Missile Defense Agency (MDA) Exhibit R-2 RDT&E Budget Item Justification	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**

COST ($ in Thousands)	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Total PE Cost	455,572	628,958	548,759	432,432	448,375	678,913	829,683	1,026,239
0810 Airborne Laser (ABL) Block 2006	431,847	595,427	0	0	0	0	0	0
0519 Airborne Laser (ABL)	0	0	516,645	404,470	412,065	638,718	782,379	969,503
0602 Program-Wide Support	23,725	33,531	32,114	27,962	36,310	40,195	47,304	56,736

A. Mission Description and Budget Item Justification

A.1 System Element Description

Program Element 0603883C, Boost Defense Segment (BDS), funds the Airborne Laser (ABL) element portions of the Ballistic Missile Defense System (BMDS). The ABL provides a capability to destroy ballistic missiles in the boost phase of their trajectory, the segment from post launch through propellant burnout. Following the boost phase, the missile enters the midcourse phase of ballistic flight. The boost phase typically includes the first 60-300 seconds of flight and concludes at altitudes between 20-450 kilometers.

The ABL program is designing, building, and testing an airborne laser system to acquire, track, and destroy ballistic missiles and will possess unique capabilities supporting the multi-tiered BMDS concept, providing boost phase defense against ballistic missile threats. ABL integrates three major subsystems (High Energy Laser (HEL); Beam Control/Fire Control (BC/FC); and Battle Management, Command, Control, Communications, Computers and Intelligence (BMC4I)) into a modified commercial 747 aircraft. ABL also includes ABL-specific ground support equipment.

A.2 System Element Budget Justification and Contribution to the Ballistic Missile Defense System (BMDS)

The primary mission of ABL is to significantly increase the overall defensive capability of the BMDS by reducing the number of targets faced by successive defenders and addressing certain threats difficult for other elements to counter. ABL is the lead boost defense element within the BMDS, uniquely adding the capability to destroy ballistic missiles from theater range to Intercontinental Ballistic Missile (ICBM) range during the boost phase. By destroying the missile in boost it also negates the threat prior to their ability to deploy multiple reentry vehicles, submunitions, or countermeasures. Additionally, warheads and engagement debris do not reach the intended target areas. Furthermore, there is a high probability that the threat missile debris will fall within the hostile country's own territory, serving as a deterrent and reducing the possible affect the debris has on protected areas and assets. Secondary missions, for an operational ABL, will be to provide additional threat protection through early ballistic missile launch warning, launch site prediction, cueing to BMDS, and impact point prediction. Detecting and tracking a missile during its boost phase significantly improves accurate estimation of the launch point location and therefore will enhance the probability of a successful counterstrike against an aggressor's missile launchers. ABL's sensor capabilities further increase the robustness of the BMDS by enhancing the performance of other

elements. In addition, the revolutionary aspect of ABL's mobility and speed-of-light directed energy weapon present adversaries with additional complexities when trying to develop or employ threat missile countermeasures. As an airborne platform, with aerial refueling capability, ABL adds unique deployment flexibility to quickly deploy to areas of interest and to more readily adapt to evolving situations that may threaten the US or its allies. Without ABL, MDA would have to address in much less viable ways both the further proliferation of threats that is expected and the likely adversary counters to the other BMDS elements.

A.3 Major System Element Goals

The development of the 1st ABL weapon system test bed will be accomplished by incrementally stepping through key knowledge points (increasing degrees of integration and testing of the integrated weapon system denoting significant levels of accumulated understanding) that confirm the ABL's viability. The Knowledge Points (KPs) are established on a calendar year basis, and are taken from major milestones within the program. Some of the major overall program milestones are:

- Completion of ground testing of a flight-worthy, weapon class laser suitable for use in an ABL (Completed December 2005)
- Completion of aircraft modifications necessary for integration of the High Energy Laser (HEL) segment (Completed August 2006)
- Completion of ground and flight testing of the integrated Battle Management Command Control Communications, Computers and Intelligence (BMC4I) and Beam Control/Fire Control (BC/FC) segments
- Completion of integration and ground/flight testing of the ABL weapon system combining the HEL, BC/FC, and BMC4I segments
- Successful demonstration of ABL lethality against a threat-representative boosting ballistic missile (lethal demonstration)
- Flight testing to expand the ABL weapon system performance envelope

Each milestone supports decisions to complete subsequent program milestones. In FY09, the program initiates the development of the 2nd ABL weapon system which will focus on addressing performance shortfalls, design weaponization, life cycle affordability and targeted improvements.

A.4 Major Events Schedule and Description

Major Event	Project	Timeframe	Description
Flight Test			
Testing Milestones			
Conduct High Power System Integration Flight Tests	0519	2Q FY 2009 - 4Q FY 2009	
Perform 1st In-Flight Atmospheric Compensation	0810	2Q FY 2007	• CY 06 Knowledge Point
Program Milestones			
System Demonstration	0519	4Q FY 2009	• Complete ABL System Demonstration

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Major Event	Project	Timeframe	Description
Ground Test			
Testing Milestones			
Conduct High Power System Integration Ground Tests	0519	2Q FY 2008 - 2Q FY 2009	
Complete Laser Module Tests in Laser SIL	0810	1Q FY 2006	• CY05 Knowledge Point (Completed Dec 05)
Complete Laser Optics Subsys Refurb & Test	0810	4Q FY 2006	• CY06 Knowledge Point (Completed Sep 06)
Complete Low Power Active Ground Testing	0810	1Q FY 2007	• CY06 Knowledge Point (Completed Dec 06)
Complete Low Power Active Flight Testing	0810	4Q FY 2007	• CY07 Knowledge Point
Other			
Program Milestones			
Aircraft and Support Systems Ready for HPSI	0519	1Q FY 2008	• CY07 Knowledge Point
Laser Installation on Aircraft	0810	4Q FY 2007 - 3Q FY 2008	

