

UNCLASSIFIED

BMDO RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)	DATE February 2000
---	------------------------------

BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603173C Support Tech - Adv Tech Dev
---	--

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	273397	212837	93249	91625	89117	88428	88644	Continuing	Continuing
1180 Surveillance Technologies	35598	30652	26037	24562	25552	20635	20798	Continuing	Continuing
1280 Interceptor Technologies	72100	60950	38297	39998	37355	42485	40933	Continuing	Continuing
1360 Directed Energy Program *	120975	73199	0	0	0	0	0	TBD	TBD
1461 BMC4I	11845	5266	7765	7003	7803	7798	7326	Continuing	Continuing
1660 Statutory and Mandated Programs	0	2930	2925	2934	2949	2992	3035	Continuing	Continuing
3354 Targets	0	12863	0	0	0	0	0	TBD	TBD
3360 Test Resources	2210	0	0	0	0	0	0	TBD	TBD
4000 Operational Support	30669	26977	18225	17128	15458	14518	16552	Continuing	Continuing

* FY01-05 funding transferred to PE 0603174C.

A. Mission Description and Budget Item Justification

To prepare for critical future active defense needs, BMDO will conduct a balanced program of high leverage technologies, including international cooperative efforts, that yield improved capabilities across a selected range of advanced interceptor, sensor, and battle management technologies as well as advances in innovative science. The objectives of these investments are components and subsystems with improved performance and reduced costs for acquisition programs.

The BMD technology program is designed to resolve many key R&D issues for future Theater and National Missile Defense systems. BMDO crafts the program as a component of the overall Department technology area plan. The efforts include:

- Advanced active and passive sensor technology development, which is needed to detect, track, discriminate, and intercept advanced BMD threats. This includes the detection and tracking of low observable targets and other high-leverage sensor technologies (Project 1180).
- Development and integration of the critical technologies for performing hypervelocity hit-to-kill intercepts of ballistic missiles within and outside the atmosphere. Development and demonstration of advanced interceptor sensor processing and power components; interceptor guidance and divert subsystems, multifunctional materials and structures; low cost interceptor composite manufacturing processes; and low cost flight test demonstrations. (Project 1280).

BMDO RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)		DATE February 2000
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603173C Support Tech - Adv Tech Dev	
<ul style="list-style-type: none"> Development and integration of advanced chemical laser systems technologies in pursuit of an integrated ground demonstration in a project structure leading to an Integrated Flight Experiment (IFX) in FY12-13 demonstrating the feasibility of a space-based boost phase intercept system. A new Program Element (0603174C – Space Based Laser) has been created to provide funding for this effort starting in FY01. (Project 1360). BMD Battle Management Command, Control, Communication, Computers and Intelligence (BMC4I) Advanced Technology programs to develop kill assessment, high-speed computing, secure & reliable communications, sensor fusion and interoperability technologies for NMD and TMD programs. (Project 1461). Development of low cost ballistic missile launch vehicle alternatives. (Project 3354). Required manpower and the associated costs specifically aligned with the performance of these programs (Project 4000). <p>This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy. Further justification of the Budget Activity code assigned to each Program Element is contained within the <u>Brief Description of Element</u> section of each Program Element Summary.</p> <p>FY 1999 Accomplishments:</p> <ul style="list-style-type: none"> 35598 Surveillance Technology: Continued satellite operation and data analysis for the Midcourse Space Experiment (MSX), including support of the AFSPC/OSD Advanced Concept Technology Demonstration (ACTD) for space surveillance. Completed performance analysis of Solar Concentrator Array with Refractive Linear Element Technology (SCARLET) flight experiment data. Delivered Space Technology Research Vehicle-1d (STRV-1d) flight experiments. Funded Advanced Radar Technology (ART) work in the areas of Transmitter/Waveform Generators, Antennas, and Receiver/Signal Processors used by MDAP systems. Established tri-service integrated product teams (IPTs) and working-level IPTs to assist the selection and management of future ART and Advanced Passive Technologies (APT) projects. 72100 Interceptor Technology: Completed AIT Integrated Test Bed (ITB) technology trades. Conducted initial testing of Jet Interaction, strapdown IR seeker (SIS) and solid divert and attitude control system (SDACS). Continued DITP Laser Radar, Passive Sensor, and Fusion Processor/Algorithm component development. Conducted laboratory testing of intermediate GFE subsystems. Continued definition of Master Frequency Generator (MFG). Completed development of interceptor thermal battery. Continued development of lightweight high performance multi-functional structures for interceptors. Continued development of advanced technology components for future interceptor systems. 11845 BMC4I Technology successfully launched Advanced Plasma Experiment Rocket and conducted space plasma experiment for use in kill assessment phenomenology project. Continued development of phase array antenna for reliable communications links to ground-based interceptor. Initiated national level hardware-in-loop (HWIL) test bed to allow real time, high fidelity TMD & NMD simulations. Completed program prioritization for Technology Master Plan. Continued development of an ultra-high speed laser communications experiment for satellite to ground communication. Continue Gallium Nitride Power Amplifier Program for radars. 120975 SBL: Awarded contract to a Joint Venture with scope permitting an Integrated Flight Experiment (IFX). Completed first of two phases of a High Energy Laser Affordability and Architecture Study. Reviewed previous high power test data; upgraded facilities and diagnostics; identified anomalies; and conducted two high power laser optimization tests. Completed low power beam control test series and developed beam profile generator. Initiated field testing for the High Altitude Balloon Experiment (HABE) of Acquisition, Tracking and Pointing (ATP) technologies and passively tracked targets of opportunity. Procured uncooled resonator optics processing equipment, selected cutting fluid, and selected coating vendor. 		
<i>Page 2 of 5 Pages</i>		Exhibit R-2 (PE 0603173C)

