have both quantified and unquantified costs. The quantified cost is the negotiated price for the warranty, while the unquantified cost includes the negotiation and subsequent administration of warranties. Warranties also provide both quantified and unquantified benefits. The quantified benefit to the government includes financial compensation received as a result of claims and low-cost or no-cost proposals to correct problems, while the unquantified benefits claimed by program officials include prepaid maintenance support for field units and the value of having a process in place for readily resolving product performance problems.

We found that the weapon system warranties purchased by DOD were not cost-effective. We were able to obtain warranty price and claim data on four weapon systems and eight contracts. In every case where price and claim data was available, the warranty price exceeded the value of the claims made. The combined warranty price was \$94 million, the value of the warranty claims was \$5 million, and the quantified price exceeded the quantified benefit by \$89 million. (See app. I.) For example:

¹See subsection (d) of 10 U.S.C. 2403. A waiver may also be granted if the Secretary determines that the waiver is necessary in the interest of national defense.

²Based on our case studies, we calculated that the average price of a warranty, for the contracts we reviewed, is about 0.87 percent of the total contract's value. We applied this percentage to the average amount of the contracts awarded by DOD for fiscal years 1992-95. We obtained the contract values from DOD's DD350 database.

- The government paid \$12 million for the F-15E (1) design and manufacture and (2) materials and workmanship warranties for the 1989 and 1990 contracts, which covered the purchase of 72 aircraft. The program office identified 260 potential warranty claims, of which 134 were agreed to and corrected by the contractor. There were 126 claims that were not agreed to by the contractor for a variety of reasons, including the fact that failed parts were unavailable for contractor inspection. The program office estimated that the average cost to fix each problem was \$3,000 and that the total financial benefit to the government was \$402,000. The quantified costs, therefore, exceeded the quantified benefits by about \$11.6 million.
- The F-16 Multiyear II warranty price for 720 aircraft procured between 1986 and 1989 was \$27.86 million. In a 1991 study,³ the program office calculated that the warranty benefit was \$2.78 million, or about 10 percent of the warranty price. While the warranty coverage had not expired at the time, the study did project a total potential benefit of \$9.94 million for this warranty, or 36 percent of the warranty price. The study found “little tangible return on investment” for this warranty. The program office was unable to provide final claim figures.
- The Multiple Launch Rocket System 1985 warranty cost \$1.584 million. The estimated value of the warranty claims was \$126,000. Therefore, the quantified cost exceeded the quantified benefit by \$1.458 million.

In 1992,⁴ the Army found a similarly large imbalance between the costs incurred and the total dollars recovered under several warranties. A review of 36 expired warranties on 12 weapon systems at the Missile Command through December 1990 showed that the warranty cost for these contracts was \$27.9 million and the dollar value of the warranted repairs was \$12.5 million—meaning that these warranties had a negative monetary return on investment of \$15.4 million.

The Air Force has also recognized that it has been obtaining some non-cost-effective warranties. The Deputy Assistant Secretary of the Air Force for Contracting, stated in a memorandum in 1992, “. . . we agree that warranties are not always cost-effective. Recent experience indicates that contractors are unwilling to provide reasonable cost proposals in some cases, even when historical warranty cost data is available that suggests a much lower warranty price is appropriate.”

³Analysis of F-16 Multiyear II Engineering Change Proposals for Correction of Deficiencies, F-16 System Program Office (Feb. 22, 1991).

⁴Evaluation of the U.S. Army Warranty Program, U.S. Army Materiel Systems Analysis Activity (Technical Report No. 547, Aug. 1992), p. 49.

The warranty price does not include all warranty costs to the government. The costs not included in the warranty price are associated with warranty development, administration, training, the need to obtain and provide special data, in-plant warranty monitoring, special transportation, increased spare component requirements because of longer logistical repair times, decreased competition opportunities, and reduced self-sufficiency of the military services. We did not estimate these additional costs to the government. In some cases, we had no basis for an estimate and in others the additional costs due to the warranty could not be readily identified.

Not All Potential Claims Submitted

One cause for the quantified cost exceeding quantified benefits is the low claims submission rate for warranted items. Air Force officials told us that one reason for the low claims rate is that submitting warranty reports and holding parts for warranty purposes is contrary to the primary mission of field units—to repair the equipment as soon as possible so that the equipment and the unit can resume its mission. A warranty functions contrary to the primary mission by requiring maintenance personnel to hold parts until a determination can be made as to whether the part is warranted and how it should be repaired.

In addition, maintenance personnel sometimes replace broken parts on one system with good parts from one or more other systems to keep the maximum number of weapon systems operating and available, thereby fulfilling their primary mission. As a consequence, the broken or defective parts are moved from their original weapon system. This can void a warranty, which can require that the part submitted for a warranty claim come from the original weapon system that the contractor delivered to the service.

The Tank-Automotive and Armaments Command official responsible for their cost-effectiveness analyses said that historically contractors only accept about 30 percent of potential claims. As a result of the claims submission problem, the Tank-Automotive and Armaments Command is primarily obtaining systemic warranties instead of threshold warranties. However, according to this official, the Tank-Automotive and Armaments Command has never successfully filed a systemic warranty claim, and the probability that claims will be filed under a systemic warranty is zero.