B. Program Change Summary	FY 2006	FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2007 PB)	471,673	631,616	577,442	455,800
Current President's Budget (FY 2008 PB)	455,572	628,958	548,759	432,432
Total Adjustments	-16,101	-2,658	-28,683	-23,368
Congressional Specific Program Adjustments	0	0	0	0
Congressional Undistributed Adjustments	0	-2,658	0	0
Reprogrammings	-7,645	0	0	0
SBIR/STTR Transfer	-8,456	0	0	0
Adjustments to Budget Years	0	0	-28,683	-23,368

FY06 decrease of $16.101 million includes SBIR/STTR transfer and MDA reprogrammings.

FY07 decrease of $2.658 million includes a portion of the MDA congressional undistributed reduction.

FY08 decrease of $28.683 million reflects MDA programmatic changes

FY09 decrease of $23.368 million reflects MDA programmatic changes.

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COST ($ in Thousands)	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
0810 Airborne Laser (ABL) Block 2006	431,847	595,427	0	0	0	0	0	0
RDT&E Articles Qty	0	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification

The Airborne Laser program achieved all Knowledge Points in both 2004 and 2005. On November 10, 2004, “First Light” was accomplished. The High Energy Laser fired its six modules simultaneously to produce photons and demonstrated the first-ever integration of the laser hardware and control software necessary to generate photons (2004 Knowledge Point). “First Flight” was achieved on December 3, 2004, at which time the Airborne Laser aircraft resumed flight testing after a two year modification and integration program (2004 Knowledge Point).

On December 9, 2005, the ABL program demonstrated the ability to reliably operate the laser for sufficient duration, and with enough power, to provide lethality at operationally significant ranges against all classes of ballistic missiles (2005 Knowledge Point). On July 28, 2005, the program completed a nine month flight test program (2005 Knowledge Point) in which the plane flew 28 missions and over 109 flight hours and accomplished the following: successfully unstowing (exposing to the outside environment) the conformal window during flight, verification of the flight envelope for the aircraft, verification of “floating” of the optics benches (allows for proper alignment of the laser beams during flight), and Link-16 communications implementation testing (key for integration into the Ballistic Missile Defense System). Upon completion, the aircraft returned to the Boeing facility in Wichita, Kansas for final structural modifications needed to install the High Energy Laser, along with the completion of Beam Control/Fire Control testing.

The ABL Program will continue the integration and ground and flight test activities for the 1st ABL weapon system test bed. It will also provide continued ABL specific technology maturation for integration and testing on subsequent blocks along with infrastructure sustainment to maintain and improve domestic capability to produce advanced optics and sensors for high-energy laser systems. More specifically, the ABL program will continue preparations for installation of the High Energy Laser (HEL) onto the aircraft, as well as continuing testing of the integrated Beam Control/Fire Control (BC/FC), aircraft, and Battle Management (BMC4I) systems, to include active testing with the beacon and tracking illuminators. The ABL program is designing, building, and testing an air-based laser system to acquire, track, and kill ballistic missiles. ABL integrates three major subsystems (High Energy Laser (HEL); Beam Control/Fire Control (BC/FC); and Battle Management, Command, Control, Communications, Computers and Intelligence (BMC4I)) into a modified commercial 747 aircraft. ABL also includes ABL-specific ground support equipment. ABL will provide the commander with an air-based revolutionary weapon system. This system will possess unique capabilities supporting the multi-tiered BMDS concept, providing boost phase defense against ballistic missile threats. The development of the 1st ABL weapon system test bed will be

accomplished by incrementally stepping through Knowledge Points (KPs) (increasing degrees of integration and testing of the integrated weapon system denoting significant levels of accumulated understanding) that confirm the ABL's viability. The KPs for Calendar Year (CY) 2006 are:

- Complete Low Power Active Ground Test - To achieve this KP, the program will have to install, activate and demonstrate ground operation of the beacon and tracking illuminators, as well as demonstrate automated interoperation of the entire low-power system
- Perform First In-Flight Atmospheric Compensation with the Tracking Illuminator Laser (TILL) tracking & Beacon Illuminator Laser (BILL) beacon - This KP demonstrates the critical atmospheric compensation portion of the system during flight
- Complete Laser Optics Subsystem Test - Completion of this KP will signal that a major portion of the laser refurbishment is complete and that the first major laser subsystems are ready for installation on the aircraft (Completed 28 Sep 06)

The Laser Optical and Diagnostics Subsystem refurbishment and test was completed in September 2006, three months ahead of the commitment date of December 31, 2006 and successfully verified that all high power optics and diagnostics systems were ready to support installation onto the aircraft. The Low Power System Integration-Active ground test series is expected to complete in late CY 2006. These tests focus on characterizing the functionality and performance of the illuminator lasers on the ground as a prerequisite for the subsequent flight test series. Although this Knowledge Point has presented significant technical challenges, several major accomplishments have already been achieved through this portion of the test program, including:

- First automated engagement sequence where the system proceeded from initial detection of an infrared signature, tracking it, firing the tracking Illuminator, firing of the Beacon Illuminator (simulated atmospheric compensation) to the final step of firing the Surrogate High Energy Laser on the ground
- Installation and multiple firings of the Tracking Illuminator and Beacon Illuminator lasers into the Range Simulator on the ground
- Completion of aircraft structural modifications necessary to support installation of the High Energy Laser

The remaining CY 2006 Knowledge Point, First In-Flight Atmospheric Compensation with Tracking Illuminator laser tracking and Beacon Illuminator laser beacon is directly linked to the completion of Low Power System Integration-Active ground testing and is now expected to be completed in 2Q FY07. Currently, the aircraft has returned to flight, successfully completing the aircraft functional check flight and initial Beam Control/Fire Control testing.