UNCLASSIFIED

BMDO RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)		DATE February 2000
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603173C Support Tech - Adv Tech Dev	
• 2210	Operations and Maintenance: Provided funds for the Aero-Optic Evaluation Center (AOEC) located at the Calspan-University of Buffalo Research Center (CUBRC) and the Army Missile Optical Range (AMOR) located on Redstone Arsenal, Alabama.	
• 30669	Management and Operational Support: Continued providing management and support for BMDO and TO overhead/indirect fixed costs, and continued to provide management and analysis support to the technology program in areas such as cost/schedule/performance assessment, cost estimating and analysis, budget analysis and formulation, program planning and control, contract management.	
Total	273397	
FY 2000 Planned Program:		
• 30652	Surveillance Technology: Continue intermediate level analysis of Midcourse Space Experiment (MSX) data in support of Space Based Infrared System (SBIRS) and NMD/GBI. Support the final year of the Space Based Space Surveillance Operations (SBSSO) Advanced Concept Technology Demonstration (ACTD) in conjunction with the Air Force Space Command. Continue to provide research and development of radar technologies in the areas of Transmitter/Waveform Generators, Antennas, Threats/Environments, Receiver/Signal Processors, Controller/Data Processors, and Electro-Mechanical Support used by MDAP systems. Launch STRV-2 and STRV-1d flight experiments. Continue development of advanced technologies for space surveillance systems. Complete data analysis of SCARLET flight experiment. Conduct engineering analysis including update of Technology Master Plan.	
• 60950	Interceptor Technology: Complete Jet Interaction testing and initial model validation, SIS prototype design, SDACS prototype design. Conduct Preliminary Design Review (PDR) and Critical Design Review (CDR) of Multi-Frequency Generator (MFG) for PAC-3. Deliver and test Discriminating Interceptor Technology Program (DITP) sensor subsystems. Begin integration of DITP sensor subsystems. Ground test DITP fused-sensor brassboard system. Begin trade studies for design of multi-functional interceptor structure. Continue development of advanced technology components for future interceptor systems.	
• 5266	BMC4I Advanced Technology: Continue APEX data reduction and intercept debris model development from kill assessment experiments; conduct satellite laser communications experiments; continue development of a high fidelity geographically distributed virtual computing test bed to connect BMDO simulation and HWIL assets. Continue development and research for NMD and TMD Kill Assessment modeling and simulation. Leverage communications infrastructure to extend range and bandwidth of missile defense nodes. Initiate development of advanced metric tracking and discrimination, correlation, fusion processing and networking technology to improve Situational Awareness and Engagement.	
• 73199	SBL: Create a project baseline in an Integrated Program Execution Plan (IPEP) outlining the design, development, test, and risk reduction activities leading to an integrated ground demonstration known as an Integrated Payload Technology Demonstration (IPTD) on the path to an Integrated Flight Experiment (IFX). Complete phase II of the HEL AAS. Publish environmental assessment report for candidate sites of the new test facility. Conduct risk reduction activities such as: high power laser optimization for flow conditions, alignment, and reverse wave suppression; beam control system improvements; high power autonomous alignment tests; uncooled resonator and gain generator ring fabrication; and ATP tests at WSMR against full scale boosting targets. Define SBL operational concept from operational and architectural perspectives.	
• 2930	Civilian Salaries for BMDO.	

