United States General Accounting Office

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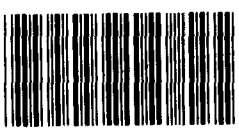
Report to the Vice Chairman,
Committee on Armed Services,
House of Representatives

September 1992

JAVELIN ANTITANK WEAPON

Quantity and Identification Capability Need to Be Reassessed



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United States
General Accounting Office
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National Security and
International Affairs Division

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September 14, 1992

The Honorable Charles E. Bennett
Vice Chairman,
Committee on Armed Services
House of Representatives

Dear Mr. Vice Chairman:

As you requested, we examined the Army's Javelin antitank weapon system program to determine (1) causes for cost increases and schedule delays and whether additional cost and schedule changes are likely, (2) whether the Army has reassessed the number of Javelin's that are needed based on current threat assessments, and (3) whether there is a requirement for the Javelin to provide an improved capability for distinguishing friend from foe.

In May 1992, we discussed the status of our review with your staff and provided the preliminary results for your use during initial markup of the fiscal year 1993 Defense Authorization Act. This report summarizes and updates the information provided at that briefing.

Background

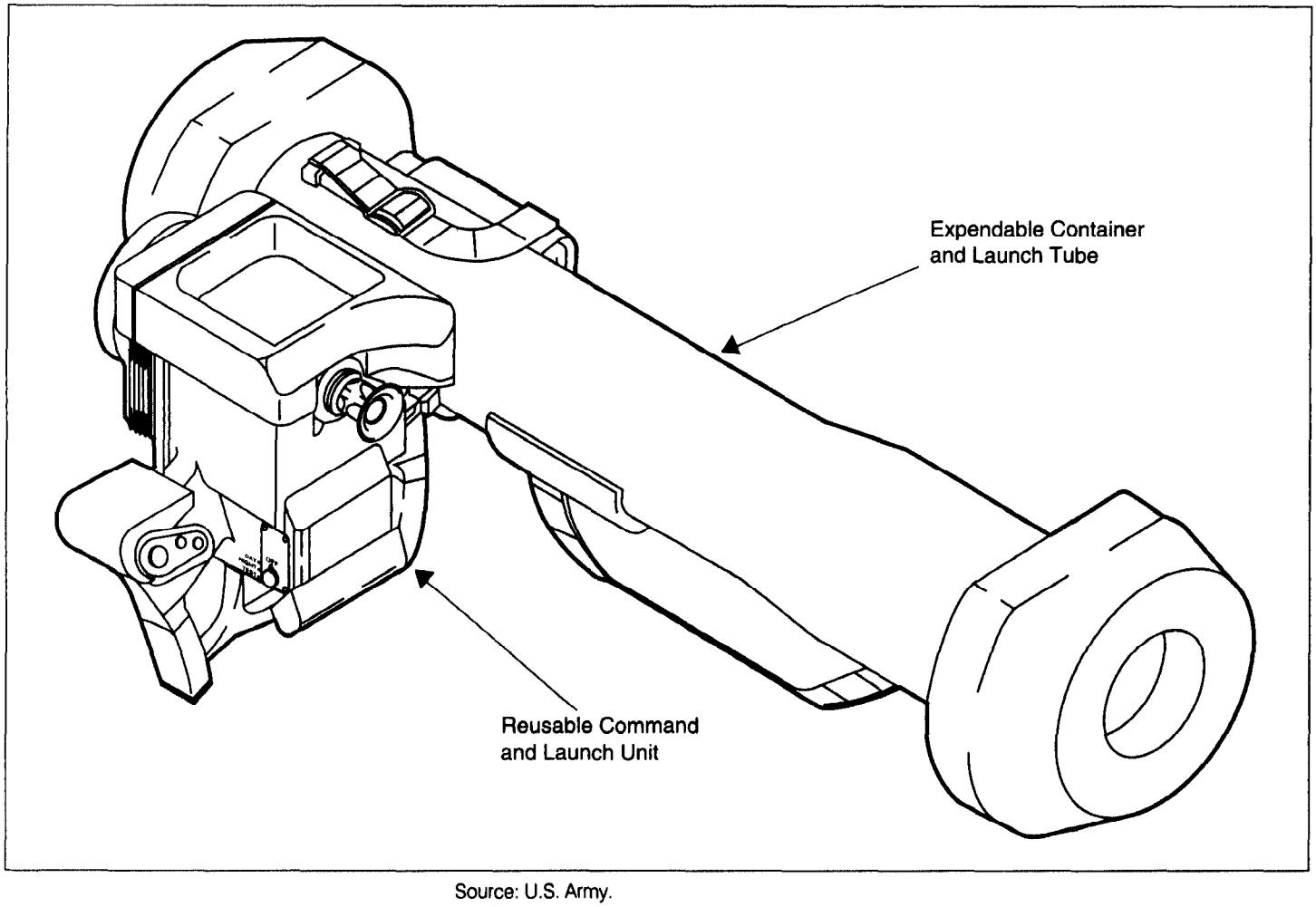
The Army is developing the Javelin—formerly the Advanced Antitank Weapon System-Medium (AAWS-M)—to replace the Dragon II antitank weapon. The Javelin is intended to be a medium-range, man-portable antiarmor system for use in rapid deployment operations, rough terrain, and air assault operations. Its mission is to defeat tanks and other targets expected on the modern battlefield. The system consists of a missile, an expendable container and launch tube that houses the missile, and a reusable command and launch unit for target acquisition and surveillance. The Javelin is in the engineering and manufacturing development phase and is scheduled for low-rate initial production in April 1994.

