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<b>ARMY RDT&amp;E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)</b>	DATE <b>February 2000</b>
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BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>	PE NUMBER AND TITLE <b>0603639A Tank and Medium Caliber Ammunition</b>
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COST (In Thousands)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	37302	56286	30139	24056	48704	27332	30472	Continuing	Continuing
D643 Tank Ammunition	20448	36668	30139	24056	48704	27332	30472	Continuing	Continuing
D656 X-ROD	16854	19618	0	0	0	0	0	0	191651

**A. Mission Description and Budget Item Justification:** The Tank and Medium Caliber Ammunition (TMA) program is a comprehensive development to rapidly field advanced tank, medium caliber and other direct fire ammunition and ensure the continued overmatch lethality of the U.S. maneuver force, despite rapid worldwide development of armored vehicle protection technologies. The TMA 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, training ammunition, and smart extended range munitions for existing and future weapons platforms. To date, four rounds of tank ammunition have completed development and entered production. All ammunition development funds within this program element (PE) are managed to facilitate transitions between phases, avoid administrative delays and to focus resources on the most promising areas.

<b>B. Program Change Summary</b>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Previous President's Budget (FY 2000/2001 PB)	35784	36937	42511
Appropriated Value	36026	56937	
Adjustments to Appropriated Value			
a. Congressional General Reductions	-242		
b. SBIR / STTR	-926		
c. Omnibus or Other Above Threshold Reductions		-228	
d. Below Threshold Reprogramming	+2588		
e. Rescissions	-144	-423	
Adjustments to Budget Years Since FY 2000/2001 PB			-12372
Current Budget Submit (FY 2001 PB)	37302	56286	30139

Change Summary Explanation: Funding - FY2001: D643 funds realigned (-12200) to support higher priority requirements.

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ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)							DATE February 2000		
BUDGET ACTIVITY 4 - Demonstration and Validation				PE NUMBER AND TITLE 0603639A Tank and Medium Caliber Ammunition				PROJECT D643	
COST (In Thousands)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D643 Tank Ammunition	20448	36668	30139	24056	48704	27332	30472	Continuing	Continuing
<p><b>A. <u>Mission Description and Justification:</u></b> This project provides for the development of all tank ammunition with the exception of the Tank Extended Range Munitions-Kinetic Energy (TERM-KE) formerly known as X-ROD. Providing lethal 120mm munitions is essential in maintaining the overmatch capabilities of the Abrams tank. This point is particularly important since the Army may retain the Abrams Tank for at least the next 20 to 25 years. Ammunition improvements will provide the lethality superiority. The focus of the project 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. The M829E3 will defeat the growing threat of explosive reactive armor that is increasingly effective against KE penetrators. 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 the M830A1 Multi-Purpose Anti-Tank (MPAT) cartridge. 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 modern tactical tank ammunition and tactical rounds are never used in training. The Army also has a requirement for an Objective Kinetic Energy (OKE) Cartridge for future targets and is in the process of finalizing the requirements for the Tank Extended Range Munitions (TERM). TERM will be capable of engaging targets at extended ranges, either line of sight or beyond line of sight, either autonomously or in conjunction with the Future Scout and Cavalry System (FSCS) and/or any other medium caliber weapon systems. Depending on warfighting and affordability considerations, either TERM or the OKE will begin PDRR development in FY02. The OKE or TERM will defeat advanced active protection systems at extended ranges and be substantially more accurate than current tank ammunition.</p> <p><b>FY 1999 Accomplishments:</b></p> <ul style="list-style-type: none"> <li>• 5550 Baselined propellant optimization for M829E3</li> <li>• 6896 Optimization of cartridge configuration for M829E3</li> <li>• 6169 Baselined penetrator configuration for M829E3</li> <li>• 538 STAFF program termination</li> <li>• 1295 Initiate risk reduction alternative propellant for M829E3</li> </ul> <p>Total 20448</p> <p><b>FY 2000 Planned Program:</b></p> <ul style="list-style-type: none"> <li>• 13817 Finalization of cartridge configuration for M829E3</li> <li>• 5464 Test optimized design for M829E3</li> <li>• 6535 Conduct producibility improvements for M829E3</li> <li>• 2000 MPAT Trainer Projectile optimization, propellant development and producibility</li> <li>• 900 Continued risk reduction alternative propellant for M829E3</li> </ul>									
Project D643			Page 2 of 10 Pages				Exhibit R-2A (PE 0603639A)		

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**FY 2000 Planned Program: (continued)**

- 7000 Initiate LRKE Trainer Development
  - 952 Small Business Innovative Research/Small Business Technology Transfer (SBIR/STTR) Programs
- Total 36668

