U. S. GENERAL ACCOUNTING OFFICE

STAFF STUDY

GAMA GOAT

DEPARTMENT OF THE ARMY

FEBRUARY 1973

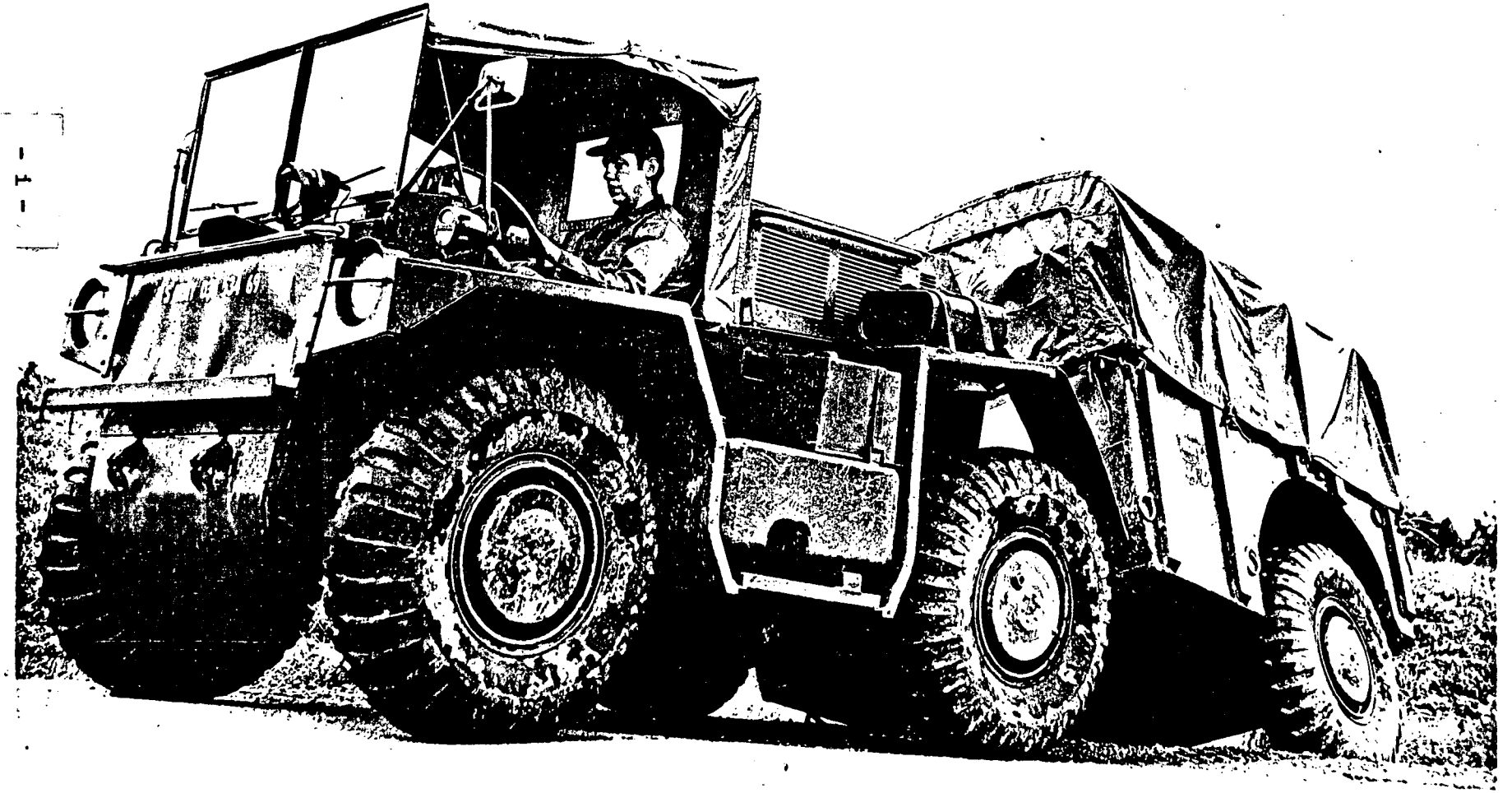
CONTENTS

ABBREVIATIONS

AMC	Army Materiel Command
DOD	Department of Defense
FPE	Fixed Price with Escalation
OSD	Office of the Secretary of Defense
SAR	Selected Acquisition Report

