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STATEMENT OF
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BEFORE THE
SUBCOMMITTEE FOR SPECIAL INVESTIGATIONS
COMMITTEE ON ARMED SERVICES, HOUSE OF REPRESENTATIVES

HSR 00510

Mr. Chairman and Members of the Subcommittee:

At your request, we appear before you today to present the information that the General Accounting Office has developed in the course of its review of the [development and production of the Sheridan Weapon System and the M60A1E1/E2 tank systems]

Why review was made

We reviewed the development and production of the Sheridan Weapon System because of delays incurred in making this important Army combat item available to the operational forces and because of the significant amount of funds involved in this program. We reviewed the M60A1E1/E2 tank systems (which I will refer to as the E1 and E2) because of Army expenditures to apply the Shillelagh missile, ammunition, and combination gun-missile launcher, which are the Sheridan's main armament, to the M60 tank. Our review was directed primarily to an evaluation of management effectiveness during the development process of these weapon systems.

The total program cost for development and procurement of the Sheridan Weapon System, through fiscal year 1972, including missiles

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and ammunition, is currently estimated at over \$1.3 billion, of which about \$200 million is for research and development. Current program costs of the E2 tank system, including only quantities delivered and those authorized for procurement to date, and without missiles and ammunition, are estimated at approximately \$250 million.

Background

Our review of the Sheridan weapon and E1 and E2 tank programs began in September 1967. We met with Department of the Army officials in November 1967 to discuss an apparent imbalance between the production of these weapon systems and the availability of suitable ammunition. We proposed that a reexamination be made of the production and deployment schedules for these weapons.

On December 15, 1967, we issued a letter report to the Secretary of Defense informing him of our observations. Since that time we continued our examination and issued a draft report to the Department of Defense on February 7, 1969, on the findings of our review. We have not yet received formal agency comments on the information presented in this statement. However, our findings were discussed with key Army officials before release of the draft report. I will discuss this later in my statement.

Before proceeding with the findings of our review, I believe it would be helpful to identify the Sheridan and the E1 and E2 tank systems, and discuss briefly the procedures generally followed in the development of weapon system programs.

Identification of systems

The Sheridan Weapon System (also called the Sheridan weapon or simply the Sheridan) is an armored reconnaissance assault vehicle mounting a turret which contains a 152mm gun-launcher with the dual capability of firing the Shillelagh missile and a series of 152mm ammunition rounds. The Sheridan is a fully tracked vehicle intended to be air transportable and to have swimming capability. The ammunition incorporates a cartridge case and primer which are intended to be completely combustible, thereby eliminating the need for handling expended cartridge cases. The E1 and E2 tank systems are adaptations of the current M60 tank to employ the Sheridan's 152mm combination gun-launcher, missile, and ammunition.

The Sheridan Weapon System will replace the light tank series (M41) and the airborne assault weapon for armor, infantry, and airborne operations, and will be used as the main assault weapon for airborne operations, and for combined arms teams not employing main battle tanks.

Development of the Sheridan Weapon System was initiated in 1959. The Sheridan weapon was originally scheduled for availability to the troops in early 1964. The primary components of the weapon system are the Sheridan vehicle and the Shillelagh subsystem which includes the Shillelagh missile, a series of 152mm ammunition rounds, a gun-launcher, and related fire control and guidance equipment. In addition, there is an XM35 Conduct-of-Fire Trainer under development as a training device for the Sheridan weapon.

Shillelagh subsystem

The Shillelagh missile is the Sheridan's primary armament against tanks. It is intended to provide a greater first round hit probability, particularly at longer ranges against hard targets, than those normally associated with gun-type armament systems.

The primary round of ammunition under development is the high explosive antitank multipurpose round (XM409). Its objective is to be capable of defeating tanks and also provide soft target capabilities (personnel, unarmored vehicles, etc.) at all usable ranges.

Also under development as part of the Shillelagh subsystem are the white phosphorus round (XM410) which is primarily for screening, marking, and incendiary use, and the target practice-training round (XM411). In addition, development of three more ammunition rounds was initiated late in the Sheridan program. These rounds are to be made available for use against soft targets and mass personnel attacks.

