

**UNCLASSIFIED**

<b>ARMY RDT&amp;E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)</b>	DATE <b>February 1999</b>
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<b>BUDGET ACTIVITY</b> <b>4 - Demonstration and Validation</b>	<b>PE NUMBER AND TITLE</b> <b>0603639A Armament Enhancement Initiative</b>
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COST (In Thousands)	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	36036	35784	36937	42511	36843	49128	27612	30836	Continuing	Continuing
D643 Project 643	21988	18400	36937	42511	36843	49128	27612	30836	Continuing	Continuing
D656 XROD	14048	17384	0	0	0	0	0	0	0	172328

**A. Mission Description and Budget Item Justification:** The Armament Enhancement Initiative (AEI) is a comprehensive program to accelerate fielding of advanced tank ammunition and ensure the continued overmatch lethality of the U.S. tank fleet despite rapid worldwide development of armored vehicle protection technology. The AEI program identifies promising technology efforts and uses competitive developments and streamlined acquisition procedures to achieve this goal. Current developments are in the areas of kinetic energy, including training ammunition, and smart extended range rounds. Developmental efforts include paced initiatives leading to new developments or upgrades to existing and future weapons platforms. To date, four rounds of tank ammunition have completed development and entered production. All tank ammunition development funds are in this program element to facilitate transition between phases, avoid administrative delays, and allow realignment of funds from less to more promising areas.

<b>B. Program Change Summary</b>	FY 1998	FY 1999	FY 2000	FY 2001
Previous President's Budget (FY 1999 PB)	37127	26526	37231	43000
Appropriated Value	38313	36026		
Adjustments to Appropriated Value				
a. Congressional General Reductions	-1186	-242		
b. SBIR / STTR	-911			
c. Omnibus or Other Above Threshold Reductions	-300			
d. Below Threshold Reprogramming	+120			
e. Rescissions				
Adjustments to Budget Years Since FY 1999 PB			-294	-489
Current Budget Submit (FY 2000 / 2001 PB)	36036	35784	36937	42511

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<i>COST (In Thousands)</i>	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
D643 Project 643	21988	18400	36937	42511	36843	49128	27612	30836	Continuing	Continuing

**A. Mission Description and Justification:** This project provides for the development of all tank ammunition with the exception of the Tank Extended Range Munitions (TERM-KE). Providing lethal 120mm munitions is essential in maintaining the overmatch capabilities of the Abrams tank. This point is particularly important since the Army will proceed with limited improvements to the Abrams after the Systems Enhancement Program (SEP), and because the future tank (Future Combat System) is not expected to enter the fleet in quantity until after the 2020 timeframe. Therefore, the 120mm Abrams tank will likely make up the bulk of our tank inventory for at least the next 25 years. The focus of the AEI program is first on the development and production of the M829E3 Kinetic Energy (KE) cartridge. KE cartridges provide the primary anti-tank capability for the armor force and the M829E3 will defeat the growing advanced KE reactive armor threat. Additionally, the eventual production of the M829E3 will be critical in maintaining the Depleted Uranium (DU) industrial base. The Army is also developing trainers for the M829E3 and M830A1. The trainers are required since the current trainers, the M865 and M831A1 do not have the required range, flight or physical characteristics to adequately simulate the M829E3 or M830A1. The Army was developing Smart Target Activated Fire and Forget (STAFF) top attack smart munitions. However, for cost reasons the STAFF program was terminated in FY 98 with final close-out in FY00. The Army also has a requirement for an Objective Kinetic Energy (OKE) Cartridge for future targets. It is not expected to start until after FY01. The OKE will be designed to defeat advanced active protection systems at extended ranges and be substantially more accurate than current ammunition.