M561 1 1/4 TON TRUCK (GAMA GOAT)

U.S. ARMY PHOTOGRAPH



TRUCK CARGO, 1-1/4 TON, (GAMA GOAT)

SYSTEM DESCRIPTION AND STATUS

The Gama Goat, is a 6-wheel drive vehicle designed to provide high mobility over adverse terrain and to have float, swim, and air drop capabilities. Intended users are infantry, armor, artillery, airborne, engineer, and selected close support type units. A truck version (facing page) is designated M561 and an ambulance version is designated as the M792. References to M561 or trucks in this study refer to both the M561 truck and M792 ambulance.

The DOD's program for the M561 cargo truck--a replacement for a portion of the existing fleet of 3/4-ton trucks--was initiated in May 1961. The truck was developed during the period March 1963 through June 1966, and in June 1968 the initial production contract was awarded.

The M561 is currently in service and in production, and 4,348 initial production trucks are being retrofitted at Army depots to correct deficiencies found during Initial Production Testing (IPT).[1] The problems which delayed production and deployment of the Gama Goat were discussed in our prior staff studies. These problems were also the subject of a special hearing held by the House Armed Services Investigating Subcommittee on May 24, 1972 and reported on July 26, 1972.

---

[1] Reported as approximately 4400 in 30 June 71 SAR. Includes the Marine Corps buy of 1758 vehicles.

As of December 31, 1972, the contractor had built 12,353 vehicles and 12,081 have been accepted by the Army.[1] As of the same date, 6,448 vehicles had been deployed (3,323 in the continental United States and 3,125 overseas). The service inventory objective (Army and Marine Corps) is now 14,274 vehicles.

The Selected Acquisition Reports (SARs), the June 30, 1972 System Status Report (SSR), and support data for the Gama Goat show various cost, schedule, and performance changes (see page 5):

--Cost increased and quantity decreased

--Speed decreased

--Range and reliability increased

--Completion of retrofit slipped and completion of production was advanced.

COMING EVENTS

In June 1973 the M561 acquisition program will be terminated as an Army Materiel Command (AMC) chartered project. Residual program activities will be managed by the U.S. Army Tank-Automotive Command. The final production and the depot retrofit of 4,348[2] initial production vehicles are both scheduled for completion in July 1973.

The Army has under consideration a long range Product Improvement

---

[1]Includes 4348 initial production vehicles undergoing retrofit.

[2]Reported as approximately 4400 in 30 June 71 SAR. Includes the Marine Corps buy of 1758 vehicles.

Program (PIP) to increase the reliability, availability, and maintainability of the Gama Goat. This plan includes further improvement of certain engine and other power train components, e.g., air cleaners, oil pump, exhaust system, suspension system, and universal joint and brake system. In addition, improved swimmability and reduced noise level will be explored. Exploratory development funds of about $450,000 have been authorized by the Army thus far for this program.

COST

As of June 30, 1972, the Army's estimated program acquisition cost, including additional procurement costs of $11.3 million, was $196.2 million[1]--a net increase of $3.8 million since June 30, 1971.

The net increase resulted from:

--a $4.0 million increase in engineering and support items--engineering support to production ($1.5 million), in-house engineering support ($0.5 million), emission control effort on the engine ($0.2 million), increased winterization kits and installation ($1.0 million), increased testing ($0.5 million), contractor technical support ($0.3 million), and

--a $0.2 million decrease due to a reduction in spares.

In our opinion, the $3.8 million increase was properly allocated to DOD prescribed cost categories.

---

[1]Does not include $.7 million RDT&E and $20.6 million Procurement for Marine Corps vehicles.