A report on the Army's warranty program further supports the claims submission problem. "Claims submission from the field is low. Only a

fraction of the work orders are submitted for claims. For many of these, the data are inaccurate and incomplete.” The report looked at several commands and weapon systems and calculated that, at the Tank-Automotive and Armaments Command, only 537 actual claims were made out of 8,567 potential claims for 21 contracts.⁵

The Air Force faces similar low claims submission problems. Officials from the Air Force Materiel Command stated that the lack of reports filed on warranted items from the field is a serious problem. They further stated that the most important mission to field personnel is to repair the items as soon as possible so that the aircraft can resume its mission. Many Air Force warranties rely on the submission of product quality deficiency reports for filing claims. An Air Force Inspector General’s report⁶ estimated that only 15 to 20 percent of failures are actually reported on these forms because they are complicated and cumbersome for maintenance personnel to fill out. Therefore, the Air Force estimates that 80 to 85 percent of failures go unreported.

In addition to the lack of incentives for field staff to track and report warranty claims, there is a lack of credible data systems and manpower to administer warranty claims. One Air Force official responsible for overseeing warranties at a major command said that because no system is in place to track the warranties or to process claims efficiently, administering the program is a “nightmare.” The Deputy Assistant Secretary of the Air Force for Contracting indicated in 1992 that (1) the problems with warranty administration are not new and (2) the Air Force does not possess and has not been able to develop data systems designed to track warranted items. He added that the lack of necessary manpower resources in the field and in the program offices for accomplishing warranty administration compounded this problem.

Benefits Claimed for Warranties May Be Questionable

Claimed warranty benefits include providing support that could be viewed as a form of prepaid maintenance and a process for resolving product performance problems. Viewed as prepaid maintenance, warranties pay contractors a sum of money up front based on an estimate of the number of defects that the government might claim. The contractor keeps the difference between actual claims and the warranty price as his profit. If

⁵Evaluation of the U.S. Army Warranty Program, U.S. Army Materiel Systems Analysis Activity (Technical Report No. 547 Aug. 1992).

⁶Process Effectiveness Review: Product Quality Deficiency Reporting, Office of the Inspector General, Headquarters Air Force Materiel Command (PN 92-06, April 20 -July 29, 1992).

the 1989 and 1990 F-15E contracts were considered a form of prepaid maintenance, then the government paid the contractor \$12 million and made claims totaling \$402,000. The contractor kept as profit \$11.6 million.

Further, the warranty provides the government a process for dealing with the contractor and delineates the contractor's responsibilities. However, the value of this process seems to vary from system to system. While several program officials told us that the contractors settled claims and fixed problems much more quickly under a warranty, other officials said that the penalties to the contractor are low under a warranty and that contractors routinely dispute government claims. According to one Air Force official, the Air Force has had poor results in getting a return on the claims it has filed. Warranty officials stated that contractors often stall and argue about claims because (1) the contractor asserts that it could have repaired the item more quickly or efficiently, if government maintenance personnel repair an item and bill the contractor; (2) the maintenance personnel did not keep the broken part for contractor inspection; (3) the contractor may believe that the weapon system was operated outside the performance parameters to which it was designed or the maintenance personnel damaged the part using improper procedures, and (4) the contractor may find that the defective part has been shifted from the original weapon system in which it was delivered to the government.

Warranty Waivers Are Not Used as Expected

Congress included a provision in the warranty law that allows the Secretary of Defense or his designee (no lower than an Assistant Secretary of Defense or a military department) to waive the requirement for a weapon system warranty for either national defense or cost-effectiveness reasons. However, since 1985 only 21 waiver requests DOD-wide have reached the assistant secretary level. Of those, 15 have been approved. The conference report accompanying the bill repealing the 1984 warranty law and enacting the current section 2403 noted clearly that the House and Senate Committees on Armed Services did not intend DOD obtain to warranties that are not cost-effective. The report stated that "a failure to conduct cost-benefit analyses and to process waivers where cost-effective guarantees are not obtainable would defeat the legislative intent of congressional warranty initiatives."

The majority of program officials we interviewed said that they do not consider waivers a viable option because of (1) the high placement of the waiver approval authority required by the warranty law (2) the potential for negative attention being focused on the program by these high level

officials, and (3) the administrative burden of processing a waiver request. The result of this reluctance to seek waivers is that warranties have become essentially mandatory for all major contracts. This was noted by the DOD Acquisition Law Advisory Panel (the Section 800 Panel) in a January 1993 report where it stated that “the reluctance of DOD to issue warranty waivers fosters the use of warranties without regard to their cost-effectiveness.”

Service officials at several major commands and at the assistant secretary level said that requests for waivers bring unwanted and often negative attention to an acquisition program. One service official stated that there is a definite “stigma” attached to waiver requests and another referred to it as a “nightmare.” Further, waiver requests impose a significant burden on the program office, which has to generate all the necessary paperwork, including cost-benefit analyses, and brief them up the chain of command to the assistant secretary level, with little or no expectation that a waiver will be approved.

As an example, the F-16 program office sought a waiver for the essential performance warranty of the third F-16 multiyear contract in November 1991. The entire process—from the completion of the cost-benefit analysis and decision to seek a waiver to the rejection of the waiver request—took 11 months. This was the first attempt by this program office to obtain a waiver for the weapon system. The second attempt, on the 1994 procurement, was rejected after 8 months. The Air Force waiver approval process for the F-16 is shown in figure 2.1.

Force program official involved in seeking these waivers, the program office did not request a waiver on these parts of the warranty because it believed it would be impossible to get approval. In addition, the official said that the program office was certain that it would be directed to renegotiate these warranties with the contractor. Rather than seek a waiver for these warranties, the program office focused on what it considered its strongest case for a waiver, the essential performance warranty. The contractor had produced approximately 1,500 F-16s when the program office began seeking a waiver and, according to an official in the program office, the program office knew how the aircraft would perform and also knew that the essential performance warranty would provide no benefit to the government. The program office therefore sought a waiver, which was denied because the warranty covered only subsystems rather than the entire weapon system. The assistant secretary indicated a warranty covering the entire weapon system was needed before a decision on whether to grant a waiver could be made.