UNCLASSIFIED

BMDO RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)		DATE
3 - Advanced Technology Development		February 2000
BUDGET ACTIVITY	PE NUMBER AND TITLE	
3 - Advanced Technology Development	0603173C Support Tech - Adv Tech Dev	
• 12863	EXCALIBUR: Conduct continued development of low cost ballistic missile launch vehicle alternatives. Funding will provide for award of a follow-on Phase III SBIR effort to build a liquid fueled target based on the Excalibur design engine for a short duration test firing, and to conduct additional design studies and prototype development for vehicle subsystems. SCORPIUS: Continue development of a low cost expendable space-launch vehicle. Funding will provide for technology demonstration vehicles that will have application as TBM targets.	
• 26977	Management and Operational Support: Continue providing management and support for BMDO and ST overhead/indirect fixed costs, and continue to provide management and analysis support to the technology program in areas such as cost/schedule/performance assessment, cost estimating and analysis, budget analysis and formulation, program planning and control, contract management.	
Total	212837	
FY 2001 Planned Program:		
• 26037	Surveillance Technology: Complete analysis of MSX data in support of SBIRS and NMD/GBI programs. Continue research development and evaluation of radar technologies in the areas of Transmitter/Waveform Generators, Antennas, Threats/Environments, Receiver/Signal Processors, Controller/Data Processors, and Electro-Mechanical Support used by MDAPs. Refine the MDAP technology transition framework for sufficiently matured radar technologies. Complete STRV-2 and STRV-1d on-orbit space experiments and continue analysis of experiment data. Begin design of SPEDE flight experiment as funding permits.	
• 38297	Interceptor Technology: Complete Jet Interaction model validation. Deliver prototypes for SIS and SDACS. Deliver MFG to PAC-3. Deliver test equipment and fused-sensor system for DITP Flight Test-1. Ground test DITP flight hardware. Begin design of advanced multi-functional interceptor structure. Continue development of advanced technology components for future interceptor systems.	
• 7765	BMC4I Advanced Technology: Complete data reduction on kill assessment experiments; provide kill assessment debris model to NMD and TMD programs. Complete operation and testing of a high speed, high fidelity virtually distributed in the Hardware-in-the-loop (HWIL) test bed; develop and provide accurate kill assessment models for BMDO interceptors; continue NMD and TMD Kill Assessment modeling and simulation. Initiate development of advanced interoperability messaging and translation protocols to improve communications. Initiate development of pre-planning and adaptive battle management tools to improve real-time battle status assessment. Continue to develop advanced metric tracking and discrimination, correlation, fusion processing and networking technology to improve Situation Awareness and Engagement (SAE). Begin to develop modeling and simulation tools and HWIL test-to evaluate BMC4I technologies integrated with representations of the actual sensors and weapons systems under development. Complete demonstration of satellite to ground laser communications experiment.	
• 2925	Civilian Salaries for BMDO.	
• 18225	Management and Operational Support: Continue providing management and support for BMDO and ST overhead/indirect fixed costs, and continue to provide management and analysis support to the technology program in areas such as cost/schedule/performance assessment, cost estimating and analysis, budget analysis and formulation, program planning and control, contract management.	
Total	93249	

UNCLASSIFIED

BMDO RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)	DATE February 2000
---	------------------------------

BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603173C Support Tech - Adv Tech Dev
---	--

B. Program Change Summary	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Previous President's Budget (<u>FY 2000</u> PB)	272820	173704	180826
Congressional Adjustments		+41000	
Appropriated Value		214704	
Adjustments to Appropriated Value			
a. Congressional General Reductions		-1858	
b. SBIR / STTR			
c. Omnibus or Other Above Threshold Reductions			
d. Below Threshold Reprogramming		78	
e. Rescissions			
Adjustments to Budget Years Since <u>FY 2000</u> PB	+577		-87577
Current Budget Submit (<u>FY 2001</u> PB)	273397	212837	93249

Change Summary Explanation: Significant FY00 increase due to Congressional action. Significant FY01 decrease due to transfer of SBL program funding to new SBL PE 0603174C.