As instructed by DOD,[1] estimated additional procurement costs of $11.3 million--$5.2 million for first destination transportation and $6.1 million for production base support--were not reported in the June 30, 1972 SSR. However, they were reported in the June 30, 1971 SAR and for comparison we also included them in the June 30, 1972 estimate of program acquisition costs.

The cost estimates included the allowance for contract price escalation, as of 30 June 1972, of $6.1 million.

As of June 30, 1972, Army funds totaling $196.2--$9.5 million from the RDT&E appropriation and $186.7 million from the procurement appropriation--have been provided for the program. The Army advises that all funds needed to complete the program have been received. The completed program will provide the Army with 12,516 production and 14 development trucks at a unit program cost of $15,658. Additional funds totalling $.7 million RDT&E and $20.6 million, have been provided which will give the Marine Corps 1,758 vehicles at a unit rollaway cost of $11,717.

CONTRACT DATA

Due to reduced Army truck requirements and fiscal constraints the 1968 Fixed Price with Escalation (FPE) contract with the Consolidated Diesel Electric Company was amended in June 1972 to cancel 1,000 of the 15,274 vehicles originally ordered. As of June 30, 1972, the amended contract amount was $135.2 million for 14, 274 production trucks which includes the 1,758 for the Marine Corps.

---

[1]Because substantial differences were found in how the military departments were reporting additional procurement cost, the Assistant Secretary of Defense, Comptroller directed them in May 1972 to delete all such costs from SARs except for modification and component improvement costs.

The vehicle cancellation also resulted in a reduction in engines ordered under a 1968 contract with Detroit Diesel and as of June 30, 1972, the reduced amount of this contract was $31.9 million.[1]

The Army requires the contractors to report progress in monthly Production Progress Reports which we believe meet the objectives of DOD Instruction 7000.2.

PERFORMANCE

Comparison of the June 1972 SSR and June 1971 SAR data showed the following changes in current operational and technical estimates:

--the maximum speed was decreased from 55 mph on land to 50 mph and from 2.5 mph on water to 1.8 mph;

--the cruising range increased from 350 miles to 377 miles; and

--the maintainability requirements increased from 120 man hours of maintenance per 20,000 miles of operations to 200 man hours.

During early initial production tests, engine cooling problems were encountered. To overcome this difficulty, the fan shroud was redesigned and smaller fuel injectors were installed. Engine cooling was improved, but the use of smaller fuel injectors reduced the fuel injection rate and maximum speed diminished by 5 mph on land. However, with the change in fuel injectors, fuel consumption was more efficient and the cruising range increased from 350 miles to 377 miles.

---

[1] Army--$27.9 million; Marine Corps--$4.0 million.

Maximum speed on water was reduced from 2.5 mph to 1.8 mph because weight increases in production vehicles caused them to swim about an inch deeper in the water. The Army advises that the higher maximum water speed estimate was based on lighter research and development vehicles. The weight increases were caused by numerous component corrections to initial production vehicles--especially the incorporation of sealed brakes.

Estimated maintenance man hours per 20,000 miles of operation increased from 120 to 200 man hours which is still better than the original estimate of 500 man hours. The Army advises that the 120 man hour estimate was based on 1967 test data. Initial production test results as of October 1971 showed that 273 man hours were required. However, with the use of improved components the Army expects to attain the 200 man hour estimate.

As reported last year, the Army adopted, as a guide, the reliability requirement established for a planned companion truck for the M561. This requirement specified that the truck have a 94 percent probability of completing a 75-mile mission. Although this 94 percent probability is not a firm requirement, latest test results--April 1972--indicate 92.5 percent probability of completing a 75-mile mission, only a slight improvement over the 92 percent estimate reported last year.

PROGRAM MILESTONES

Because of delays in obtaining acceptable differential gears from a new supplier, the completion date for incorporating product corrections in 4,348 initial production trucks at Army depots was extended from February 1973 to July 1973.[1]

---

[1]Includes the Marine Corps buy of 1758 vehicles.