The F-16 program office again sought and was denied a waiver for the essential performance requirement warranty for the fiscal year 1994 procurement. According to Air Force officials, a determination was made at the assistant secretary level that, pursuant to the law, a front-line fighter (a major weapon system) should have a warranty and the F-16, because it is a system that has been in production for many years, should have enough data to craft a valid warranty. Therefore, the waiver request was rejected. The warranty obtained contained no risk to the contractor because the warranty was tied to performance measurements that the system had already passed, a fact the contractor and the government already knew. The warranty thresholds have a mission reliability of 90 percent and aircraft availability of 85 percent. The aircraft achieved a mission reliability rate of 97.2 percent and an aircraft availability rate of 91 percent during the official measurement period. This warranty was a warranty in name only.

It was clear to us from discussions with several officials that they believe that obtaining a warranty requires a relatively small amount of time and effort for the program office compared to the amount of time and effort required to avoid spending that money by obtaining a waiver. In addition, according to officials at a major Air Force command, contractors are aware that waivers are exceedingly difficult to obtain and may insist on a high warranty price if the program office seeks an effective warranty. This in turn may drive the program office to obtain reduced warranty coverage to reduce the warranty price. Program managers do not request a waiver

because they believe it will not be granted and, consequently, unnecessary or costly warranties are purchased.

As required by the Federal Acquisition Streamlining Act of 1994 (P.L.103-355), DOD revised DFARS regarding weapon system warranties. The new regulations provide guidelines for contracting officers and program managers to use when developing and negotiating weapon system warranties. These regulations state that the use of a weapon system warranty may not be appropriate in all situations. Further, a waiver should be requested if it is determined that obtaining a warranty is not cost-effective or is inconsistent with the national defense. However, program managers still need to obtain a waiver before deciding not to obtain a warranty. That process has not been affected by the revised regulations.

Cost-Benefit Analyses Are Not Adequate

The warranty law requires DOD to obtain a warranty unless the Secretary of Defense determines that warranty would not be cost-effective or in the interest of the national defense. Applicable regulations (DFARS 246.770-7) require that a cost-benefit analysis be conducted and documented in the contract file to determine if the warranty is cost-effective. The Air Force and the Army had conducted cost-benefit analyses for 21 of the warranties on the 30 contracts we reviewed. The cost-benefit analyses performed, however, were inadequate because (1) the warranties were often not separately priced, (2) the government's administrative costs were not fully included, (3) the analyses assumed all potential defects would be identified and claims submitted, and (4) they did not include a present value analysis.

The Navy conducted only one cost-benefit analysis and has not adhered to DFARS 246.770-7, which states that "in assessing the cost effectiveness of a proposed warranty, perform an analysis which considers both the quantitative and qualitative costs and benefits of the warranty." The Navy's policy is to obtain what it calls "no-cost" warranties. However, no warranty is without cost, and not separately pricing a warranty does not mean the government does not incur a cost for the warranty, only that the price of the warranty is built into the cost of the system.⁷

Warranties Often Not Separately Priced

Contracts in all services are often signed without separately pricing the warranty. Of the 38 contracts we reviewed, 24 warranties were not

⁷Warranty Guidebook, Defense Systems Management College (Oct. 1992).

separately priced. Instead, the warranty price was included in the price of the product, thereby making it almost impossible to perform a realistic cost-benefit analysis. The services have different policies on pricing a warranty. Although the Air Force's policy since 1994 has been to separately price all warranties, the Army does not require that the warranty be separately priced, and the Navy maintains that it is not appropriate to negotiate additional costs for weapon system warranties. In addition, we were told by a DOD official that the government often pays twice for the warranty, once in the actual price of the product and separately in the price of a warranty.

**Government
Administrative Costs Not
Included**

The services performed cost-benefit analyses for 22 out of the 38 contracts we reviewed. In general, these cost-benefit analyses do not appear to fully include the administrative costs paid by the government for warranty development and administration. Thus, the cost element of the analysis is kept artificially low. However, the Tank-Automotive and Armaments Command uses an estimate, developed in the early 1980s, that calculates the administrative costs of processing each warranty claim as \$150. The Army could not provide us with a copy of the study from which this figure was obtained.

**Low Claims Submission
and Acceptance**

The cost-benefit analyses generally assume that all or a high percentage of claims will be made and accepted. We found that the U.S. Army Missile Command and the U. S. Army Tank-Automotive and Armaments Command sometimes made greatly different claims submission and acceptance assumptions when analyzing the costs and benefits of warranties. The 1989 Multiple Launch Rocket System cost-benefit analysis by the Missile Command assumed claims would always be filed and accepted when warranted items break.

The Tank-Automotive and Armaments Command official responsible for its cost-effectiveness analyses used a range of 20 to 90 percent for the probability that claims would be filed. As discussed previously, Army and Air Force studies indicate that actual claims submission from the field is low. In the case of the Air Force, possibly as low as 15 to 20 percent of actual failures.