Development procedures

I believe a brief description of the procedures followed during the development phase of a weapon system may be helpful. Three types of tests are required to determine whether the product is satisfactory for its intended use, and to obtain data needed to determine changes required prior to production. These tests are generally referred to as engineering design tests, the engineering test, and the service test.

1. The engineering design tests are conducted by or under the control of the design agency. The purpose of these tests is to collect design data, confirm preliminary concepts and calculations, and determine the compatibility of components.
2. The engineering test provides data for use in any further development required, and for determination as to the technical and maintenance suitability of the item or system for service test.
3. The service test provides data to be used to determine if the item or system is suitable for Army use.

Engineering and service tests are conducted by or under the supervision of the Test and Evaluation Command, a subordinate element of the Army Materiel Command.

After service tests show that an item is suitable for Army use, it may be type classified Standard A, adopted into the Army supply system, and approved for full production.

In exceptional cases, the Army may type classify an item as "Limited Production" provided an urgent operational requirement for the item exists. The item must appear to fulfill a specified set of performance requirements and technical characteristics as approved by the Department of the Army. It also must be promising enough operationally to warrant initiating procurement or production for troop issue prior to completion of development and/or test, or adoption as a standard-type item.

Any item, subsystem, or weapon system authorized for Limited Production is under development and production concurrently. This procedure involves expedited development under high-risk conditions. No specific amount of testing is required before an item can be type classified Limited Production. However, disclosure must be made as to the type and extent of testing already conducted on the item, the additional testing considered necessary, and the estimated confidence level for successful development completion of the item.

Findings

Our review of the Sheridan Weapon System and E1 and E2 tank programs showed a lack of effectiveness in the management and control of their development which, in our opinion, affected the timely and satisfactory fielding of these weapon systems. This resulted in the premature production and storage of weapons and weapon trainers which were not suitable for operational use.

The Army purchased Sheridan weapons, E1 tank turret systems, and E2 tanks, all incorporating the combination gun-missile launcher, even though no acceptable ammunition was available for this gun-launcher. Also, the E1 tank turrets and the E2 tanks were procured before sufficient testing was performed on these items to adequately evaluate their suitability for operational use. Furthermore, mass production of the Sheridan was permitted to continue although it was apparent that acceptable ammunition would not be developed in time to meet the scheduled deployment of the weapon. As a matter of fact, fully acceptable ammunition still has not been developed.

As a result, many of these weapons could not be issued to operational units and, therefore, had to be put into storage, thereby impairing the planned combat effectiveness of the Army.

In addition, the Army purchased training devices for the Sheridan weapon although tests showed that these devices were not suitable for troop training due to numerous deficiencies.

Type classification of the
Sheridan Weapon System

The Sheridan Weapon System, less the ammunition, was type classified Standard A in May 1966 although acceptable ammunition had not been developed for the weapon. Serious deficiencies were being experienced with the ammunition at that time, and considerable doubt was expressed by various Army agencies as to the timely resolution of these problems.

The deficiencies related primarily to the performance of the combustible cartridge case and primer. I am unable to provide any information on these problems in open hearings as this information is classified. However, we will discuss these problems in executive session, if desired.

Inasmuch as acceptable ammunition was not available, we believe that the decision to type classify the Sheridan as Standard A was inappropriate as it resulted in the mass production and storage of weapons which could not be used as intended.

Continued development and production
of the Sheridan Weapon

The Army approved Standard A type classification of the Sheridan weapon in May 1966 with assurances from the developing agencies that

the ammunition would be type classified as Standard A in the first quarter of fiscal year 1967. However, engineering and service tests conducted on the modified ammunition in June and July 1966, showed that major deficiencies still existed and that the ammunition continued to be unsuitable for troop use.

In spite of the problems being experienced with the ammunition, the Army continued full-scale production of the Sheridan until December 1967 when the third year buy (fiscal year 1968) was reduced from 600 to 420 units. First production deliveries were made in June 1966.