**FY 1998 Accomplishments:**

**M829E3**

- 4013 Initiated propellant optimization for velocity and vulnerability response
- 4500 Improved penetrator testing
- 250 Initiated concept studies for trainer
- 1400 Downselected to a system contractor and awarded multiphase contract
- 10852 Conducted cartridge integration and projectile optimization

**STAFF**

- 973 Program termination [tailored critical design review (CDR)] for close-out

Total 21988

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**FY 1999 Planned Program:**

- 5464 Finalize propellant optimization
  - 6790 Optimization of cartridge configuration
  - 5300 Finalize penetrator configuration
  - 380 Finalize concept studies for trainer
  - 466 Small Business Innovative Research/Small Business Technology Transfer (SBIR/STTR) Programs
- Total 18400

**FY 2000 Planned Program:**

- 12066 Finalization of cartridge configuration
  - 5837 Test Optimized Design
  - 4862 Initiate Build of Production Qualification Hardware
  - 7172 Conduct Producibility Improvements
  - 6000 Fabrication and Test Long Range Trainer Hardware
  - 1000 STAFF Program Termination
- Total 36937

**FY 2001 Planned Program:**

- 14911 Complete Build of Production Qualification Test (PQT) Hardware
  - 9031 Initiate Testing of PQT Hardware
  - 7432 Finalize Producibility Improvements
  - 8607 Long Range Trainer Design Optimization
  - 2530 MPAT Trainer build and test
- Total 42511

<b>B. Other Program Funding Summary</b>	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>To</u> <u>Compl</u>	<u>Total Cost</u>
Procurement Ammunition, Army 120MM Tank										
E73300-M831/M831A1	59684	60216	32623	49541	48000	47592	48510	49431	Cont	Cont
E73400-M865	114846	129548	86027	104642	102105	97200	94290	96007	Cont	Cont
E78001-M829A2/E3	75168	14691	0	0	41362	71764	71714	71641	Cont	Cont
E78007-M830A1	7698	9972	0	0	0	0	0	0	0	532496
E08210-M919	30000	20741	29585	23797	0	0	0	0	0	Cont

Project D643

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**C. Acquisition Strategy: M829E3, Long Range Trainers, OKE and STAFF** These projects have used a streamlined acquisition strategy since inception. Keeping costs low is paramount while meeting schedule requirements. Integrated Product Teams (IPTs) are being used. A development system contractor, Alliant Techsystems, was selected to develop the M829E3 using a performance specification. Long Range Trainer will be developed using performance specifications and system contractors. Operational Requirements Documents (ORDs) have been approved for M829E3 Long Range Trainers and Objective Kinetic Energy (OKE). The STAFF close-out will occur in 1QFY00.

<b>D. Schedule Profile</b>	<u>FY1998</u>	<u>FY1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>		
<b><u>M829E3</u></b>										
Prototype mfg. & testing	1Q-4Q*									
Select Propellant for Velocity/Vulnerability Response	4Q*									
Cartridge Demonstration	3Q*									
Milestone II	3Q*									
Award contract to EMD Contractor	4Q*									
Select penetrator		4Q								
Optimize propellant configuration		1Q-4Q								

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BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>				PE NUMBER AND TITLE <b>0603639A Armament Enhancement Initiative</b>				PROJECT <b>D643</b>	
<b>D. Schedule Profile</b>	FY1998	FY1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	
Optimize Cartridge Integration			1Q-4Q						
Test Penetrator vs. Target Suite		2Q-4Q	1Q-2Q						
Design Freeze				1Q					
Build Production Qualification Hardware				1Q-4Q					
Begin Production Qualification Test (PQT)				3Q					
Low Rate Production IPR					1Q				
Complete PQT					3Q				
Conduct Operation Test					2Q-4Q				
Type Classification – Standard						1Q			
Initial Operational Capability						3Q			
<b>STAFF</b>									
Program close out	2Q*								
Negotiate/Settle Program Termination with Contractor			1Q						
<b>LONG RANGE TRAINERS</b>									
Long Range Kinetic Energy (LRKE) Trainer Concept Studies Complete		4Q							
LRKE Milestone II		4Q							
Award Engineering Manufacturing Development (EMD) Contract			1Q						
Optimize Configuration			1Q-4Q						
Design Freeze			4Q						
Build Production Qualification Testing (PQT) hardware				1Q-4Q					
LRKE PQT Start					1Q				
LRKE PQT Complete					4Q				
LRKE TC-Standard						1Q			