Present Value Analysis Excluded

Nine of 12 cost-benefit analyses we sampled did not conduct a present value analysis as part of the cost-effectiveness review.⁸ Cost-benefit analyses normally involve comparing different costs incurred at different times. For two or more alternatives to be compared on an equal economic basis, it is necessary to consider the costs of each alternative currently or at their “present values.” This recognizes that money has earning power over time. A present value analysis is important because it allows the comparison of current expenses with expected future benefits by taking into account the time value of money. Without a present value analysis, comparing a contract with and without a warranty cannot be done because the stream of dollars involved are not comparable.

Warranty Post-Award Assessments Are Generally Not Being Prepared

Our review indicated that the services had not prepared post-award assessments in 35 of 38 warranties that we reviewed. There are two types of post-award assessments required, an in-process assessment and a final payoff assessment. The in-process assessments evaluate whether the claims made under a warranty justify its cost and document the desirable and undesirable warranty provisions and tasks for follow-on procurements. A final payoff assessment evaluates the economic benefits derived from the warranty compared to the cost of corrective actions had there been no warranty. Army regulations specifically require an in-process and final payoff assessments. Air Force regulations only require annual assessments and specify how the assessments should be performed. Navy regulations only require that data be collected to perform an annual assessment of warranty activity but does not require a final payoff assessment.

We found that none of the services had prepared the annual in-process assessments. In two cases, the Army did prepare final payoff assessments, it concluded in one that the 1985 Multiple Launch Rocket System warranty cost the government \$1,458,040 more than the benefits it provided and therefore the warranty was ineffective. In the other case, the Army decided that the 1987 Multiple Launch Rocket System warranty, while appropriate, might have negatively affected the reliability of the system. According to the Army Audit Agency,

Cost-effectiveness analyses and final payoff assessments provide the management tools and internal controls that are essential and critically needed to make sure the intent of the law is satisfied in a way that adequately protects the interests of the Army. Without

⁸One of the cost-benefit analyses did conduct a present value analysis and two did not have sufficient documentation to make a determination.

cost-effectiveness analyses and warranty assessments, there is little assurance that the warranties obtained and the associated costs were commensurate with the benefits received.

According to Air Force officials with one program office, their office knows it will have to obtain warranties “no matter what,” so there is no reason for a post-award assessment. These officials were referring to the difficulty of receiving a waiver from the requirement to obtain a warranty, discussed previously.

For the 18 Army contracts we reviewed, the Army either ignored the requirement⁹ to conduct the final payoff assessments or ignored findings that showed the warranty benefits did not justify the costs. For example, the 1987 Multiple Launch Rocket System final payoff assessment specifically cited the fact that the thresholds were set so that the government would repair the first four failures on each launcher, but only about one claim was actually filed per launcher. Because the performance thresholds were set so high, the warranty was unlikely to serve as an incentive to the contractor to improve the system’s reliability and the warranty may have had a negative effect on reliability. The Army obtained a follow-on warranty.

Air Force regulations covering post-award assessments require the program manager to monitor warranty feasibility and cost-effectiveness using annual warranty activity reports submitted by the contractor or the government. These assessments are to include a remarks section that “identifies the warranted tasks or services that are considered desirable or undesirable based on the claim frequency, failure mode, and dollar value.” The Air Force had not completed this annual assessment on any of the 12 Air Force contracts we reviewed.

In 1987, the Navy¹⁰ issued instructions on warranties and stated that the Chief of Naval Operations will develop a system for collecting and analyzing actual warranty use and claim data on an annual basis. To date, the Navy has not approved a warranty information system. We found only one of the eight naval systems we reviewed had performed a post-award assessment.

Air Force program officials stated that final payoff assessments and post-award assessments are difficult to perform for two reasons. First, the

⁹Army Regulation 700-139 (Apr. 10, 1986).

¹⁰Secretary of the Navy Instruction 4330.17 (Sept. 1987).

warranty is not always separately priced. Second, the weapon system warranted may have had many engineering changes from the time the contract was initially signed until the end of the warranty period. These changes make comparing expected costs and benefits to actual costs and benefits difficult because the initially projected and actually produced weapon systems are different.

Conclusions

Weapon system warranties are generally not cost-effective. They have resulted in a significant cost to the government that substantially exceeds their benefit. The necessity of negotiating and administering the warranties also imposes a large, but unquantified burden on the services.

The waiver process has resulted in a system in which warranties are virtually mandatory. In this system, the program office seeking a waiver must demonstrate why a warranty would not be cost-effective and seek approval from an assistant secretary. It is easier and less disruptive for that program office to obtain a warranty, regardless of whether it is necessary or cost-effective, than it is to seek a waiver. Because the waiver process is so burdensome and protracted, warranties are obtained without regard to their cost-effectiveness and the officials in the program offices have no incentive to conduct rigorous cost-benefit analyses. In addition, post-award assessments have little value to program officials as tools to identify desirable and undesirable warranties for future contracts because they believe warranties will have to be obtained “no matter what.”

The current DFARS revision, which stresses that weapon system warranties may not be appropriate in all situations, is a step in the right direction. However, it is inadequate to resolve the difficulties in obtaining a waiver because the regulation could not change the high level required for approving waivers. The waiver approval authority is stipulated in the law itself, and the incentives that arise from it could not have been changed by this revision. As DOD and Congress proceed with acquisition reform, we believe they need to reexamine the need for and practical implementation of weapon system warranties.

