

UNCLASSIFIED

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)								DATE February 1999		
BUDGET ACTIVITY 4 - Demonstration and Validation				PE NUMBER AND TITLE 0603790A NATO Research & Development				PROJECT D691		
COST (In Thousands)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D691 NATO Research and Development	7885	4132	1872	1971	8676	8848	9083	9325	Continuing	Continuing

A. Mission Description and Budget Item Justification: This program implements the provisions of Title 10 U.S. Code, Section 2350a, Cooperative Research and Development (R&D) Projects: Allied Countries. The objective is to improve, through the application of emerging technologies, the conventional defense capabilities of the United States, the North Atlantic Treaty Organization (NATO), and U.S. major non-NATO allies. This program element only funds the U.S. equitable share of the cooperative R&D project spent in the U.S. Projects are implemented with the allied partners through international agreements which define the scope, cost and work sharing arrangements, management, contracting, security, data protection and third party transfers. By technology sharing the program jointly develops equipment with our allies to improve operational efforts by achieving multi-national force compatibility through the use of similar equipment and improved interfaces. Funds support all the R&D costs including the identification of cooperative opportunities and administration of the program. All funds are used to pay for the U.S. work share in the United States at U.S. Government and U.S. contractor's facilities. This program focuses on international cooperative technology demonstration, validation, and interoperability of the Battlefield Combat Identification System, Force XXI Battle Command Brigade & Below (FBCB2)/Appliqué Systems, Adaptive Digital Beamforming for THAAD radars, helicopter helmet mounted displays, military network switching , Patriot Tactical Operations Center, improved combat vehicle propulsion, missile seeker electronic countermeasures, eyesafe laser radar, artillery command and control, standoff chemical detectors, kinetic energy penetrators, and signal jamming subsystems. The final program will be reported separately as required by 10 USC 2350a(f).

FY 1998 Accomplishments:

- 1917 **Battlefield Command and Control (C2) Systems Interoperability (Partner: Germany):** Continued to test and evaluate message exchange through the Intelligent Translation Gateway, over the Defense Simulation Internet and the Digital Interface Lab in a simulated Operational Environment.
- 528 **Adaptive Beamforming Technology (ABFT) for Wide Band Phased Array Radars (Partner: United Kingdom):** Continued improvement of detection in severe Electronic CM environments. Defined ABFT technology insertion program for THAAD Radar objective system, to include beamforming algorithms and required hardware and software modifications. Published final point design.
- 933 **Covert Night/Day Operations in Rotorcraft (CONDOR) (Partner: United Kingdom):** Continued to improve helicopter helmet mount display and flight controls. Fabricated Advanced Visionics System (AVS) and Advanced Flight Control System (AFCS) prototypes, system integration and tests.
- 371 **High Technology Switch (Partner: France):** Continued development of advance interoperable Asynchronous Transfer Mode (ATM) switches for ATM communication field tests, military networks and test beds, Digital Interoperability Lab (DIL) and Battlefield Info Transition System (BITS).
- 47 **Extended Air Defense (AD) Command and Control Interoperability (Partner: Germany):** Continued the development of system specification to achieve interoperability between US and GE air defense tactical operations centers. Analyzed interoperability elements and prepared final specification.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)		DATE February 1999
BUDGET ACTIVITY 4 - Demonstration and Validation	PE NUMBER AND TITLE 0603790A NATO Research & Development	PROJECT D691
• 1740	Fighting Vehicle Propulsion Technology using Ceramic Materials (Partner: Japan): Continued to develop, test and characterize advance materials including ceramics, high temperature combustion optimization, low heat rejection technology, and advanced friction and wear phenomena.	
FY 1998 Accomplishments: (continued)		
• 669	Focal Plane Array Countermeasures (FPACM) (Partner: United Kingdom): Characterized and assessed advanced focal plane array missile seekers and developed electronic countermeasures (ECM) to defeat them through simulation, modeling and lab testing.	
• 670	Cooperative Eyesafe Laser Project (CELRAP) (Partner: Japan): Developed a joint performance specification for a multifunctional eyesafe laser radar for range finding, target profiling, obstacle avoidance, range and terrain mapping. Started brassboard design and subsystem development.	
• 124	Artillery System Cooperation Activities (ASCA) (Partners: France, Germany, United Kingdom): Developed common interface requirements for Allied Field Artillery Command and Control Systems and conducted field demonstration(s) for interoperability between AFATDS and Allies' systems.	
• 85	Laser Standoff Chemical Detector (LSCD) (Partner: France): Developed detection technology for incorporation in a lightweight, vehicle mountable contamination monitoring system that can detect and quantify in a standoff mode all known types of chemical agent contamination.	
• 135	Advanced Penetrator Development In Tank Munitions (Partner: United Kingdom): Developed an advanced kinetic energy penetrator to defeat upgraded tanks being equipped with Kinetic Energy/Explosively Reactive Armor (KE/ERA). Evaluated technologies and determined design capability.	
• 198	Low Level Air Picture Interface (LLAPI) (Partners: Canada, Germany, France, Netherlands, United Kingdom): Developed automated interfaces between US and Allied short range air defenses for radar data exchange and demonstrated systems interoperability.	
• 236	TACJAM-A Electronic Support Subsystem Upgrades (Partner: United Kingdom): Developed and integrated technology enhancements to current jamming subsystems used on vehicles and aircraft that detect modern signal transmissions.	
• 132	Next- Generation Autonomous Vehicle Navigation Control System (AUTOVAV) (Partner: Germany): Initiated design and development of an advanced autonomous vehicle navigation control system. Initiated sub-system tests of obstacle detection, classification, and avoidance technologies.	
• 100	Report To Congress: Pursuant to 10 USC 2350a, prepared and provided to USD(A&T) the Army section of the 1998 Report to Congress on the International Cooperative Research and Development Program	
Total	7885	
FY 1999 Planned Program:		
• 2182	Fighting Vehicle Propulsion Technology using Ceramic Materials (Partner: Japan): Continue to develop, test and characterize advance materials including ceramics, high temperature combustion optimization, low heat rejection technology, and advanced friction and wear phenomena.	
• 500	Focal Plane Array Countermeasures (FPACM) (Partner: United Kingdom): Characterize and assess advanced focal plane array missile seekers and develop electronic countermeasures (ECM) to defeat them through simulation, modeling and lab testing.	

