



UNITED STATES GENERAL ACCOUNTING OFFICE

WASHINGTON, D.C. 20548

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PROCUREMENT AND SYSTEMS
ACQUISITION DIVISION

FEBRUARY 5, 1980

B-196877

The Honorable Harold Brown
The Secretary of Defense

Attention: Assistant for Audit Reports
Room 3A336
ASD (Comptroller)

ABC 5 →

ABC 20

Dear Mr. Secretary:

Subject: Concerns About the Army's Infantry Fighting
Vehicle (PSAD-80-27)

As part of our annual examinations of selected major
weapon system acquisitions, we have reviewed the Army's
Fighting Vehicle Systems Program. Primarily, our review
focused on the Infantry Fighting Vehicle's (IFV's) perform-
ance in operational and development testing. The test re-
sults were used as a basis for the Defense Systems Acquisi-
tion Review Council's recommending approval of the start
of production in January 1980.

ID
ABC 1480

The Army is looking to IFV to provide the infantry
with a vehicle to move rapidly in a hostile environment with
better armor and greater firepower than is currently avail-
able in the M113. Unlike the M113 that is basically a trans-
port vehicle, IFV will be a fighting vehicle that can carry
troops into combat as a companion to the tank.

Military engineering

Operational testing was completed in November 1979, and
development tests are scheduled for completion in July 1980.
Test data available in December 1979 showed that IFV had met
or exceeded virtually all its performance requirements, in-
cluding its reliability goals.

IFV'S HIGH COST MAY WARRANT
CONSIDERATION OF A HIGH-LOW MIX

A principal concern about IFV is its high cost. The
September 1979 Selected Acquisition Report shows an esti-
mated unit procurement cost of about \$600,000 for contem-
plated procurements through 1995. The report uses rather

Army procurement
weapons systems
Army supplies

Military land
vehicles 008547
Combat readiness

(951524)

Product performance
evaluation

low inflation rates, generally about 5.5 percent. The armored personnel carrier it is replacing, the M113, can be purchased for about \$100,000.

IFV's estimated cost per vehicle has grown considerably and rapidly over the past several years. In 1972 it was, according to Army estimates, \$172,000. Just 1 year ago, the contractor submitted a proposal showing a unit cost of \$497,000, based on the fiscal year 1978 cost index.

We were informed by IFV program officials that despite the acquisition of the new fighting vehicle, the Army does not intend to reduce its inventory of M113s. It plans to use them as carriers for the TOW (tube-launched, optically tracked, wire-guided) missile; vehicles for the artillery's forward observer; and carriers for tactical signal intelligence systems.

We believe IFV's high cost also merits considering the use of the M113 as part of a high-low mix with IFV within the mechanized infantry battalion if the M113's firepower can be augmented. We understand the Army's Training and Doctrine Command is planning to retain some M113 vehicles in mechanized battalions for other purposes than transporting troops.

IFV'S TEST SCORES EXCEED ARMY'S RELIABILITY GOALS

The mean miles between failures, as scored by the Army, show steady growth in total system reliability. A reliability score as of December 6, 1979, showed that 260 mean miles between failures was achieved. This reliability measurement exceeds the operational and development testing goal of 195 and the initial production goal of 240 mean miles. Several problems surfaced during testing, but most have already been corrected. Further corrections to rectify problems will continue throughout development testing.

NEED TO MONITOR FUTURE VULNERABILITY TESTS

There is, however, one crucial development test still to be completed. It concerns the vehicle's vulnerability. One of the advantages of IFV over the M113 is its anticipated greater survivability on the battlefield because of its superior armor protection. Very limited testing of the vehicle's armor has been conducted to date. The initial testing showed the armor to be somewhat under the Army's stated ballistic protection requirements against both small arms fire and overhead airbursts.