As of mid-September 1968, the Army had produced a large number of Sheridans more than half of which were stored in depots and at the production site. The remaining Sheridans had been issued to active units, training centers, and other installations for training, testing, and other purposes.

On November 17, 1968, the Army Test and Evaluation Command, in a report on the suitability for conditional release of the Sheridan to the troops, listed numerous safety and performance limitations of the system when in the hands of the troops. The Department of the Army has informed us that this information is classified. We will furnish additional information on this matter in executive session, if you so desire.

The Sheridan was deployed to an operational theater in January 1969.

Development of an alternative cartridge case was not authorized until October 1967, more than a year after the Sheridan was standardized. This back-up development effort was terminated on October 6, 1968, due to the developmental risks, time and cost involved.

In view of the continuous problems experienced with the combustible cartridge case throughout its development, we believe it would have been prudent to have initiated development of an alternative cartridge case at an earlier date to provide greater assurance that acceptable ammunition would be available concurrently with the weapon. In our opinion, a timely back-up development effort is

especially applicable when a major state-of-the-art advance is being attempted, and substantial problems are known to exist in the development of the new concept, such as the combustible cartridge case.

In any event, we believe that the Army should have reevaluated the Sheridan weapon contract in 1966, with a view toward decreasing production, when it became apparent that acceptable ammunition would not be available to meet scheduled deployment of the Sheridan weapon.

Premature production
of training devices

The XM35 Conduct-of-Fire Trainer simulates firing and tracking of the Shillelagh missile to the target. The Army type classified the XM35 trainer as Limited Production and purchased the item before sufficient testing was performed to evaluate whether it was promising enough operationally to warrant production. Furthermore, a letter contract for additional trainers was awarded and later definitized although tests showed that the trainers being procured under the initial contract were not suitable for crew training due to numerous deficiencies. These deficiencies involved a lack of reliability, frequent breakdowns, and continuous maintenance problems due to repair difficulties. Consequently, the XM35 trainers will require modification to correct the deficiencies before they can be issued for troop use.

In our opinion, the initial procurement of the XM35 was premature. Also, in view of the serious problems existing with the XM35 trainers

produced under the first contract, approval of additional procurement should have been deferred until test results conclusively showed that the trainer was suitable for crew training. In any event, the follow-on contract should have been terminated when test results showed that the trainers continued to have major deficiencies. This action would have been in accordance with instructions from the Department of the Army staff when they approved the request for additional procurement.

Application of the Shillelagh
subsystem to the M60 tank

In 1964, the Secretary of Defense approved a proposal to apply the Shillelagh subsystem to a turret under development for the M60 tank. Under this program, existing M60 tanks were to be retrofitted to use the Sheridan's 152mm gun-launcher. The new tank system was designated as the E1, and development was initiated to permit use of the Shillelagh subsystem (152mm gun-launcher, Shillelagh missile, and ammunition) on the M60 tank and provide it to the using forces. In addition, it was later decided to apply the Shillelagh subsystem to a new M60 chassis. This tank system was designated as the E2.

The Army applied the Shillelagh subsystem to the M60 tank although the ammunition portion of this subsystem was a new concept still under development and not proven in its initial application on the Sheridan Weapon System. Furthermore, the Army approved Limited Production type classification and awarded production contracts for these E1 and E2 tanks when serious deficiencies were known to exist.

At the time this action was taken, these tanks had completed only about 10 percent of their engineering and service tests; the test vehicles had just undergone extensive rework and reconfiguration; and unsolved problems existed with the 152mm ammunition and with the tanks themselves.

The first buy of a substantial number of these tanks has recently been completed. The tanks are being retained at the tank plant until these problems are solved and ammunition is available.

We believe that the type classification and production of the E1 and E2 tanks was premature because of the foregoing unsolved problems and because the ammunition had not been proven suitable for operational use in its initial application on the Sheridan system.