Warranties Often Not Appropriate for Use in Weapon Acquisitions

Requiring the routine use of warranties in weapon system acquisitions is often not appropriate and does not provide the government much in the way of benefits. The Institute for Defense Analyses has identified three functions of a warranty in weapon system acquisitions—insurance, assurance-validation, and incentivization.¹ In the commercial marketplace, warranties have similar functions. Commercial buyers believe warranties protect them against catastrophic financial losses and excessive operating costs through a warranty’s insurance aspect. A warranty may also indicate to a buyer that a product is of better quality, which can be equated to the assurance-validation function,² and may motivate the contractor to maintain product quality, which equates to the incentivization function.³ However, these functions are not as significant in weapon system acquisitions as they are in buying a commercial product on the open market.

For insurance to be cost-effective to the buyer, the risk must be shared and spread over many insured customers, which is not the case in weapon acquisitions. DOD is the only buyer of most weapon systems and must pay the full cost of the insurance provided by the warranty. Also, DOD already has quality assurance processes built into its contracts to ensure that the product complies with all contract specifications. This lessens the need for a warranty’s assurance-validation function. Finally, in our review of 20 weapon systems, we could not find any evidence that indicated that a warranty was a factor in improving system reliability. Since none of the traditional benefits conferred by warranties apply to weapon system purchases, the main benefit that warranties seem to provide is the extension of the time period DOD has to identify defects to be corrected by the contractor.

Insurance Aspect Is Not Typically a Good Reason for Obtaining a Warranty

Commercial buyers are interested in stabilizing their operating costs and protecting themselves against catastrophic losses. A manufacturer’s warranty provides a commercial buyer with a measure of insurance against the risks of repair or replacement costs. If a warranted product does not perform as specified, the buyer whose product failed does not face a total financial loss.

¹Robert E. Kuenne, Paul H. Richanbach, Frederick R. Ridell, and Rachel Kaganoff, Warranties in Weapon System Procurement: Theory and Practice, Westview Press (1988).

²Lt. Col. John P. Clark, USAF, Report of the Working Group to Define an Implementable Warranty Program, U.S. Air Force.

³Wallace R. Blischke and D.N. Prabhakar Murthy, Warranty Cost Analysis, Marcel Dekker, Inc. (1994).

The concept of insurance is based on the principle of shared risk. In the commercial marketplace, the cost of offering a warranty is shared by many buyers who individually pay a small amount of the total warranty as part of the product's price. Manufacturers generally estimate how many of their products will be defective and price the product to cover this risk. However, because DOD is usually the only buyer for a weapon system, the contractor cannot allocate the cost of insuring against that risk among multiple buyers. The complete cost for the estimated risk must be borne by the sole buyer or absorbed by the contractor. If it is borne by the buyer it becomes the price of the warranty. If it is absorbed by the contractor then it is a cost that must be covered by the price of the system. In both cases the buyer pays. A further factor in the cost of a warranty is the extent of unproven technology or innovative design that a weapon system encompasses, which may cause the contractor to perceive its financial risk is significant. This will tend to drive up the warranty price to the government and causes the contractors to try to limit warranty coverage as much as possible. As a result, insuring against weapon system failures generally is not beneficial to the government since the government will be responsible for 100 percent of the estimated cost of that risk. The government will only achieve a positive financial result if failures in the system substantially exceed the contractor's estimates of risk.

While it may seem that a warranty would make sense in cases where the extent of system failures exceeds the cost of the warranty, this occurs in very few instances and the cost of insuring all weapon systems to cover costs in these instances is not a good financial decision. It is for this reason that the government maintains a policy of self-insurance against losses in almost all other areas. A RAND study reported that shifting financial risk to the manufacturer is seldom an appropriate or sufficient rationale for obtaining a weapon system warranty, for the same reason that it is not to the government's advantage to buy insurance from a commercial firm.⁴

Another factor limiting the potential insurance benefits of warranties is the relationship of the government to major defense contractors. If a contractor were someday to incur large losses as a result of a warranty on a weapon system, the threat of insolvency might cause the government to excuse the contractor from its warranty obligation. Historically, when a defense firm incurs large losses because of a contract, the government has taken action to provide relief and prevent the firm from going out of

⁴James P. Stucker and Giles K. Smith, Warranties for Weapon: Theory and Initial Assessment, RAND Corp. (N-2479-AF, Apr. 1987).

business. DOD's ability to provide extraordinary contractual relief to a defense contractor is recognized in Public Law 85-804. From 1959 to 1993, DOD used this provision to provide over \$4.3 billion (in constant 1996 dollars) in relief to assist contractors in recovering from losses.⁵ As a result, the utility of warranties may be limited to collecting small or marginal amounts from a contractor rather than making good a catastrophic loss.

Warranties Are Not Generally a Good Means of Assuring Quality Systems

The second purpose of warranties is assurance-validation. Applied to weapon systems, assurance-validation means assuring DOD that the manufacturer's product conforms to the design, quality, and performance levels specified in the contract. Although DOD is moving more toward a commercial acquisition system, it uses many quality assurance processes to verify product quality and contract conformance independent of the warranty clauses. Since the cognizant contract administration office is responsible for verifying that the accepted product conforms to the specifications in the contract, the assurance-validation function of a weapon system warranty may not be necessary.

In weapon system acquisitions, DOD uses many different program management tools to reduce the inherent risks of the acquisition process. DOD's weapon acquisition policies seek to reduce the risk of obtaining a poor quality product by establishing a disciplined multiphased process that (1) translates mission needs into stable and affordable programs; (2) acquires quality products; and (3) provides a program management structure that has clear lines of responsibility, authority, and accountability. As each weapon system progresses through the phases, it is subject to comprehensive programmatic reviews. During the reviews, an assessment is made of the program's accomplishments to date, plans for the next phase, and acquisition strategies for the remainder of the program. Additionally, the program risks and risk management planning is evaluated. In theory, for each of the acquisition phases, program-specific results are required before a program is permitted to proceed to the next phase. For example, a program may be required to demonstrate the maturity of a manufacturing process before being permitted to start production. Techniques available to manage risk include the use of technology demonstrations and prototyping to test hardware, software, manufacturing processes and/or critical subsystems. Another technique is

⁵David V. Anthony and Carl L. Vacketta eds. Extraordinary Contractual Relief Reporter. Federal Publications, Inc. (1996).

to test and evaluate the weapon system or its components to determine system maturity and identify technical risks.