Although the program has made great strides in achieving the CY 2006 Knowledge Points, hardware and software integration issues have been experienced that have delayed the completion of two of the three CY 2006 Knowledge Points and has made the lethal demonstration scheduled in late CY 2008 unachievable. Given the technical challenges encountered during CY 2006, and the associated schedule slips, the date for lethal demonstration has moved to 4Q FY09.

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B. Accomplishments/Planned Program

	FY 2006	FY 2007	FY 2008	FY 2009
1st ABL	378,625	500,788	0	0
RDT&E Articles (Quantity)	0	0	0	0

Continue program for developing the 1st ABL weapon system test bed, to include start of the integration of the laser into the 1st ABL aircraft, the initiation of ground testing and the purchase of spares for the 1st ABL. Air Vehicle Integration and Test (AVIT) provides the main framework for integration of all aspects of the weapon system. The structural aircraft modification needed for lethal demonstration and the Low Power System Integration-Active (LPSI-A) ground testing have been completed. Also, the System Integration Laboratory (SIL) testing and laser disassembly have been completed. The laser refurbishment and retrofit of all High Energy Laser (HEL) parts have begun. In FY07, work will continue towards completion of LPSI-A flight testing and will begin on the integration of the HEL onto the aircraft. In addition, the remaining laser components will have completed refurbishment and any BC/FC refurbishment activities needed for High Power Systems Integration will be well underway. An increase in funding occurs from FY06 to FY07 mainly due to increased Air Vehicle Integration and Test (AVIT) activities at Edwards AFB, initiation of 1st ABL maintenance activities, spares purchases, and the implementation of amended security requirements.

FY06 Accomplishments:
Laser ($74.3 million):
- Initiated refurbishment and retrofit of major laser subsystems & components
- Completed planned design, component fabrication, and support of laser provisions integration

Aircraft ($16.5 million):
- Completed engineering support, design, drawings for aircraft structural modifications
- Completed engineering support, design, drawings, for laser provisioning

Beam Control/Fire Control (BC/FC) ($67.3 million):
- Completed Low Power System Integration-Active (LPSI-A) ground tests
- Completed integration of the Beacon Illuminator Laser (BILL) and Tracking Illuminator Laser (TILL) on the aircraft

Battle Management ($11.5 million):
- Completed software coding to support system ground test
- Continued software support of low-power flight tests

- Completed software and validation tests to support predictive avoidance certification

Air Vehicle Integration and Test ($176.5 million):
- Completed High Energy Laser (HEL) System Integration Lab (SIL) testing
  - Demonstrated long-duration lasing capability in the SIL
  - Demonstrated repeated long duration lasing
  - Performed power-chemical characterization tests
  - Completed laser SIL disassembly
  - Removed required laser components from the SIL in preparation for refurbishment
- Completed planned aircraft modifications, laser provisioning and laser integration work
- Began low-power system ground tests
  - Integrated tracking illuminator into the low-power system
  - Integrated the beacon illuminator into the low-power system
  - Demonstrated ground operation of the integrated low-power system in active mode, including a complete engagement sequence
- Began low-power system flight test planning

Program Management/System Engineering ($28.5 million):
- Continued System Engineering and Structural Integrity, Quality Assurance, Safety, Hardware and System Analysis and Integration
- Conducted baseline studies to capture 1st ABL baseline and identify required content and extent of ABL future improvement
- Conducted Common Cost Methodology Working Group (CCMWG) efforts in support of ABL life cycle cost estimates and affordability modeling

Other Support Activities ($4.0 million):
- Continued phased implementation of amended classification guidance and program protection plans

FY07 Planned Program:
Laser ($93.0 million):
- Completed laser optics subsystem refurbishment and test
- Complete planned laser refurbishment and retrofits

- Initiate laser integration support on the aircraft

Aircraft ($11.1 million):
- Continue engineering support for aircraft structural modifications, laser provisioning, Beam Control/Fire Control (BC/FC) upgrades and rework

Beam Control/Fire Control (BC/FC) ($84.2 million):
- Complete substantiation of acquisition pointing, and tracking with Tracking Illuminator Laser (TILL)
- Complete demonstration of Surrogate High Energy Laser (SHEL) scoring with illuminator laser beacons
- Complete demonstration of first in-flight atmospheric compensation with Tracking Illuminator Laser (TILL) tracking and Beacon Illuminator Laser (BILL)
- Complete substantiation of atmospheric compensation with TILL tracking and BILL

Battle Management ($5.5 million):
- Complete software support of low-power flight tests
- Continue software support of weapon system integration and test
- Continue Active Ranging System (ARS) development