The testing for small arms fire was accomplished by firing against armor plates, similar to those to be used on portions of the vehicle, as opposed to firing against the armored vehicle itself. In overhead airburst testing with armored plates, four different scenarios were used, and the vulnerability requirement was met in three of them. In the fourth scenario, the protection achieved was slightly less than the requirement.

Based on these limited tests, the Fighting Vehicle Systems program office is prepared to consider increasing the thickness of the armor plating of several areas on the vehicle and changing the obliqueness of others. The program office believes that a few of these changes will bring the protection level up to the requirements for the first production vehicles. However, the extent of any changes to the armor will depend on the results of the vulnerability tests on a fully armored vehicle scheduled for June and July 1980.

Since the tactical use of IFV would require its moving into areas where it could come under attack from machine guns and artillery weapons, the criticality of the vulnerability tests is self-evident.

IFV'S SPACE LIMITATIONS MAY IMPEDE MECHANIZED INFANTRY SQUAD'S EFFECTIVENESS

DLG 9/16

A 1978 study by the Army Training and Doctrine Command's Infantry School indicates that the proposed dismounting of six infantry men may be insufficient for accomplishing the mechanized infantry's mission. Consequently, the Army is considering either enlarging the infantry squad or increasing the number of vehicles in each mechanized infantry unit.

At one time, an 11-man squad was being considered for IFV, of which 9 would dismount and 2 remain inside. Partly because of configuration changes to the vehicle which reduced the interior space, the squad size was reduced to nine.

The Infantry School's study was used in a report on IFV prepared at your request to consider, among other matters, possible alternatives to IFV. This is the latest completed study on squad effectiveness. The study showed the following levels of enemy kills for a force of IFVs where seven or five men, instead of nine, are able to dismount.

Percent Killed Compared to Case
Where 9 Men Can Dismount

	<u>7 men vs. 9 men</u>	<u>5 men vs. 9 men</u>
	------(percent)-----	
Enemy vehicle and weapons	74	19
Enemy personnel	55	14

The study assumed that only two men would remain with the vehicle. Since the study was made, the Infantry School has decided that in most situations three men, rather than two, would remain with the vehicle. Thus, the current IFV squad of nine men would result generally in six men, rather than seven, dismounting. Its effectiveness would fall between that of the five and seven men dismounting, as shown above.

If the close-in battle that was war gamed in this study is typical of situations that IFV will face, then an increase in dismounted capability is desirable, if not mandatory.

Due to the sensitivity of force effectiveness to the number of men able to dismount, the Army is considering ways to accommodate one or two additional men in each IFV. The Army found that with a few minor rearrangements of stowed equipment, adequate floor space exists for two additional men.

We viewed the interior of an IFV at Fort Carson, Colorado, and discussed the space problem with several squad members. It appeared that with the gear the additional men would bring aboard and the seats that would have to be installed for them, conditions inside the vehicle would be intolerably cramped.

In a meeting at the Infantry School, we were told the Army may consider a second alternative of increasing the number of IFVs per mechanized infantry unit. If the Army opts for adding vehicles to enhance the dismounted fighting capability, it would appear much more cost effective to consider adding M113s rather than more IFVs for this role, considering the great disparity in their cost.

SCOPE OF REVIEW

Most of our review was accomplished at the offices of the Program Manager, Fighting Vehicle Systems. We reviewed

the test plans, procedures, and results with officials of the Army Test and Evaluation Command and the Army Operational Test and Evaluation Agency. We also discussed the IFV cost and operational effectiveness analysis results with officials of the Army Training and Doctrine Command's Infantry School.

We would appreciate receiving your comments on these matters within 30 days. Should you desire, we will be pleased to discuss this report with you or your staff.

We are sending copies of this letter to the Director, Office of Management and Budget, and to the Secretary of the Army. We are also sending copies to the chairmen of the Senate Committees on Appropriations, Armed Services, and Governmental Affairs and to the chairmen of the House Committees on Appropriations, Armed Services, and Government Operations.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "J. H. Stolarow".

J. H. Stolarow
Director