

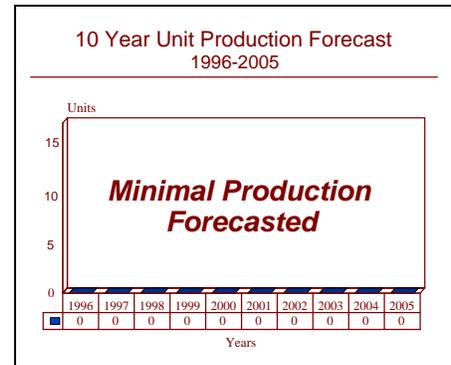
ARCHIVED REPORT

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Advanced Rocket System - Archived 2/97

Outlook

- Program in serious trouble due to lack of funding and the proven ability to retrofit desired technology with existing 2.75 inch rocket.
- Program forecast to be terminated as it presently exists.



Orientation

Description. An aerial rocket system.

Sponsor. The development of the Advanced Rocket System has been sponsored by the United States Department of Defense through the United States Navy, Naval Air Systems Command, Washington, District of Columbia. The executive office is PMA-201 with the Naval Weapons Center at China Lake, California, leading the technical effort. The United States Marine Corps has also been supporting the development effort. The United States Army was also involved in what was formerly a tri-service program but withdrew in June of 1994.

Contractors. As a distinct program, the Advanced Rocket System was being developed and would have been manufactured by the team of BEI Defense Systems Company, Fort Worth, Texas, and Lockheed Missiles and Space Company Incorporated, Austin, Texas, United States of America. In mid-October of 1995, BEI Defense Systems announced that it was getting out of the aerial rocket business after its last production contracts related to the Hydra 70 were completed in 1996. The company preferred that the aerial rocket portion of its business be purchased by Alliant Techsystems.

Licensees. None as of this writing.

Status. As a distinct entity, this program was effectively terminated when it was omitted in the Navy Fiscal 1996 program objective memorandum. Before this action, the program was in full scale engineering development with the safety, integration and flight tests ongoing. These tests are ongoing under previously funded contracts.

Total Produced. As of January 1, 1996, 1,865 prototype and developmental rockets had been manufactured.

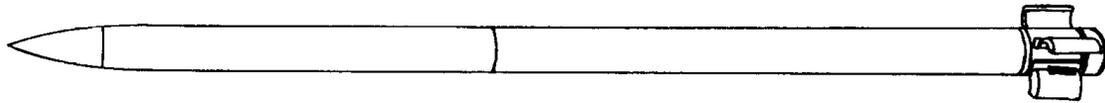
Application. The Advanced Rocket System program was developed to provide technology to offer highly flexible and safer aerial fire support including the destruction of a variety of targets. The Advanced Rocket System is to replace 69.85 and 127 millimeter (2.75 and 5 inch) aerial rockets which have been in service since the late forties.

Price Range. The projected unit price of the standard high explosive rocket was \$452, while the projected unit price of the illumination rocket was expected to be \$584. All prices are in 1996 United States dollars.

Technical Data

The diameter of the rocket is the standard 69.85 millimeters (2.75 inches). The length of the rocket without the warhead is 1.15 meters (3.775 feet). The various warheads under development for the Advanced Rocket System rockets will result in slightly different lengths for the complete rocket depending on configuration. The maximum speed is around a thousand meters per second

(3,280.8 feet per second) and the range is over 15 kilometers (16,404 yards). Insensitive munitions grade propellant and warhead fillings are used; control and guidance is by a high-rate initial spin provided by eroding vanes and four wrap-around fins. The new rocket was to be launched from a new design 19-round launcher.



ADVANCED ROCKET SYSTEM (ARS)

Source: Forecast International

Variants/Upgrades

Not applicable for the specific Advanced Rocket System; different or enhanced rockets are given new or modified designations. However, the United States Army has been funding a separate development effort called the

Hypervelocity Rocket. As previously envisioned, this rocket would have been based on a modified Advanced Rocket System rocket motor and airframe.