The initial lot of replacement differential gears produced by the new supplier were determined unacceptable and as a result, the retrofit program was interrupted in January 1972. By May 1972, a sufficient number of acceptable gears were available to permit resumption of the retrofit program. As of December 31, 1972, 2,117 of the vehicles (48.7 percent) were fixed.[1] The Army advised that retrofit completion of 2,437 vehicles had been scheduled by this date, and the program was two to three weeks behind schedule but it still expects the program to be completed by July 1973.

As a result of the reduction from 15,274 to 14,274 trucks, the completion of production was shortened from September 1973 to July 1973.

RELATIONSHIP TO OTHER SYSTEMS

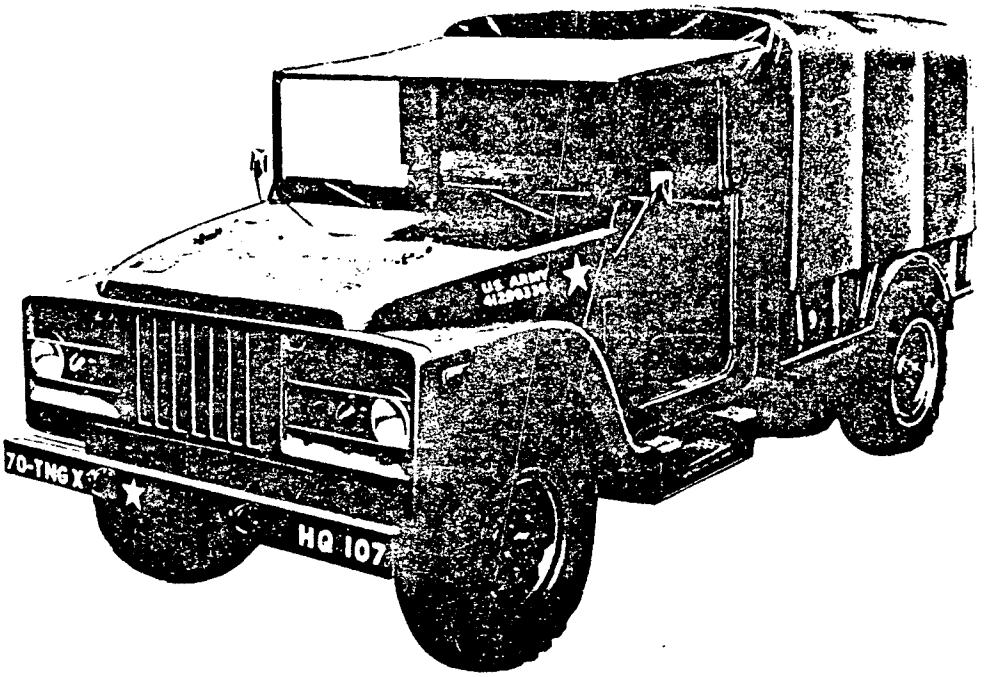
The Gama Goat is one of the trucks originally developed to replace a portion of the existing fleet of 3/4 ton M37 trucks. It is designed to operate in combat areas, while another truck--the XM705, and later the XM852--was planned for rear areas. The Army has terminated both the XM705 and XM852 programs and now plans to buy commercial trucks for use in rear areas. M-37 3/4-ton trucks have been rebuilt by the Army and Marine Corps and remain in service awaiting the deployment of newer vehicles.