Air Vehicle Integration and Test ($242.5 million):
- Completed Low Power System Integration-active (LPSI-A) ground tests
- Complete Low Power System Integration-active (LPSI-A) flight tests
- Complete substantiation of atmospheric compensation with Tracking Illuminator Laser (TILL) tracking and Beacon Illuminator Laser (BILL) in flight
- Characterize performance against a vertically accelerating target
- Initiate integration of the High Energy Laser (HEL) into the 1st ABL weapon system

Program Management/System Engineering ($36.6 million):
- Continue System Engineering and Structural Integrity, Quality Assurance, Safety, Hardware and System Analysis and Integration
- Conduct Common Cost Methodology Working Group (CCMWG) efforts in support of ABL life cycle cost estimates and affordability modeling
- Continue baseline studies to capture 1st ABL baseline and identify required content and extent of ABL future improvement

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Other Support Activities ($27.9 million):

- Initiate effort to sustain the 1st ABL aircraft to include: aircraft (engine wear and other maintenance), laser (valves and other plumbing, turbo pumps, gas generators, tanks), Beam Control/Fire Control (processors/cards, steering mirrors, illuminator diodes), Battle Management, Command, Control, Communication, Computers and Intelligence (processors/cards, Infrared Search and Track (IRST) components)
- Complete implementation of amended classification guidance and program protection plans
- Initiate engineering studies for future procurement of Deployable Ground Support Equipment (DGSE)

	FY 2006	FY 2007	FY 2008	FY 2009
Industrial Base	6,060	7,835	0	0
RDT&E Articles (Quantity)	0	0	0	0

Conduct investments to enhance the ABL specific industrial base with the focus on large optics, optical coatings and targeted manufacturing shortfalls for current and future ABL weapon systems. Maintain and utilize an industrial base to ensure ABL unique personnel, facilities and processes are available to meet future ABL requirements. Provide a rapid response capability if a critical component is needed while addressing sparing and long lead needs.

FY06 Accomplishments:

- Continued sustainment of optics fabrication and coating capabilities
- Continued improvements to bulkhead window production capability
- Continued optical coatings process and chamber control improvements
- Continued to improve Electron Bombarded Charged Couple Device (EBCCD) camera designs

FY07 Planned Program:

- Continue sustainment of optics fabrication and coating capabilities
- Continue improvements to bulkhead window production capability
- Continue optical coatings process and chamber control improvements
- Initiate higher performing, lower risk conformal window coating processes

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	FY 2006	FY 2007	FY 2008	FY 2009
Technology Insertion	6,661	15,733	0	0
RDT&E Articles (Quantity)	0	0	0	0

Develop promising technologies for possible incorporation into the 1st ABL weapon system and later ABLs. Efforts will focus on technologies that will improve ABL lethality, reliability, maintainability and improve ABL's contribution to the BMDS. Provide technical/schedule/cost risk reduction for the 1st ABL and future blocks. Focus on critical performance risk items and areas for high-payoff to operational utility. The increase in funding from FY06 to FY07 is due to additional development efforts for the enhanced illuminator laser.

FY06 Accomplishment:

- Continued efforts to reduce optical jitter and improve beam control performance
- Continued project to develop an enhanced illuminator laser
- Continued efforts to improve ABL's engagement capabilities
- Initiated surveillance sensor study to evaluate infrared search and track (IRST) follow-on options

FY07 Planned Program:

- Continue efforts to reduce optical jitter and improve beam control performance
- Continue to develop an enhanced illuminator laser
- Continue efforts to improve ABL's engagement capabilities
- Continue program to increase high energy laser power, efficiency, and operational regime
- Develop enhanced Electron Bombarded Charge Coupled Device (EBCCD) sensor

	FY 2006	FY 2007	FY 2008	FY 2009
Direct Support Activities	40,501	68,570	0	0
RDT&E Articles (Quantity)	0	0	0	0

The Block 2006 direct support activities include support for the increased operations tempo for the Combined Test Force (CTF), ground test activities at Edwards AFB, diagnostics for flight tests, boost diagnostics and lethality and survivability. The increase in funding for lethality and survivability from FY06 to FY07 is due to the increase in the number of target evaluations, initiation of efforts to evaluate alternate target aim-points and initiation of an aggressive full scale lethality evaluation testing process. The increase in funding for diagnostics/instrumentation is due to the purchase of diagnostics for post shoot down.

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FY06 Accomplishment:
Combined Test Force (CTF) ($12.3 million):
- Supported Low Power System Integration - Active (LPSI-A) ground and flight test activities at test ranges
- Supported System Integration Lab (SIL) disassembly and refurbishment as well as Hangar 151 modification

Lethality and Survivability ($13.1 million):
- Continued intelligence, lethality data collection, assessments and evaluations per Title 10 lethality and survivability requirements
- Developed modeling and simulation programs and integrated test data to identify compliance with the requirements

Diagnostics/Instrumentation ($15.1 million):
- Provided diagnostics to support ABL flight testing
- Prepared to execute up to 3 Low-Power Missile Alternative Range Target Instrument (MARTI) launches for LPSI-A
- Continued development of Big Crow (NC-135) backup target board for in-flight testing with ABL aircraft

FY07 Planned Program:
Combined Test Force (CTF) ($21.5 million):
- Support Low Power System Integration - Active (LPSI-A) ground and flight test activities at test ranges
- Support integration of the High Energy Laser (HEL) into the ABL aircraft
- Support System Integration Lab decontamination and disassembly