The Javelin is expected to offer more than twice Dragon II's maximum range—2,000 versus 950 meters—and enhanced lethality. Also, unlike the Dragon, the gunner would not guide the Javelin's missile after firing. This would enable the gunner to rapidly fire a second missile or take cover.

The autonomous guidance capability relies on an advanced imaging infrared device, referred to as the focal plane array sensor, to detect the thermal energy emitted by a target and provide tracking information to the guidance system. Before firing the missile, the gunner can select either

(1) a flat trajectory to attack targets under cover such as bridges or (2) a lofted trajectory to attack the more vulnerable top of the tank. See figure 1 for an illustration of the Javelin system.

Figure 1: The Javelin System



Source: U.S. Army.

Note: The prime contractor for the Javelin is a joint venture of Texas Instruments, Dallas, Texas, and Martin Marietta, Orlando, Florida. The original contractor for the missile focal plane array component was Texas Instruments. The current focal plane array contractor is Hughes Aircraft Company's Santa Barbara Research Center, California.

Results in Brief

Since June 1989, the Army's total cost estimate for development, production, fielding, and support of the Army's Javelin antitank system has increased by about 57 percent to $11.9 billion in then-year (escalated) dollars.[1] The primary reasons for the cost increase are (1) the Army stretched the planned production and fielding period over an additional 4 years and (2) technical problems that resulted in additional schedule delays. Program costs could further increase because the focal plane array component's cost estimate appears to be optimistic. In early 1993, the Department of Defense (DOD) plans to formally review the component's estimated cost. If that estimate exceeds the established thresholds, the Under Secretary of Defense for Acquisition (Defense Acquisition Executive) plans to consider other alternatives such as (1) developing an earlier competing concept for the Javelin or (2) upgrading the existing Dragon II system.

Technical difficulties, including problems in producing effective missile focal plane array components, caused an 18-month slippage in the Javelin's development and a projected 26-month delay in initial fielding. Program officials believe the problems with the focal plane array have been resolved, and they assess risk of the Javelin's revised schedule as moderate.

Since June 1989, the Army has planned to procure 58,000 Javelin missiles and 5,000 command launch units. Since the threat posed by the former Soviet Union and Warsaw Pact countries has diminished, all the military services are reducing their force levels. The Marine Corps has reduced the number of Javelin systems it plans to procure by over 30 percent.[2] The Army, however, does not plan to reduce its Javelin procurements. Instead, it now plans to provide the Javelin to units that earlier had insufficient priority to receive them.