Program Review

Background. Despite the advent of a plethora of guided missiles, unguided aerial rockets remain a major component of most of the world's military air arms. Unguided aerial rockets offer a highly lethal saturation type fire support which is especially effective against massed formations of military hardware and personnel. Aerial rocket technology is also tactically flexible with a wide variety of types available. These types range from rockets with specialized anti-tank warheads, flechette warheads, window (chaff) dispensing warheads, smoke and illumination warheads.

Following the Second World War, the United States of America, then the military leader of most of the world, developed two new aerial rockets based on wartime technological developments. The 69.85 millimeter (2.75 inch) rocket, called Mighty Mouse, was based on the German R4M, which was operationally used on the Me-262 aircraft in the closing stages of the war. The R4M pioneered the folding fin concept which is so common in aerial rockets today. The Mighty Mouse was developed by the United States Air Force into a highly effective

weapon; since the seventies, a number of private firms, both in the United States and elsewhere, have further developed this rocket under a variety of names and designations. As of early 1996, in addition to all three armed services of the United States of America, over 100 other nations use this pattern rocket. In the 127 millimeter (5 inch) class, the original High Velocity Aircraft Rocket, also called Holy Moses, was further developed by the United States Navy into the Zuni. The 127 millimeter (5 inch) Zuni remains in limited service with the United States Navy and Marine Corps to this day, as well as in other nations.

The Zuni and the Mighty Mouse have been extensively developed. The Texas firm BEI Defense Systems has so extensively developed the 69.78 millimeter (2.75 inch) Mighty Mouse that it is now known under the name Hydra 70. Prior to early 1995, BEI Defense Systems was for years the last and only active manufacturer of aerial rockets in the United States of America. This changed as a result of a multi-year contract for the Hydra 70 being

awarded to the Lockheed Martin/Conventional Munitions Systems team.

For years, the United States Navy has been concerned with the shipboard safety of the weapons. In fact, two of the worst aircraft carrier accidents in the last three decades involved the unintended ignition of aerial rockets. In the early eighties, the United States Navy began in earnest a program to enhance the safety of shipboard munitions under the Insensitive Munitions Program. While this program involves all types of munitions, the area of aerial rockets is considered to be one of the most important to be addressed.

The requirements for a new aerial rocket system were defined in Operational Requirement 194-05-88; the new system is one of three components of the United States Navy's Strike Warfare Master Plan. In May of 1991, the Naval Air Systems Command issued a request for proposals to industry for the full scale development of a new generation 69.85 millimeter (2.75 inch) aerial rocket system. Although most commonly known as the Advanced Rocket System, the program is also known as the High Speed Attack Multi-Mission Advanced Rocket. The new rockets are to use insensitive munition technology and are to be compatible with existing launchers such as the LAU-61. The Advanced Rocket System is an example of the "necking down" concept whereby one new system (the Advanced Rocket System) is to replace two other systems (the 69.85 and 127 millimeter - 2.75 and 5 inch rockets). This concept reduces procurement, logistics and other costs associated with the fielding of two separate systems.

Contenders. Olin Ordnance was originally expected by most analysts to compete in the Advanced Rocket System program; however, the firm decided otherwise, leaving only two competitors. BEI Defense Systems teamed with the Austin Division of Lockheed Missiles and Space Company for the contract. Another team led by Alliant

Techsystems was the other competitor; Hughes Aircraft was developing the new launcher, GenCorp Aerojet was working on the propulsion, KDI Precision Products was involved with the fuzing, and Thiokol was developing the illumination warhead.

Schedule. In July of 1992, the Lockheed/BEI team's proposal was selected to fill the Advanced Rocket System requirement. Following the selection of the winning design, a \$200,000 basic order agreement for program management and technical studies was awarded. As of early 1996, the expected follow-on four year development contract has yet to be awarded, a result of the effective termination as noted above. The contract was expected to be in three parts: full scale engineering development, pre-planned product improvement, and low rate initial production.