Lethality and Survivability ($16.2 million):
- Continue traditional susceptibility-driven survivability assessment in support of Title 10 lethality and survivability requirements
- Continue intelligence, lethality data collection, assessments and evaluations per Title 10 lethality and survivability requirements
- Initiate aggressive full scale lethality evaluation testing process to support FY09 shoot down

Diagnostics/Instrumentation ($30.9 million):
- Provide requirements for diagnostics and targets to the MDA Targets and Countermeasures Directorate to support the ABL test program
- Continue to develop and acquire High-Power Missile Alternative Range Target Instrument (MARTI) for High Power System Integration (HPSI) testing

- Integrate and launch low power MARTI missiles for Low Power System Integration (LPSI-A) (up to 3)
- Perform post mission analysis of ABL system performance
- Fabricate, integrate and test low power MARTI missiles
- Purchase high power MARTI boosters (up to 5)
- Development of high altitude loiter target
- Upgrade Big Crow target board diagnostic system as required (i.e. repaint missile silhouette, move Tracking Illuminator Laser (TILL), and install new camera filters)
- Continue storage of Lance and Foreign Military Asset (FMA) missiles

	FY 2006	FY 2007	FY 2008	FY 2009
Targets	0	2,501	0	0
RDT&E Articles (Quantity)	0	0	0	0

This effort provides the Missile Defense Agency with ballistic missile target hardware, target range support, logistics support, target integration, and associated launch services to support ABL Low Power System Integration-Active (LPSI-A) and High Power System Integration (HPSI) flight tests, as well as other system wide tests to support the development of the Ballistic Missile Defense System (BMDS).

FY07 Planned Program:

- Begin Medium Range Ballistic Missile (MRBM) target redesign to meet ABL unique requirements
- Begin coordination effort with launch range and mission management planning

C. Other Program Funding Summary

	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Total Cost
PE 0603175C Ballistic Missile Defense Technology	147,270	193,307	118,569	109,540	116,014	121,008	127,917	131,291	1,064,916
PE 0603881C Ballistic Missile Defense Terminal Defense Segment	1,120,879	1,092,076	962,585	1,004,282	924,101	851,213	678,694	501,147	7,134,977
PE 0603882C Ballistic Missile Defense Midcourse Defense Segment	2,391,246	3,043,058	2,520,064	2,359,665	2,179,602	1,699,963	1,153,082	1,183,003	16,529,683
PE 0603884C Ballistic Missile Defense Sensors	284,297	514,129	778,163	984,963	939,417	791,701	723,843	603,585	5,620,098
PE 0603886C Ballistic Missile Defense System Interceptors	200,446	356,004	227,499	393,317	522,388	730,236	836,029	570,206	3,836,125

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	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Total Cost
PE 0603888C Ballistic Missile Defense Test and Targets	610,619	601,782	586,150	628,364	662,984	681,511	696,037	705,210	5,172,657
PE 0603889C Ballistic Missile Defense Products	387,402	0	0	0	0	0	0	0	387,402
PE 0603890C Ballistic Missile Defense System Core	409,993	429,420	482,016	511,147	558,746	579,571	579,316	588,481	4,138,690
PE 0603891C Special Programs - MDA	271,021	353,031	323,250	305,409	369,073	526,966	789,017	792,271	3,730,038
PE 0603892C Ballistic Missile Defense Aegis	893,040	1,122,669	1,059,103	1,129,425	1,221,650	1,067,587	1,054,753	1,089,078	8,637,305
PE 0603893C Space Tracking & Surveillance System	220,048	322,220	331,525	347,811	412,623	501,197	778,067	981,424	3,894,915
PE 0603894C Multiple Kill Vehicle	48,370	144,362	271,151	352,741	461,179	618,263	673,477	842,905	3,412,448
PE 0603895C BMD System Space Program	0	0	27,666	35,093	46,849	56,183	133,617	157,117	456,525
PE 0603896C BMD C2BMC	0	246,852	258,913	294,627	300,847	282,615	267,275	269,420	1,920,549
PE 0603897C BMD Hercules	0	49,674	53,658	54,264	54,405	55,142	53,355	54,198	374,696
PE 0603898C BMD Joint Warfighter Support	0	54,935	48,787	50,428	54,086	56,603	58,890	60,206	383,935
PE 0603904C BMD Joint National Integration Center (JNIC)	0	110,629	104,012	106,985	111,542	111,947	113,592	115,287	773,994
PE 0603905C BMD Concurrent Test and Operations	0	23,159	0	0	0	0	0	0	23,159
PE 0603906C Regarding Trench	0	0	2,000	3,000	5,000	5,000	9,000	9,000	33,000
PE 0605502C Small Business Innovative Research - MDA	133,105	0	0	0	0	0	0	0	133,105
PE 0901585C Pentagon Reservation	14,874	15,527	6,058	6,376	4,490	4,725	4,801	4,877	61,728
PE 0901598C Management Headquarters - MDA	98,609	87,059	85,906	86,453	70,355	69,855	69,855	69,855	637,947

D. Acquisition Strategy

The Airborne Laser development follows the Missile Defense Agency's capability-based acquisition strategy that emphasizes testing, spiral development, and evolutionary acquisition. This approach systematically and incrementally adds more capability as technology matures. The FY06 and FY07 effort will implement improvements learned during prior years and will continue the program's integration and ground and flight test activities for the 1st ABL weapon system testbed. It will also provide continued ABL specific technology maturation for integration and testing on subsequent blocks along with infrastructure sustainment to maintain and improve domestic capability to produce advanced optics and sensors for high-energy laser systems.