**FY 2001 Planned Program:**

- 15089 Complete build of Production Qualification Test (PQT) Hardware for M829E3
  - 6750 Initiate testing of PQT hardware for M829E3
  - 5400 Finalize Producibility Improvements for M829E3
  - 900 Complete risk reduction alternative propellant for M829E3
  - 2000 MPAT Trainer design and producibility completion; procure propulsion PQT components
- Total 30139

<b>B. Other Program Funding Summary</b>	<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 Compl</u>	<u>Total Cost</u>
Procurement Ammunition, Army									
E73300-M831/M831A1 120mm Heat Tank Trainer	58276	32367	48477	47925	48725	48021	47976	Cont	Cont
E73400-M865 120mm KE Tank Trainer	122816	85352	101512	100907	100872	93341	93253	Cont	Cont
E78001-M829A2/E3 120mm Tank KE	14609	31387	0	37385	35569	35496	35413	Cont	Cont
E78007-M830A1 120mm Tank MPAT	10916	14713	0	0	0	0	0	0	547153
E08210-M919 25mm KE (Bradley)	20623	30285	23650	0	0	0	0	0	242069

**C. Acquisition Strategy: M829E3, MPAT and Long Range KE Trainers, TERM/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 Trainers will be developed using performance specifications and system contractors. Operational Requirements Documents (ORDs) have been approved for M829E3, the two Trainers and Objective Kinetic Energy (OKE). The STAFF closeout occurred in 3QFY99.

<b>D. Schedule Profile</b>	<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>M829E3</b>							
Select penetrator	4Q*						
Optimize propellant configuration	1Q-4Q*	1Q*-2Q					

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<b>D. Schedule Profile</b>	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*-4Q					
Design Freeze			1Q				
Build Production Qualification Hardware			1Q-4Q				
Begin Production Qualification Test (PQT)			3Q				
Low Rate Production Decision			4Q				
Complete PQT				3Q			
Conduct Initial Operational Test and Evaluation (IOT&E)				2Q-4Q			
Type Classification – Standard					1Q		
Initial Operational Capability					3Q		
<b>STAFF</b>							
Negotiate/Settle Program Termination with Contractor	3Q*						
<b>LONG RANGE KE TRAINER</b>							
Long Range Kinetic Energy (LRKE) Trainer Concept Studies Complete	4Q*						
Manufacture/Design Prototype Test		1Q-4Q	1Q-4Q				
Award Engineering Manufacturing Development (EMD) Contract					1Q		
Optimize Configuration					1Q-3Q		
Design Freeze					3Q		
Build Production Qualification Testing (PQT) hardware					3Q-4Q	1Q	
LRKE PQT						2Q-4Q	1Q
Operational Test							2Q-3Q
LRKE TC-Standard							3Q

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<b>D. Schedule Profile</b>	FY1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
<b>MPAT TRAINER</b>							
Projectile Optimization		1Q*-3Q					
Propellant Development		1Q*-4Q	1Q-2Q				
Contractor projectile producibility/cost reduction		3Q-4Q	1Q-3Q				
Cartridge Design Freeze			3Q				
Procure PQT propellant/propulsion components			3Q-4Q	1Q			
Procure "other" PQT components/LAP				1Q-4Q			
Procure user test quantity					1Q-2Q		
Test PQT					1Q-3Q		
User Test					3Q		
Type Classify					4Q		
<b>TERM/OBJECTIVE KE</b>							
Milestone I				3Q			
Award PDRR Contracts				3Q			
Preliminary Design Review					1Q		
Critical Design Review						1Q	
Component Demonstrations					1Q-4Q	1Q-4Q	
Demonstrate Integrated Design							1Q-4Q
Milestone II							4Q
Award EMD Contract							4Q

\*Completed milestone

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**ARMY RDT&E COST ANALYSIS (R-3)**

DATE **February 2000**

<b>BUDGET ACTIVITY</b> <b>4 - Demonstration and Validation</b>	<b>PE NUMBER AND TITLE</b> <b>0603639A Tank and Medium Caliber Ammunition</b>	<b>PROJECT</b> <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(STAFF)	C-CPFF	ATK Hopkins, MN	35985	538	Sep 90					Cont	Cont	
b. Alliant Techsystems (M829E3)	SS-CPFF	ATK Hopkins, MN	12870	11845	Aug 98	13304		13590		Cont	Cont	
c. ARDEC	MIPR	Picatinny Arsenal, NJ	18662	1334		3312		3500		Cont	Cont	
d. Army Research Lab	MIPR	Aberdeen PG, MD	14653	1051		1195		1596		Cont	Cont	
e. Batelle Northwest Lab	MIPR	Richmond, WA	2000	985		725		428		Cont	Cont	
f. LRKE Trainer	C-CPFF	Unknown				7000				Cont	Cont	
g. MPAT Trainer	C-CPFF	Unknown				2000		2000		Cont	Cont	
h. Rheinmettal	SS-FFP	Germany		1200	Sep 99	900		900		Cont	Cont	
i. Miscellaneous	MIPR	Multiple		365		350		300		Cont	Cont	
Subtotal Product Development:			84170	17318		28786		22314		Cont	Cont	