The Advanced Rocket System was expected to be in service in 1997. However, the program began to run into trouble in 1993. The United States Army has always been unsure of its involvement in the program. The service has a tremendous inventory (over 1.1 million) of Hydra 70 rockets of all types. Further adding to its uncertainty is the fact that the Army has no problem with the safety record of its rockets and has no pressing need to develop and field rockets with insensitive fillings. In the latter part of 1993, the first rumblings of the services' withdrawal from the program were heard. While the service made an official commitment to the program in October of 1993, in May of 1994, the House Armed Services Committee decided to kill the program and instead opted for new purchases of improved versions of the Hydra 70. Shortly thereafter, the Army withdrew from the program. However, several subsequent efforts were made to restructure the entire program, some without the Army's participation. However, the Navy left the Advanced Rocket System out of its Fiscal 1996 program objective memorandum, effectively terminating the program.

Funding

No separate line item for the procurement of the Advanced Rocket System was included in the Fiscal 1994 or following documents. Even though this program was effectively terminated because it was not included in the Fiscal 1996 program objective memorandum, the funding is shown because it will most likely be reallocated to the development of off-the-shelf technology that will satisfy the Advanced Rocket System requirements, especially the ones related to insensitive munitions.

US FUNDING

	FY91		FY92		FY93		FY94	
	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
Research and Development								
Program Element 0603609N ^(a)								

Project S0363	-	31.4	-	22.3	-	26.9	-	10.5
Program Element 0604603N ^(b)								
Project E1341	-	3.6	-	12.2	-	11.7	-	10.6
Total	-	35.0	-	34.5	-	38.6	-	21.1

	FY95		FY96		FY97		FY98	
	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
Research and Development								
Program Element 0603609N ^(a)								
Project S0363	-	12.6	-	12.8	-	13.1	-	13.4
Program Element 0604603N ^(b)								
Project E1341	-	14.8	-	10.0	-	7.4	-	4.2
Total	-	27.4	-	22.8	-	20.5	-	17.6

All dollar amounts are in millions.

^(a) Program Element 0603609N - Conventional Munitions. Project S0363, Insensitive Munitions Advanced Development continues the development and integration of various insensitive high explosives and propellants with a variety of munitions including the Advanced Rocket System.

^(b) Program Element 0604603N - Unguided Conventional Air Launched Weapons. Project E1341, Airborne Guns and Ordnance supports the development of the Advanced Rocket System.

Recent Contracts

Other than for the data given above, no contract information is available as of early 1996. A contract award for the full-scale engineering development and low-rate initial production of the Advanced Rocket System was expected, but none was ever awarded.

Timetable

The following timetable relates to the Advanced Rocket System only and not to the various 69.85 (2.75 inch) and 127 millimeter rockets mentioned in this report.

May	1991	Request for Proposals released
Jun	1992	Team of Lockheed and BEI Defense Systems won the competitive evaluation
Sep	1993	Army announced it would partially fund development
Jun	1994	Army withdraws from program
Early	1996	Development of Advanced Rocket System technology ongoing

Worldwide Distribution

Export Potential. As this program was previously existing, there is no export potential as it is effectively dead. However, some of the technology developed under the program could possibly find its way onto the export market in an advanced version of the Hydra 70.

Countries. United States of America (developmental prototypes)

Forecast Rationale

Our latest forecast for the Advanced Rocket System has no serial production, at least as the program was previously constituted. Due to Congressional and funding pressures, the safety and lethality improvements desired by the Navy will be incorporated into the existing Hydra 70 rocket.

While the evidence does not support the serial production of a revived Advanced Rocket System, due to the dynamic nature of this politically sensitive program, we will monitor it in the closest manner and update it on an interim basis if warranted.

Ten-Year Outlook

		ESTIMATED CALENDAR YEAR PRODUCTION										
		High Confidence Level			Good Confidence Level			Speculative				Total
Munition	through 95	96	97	98	99	00	01	02	03	04	05	96-05
BEI DEFENSE SYSTEMS/LOCKHEED MARTIN												
ADVANCED ROCKET SYSTEM(a)	1865	944	0	0	0	0	0	0	0	0	0	944
Total Production	1865	944	0	0	0	0	0	0	0	0	0	944

(a) Production into 1996 is for developmental and operational test rockets with various warheads.