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BUDGET ACTIVITY  
**4 - Demonstration and Validation**

PE NUMBER AND TITLE  
**0603639A Armament Enhancement Initiative**

<b>D. Schedule Profile</b>	<u>FY1998</u>	<u>FY1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>		
Multi-Purpose Anti-Tank (MPAT) Trainer Concept Studies Complete				1Q						
Award MPAT Trainer EMD Contract				2Q						
Optimize Configuration				2Q-4Q						
Design Freeze				4Q						
Build PQT Hardware				4Q	1Q-2Q					
MPAT Trainer PQT Start					2Q					
MPAT Trainer PQT Complete						1Q				
MPAT Trainer Type Classification Standard						2Q				
<b>OBJECTIVE KE</b>										
OKE Milestone I				2Q						
OKE Award PDRR Contracts					1Q					
OKE Integrate various Tech Base Efforts					1Q-4Q	1Q-4Q				
OKE Demonstrate Integrated Design						2Q				
OKE Milestone II						4Q				
OKE Award EMD Contract							1Q			

\*Completed milestone

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<b>ARMY RDT&amp;E COST ANALYSIS (R-3)</b>	DATE <b>February 1999</b>
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BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>	PE NUMBER AND TITLE <b>0603639A Armament Enhancement Initiative</b>	PROJECT <b>D643</b>
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I. Product Development	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a. Alliant Techsystems	C-CPFF	Hopkins, MN	35985		Sep 90	1000				0	36985	
b. Alliant Techsystems	SS-CPFF	Hopkins, MN	12870	12307	Aug 98	13660	Aug 98	13100	Aug 98	Cont	51937	
c. ARDEC	MIPR	Picatinny Arsenal, NJ	18662	1200		3000		3000		Cont	25862	
d. Army Research Lab	MIPR	Aberdeen PG, MD	14653	2427		3500		2688		Cont	23268	
e. Batelle Northwest Lab	MIPR	Richmond, WA	2000	400		1773		1500		Cont	5673	
f. LRKE Trainer	C-CPFF	Unknown				6000		8854		Cont	14854	
g. MPAT Trainer	C-CPFF	Unknown						2530		Cont	2530	
Subtotal Product Development:			84170	16334		28933		31672			161109	

Remark: Army Research Lab and ARDEC Engineering include M829E3, LRKE Trainer and OKE

II. Support Costs: Not applicable

III. Test and Evaluation	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a. YPG, APG	MIPR	Yuma AZ/APG, MD	6947	625		3370		5264		Cont	Cont	
b. Army Research Lab	MIPR	Aberdeen PG, MD	2400	500		3514		4475		Cont	Cont	
c. Miscellaneous	MIPR	Multiple	10984	275								
Subtotal Test and Evaluation:			20331	1400		6884		9739		Cont	Cont	

Remark: Testing includes all testing needed to support M829E3, LRKE Trainer and OKE

IV. Management Services	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
a. PM-TMAS	MIPR	Picatinny Arsenal, NJ	7120	200		1120		1100		Cont	Cont	
b. SBIR/STTR				466								
Subtotal Management Services:			7120	666		1120		1100		Cont	Cont	

Remark: - Management Services also includes data line costs to support Contractor Integrated Technical Information Services (CITIS).  
 - Management is considered continuous from the earliest portions of the AEI Program until the Abrams Tank Fleet does not need further ammunition improvements.