UNCLASSIFIED

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)		DATE February 1999
BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
4 - Demonstration and Validation	0603790A NATO Research & Development	D691
<ul style="list-style-type: none"> • 500 Cooperative Eyesafe Laser Project (CELRAP) (Partner: Japan): Continue to develop a joint performance specification for a multifunctional, eyesafe laser radar for range finding, target profiling, obstacle avoidance, range and terrain mapping. Continue fabricating subsystems and brassboard. • 500 Combat Identification (CI) Interoperability Demonstration (Partners: France, Germany, United Kingdom): Develop a NATO STANAG for CI based upon the Battlefield Combat Identification System (BCIS) and the completed interoperability trials of prototype systems in Munster, GE. • 250 Adaptive Beamforming Technology (ABFT) for Wide Band Phased Array Radars (Partner: United Kingdom): Complete ABFT technology insertion program for THAAD Radar objective system, beamforming algorithms, hardware and software modifications. Publish final point design. <p>FY 1999 Planned Program: (continued)</p> <ul style="list-style-type: none"> • 91 Report to Congress: Pursuant to 10 USC 2350a, prepare and provide to USD(A&T) the Army section of the 1999 Report to Congress on the International Cooperative Research and Development Program • 109 Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs <p>Total 4132</p> <p>FY 2000 Planned Program:</p> <ul style="list-style-type: none"> • 1000 Command and Control (C2) Systems Interoperability Program (C2SIP) (Partners: Germany, France, United Kingdom): Continue integration work from Battlefield Interoperability Program (BIP), Quadrilateral Interoperability Program (QIP), and the Army Tactical Command & Control Information System (ATCCIS) into an Advance Technology Demonstration (ATD) to achieve NATO levels four (messaging) & five (database) interoperability. • 800 Laser Stand-off Chemical Detector (LSCD) (Partner: France): Continue development of technology that will allow U.S. troops to detect, identify, and quantify chemical agents from a distance by employment of the preferred doctrine of contamination avoidance. • 72 Report to Congress: Pursuant to 10 USC 2350a, prepare and provide to USD(A&T) the Army section of the 2000 Report to Congress on the International Cooperative Research and Development Program. <p>Total 1872</p> <p>FY 2001 Planned Program:</p> <ul style="list-style-type: none"> • 1000 Laser Stand-off Chemical Detector (LSCD) (Partner: France): Continue developing technology that will allow U.S. troops to detect, identify, and quantify chemical agents from a distance by employment of the preferred doctrine of contamination avoidance. • 900 Command and Control (C2) Systems Interoperability Program (C2SIP) (Partners: Germany, France, United Kingdom): Continue integration work from Battlefield Interoperability Program (BIP), Quadrilateral Interoperability Program (QIP), and the Army Tactical Command & Control Information System (ATCCIS) into an Advance Technology Demonstration (ATD) to achieve NATO levels four (messaging) & five (database) interoperability. • 71 Report to Congress: Pursuant to 10 USC 2350a, prepare and provide to USD(A&T) the Army section of the 2001 Report to Congress on the International Cooperative Research and Development Program. 		
Project D691	Page 3 of 10 Pages	Exhibit R-2 (PE 0603790A)