With respect to the ammunition, we agree with the Army's policy to update existing weapons with the newest, most effective armament available. However, in our opinion, this should not be attempted on other than an experimental basis until the new item has been fully tested and proven acceptable for operational use in its initial application.

We further believe that the testing conducted on the E1 and E2 tanks was not sufficient to adequately evaluate their operational suitability, or to support the type classification and production decisions made on these tanks. In our opinion, before an item is approved for type classification and production, sufficient testing should be accomplished to demonstrate that the item will be suitable in large part for troop issue.

Summarized findings

We believe that the cited findings indicate a less than satisfactory degree of management effectiveness during the development of the Sheridan and E1 and E2 tank systems. These findings are summarized, as follows:

1. Mass production of the Sheridan under Standard A type classification was approved before the ammunition, necessary for the satisfactory fielding of the weapon system, was fully developed and acceptable for troop use.
2. Timely action was not taken to limit the production of Sheridan weapons when it was apparent that suitable ammunition would not be available to meet the scheduled deployment of the weapon.
3. A back-up cartridge case development effort for the ammunition was not initiated early enough in the program to insure availability of acceptable ammunition when the Sheridan Weapon System was scheduled for deployment. This back-up effort was subsequently dropped because of the time, risks, and cost involved.
4. Production of major weapon systems (the E1 and E2 tanks) and development of the MBT-70 were committed to the Shillelagh subsystem, which represents an attempt to advance the state-of-the art, prior to the completion of its ammunition development and acceptability in its initial Sheridan application.
5. Sufficient testing was not conducted on the E1 and E2 tanks and XM35 trainers prior to their production release to ascertain the

degree of suitability, and timely action was not taken to terminate production when major deficiencies were known to exist.

Army Materiel Command
comments

As stated previously, we discussed our findings with officials of the Army Materiel Command prior to the issuance of our draft report. One of the major issues stated by AMC regarding our findings was that we failed to give recognition to the existing and potential threat, the United States posture to counter it, and the resulting need for the Sheridan Weapon System. AMC officials commented that, due to this need, it was necessary to expedite production even though known development problems existed.

In this connection, we note that the Sheridan system was originally scheduled to be operational in early 1964. While the Sheridan is now being deployed, you will recall that numerous limitations were reported by the Test and Evaluation Command on the use of the Sheridan in the hands of the troops.

Our proposals

We believe that the problem areas noted in our review have application to the development of any weapon system. Toward this end we have made the following proposals:

1. That before a weapon system or subsystem is approved for Limited Production type classification and released for production, testing must be

performed to determine whether the weapon system is developed to the point of warranting this action. In this regard, criteria should be established as to the degree of testing necessary before Limited Production type classification and production of weapon systems or subsystems can be justified. We would suggest, as a minimum, that successful engineering tests be completed on all essential subsystems or portions of subsystems.

2. That before a weapon system is type classified Standard A and approved for full production, tests should conclusively show that the overall weapon system, including all critical components, is suitable for operational use. In this regard, we believe that the weapon system should remain in the Limited Production classification until all essential subsystems (and portions thereof) necessary for fielding the weapon have satisfactorily passed their service tests. This would indicate to higher authority, such as the Department of the Army, Department of Defense, Bureau of the Budget, and the Congress, that the entire weapon system has not completed its development and would facilitate high level reviews of the suitability of the overall weapon system before additional procurements are made.

3. That when an essential portion of a weapon system is experiencing continuous development difficulty, as was the case with the ammunition for the Sheridan's combination gun-missile launcher, timely action should be taken to initiate development of a back-up item to insure that an acceptable item will be available to meet the scheduled deployment of the weapon system.

4. That the development of a new weapon concept (such as the combustible cartridge case) be completed and its acceptability for operational use proven in its initial application before the new concept is committed on other than an experimental basis to other weapon systems.

It is our opinion that the implementation of these proposals will contribute to increased management effectiveness and the more timely fielding of satisfactory weapon systems.

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Mr. Chairman, this concludes our overall statement on our review of this program. Members of my staff who are with me today are available to give you further details as your hearing progresses.