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2007
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I. Product Development Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
1st ABL										
Prime Contract	C/CPAF	Boeing Defense & Space Group/ Seattle, WA	345,588	434,983	1/4Q	0	N/A	0	N/A	780,571
Service Life Extension Program	C/CPAF	Boeing Defense & Space Group/ Seattle, WA	0	6,900	1/4Q	0	N/A	0	N/A	6,900
BMDS Security	C/CPAF	Boeing Defense & Space Group/ Seattle, WA	4,029	9,640	1/4Q	0	N/A	0	N/A	13,669
1st ABL Spares	C/CPAF	Boeing Defense & Space Group/ Seattle, WA	0	10,900	1/4Q	0	N/A	0	N/A	10,900
Common Cost Methodology/Program Integration Spt	C/CPAF	Boeing Defense & Space Group/ Seattle, WA	2,167	2,316	1/4Q	0	N/A	0	N/A	4,483
Deployable Ground Support	C/CPAF	Boeing Defense & Space Group/ Seattle, WA	0	500	4Q	0	N/A	0	N/A	500
Technical Support Costs	C/CPAF	Northrop Grumman/Kirtland AFB, Various	16,171	16,489	1/4Q	0	N/A	0	N/A	32,660
FFRDC Support	MIPR	Aerospace/MITRE/Kirtland AFB	1,802	1,922	1/4Q	0	N/A	0	N/A	3,724
Technical Support Costs	MIPR	Tecolote Research/ Kirtland AFB	1,969	2,367	1/4Q	0	N/A	0	N/A	4,336
Government and Other Support Costs	C/FP	Brooks City Base/TX	394	475	1/4Q	0	N/A	0	N/A	869

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Government and Other Support Costs	MIPR	AFRL/Kirtland, Wright Patterson & Edwards AFB/ NM, CA, OH	2,487	2,916	1/4Q	0	N/A	0	N/A	5,403
Government and Other Support Costs	MIPR	NAVAIR/CA	400	415	1/4Q	0	N/A	0	N/A	815
Government and Other Support Costs	C/FP	Tyndall AFB	666	1,010	1/4Q	0	N/A	0	N/A	1,676
Government and Other Support Costs	MIPR	ABL SPO/Kirtland AFB/Multiple	2,452	5,088	1/4Q	0	N/A	0	N/A	7,540
Government and Other Support Costs	MIPR	ACC/VA	500	515	1/4Q	0	N/A	0	N/A	1,015
Logistics Costs	C/CPAF	Boeing Defense & Space Group	0	3,509	1/4Q	0	N/A	0	N/A	3,509
Government and Other Support Costs	MIPR	Kirtland AFB	0	843	N/A	0	N/A	0	N/A	843
Industrial Base										
Contract	SS/MIPR	Multiple, i.e. Lockheed Martin/Multiple/ MD, CA	5,518	7,048	N/A	0	N/A	0	N/A	12,566
Technical Support Costs	C/CPAF	Northrop Grumman/ Multiple	542	787	N/A	0	N/A	0	N/A	1,329
Technology Insertion										

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603883C Ballistic Missile Defense Boost Defense Segment

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Contract	SS/MIPR	Multiple, i.e. Northrop Grumman, Lockheed Martin/ Multiple, i.e. MD,CA	6,065	14,152	1/4Q	0	N/A	0	N/A	20,217
Technical Support Costs	C/CPAF	Northrop Grumman/Kirtland AFB, Multiple	596	1,581	1/4Q	0	N/A	0	N/A	2,177
Subtotal Product Development			391,346	524,356		0		0		915,702

Remarks

Operating support costs have been allocated to the activities they support.

II. Support Costs Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Subtotal Support Costs										

Remarks

III. Test and Evaluation Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Direct Support Activities										
Combined Test Force	MIPR	AFFTC/ Edwards AFB	12,313	21,500	1/4Q	0	N/A	0	N/A	33,813
Lethality & Survivability-Baseline Tests	MIPR	Kirtland AFB, NM/ Eglin AFB, FL	13,100	16,200	1/4Q	0	N/A	0	N/A	29,300
Diagnostics/Instrumentation	MIPR	Hanscom AFB, Peterson AFB, Hill AFB, Kirtland AFB/ MA, CO, UT, NM	15,088	30,870	1/4Q	0	N/A	0	N/A	45,958
Targets										
Targets	MIPR	Multiple	0	2,501	4Q	0	N/A	0	N/A	2,501
Subtotal Test and Evaluation			40,501	71,071		0		0		111,572

Remarks

IV. Management Services Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Subtotal Management Services										
Project Total Cost			431,847	595,427		0		0		1,027,274

Remarks

Remarks

Missile Defense Agency (MDA) Exhibit R-4 Schedule Profile

Date: **February 2007**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**

R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**

Fiscal Year	2006				2007				2008				2009				2010				2011				2012				2013			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Testing Milestones																																
Complete Laser Module Tests in Laser SIL	▲																															
Complete Laser Optics Subsys Refurb & Test				▲																												
Complete Low Power Active Ground Testing					▲																											
Perform 1st In-Flight Atmospheric Compensation						△																										
Complete Low Power Active Flight Testing								△																								
Program Milestones																																
Laser Installation on Aircraft								△	▬	▬	▬	△																				

Legend

▲	Significant Event (complete)	△	Significant Event (planned)
★	Milestone Decision (complete)	☆	Milestone Decision (planned)
◆	Element Test (complete)	◇	Element Test (planned)
▼	System Level Test (complete)	▽	System Level Test (planned)
▲▬▲	Complete Activity	△▬△	Planned Activity