DATE
February 1999

BUDGET ACTIVITY
4 - Demonstration and Validation

PE NUMBER AND TITLE
0603790A NATO Research & Development

Total 1971

UNCLASSIFIED

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)							DATE February 1999				
BUDGET ACTIVITY 4 - Demonstration and Validation				PE NUMBER AND TITLE 0603790A NATO Research & Development				PROJECT D691			
E. Schedule Profile	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005		
Fighting Vehicle Propulsion Technology											
Contract Awards	1QTR										
Preliminary Engine Analysis Complete		4QTR									
Materials Characterization/Test Complete			4QTR								
Combustion Test and Analysis Complete				4QTR							
Complete Tests of Japanese Ceramic Components					3QTR						
Focal Plane Array Countermeasures											
Complete Missile Seeker Characterization	3QTR										
Mathematical Model Development		3QTR									
Complete Software Simulations			3QTR								
Develop Advanced CM Model				3QTR							
Complete Testing of Advanced CM Model					3QTR						
Cooperative Eyesafe Laser Project											
Complete Performance Specification	2QTR										
Complete Subsystem Development		4QTR									
Complete Brassboard Integration			4QTR								
Complete Development Testing				4QTR							
Complete Early Operational Testing					3QTR						
Artillery Systems Cooperation Activity											
MOU Negotiations Complete	4QTR										
Complete Interface Requirements		4QTR									
Complete Phase I Technical Test			3QTR								
Complete Phase I Operational Tests				2QTR							
Complete Phase II Tests					3QTR						
AUTONAV											
MOU Project Arrangement Concluded	2QTR										
Complete Prototype Design		3QTR									
Complete Fabrication & Integration			2QTR								
Complete Phase I Development Testing				4QTR							
Complete Early Operational Testing					3QTR						

UNCLASSIFIED

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)	DATE February 1999
---	------------------------------

BUDGET ACTIVITY 4 - Demonstration and Validation	PE NUMBER AND TITLE 0603790A NATO Research & Development	PROJECT D691
--	--	------------------------

E. Schedule Profile	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
TACJAM-A									
MOU Concluded	1QTR								
Complete Prototype Hardware Upgrades		2QTR							
Complete Systems Integration			3QTR						
Complete Development Testing				4QTR					
Complete Operational Testing					3QTR				
Laser Standoff Chemical Detector									
MOU Project Arrangement Concluded		2QTR							
Complete Analysis of Spectral Properties			3QTR						
Begin Laser Prototype Development				2QTR					
Complete Development Testing					3QTR				

UNCLASSIFIED

ARMY RDT&E COST ANALYSIS (R-3)										DATE February 1999		
BUDGET ACTIVITY 4 - Demonstration and Validation				PE NUMBER AND TITLE 0603790A NATO Research & Development						PROJECT D691		
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. Helmet Mounted Display	CPIF	Hughes Training Herdon, VA	4868	0		0		0		0	4868	4868
b. Systems Integration	CPIF	McDonnell Douglas Mesa, AZ	2500	0		0		0		0	2500	2500
c. Sensors	FFP	Quantum Research Huntsville, AL	1550	0		0		0		0	1550	1550
d. Command & Control Systems	CPFF	CSC Ft Washington, PA	15050	800		572		671		880	17973	18028
e. Combat Identification SystemsJ	CPAF	TRW Redondo Bch, CA	3893	100		0		0		0	3993	3993
f. Command & Control Systems	CPFF	Madentech Shrewsbury, NJ	1600	100		100		100		150	2050	2050
g. Algorithm Development	CPFF	Georgia Tech Atlanta, GA	7820	100		100		100		0	8120	8120
h. Sensors	CPFF	Dynetics Huntsville, AL	450	100		100		100		100	850	850
i. Software	FFRDC	Mitre Boston, MA	300	100		100		100		400	1000	1000
j. High Temperature Lubricant Research	CPFF	Wayne State Univ Detroit, MI	1600	200		0		0		0	1800	1800
k. Combustion Research	CPFF	Rutgers Univ Brunswick, NJ	900	200		0		0		0	1100	1100
l. Software Development	CPFF	SRI Menlo Park , CA	1350	100		100		100		400	2050	2050
m. Diesel Engine Research	CPFF	Detroit Diesel Allison Detroit, MI	1000	1000		0		0		0	2000	2000
n. Software Development	CPFF	Nichols Research Huntsville, AL	700	132		100		100		200	1232	1232
o. Ordnance Research	CPFF	Nuclear Metals Inc. Concord, MA	1200	0		0		0		0	1200	1200