Finally, DOD establishes quality assurance programs to provide confidence that a weapon system will conform to the technical requirements and provide satisfactory performance. A warranty is one more management tool at DOD's disposal to assure quality as the weapon system begins to be put in use. Given the extensive quality assurance efforts made over the whole development and production cycle, however, a warranty may actually be insurance against the failure of the quality assurance process.

Warranties May Not Provide Much Incentive to Improve Product Quality

Finally, warranties are supposed to serve as an incentive to manufacturers to improve quality. Conceptually, all warranties motivate a manufacturer to improve product quality because the goal is to maximize profits by not having to perform warranty service. However, when a commercial manufacturer provides a warranty, it generally knows the projected failure rates of the product and the probable repair costs. The costs for these failures are included in the cost of the product. Efforts to keep commercial prices competitive probably undercuts the incentive to make additional profit by pricing the warranty higher than its expected cost.

In the commercial market, a warranty may also signal product quality to the buyer because the commercial buyer generally is not familiar with how the product was made and does not know how the product will perform.⁶ Therefore, the warranty becomes a marketing tool to help sell the product by convincing the buyer it is a superior product.⁷

In weapon acquisition, the contractor is generally not faced with direct price competition. Absent direct price competition, there is no incentive for the contractor to limit its ability to fully cover the estimated cost of risks of system failure being warranted. Further, the marketing aspects of a warranty are for the most part irrelevant to DOD. The warranty's indication of manufacturer confidence in product quality is not needed because, as shown in the previous section, DOD is not a typical consumer. DOD is knowledgeable about how the weapons it obtains are made and in some cases helped to design the system. Generally, DOD knows how the

⁶Nancy A. Lutz, *The Economic Theory of Warranties*, Virginia Polytechnic Institute and State University (Jan. 1993).

⁷A warranty, in the commercial market, also limits the manufacturers' liability for loss or damage caused by a product's malfunction or defect. Usually, the maximum recoverable by a buyer under a warranty is the full price of the item.

product will perform and uses other management techniques to maintain product quality.

In addition, the majority of officials in the weapon system program offices we visited stated that either (1) the warranties had not induced the contractors to take actions to improve the quality of their warranted products or (2) if there were quality and reliability improvements due to the warranty, those improvements were marginal and unmeasurable. For example, the F-15 warranty manager stated that the contractor has not designed components of the weapon system differently nor is the contractor building the weapon system differently because of the warranty. The F-110 engine warranty manager also said that the warranty has not helped to improve the reliability of the engine.

In a report issued in August 1992, the U.S. Army Materiel Systems Analysis Activity, reached a similar conclusion regarding different warranties on several systems. The report stated: "It is extremely unlikely that hardware improvements that were performed under the warranty would not have been performed had there not been a warranty. Therefore, it is unlikely that any reliability growth from these improvements could be attributed to the warranty." The report stated that no models were available that could be used to measure reliability improvements resulting from a warranty.

Warranties May Confer Limited Benefits at Great Expense

With or without a warranty, a contractor is obligated to produce a product that complies with the terms delineated in the contract, including all design, manufacturing, and performance specifications. During DOD's inspection and quality assurance processes, the government needs to identify defects or deficiencies and notify the contractor of problems at the earliest reasonable time. If DOD did not obtain a warranty, the contractor could be released from any further obligation to correct problems once the government accepted the product.⁸ A warranty extends beyond acceptance the period during which the government can identify defects and require the contractor to correct them at no charge.

Prior to acceptance, if defects are discovered, the government, even without a warranty, can (1) order the contractor to correct the defects at no additional charge, (2) reject the nonconforming product, (3) terminate the contract for default, or (4) seek a price reduction. A warranty obligates the contractor to correct defects, even if the government did not identify

⁸Acceptance does not relieve the contractor of its obligation to correct latent defects. Kaminer Const. Co v. United States, 488 F. 2d 980 (Ct. Cl. 1973).

them before acceptance. This can reduce disputes because the warranty eliminates the need to prove where and when a defect came into existence. For example, in the case of a failure-free warranty, the government merely needs to demonstrate that an item does not work.

A warranty also supplements inspection by providing the opportunity to observe the product's performance during a period of use when additional problems may become apparent. However, a properly structured test program could identify such problems early in the acquisition process, when it is less costly to address deficiencies.⁹

In a contract without a warranty, the government's acceptance of the product generally ends the contractor's obligation.¹⁰ Even without a warranty, however, the government can revoke its acceptance and hold the contractor financially accountable if latent defects are discovered. In cases of latent defects, the government must demonstrate that the defects existed at the time of delivery, but could not have been discovered by a reasonable inspection.

Conclusions

While warranties may have value to a consumer in the commercial world, obtaining a warranty for a weapon system may be a flawed concept because (1) the government does not need the insurance coverage provided by a warranty and cannot share the expense of the warranty with other customers; (2) warranties are an expensive way to assure the quality of a weapon system; (3) DOD's quality assurance activities, should provide much greater assurance of compliance with contract specifications than does a warranty; and (4) warranties may not cause contractors to improve the quality of the weapon systems they produce. Further, weapon system warranties provide very limited benefits to the government. The only measurable benefit of a warranty is the ability to have the contractor correct defects for some negotiated period after acceptance of the product, and as discussed in the prior chapter this comes at a high cost.