The Secretary of Defense's February 1992 annual report to the President and the Congress stated that the Javelin's advanced sensor would provide needed improvements in the capability to distinguish friend from foe. However, the Javelin's 1988 requirement document does not call for the Javelin to provide that capability. Therefore, the Army does not plan to assess the Javelin's capability in this area with the result that its capability to distinguish friend from foe may not be known. Also, in an effort to limit

[1]The $11.9 billion estimate does not include the estimated costs for the Marine Corps' Javelin program.

[2]The Marine Corps plans to procure 8,485 missiles and 917 command launch units at an estimated cost of about $500 million, but has not yet established its fielding and support costs.

costs, the Army is considering reduced specifications for target clarity that could reduce the Javelin's potential for distinguishing friend from foe.

Estimated Program Cost Has Increased Substantially and May Increase Further

Since June 1989, when the Javelin entered the engineering and manufacturing development phase, the Army's total cost estimate for the program has increased from $7.6 billion to $11.9 billion (then-year dollars), a $4.3 billion increase.

As shown in table 1, the estimated increases consist of a $1.1 billion increase in acquisition costs and a $3.2 billion increase in fielding and support costs. However, the acquisition costs could increase further because the cost estimated for producing the missile's focal plane array component appears to be optimistic.

Table 1: Cost Growth in the Army's Javelin Program

Then-year dollars in millions

Cost category	June 1989 estimate	August 1991 estimate	Cost growth	Percent increase
Acquisition costs				
Development	$481.0	$727.5	$246.5	51.2
Production	2,799.0	3,647.6	848.6	30.3
Subtotal	**3,280.0**	**4,375.1**	**1,095.1**	**33.4**
Fielding and support costs				
Fielding	26.9	86.2	59.3	220.4
Support	4,283.8	7,441.3	3,157.5	73.7
Subtotal	**4,310.7**	**7,527.5**	**3,216.8**	**74.6**
Total	**$7,590.7**	**$11,902.6**	**$4,311.9**	**56.8**

Causes for Cost Increases

The acquisition cost estimates increased primarily because (1) the Army stretched the planned production period from 6 years to 10 years in light of funding constraints and (2) the original contractor experienced problems in developing an effective focal plane array missile component, resulting in program delay. The fielding and support cost estimates increased primarily because of (1) higher costs (such as those for military personnel) associated with fielding and supporting the system over an additional 4 years, (2) higher charges for the Javelin's spare parts, and (3) higher escalation rates in estimates for future years.

Cost Estimate Appears to Be Low

The cost of producing the missile's focal plane array component appears to be low because of optimistic production cost estimates. The Defense Acquisition Executive established in September 1991 that the cost of producing that component must average no more than $12,500 (constant 1992 dollars)[3] to meet the current production cost estimate for the Javelin and ensure that the Javelin remains cost effective. However, limiting the cost to that amount would require a decrease of more than 62 percent between development and initial production, from an estimated average cost of about $63,000 for the focal plane array component to about $24,000 (constant 1992 dollars). As production continues, additional significant reductions will be required to attain the overall average cost of no more than $12,500. DOD systems and production analysts believe that the planned cost reductions may be optimistic.

In early 1993, DOD systems and production analysts plan to review the Javelin's estimated cost based on (1) the costs of about 200 focal plane array components produced for development testing, (2) the contractor's low-rate production estimate, and (3) potential improvements in the focal plane array production process. If estimated average costs exceed the $12,500 threshold, the Defense Acquisition Executive plans to evaluate alternatives such as an earlier competing concept or upgrades to the existing Dragon II system.

In its June 1992 report on the fiscal year 1993 Defense Authorization Act, the House Committee on Armed Services requested that the Secretary of Defense provide the planned Javelin cost-effectiveness evaluation to the congressional defense committees along with the fiscal year 1994 appropriation request for the Javelin funding.

Javelin Schedule Delayed—Risk Termed Moderate

After encountering significant problems in developing the missile's focal plane array component, the Army and development contractor determined that the 36-month Javelin development schedule could not be met. In September 1991, the Defense Acquisition Executive approved the Army's restructured 54-month development program.