SELECTED ACQUISITION REPORTING

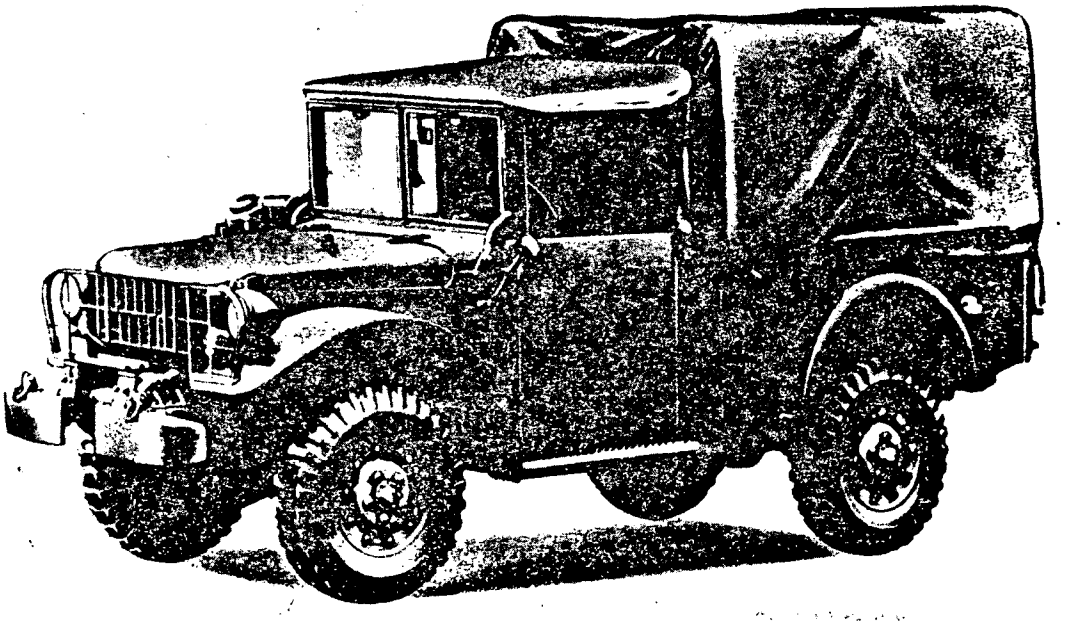
In October 1971, the Office of the Secretary of Defense (OSD) decided that

---

[1]As of January 5, 1973 the Army had shipped 827 to the Marine Corps.



TRUCK, UTILITY, 1-1/4-TON, 4 X 4, XM705



TRUCK, CARGO ¾ TON, 4x4, W/WINCH, W/E **M37B1**

Gama Goat SARs were not required after June 30, 1971. However, the project office, at AMC direction, has continued to prepare and submit them quarterly to AMC to provide continuity from June 1971 through September 1973, when a formal close-out SAR will be prepared. Except for not showing current milestones--vehicle production and retrofit completion dates--the informal June 30, 1972, SAR provided an adequate statement of program status. In response to a GAO request a System Status Report (SSR) as of June 30, 1972 was submitted through Army and OSD channels.

We believe SARs should be continuously submitted on major weapon systems, e.g., the Gama Goat, with important milestones included, e.g., retrofit completion date, quantity change, revised production completion date, until all significant program milestones have been met. In this case the deployment of enough vehicles to meet the Army and Marine Corps requirements on which the program was justified could be the final significant program milestone.

We also think the funding of other military services joining in the procurement should be included in the basic SAR data rather than in footnotes in order to show the total DOD program acquisition cost clearly.

MATTERS FOR CONSIDERATION

The Army advised that although it was too early to measure actual field performance, preliminary information indicates that the Gama Goat is meeting or exceeding expectations. The problems experienced by the Army in this program are well known and since vehicles have now been released for

troop use, the Congress should satisfy itself as to the effectiveness of the deployed Gama Goat, and its performance in relation to companion battlefield vehicles.

AGENCY REVIEW

A draft of this staff study was reviewed by Army officials associated with the management of this program and comments were coordinated at the Headquarters level. The Army's comments are incorporated as appropriate. As far as we know there are no residual differences in fact.

We did not ask Marine Corps officials to review this study since the Army has the project management responsibility for the Gama Goat.

COST DEFINITIONS [1]

ROLLAWAY COST: Total PEMA costs for the basic unit (chassis, etc.), propulsion, eletronics, armament, and other installed government furnished equipment (GFE).

WEAPON SYSTEM COST: Rollaway Cost plus total PEMA costs for peculiar ground support equipment, peculiar training equipment, publications, technical data, contractor technical services, installation and checkout, and factory training.

PROCUREMENT COST: Weapon System Cost plus total PEMA costs for initial spares.

PROGRAM ACQUISITION COST: Procurement Cost plus total RDT&E and Military Construction appropriation charges allocated to the system.

---

[1] DOD 7110-1-M, Budget Guidance Manual