⁹Michael S. Bridgman and David V. Glass, Better Assessment of Operational Suitability, Logistics Management Institute (Jan. 1992).

¹⁰The government may seek financial recovery if a contractor engaged in fraud, or made gross mistakes amounting to fraud. In cases of fraud, the contractor willingly and knowingly gives the government a inferior product. To recover for fraud, the government must prove intent to defraud. Bar-Ray Products, Inc. v. United States, 340 F. 2d 343 (Ct.Cl. 1964). In the case of gross mistakes, the government must show deviation from contract specifications, and misrepresentation of its performance led the government to accept a non-conforming or defective product. Catalytic Engineering and Manufacturing Corp., 72-1 BCA ¶ 9342 (1972). These cases are rare and very difficult to prove.

We believe warranties should be used judiciously and only in cases where their cost-effectiveness can be clearly demonstrated.

Recommendations to the Secretary of Defense

We recommend that the Secretary of Defense establish an expedited waiver process that limits the disincentives inherent in the current process. We also recommend that the Secretary of Defense revise DOD's acquisition policies to adequately manage those warranties that the military services determine should be obtained. Consideration should be given to (1) requiring that all weapon system warranties be separately priced in order to allow meaningful cost-benefit analyses; (2) improving cost-benefit analyses through more realistically reflecting the likelihood of claim submission, performing present value analyses, and including the government's administrative costs; and (3) ensuring that the services enforce the regulations requiring post-award assessments of weapon system warranties so that the services will know why these warranties were or were not beneficial to the government. We also recommend that the Secretary of Defense direct the Secretaries of the Air Force and the Navy revise their regulations to require a final payoff assessment for weapon system warranties as the basis for purchasing more beneficial follow-on warranties and building institutional knowledge for procuring and administering effective warranties.

Recommendation to Congress

The administrative problems that we have identified appear to be unintended consequences of the warranty law due to the *de facto* mandatory nature of warranties. Attempts to administratively correct the problem have not been very successful. Since DOD continues to have problems administering weapon system warranties and the warranties provide minimal benefits for the costs incurred, Congress should repeal 10 U.S.C. 2403. Were the warranty requirement repealed, DOD and the services would still have management flexibility to obtain warranties for major weapon systems only when deemed appropriate. As was done prior to the warranty law, DOD and the services would rely on the FAR and their own policies to determine when it is appropriate to obtain a weapon system warranty. The decision should be documented as part of the system acquisition strategy.

Agency Comments and Our Evaluation

In commenting on a draft of this report, DOD stated that it "strongly supports" our recommendation that Congress should repeal 10 U.S.C. 2403. Since 1992, DOD has supported the need for congressional

repeal of the weapon system warranty law. DOD only partially concurred with the recommendations to the Secretary of Defense, stating that the solution to the problems we cited is repeal of the law. DOD indicated that it will ask the military departments to review their warranty waiver process. DOD noted, however, that in order to remove the disincentives and streamline the waiver process it needs relief from the congressional notification requirement and the warranty waiver approval level.

DOD stated that it did not see the need to separately price warranties because it has insight into warranty costs through cost reporting and can project warranty cost from actual claim data. Although DOD currently has insight into warranty costs, we found that this information is often not used in the cost-benefit analyses. Therefore, we believe that separately pricing the warranty would permit DOD to perform better warranty cost-benefit analyses.

DOD stated that all the military departments have in place regulations that require post-award assessments, but acknowledged that the military departments were not fully complying with existing regulations. DOD stated that it would reiterate the importance of such assessments in a memorandum to the military departments. Our review indicated, however, that only the Army's regulation specifically requires a final pay-off assessment to determine the economic benefit derived from a warranty. We believe that the Air Force and the Navy regulations should be revised to explicitly require final payoff assessments. DOD's comments are reprinted in their entirety in appendix II.

Quantified Costs and Benefits of Warranties

Dollars in millions					
Weapon system	Contract number	Warranty price	Warranty claims	Net	Warranty status
F-15E	F33657-89-C-2000	\$6.000	\$0.048	(\$5.952)	Expired
	F33657-90-C-2319	6.000	0.354	(5.646)	Expired
F-16 ^a	F33657-84-C-0247	27.860	2.780	(25.080)	Expired
	F33657-88-C-0037	15.100	1.091	(14.009)	Majority expired
C-17 ^b	F33657-89-C-0001	11.563	0.186	(11.377)	Expired
	F33657-92-C-0030	10.500	0.218	(10.282)	Expired
	F33657-92-C-0031	15.471	0.276	(15.195)	Expired
Multiple Launch Rocket System	DAAH01-85-C-1134	1.584	0.126	(1.458)	Expired
Total		\$94.078	\$5.079	(\$88.999)	

^aFinal figures for the Multiyear II warranty's claim data were unavailable because the program office never collected the final numbers. Estimates from a 1991 study put the total potential warranty claims at \$9.94 million. The \$2.78 million figure provided to us is the only figure available. The essential performance requirement warranty for the Multiyear III contract has expired and the materials and workmanship/design and manufacture warranties are approximately 80 percent expired, according to the program office.

^bClaim figures for the C-17 are actuals through December 31, 1995. They do not reflect the final numbers. Potential claims may occur as a result of durability, reliability, maintainability, and availability testing.