The restructured program extended the current engineering and manufacturing development program by 18 months to December 1993 and

[3]A DOD systems analyst based the average cost limit on producing 70,550 missiles, or 4,065 more than currently planned. The analyst stated that the planned reduction should have little, if any, impact on the $12,500 cost limit.

delayed initial fielding by 26 months to April 1996. It also delayed by 20 months completion of tests that are intended to demonstrate whether the system (1) is ready for low-rate initial production and (2) meets the required capability. These preproduction qualification and operational tests are currently scheduled to be conducted from September 1992 to December 1993.

The Javelin program management and DOD test officials currently assess Javelin's restructured schedule as having moderate risk because of the limited time available to redesign and retest, if required. In addition, the Javelin project manager stated that while risk remains moderate, he was encouraged by recent progress made by the missile focal plane array contractor. He said that the contractor had delivered 28 focal plane arrays as of July 1992, all of which exceeded specifications. He also stated that the earlier technical problems appear to have been resolved.

Army Has Not Reduced Planned Quantities in Light of Planned Force Structure Reduction

Since June 1989, the Army has maintained its plans to procure 58,000 Javelin missiles and 5,000 command launch units. However, since that time, the threat posed by the former Soviet Union and Warsaw Pact countries has declined so dramatically, that all the military services are making reductions in their force structures. As part of its reduction plans, the Marine Corps recently reduced its planned procurement of Javelin missiles and command launch units by over 30 percent. The Army, however, has not reduced its planned Javelin procurements despite the reduced threat and force reduction plans.

The Secretary of Defense's February 1992 annual report stated that the passing of the traditional Cold War threat planning assumption — a global war beginning on short notice in Europe—made it possible to identify some missions and forces that were no longer needed. Accordingly, the Marine Corps plans to deactivate 4 (or 20 percent) of its 20 infantry battalions by the year 2001. As a result, the Marine Corps reduced planned Javelin missile quantities by 32 percent, from 12,550 to 8,485, and command launch units by 38 percent, from 1,486 to 917.

According to the Secretary of Defense's report, the United States would reduce the active duty Army force structure by roughly one-third of its 1990 level, from 18 divisions to 12 by 1995. However, the representative from the Army's Office of the Deputy Chief of Staff for Operations who was responsible for determining Army quantities for the Javelin told us that the Army had no plans to reduce the Javelin quantities it planned to procure.

He stated that the Army based its quantities on partially replacing Dragon day launchers with the Javelin command and launch units (funding did not permit a one-for-one replacement), and providing about 12 missiles for each launch unit. He further stated that deactivation of Army units will allow the Army to provide the Javelin to units that previously were not scheduled to receive it.

Javelin Is Not Required to Distinguish Friend From Foe

The Javelin is not required to distinguish friend from foe (called positive identification), but its advanced sensor offers some inherent capability in that area. However, the Javelin's positive identification capability is not scheduled for assessment, and its capability in this area could be reduced by Army decisions regarding cost versus minimum specification requirements.

The Secretary of Defense's 1992 annual report to the Congress stated that improvements were required in the ability to distinguish friend from foe because of (1) the range and lethality of modern weapons and (2) the value America places on the lives of its personnel. The report concluded that weapons such as the Javelin with its advanced focal plane array sensor will allow U.S. forces to identify enemy formations at increased range in day or night.

The need for improved positive identification was reinforced by Desert Storm experiences. For example, DOD's April 1992 after action report to the Congress on Desert Storm stated that (1) fire from friendly forces caused more Bradley Fighting Vehicle losses than enemy fire and (2) all nine permanent losses of M1A1 tanks were caused by friendly fire.

However, the 1988 Joint Army and Marine Corps Operational Requirement for the Javelin calls for the system to be capable of recognizing different categories of targets, such as trucks versus tanks. The Javelin is not required to distinguish friend from foe or identify the type of tank, truck, or other target—a capability critical to positive identification. Notwithstanding the Secretary of Defense's statement in the 1992 annual report, the Chief of Javelin Technical Management said that the Javelin's capability to distinguish friend from foe will not be assessed because that capability is not required. However, unless assessed, the Javelin's capabilities in positive identification will not be known. The official also said that if such an assessment were to be made, computer simulations may be superior to operational testing because (1) data bases are available

on a large number of targets and scenarios and (2) instrumentation may be a problem in operational testing.