Missile Defense Agency (MDA) Exhibit R-4A Schedule Detail	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**

Schedule Profile	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Testing Milestones								
Complete Laser Module Tests in Laser SIL	1Q							
Complete Laser Optics Subsys Refurb & Test	4Q							
Complete Low Power Active Ground Testing		1Q						
Perform 1st In-Flight Atmospheric Compensation		2Q						
Complete Low Power Active Flight Testing		4Q						
Program Milestones								
Begin SIL Disassembly and Parts Refurbishment	1Q							
Integrate TILL and BILL on Aircraft	3Q							
Complete A/C Modifications, Laser Provisioning	4Q							
Aircraft Return to Edwards AFB		2Q						
A/C Residual Provisioning and Mods/BCFC Upgrades		2Q-4Q						
Laser Installation on Aircraft		4Q	1Q-3Q					

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**

COST ($ in Thousands)	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
0519 Airborne Laser (ABL)	0	0	516,645	404,470	412,065	638,718	782,379	969,503
RDT&E Articles Qty	0	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification

In the FY08-FY09 timeframe, the ABL program continues the spiral development of the ABL for future integration of its capabilities into the Ballistic Missile Defense System (BMDS). The key component of this spiral activity is the 1st ABL Weapon System prototype. The 1st ABL advances and matures the technology as well as addresses the challenge of integration into a complete weapon system. The weapon system flight testing will culminate in a lethal demonstration of the weapon system. The 1st ABL will also serve as a flying test bed for advancing capabilities of future ABLs through technology and operations improvement. The FY08-FY09 ABL effort furthers ground and flight testing of the 1st ABL weapon system prototype, continues the ABL-specific technology and industrial base sustainment efforts, provides for enhancement of BMDS integration, and the initiation of future operational ground support development activities. In addition, the FY09 ABL program will establish a new contract for the 2nd ABL and initiate engineering studies in order to establish the capabilities baseline for an advanced (robust, supportable, and producible) 2nd ABL weapon system. The initial plans for the second ABL address four targeted areas for improvement. The four areas include: performance shortfalls, weaponization design, life cycle affordability, and targeted improvements. All four of these areas require incorporation of the lessons learned from the first aircraft program through lethal demonstration. The second aircraft will demonstrate an increase in lethal performance, full operational capability and have the ability to deploy.

In the FY10-FY11 timeframe, the ABL program continues the spiral development of the ABL for future integration of its capabilities into the BMDS. The FY10-FY11 ABL program includes envelope expansion activities. Envelope expansion refers to the further testing of the 1st ABL aircraft that evaluates the weapon system performance against a broader spectrum of threats as an integrated part of the overall BMDS, and also provides for enhancement of BMDS integration. ABL envelope expansion and participation in BMDS test activities with the 1st ABL prototype are planned throughout the Future Years Defense Program (FYDP). Envelope expansion tests will address ABL capabilities under different engagement conditions in terms of range, azimuth angle, elevation angle and optical turbulence. The intent is to use the 1st ABL aircraft to address, improve upon and test the lessons-learned and system upgrades prior to inclusion in the design of the 2nd ABL aircraft. The FY10-FY11 effort also continues trade studies and capability baseline efforts for defining the 2nd ABL weapon system leading to a completion of a System Requirements Review and System Functional Review. ABL-specific technology maturation and industrial base sustainment efforts also continue.

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2007
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The FY12-FY13 ABL program continues envelope expansion testing for the 1st ABL aircraft. Envelope expansion will address ABL capabilities against other types of ballistic missiles, such as a multiple-stage, solid-fuel, metal-case missile with an intercontinental range. As part of envelope expansion activities, remaining requirement verification items will be prioritized and integrated into test events after lethal demonstration. The FY12-FY13 ABL also initiates the acquisition activities for the purchase of the 2nd ABL airframe. The 2nd ABL aircraft is planned to be a production representative aircraft and to include in its design ready-for-combat improvements developed from the first ABL prototype aircraft program. Also, in the FY12-FY13 timeframe, the 2nd ABL efforts transition to the system design activities necessary to complete a System Design Review and support subsystem design work for a Preliminary Design Review. ABL-specific technology maturation and industrial base sustainment efforts also continue. The increase in funding in FY11-FY13 is due to the additional development efforts for the 2nd ABL weapon system culminating in a Critical Design Review (CDR).

B. Accomplishments/Planned Program

	FY 2006	FY 2007	FY 2008	FY 2009
1st ABL	0	0	422,929	306,700
RDT&E Articles (Quantity)	0	0	0	0

Continue the program for developing the 1st ABL weapon system test bed, to include the integration of the High Energy Laser (HEL) modules onto the aircraft (after which it will be a fully integrated weapon system) and initiation of the High Power System Integration (HPSI) phase of testing. The primary objectives of ground testing during the HPSI phase will be to demonstrate, verify, and characterize the 1st ABL weapon system operations and performance, characterize functionality and performance of the entire ABL weapon system and verify the readiness of the 1st ABL aircraft for HPSI flight tests. The primary objective of flight testing during the HPSI phase is to accomplish the ABL lethal demonstration: negating a threat-representative ballistic missile during the boost phase.