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	Total PYs Cost	<u>FY 1999</u> Cost		<u>FY 2000</u> Cost		<u>FY 2001</u> Cost		Cost To Complete	Total Cost	Target Value of Contract
Project Total Cost:	111621	18400		36937		42511		Cont	Cont	

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BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>				PE NUMBER AND TITLE <b>0603639A Armament Enhancement Initiative</b>					PROJECT <b>D656</b>	
COST (In Thousands)	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
D656 XROD	14048	17384	0	0	0	0	0	0	0	172328
<p><b>A. Mission Description and Budget Item Justification:</b> The X-Rod, now known as the Tank Extended Range Munitions – KE (TERM-KE) is a 120mm tank ammunition development effort which will use a standard kinetic energy penetrator boosted by a rocket motor and a dual mode semi-active laser/millimeter wave radar fire-and-forget guidance. The TERM-KE will provide greater hit probability at extended ranges, both line of sight and beyond line of sight, increasing overall kill probability and battle space.</p> <p><b>FY 1998 Accomplishments:</b></p> <ul style="list-style-type: none"> <li>• 1048 Interior ballistics exit criteria</li> <li>• 4800 Lethality demonstrations</li> <li>• 3900 Unguided All Up Round (UAUR) exit criteria</li> <li>• 4300 System analysis and system design baseline for TERM</li> </ul> <p>Total 14048</p> <p><b>FY 1999 Planned Program:</b></p> <ul style="list-style-type: none"> <li>• 5297 System Analysis and System Design for TERM</li> <li>• 3650 Lethality Demonstration</li> <li>• 4457 Dual Mode Sensor Demonstration</li> <li>• 3520 UAUR Exit Criteria</li> <li>• 460 Small Business Innovative Research/Small Business Technology Transfer Program</li> </ul> <p>Total 17384</p> <p><b>FY 2000 Planned Program:</b> Project not funded in FY 2000</p> <p><b>FY 2001 Planned Program:</b> Project not funded in FY 2001</p>										
Project D656			Page 8 of 10 Pages				Exhibit R-2A (PE 0603639A)			

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**C. Acquisition Strategy:** This program uses a streamlined acquisition strategy. The program is in the Proof of Principle phase. A unique system contracting strategy to prove out innovative component technologies was instituted at inception of the program. A modified Integrated Product Team is being used to leverage the expertise of both the Army and the contractor, Alliant Techsystems. In FY96 the Army terminated the X-Rod program for affordability reasons. The TERM-KE program has continued through congressional plus-ups. The current program is developing a possible future Tank Extended Range Munitions (TERM) candidate.

<b>D. Schedule Profile</b>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
Interior ballistics exit criteria met				3Q						
System Requirements Review			1Q*							
In-flight discard exit criteria met			1Q*							
Lethality demonstrations			3Q-4Q*	2Q-3Q						
System Functional Review				2Q						
Preliminary Design Review				4Q						
Dual Mode Seeker Demo				3Q						

\* Completed milestone

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BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>				PE NUMBER AND TITLE <b>0603639A Armament Enhancement Initiative</b>						PROJECT <b>D656</b>		
I. Product Development												
Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract	
a. Alliant Techsystems	SS-CPFF	Clearwater, FL	122253	12450	Sep 87					134703		
b. ARDEC	MIPR	Picatinny Arsenal, NJ	24777	1000						25777		
Subtotal Product Development:			147030	13450						160480		
II. Support Costs: Not Applicable.												
III. Test and Evaluation												
Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract	
a. YPG,ATC	MIPR	Yuma AZ/APG, MD	1600	200						1800		
b. Army Research Lab	MIPR	Aberdeen PG, MD	2800	540						3340		
c. TECOM	MIPR	Huntsville, AL	0	200						200		
d. Miscellaneous	MIPR	Multiple	1536	1534						3070		
Subtotal Test and Evaluation:			5936	2474						8410		
IV. Management Services												
Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract	
a. PM/TMAS	MIPR	Picatinny Arsenal, NJ	2143	1000						3143		
b. SBIR/STTR				460						460		
Subtotal Management Services:			2143	1460						3603		
Project Total Cost:			155109	17384						172493		
Project D656												