Capability Could Be Reduced

Since distinguishing friend from foe is not a Javelin requirement, the system's inherent capability could be reduced as a cost-cutting measure. The Javelin's command launch unit contains the focal plane array acquisition device through which the gunner acquires and attempts to identify an infrared image of a potential target. However, in an effort to limit cost, the Army is considering whether relaxed and less costly focal plane array specifications would meet its minimum requirements for distinguishing between such target categories as tanks versus trucks. On the other hand, if positive identification of tanks, trucks, or other targets under battlefield conditions is considered important, then more stringent requirements and resulting specifications for greater identification capability than those under evaluation may be prudent. According to the Chief of Javelin Technical Management, a requirement for positive identification (1) would alter the Army's evaluation and (2) could result in selection of more stringent and costly specifications.

Recommendations

We recommend that the Secretary of the Army reassess the quantity of Javelin missiles and command launch units needed in light of the current threat assessments and Army force structure reduction plans.

We also recommend that the Secretary of Defense determine whether the Javelin should be capable of positive target identification and, if so, define the capability as part of the system's operational requirement.

Scope and Methodology

To examine the Javelin's cost and schedule issues, we (1) compared past and current cost estimates and schedule plans, (2) reviewed Army and DOD assessments of whether additional cost and schedule changes are likely, and (3) evaluated DOD planning to reconsider the Javelin's cost-effectiveness. We discussed the issues with officials from the Army's Javelin Project Office, Redstone Arsenal, Alabama, and from the Offices of Assistant Secretary of the Army (Research, Development, and Acquisition) and Assistant Secretary of Defense (Acquisition) in Washington D.C.

In examining risks associated with the focal plane array component, we discussed progress and problems in developing that component with engineers from the Army's Communications and Electronics Command's

Center for Night Vision and Electro-optics at Fort Belvoir, Virginia. To obtain DOD's perspective on the array component, we met with representatives of the (1) Office of the Director, Defense Research and Engineering in Washington D.C., and (2) Defense Advanced Research Projects Agency in Falls Church, Virginia.

In assessing planned Marine Corps and Army quantities, we reviewed force structure reduction plans and discussed their impact on planned procurements with officials from (1) the Marine Corps' Combat Development Command, Quantico, Virginia, and (2) the Army's Office of the Deputy Chief of Staff for Operations, Washington, D.C.

To examine the Javelin's requirement for distinguishing friend from foe, we reviewed the Javelin's requirement documents and related DOD reports. In addition, we discussed target identification capabilities and test objectives with representatives from the Javelin Project Office and an official from the Office of the Director, Operational Test and Evaluation.

We performed our work from March 1991 to July 1992 in accordance with generally accepted government auditing standards.

As requested, we did not obtain fully coordinated DOD comments on this report. However, we discussed our findings with officials from the Army's Javelin Project Office and from the Offices of the Under Secretary of Defense for Acquisition; the Assistant Secretary of Defense for Program Analysis and Evaluation; the Assistant Secretary of the Army for Research, Development, and Acquisition; and the Army's Deputy Chief of Staff for Operations and Plans. They generally agreed with our findings. We have incorporated their specific comments in the report where appropriate.

As you requested, we plan no further distribution of this report until 10 days from its issue date. At that time, we will send copies to the Chairmen of the Senate and House Committees on Armed Services and on Appropriations, the Senate Committee on Governmental Affairs, and the House Committee on Government Operations; the Director of the Office of Management and Budget; and the Secretaries of Defense and the Army. Copies will also be made available to others on request.

Please contact me at (202) 275-4141 if you or your staff have any questions concerning this report. Other major contributors to the report are listed in appendix I.

Sincerely yours,

Richard Davis

Richard Davis
Director, Army Issues

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