Remark: Army Research Lab and ARDEC Engineering include M829E3 and OKE/TERM, MPAT Trainer and LR-KE Trainer

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	960		2830		4500		Cont	Cont	
b. Army Research Lab	MIPR	Aberdeen PG, MD	2400	1385		2280		1500		Cont	Cont	
c. Miscellaneous	MIPR	Multiple	10984	311		400		325		Cont	Cont	
Subtotal Test and Evaluation:			20331	2656		5510		6325		Cont	Cont	

Remark: Testing includes all testing needed to support M829E3 and OKE/TERM, MPAT Trainer and LR-KE Trainer

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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	374		1290		1300		Cont	Cont	
b. Miscellaneous	MIPR	Multiple		100		130		200		Cont	Cont	
c. SBIR/STTR						952					952	
Subtotal Management Services:			7120	474		2372		1500		Cont	Cont	

Remark: - Management Services also includes data line/contract costs to support Contractor Integrated Technical Information Services (CITIS) for M829E3.  
 - Management is considered continuous from the earliest portions of the AEI Program until the Abrams Tank Fleet does not need further ammunition improvements.

Project Total Cost:	111621	20448	36668	30139	Cont	Cont
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COST (In Thousands)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D656 X-ROD	16854	19618	0	0	0	0	0	0	191651

**A. Mission Description and Budget Item Justification:** The X-Rod, now known as the Tank Extended Range Munitions – Kinetic Energy (TERM-KE) is a 120mm tank ammunition development effort which will use a standard kinetic energy penetrator, 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 kill probability and expanding the Maneuver Task Force Commander’s battle space. The TERM-KE is one of two concepts being evaluated in the generic TERM Science and Technology Objective (STO) which is scheduled to down select to a single source in FY02.

**FY 1999 Accomplishments:**

- 5232 System analysis and system design
  - 3655 Lethality demonstration
  - 4462 Dual Mode Sensor demonstration
  - 3505 Met Unguided All-Up-Round (UAUR) Exit Criteria
- Total 16854

**FY 2000 Planned Program:**

- 10390 System analysis and system design
  - 1900 Lethality testing
  - 2300 Seeker Captive Flight Test
  - 4500 Ignition/Propulsion Test
  - 528 Small Business Innovative Research/Small Business Technology Transfer (SBIR/STTR) Programs
- Total 19618

**FY 2001 Planned Program:** Project not funded in FY 2001

**B. Other Program Funding Source:** Not applicable

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**C. Acquisition Strategy:** This program uses a streamlined acquisition strategy. The program is in the Concept Exploration 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. The Army terminated the X-Rod Program in FY96 for affordability reasons. The TERM-KE program has continued through congressional plus-ups. The current program is developing one of the Tank Extended Range Munition (TERM) candidates.

<b>D. Schedule Profile</b>	<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	*2Q						
Lethality demonstrations	*2Q-3Q						
System Functional Review	*2Q						
Dual Mode Seeker Demo	*3Q						
Exterior Ballistics Exit Criteria Met	*4Q						
Preliminary Design Review		1Q-2Q					
Lethality Test		3Q					
Seeker Captive Flight Test		4Q					
Ignition/Propulsion Test		4Q					

\* Completed milestone

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ARMY RDT&E COST ANALYSIS (R-3)										DATE February 2000		
BUDGET ACTIVITY 4 - Demonstration and Validation				PE NUMBER AND TITLE 0603639A Tank and Medium Caliber Ammunition						PROJECT D656		
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	16500				0	151203	
b. ARDEC	MIPR	Picatinny Arsenal, NJ	24777	1100		1000				0	26877	
Subtotal Product Development:			147030	13550		17500					178080	
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	250		0				0	1850	
b. Army Research Lab	MIPR	Aberdeen PG, MD	2800	540		575				0	3915	
c. TECOM	MIPR	Huntsville, AL	0	150		150				0	300	
d. Miscellaneous	MIPR	Multiple	1536	1464		215				0	3215	
Subtotal Test and Evaluation:			5936	2404		940					9280	
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	440		650				0	3233	
b. SBIR/STTR				460		528				0	988	
Subtotal Management Services:			2143	900		1178					4221	
Project Total Cost:			155109	16854		19618					191581	
Project D656												