Comments From the Department of Defense

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



ACQUISITION AND
TECHNOLOGY

OFFICE OF THE UNDER SECRETARY OF DEFENSE

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April 22, 1996

Mr. Louis Rodriques
Director, Defense Acquisition Issues
National Security and International
Affairs Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Rodriques:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "WEAPONS ACQUISITION: Warranty Law Should be Repealed," dated March 19, 1996 (GAO Code 707099), OSD Case 1117.

The Department strongly supports the GAO's suggestion that Congress repeal 10 U.S.C. 2403, which mandates weapon system warranties. The Department partially concurs with the remainder of the recommendations and will reemphasize the importance of thorough cost-benefit analyses and post-award assessments. We believe the solution to the problems cited in the GAO report is repeal of the law. Rather than being statutorily required, the decision to incorporate a warranty should be left to the discretion of the contracting officer based on the circumstances of each program.

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

Eleanor R. Spector
Director, Defense Procurement

Enclosure



Appendix II
Comments From the Department of Defense

GAO DRAFT REPORT--DATED MARCH 19, 1996
(GAO CODE 707099) OSD CASE 1117

"WEAPONS ACQUISITION: WARRANTY LAW SHOULD BE REPEALED"

DOD COMMENTS ON THE GAO RECOMMENDATIONS

RECOMMENDATIONS

RECOMMENDATION 1: The GAO recommended that the Secretary of Defense establish an expedited waiver process that will limit the disincentives on program officials inherent in the current process.
(p. 7, p. 43/GAO Draft Report)

DOD RESPONSE: Partially concur. The Department will ask each Military Department to review the current waiver approval process to determine if it can be streamlined. In order to remove the disincentives to waiving warranties and to streamline the waiver approval process, statutory relief is required to the Congressional notification requirement and the waiver approval level.

RECOMMENDATION 2: The GAO recommended that the Secretary of Defense should revise the DoD acquisition policies to adequately manage those warranties that the military Services determine should be obtained. The GAO added that consideration should be given to:

- requiring that all weapon system warranties be separately priced in order to allow meaningful cost-benefit analyses;
- improving cost-benefit analyses through more realistically reflecting the likelihood of claims submission, performing present value analyses, and including the government's administrative costs; and
- ensuring that Services enforce the regulations requiring post-award assessments of weapons system

Now on pp. 7 and 36.

Appendix II
Comments From the Department of Defense

warranties so that the Services will know why these warranties were or were not beneficial to the government. (p. 7, p. 43/GAO Draft Report)

Now on pp. 7 and 36.

See comment 1.

DOD RESPONSE: Partially concur. We do not consider it necessary to separately price warranties because the government has cost insight via cost reporting without requiring separate pricing. With or without separate pricing, future warranty costs are normally projected using actual cost data. The Department generally agrees with the remainder of the recommendation, but does not believe additional regulation is necessary. The Department will issue a memorandum to the Military Departments that emphasizes the need to improve cost-benefit analyses and accomplish post-award assessments. We believe the real solution is to repeal the law and leave the decision on inclusion of a warranty to the discretion of the contracting officer. In this era of downsizing, it will be difficult to obtain significant improvements in the labor intensive efforts associated with analyzing warranty administration costs.

RECOMMENDATION 3: The GAO recommended that the Air Force and the Navy should revise their regulations to require a final payoff assessment for weapon systems warranties as the basis for purchasing more beneficial follow-on warranties and building institutional knowledge for procuring and administering effective warranties. (pg. 7, pg. 43/GAO Draft Report)

Now on pp. 7 and 36.

See comment 2.

DOD RESPONSE: Partially concur. All the Military Departments have regulations in place that provide for a final assessment of the overall effectiveness of a weapon system warranty. Administration assessments can be labor intensive and burdensome to a workforce facing intense downsizing. Additional regulation will not guarantee accomplishment. However, since we recognize that the Military Departments are not complying fully with existing regulation, the Department will reiterate the importance of such analyses in a memorandum to the Military Departments.

Appendix II
Comments From the Department of Defense

MATTER FOR CONGRESSIONAL CONSIDERATION

SUGGESTION: The GAO suggested that since DoD continues to have problems administering weapon system warranties and the warranties provide minimal benefits to the costs incurred, Congress may wish to repeal 10 U.S.C. 2403, providing DoD and the Services greater management flexibility to obtain warranties for major weapon systems only when deemed appropriate. (p. 7, pp. 43-44/GAO Draft Report)

DOD RESPONSE: Concur. The Department has supported strongly the need for Congressional repeal of the weapon system warranty law since 1992.

Now on pp. 7 and 36.

The following are GAO's comments on the Department of Defense's (DOD) letter dated April 22, 1996.

GAO Comments

1. Separately pricing the warranty would permit improved analysis of the benefits derived from warranty coverage. At a minimum, the negotiated warranty price should be noted in the contract file and used in the cost-benefit analysis. Further, the Defense Federal Acquisition Regulation Supplement (DFARS) requires that the warranty cost be included as part of the cost-benefit analysis.
2. Current Air Force and Navy regulations do not clearly require a final payoff assessment. The regulations should be revised to clearly require a final payoff assessment. We recognize that the acquisition community is downsizing and that additional regulations will not guarantee the assessments will be conducted; however, DOD and the military departments have a responsibility to properly execute weapon system contracts. Part of the responsibility involves building institutional knowledge on how to procure and administer weapon system warranties in order to ensure that the government is obtaining the best value for its procurement dollars.

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