UNCLASSIFIED

ARMY RDT&E COST ANALYSIS (R-3)										DATE February 1999		
BUDGET ACTIVITY 4 - Demonstration and Validation				PE NUMBER AND TITLE 0603790A NATO Research & Development						PROJECT D691		
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
p. Ammunition	CPFF	Aerojet Ordnance Jonesboro, TN	1200	0		0		0		0	1200	1200
q. Ammunition	CPFF	Olin Ordnance St. Petersburg, FL	300	0		0		0		0	300	300
Subtotal Product Development:			46281	2932		1172		1271		2130	53786	53841
II. Support Costs	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. Engineering	MIPR	AMCOM Ft. Eustis, VA	200	50		0		0		0	250	
b. Engineering	MIPR	CECOM Ft. Monmouth, NJ	400	100		150		150		400	1200	
c. Engineering	MIPR	TACOM Warren, MI	400	100		0		0		0	500	
d. Logistics	MIPR	ICPA APG, MD	481	100		100		100		400	1181	
e. Logistics	MIPR	LOGSA Huntsville, AL	150	50		50		50		600	900	
f. Engineering	MIPR	AMCOM Huntsville, AL	130	100		0		0		0	230	
Subtotal Support Costs:			1761	500		300		300		1400	4261	

UNCLASSIFIED

ARMY RDT&E COST ANALYSIS (R-3)										DATE February 1999		
BUDGET ACTIVITY 4 - Demonstration and Validation				PE NUMBER AND TITLE 0603790A NATO Research & Development						PROJECT D691		
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. Independent Evaluations	MIPR	AMSAA APG, MD	400	100		50		50		300	900	
b. Software Validation	MIPR	CECOM Ft Monmouth, NJ	300	100		50		50		300	800	
c. System Testing	MIPR	Army Research Lab, APG, MD	300	0		0		0		0	300	
d. System Testing	MIPR	TECOM APG, MD	500	100		50		50		1760	2460	
Subtotal Test and Evaluation:			1500	300		150		150		2360	4460	
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. Project Management	MIPR	PEO C3S Ft. Monmouth, NJ	600	50		100		100		600	1450	
b. Project Management	MIPR	TACOM Warren, MI	400	100		0		0		0	500	
c. Project Management	MIPR	PEO IEW Ft. Monmouth, NJ	500	100		0		0		0	600	
d. Project Management	MIPR	PEO GCSS Warren, MI	400	0		0		0		0	400	
e. Project Management	MIPR	CBDCOM Edgewood Ars, MD	300	50		100		100		330	880	
f. Project Management	MIPR	Army Research Lab, APG, MD	200	0		0		0		0	200	
g. Project Management	MIPR	Army Research Lab, WSMR, NM	400	50		0		0		0	450	
h. Project Management	MIPR	CECOM Ft. Belvoir, VA	500	50		50		50		380	1030	
i. Project Management	MIPR	AMCOM Redstone Ars, AL	550	0		0		0		0	550	
Subtotal Management Services:			3850	400		250		250		1310	6060	

UNCLASSIFIED

ARMY RDT&E COST ANALYSIS (R-3)	DATE February 1999
---	------------------------------

BUDGET ACTIVITY 4 - Demonstration and Validation	PE NUMBER AND TITLE 0603790A NATO Research & Development	PROJECT D691
--	--	------------------------

	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:	53392	4132		1872		1971		7200	68567	53841