FY08 Planned Program:
Laser ($56.4 million):

- Support High Energy Laser (HEL) integration activities to include material analysis, structural analysis and initial performance measurements
- Perform HEL performance data analysis during ground testing
- Support HEL and Beam Control/Fire Control (BC/FC) laser integration issues

Aircraft ($11.6 million):

- Continue aircraft engineering support during High Energy Laser (HEL) component integration
- Continue work on aircraft service bulletins

- Continue aircraft integration efforts

Battle Management ($4.6 million):
- Continue software support for High Power Systems Integration (HPSI)
- Perform ground functional testing of Link-16 communications, predictive avoidance, mission planning activities, and communication checks

Beam Control/Fire Control ($41.7 million):
- Complete beam control component refurbishment in preparation of High Power System Integration (HPSI) efforts
- Complete integration with High Energy Laser (HEL)
- Begin HEL to Beam Control/Fire Control ground testing activities

Air Vehicle Integration and Test ($253.4 million):
- Complete wiring, plumbing, and installation of High Energy Laser (HEL) components on the aircraft
- Complete HEL activation and begin testing of the HEL system
- Begin weapon system testing with Beam Control/Fire Control (BC/FC), HEL and Battle Management, Command, Control, Communications, Computers and Intelligence (BMC4I) subsystems on the ground
- Continue flight test planning of ABL weapon system

Program Management/System Engineering ($33.1 million):
- Continue System Engineering and Structural Integrity, Quality Assurance, Safety, Hardware and System Analysis and Integration
- Conduct Common Cost Methodology Working Group (CCMWG) efforts in support of ABL life cycle cost estimates and affordability modeling
- Continue baseline studies to capture 1st ABL baseline and identify required content and extent of ABL future improvement

Other Support Activities ($22.2 million):
- Continue the implementation of amended security requirements
- Continue effort to sustain the 1st ABL aircraft to include: aircraft (engine wear and other maintenance), laser (valves and other plumbing, turbo pumps, gas generators, tanks), and Beam Control/Fire Control (processors/cards, steering mirrors, illuminator components and turret), Battle Management, Command, Control, Communications, Computers and Intelligence (BMC4I) (processors/cards, Infrared Search and Track (IRST) components)

- Continue purchases of spares supporting ABL test activities to ensure critical components are available to meet more demanding laser firings and flight testing of all integrated systems
- Continue Active Ranging System (ARS) trade studies to determine requirements and conduct analysis of alternatives

FY09 Planned Program:
Laser ($34.0 million):
- Continue High Energy Laser (HEL) data analysis in support of High Power Systems Integration (HPSI) testing
- Prepare for weapon system envelope expansion activities

Aircraft ($7.7 million):
- Perform aircraft maintenance as needed
- Support ABL weapon system flight testing
- Perform post-lethal demonstration activity planning, i.e., flight test and envelope expansion

Battle Management ($3.2 million):
- Continue software support for High Power Systems Integration (HPSI)
- Perform functional testing of Link-16 communications, predictive avoidance, mission planning activities, and communication checks

Beam Control/Fire Control ($47.7 million):
- Support High Power Systems Integration (HPSI) activities
- Complete Beam Control/Fire Control and High Energy Laser (HEL) ground testing data analysis
- Complete weapon system flight demonstration data analysis to include pointing accuracy and jitter control analyses

Air Vehicle Integration and Test ($170.6 million):
- Complete ground testing of the HEL system
- Complete weapon system ground testing with High Energy Laser, Beam Control/Fire Control, and Battle Management, Command, Control, Communications, Computers and Intelligence (BMC4I) subsystems
- Complete ABL weapon system flight testing/lethal demonstration

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**

Program Management/System Engineering ($22.2 million):

- Continue System Engineering and Structural Integrity, Quality Assurance, Safety, Hardware and System Analysis and Integration
- Conduct Common Cost Methodology Working Group (CCMWG) efforts in support of ABL life cycle cost estimates and affordability modeling
- Continue baseline studies to capture 1st ABL baseline and identify required content and extent of ABL future improvement

Other Support Activities ($21.0 million):

- Complete implementation of amended security requirements
- Continue effort to sustain the 1st ABL aircraft to include: aircraft (engine wear and other maintenance), laser (valves and other plumbing, turbo pumps, gas generators, tanks), Beam Control/Fire Control (processors/cards, steering mirrors, illuminator components and turret), Battle Management, Command, Control, Communications, Computers and Intelligence (BMC4I) (processors/cards, Infrared Search and Track (IRST) components)
- Continue purchases of spares supporting ABL test activities to ensure critical components are available to meet more demanding laser firings and flight testing of all integrated systems
- Continue Active Ranging System (ARS) trade studies to determine requirements and conduct analysis of alternatives

	FY 2006	FY 2007	FY 2008	FY 2009
Industrial Base	0	0	9,373	11,463
RDT&E Articles (Quantity)	0	0	0	0

Conduct investments to enhance the ABL specific industrial base with the focus on large optics, optical coatings and targeted manufacturing shortfalls for current and future ABL weapon systems. Maintain and utilize an industrial base to ensure ABL unique personnel, facilities and processes are available to meet future ABL requirements. Provide a rapid response capability if a critical component is needed while addressing sparing and long lead needs.

FY08 Planned Program:

- Continue development of advanced optics coatings
- Maintain optics testing capabilities while testing new optics, materials, and coatings
- Develop and certify government-owned large optics coating capability
- Continue improvements to bulkhead window production capability
- Continue optical coatings process and chamber control improvements

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FY09 Planned Program:
- Continue development of advanced optics coatings
- Maintain optics testing capabilities while testing new optics, materials, and coatings
- Maintain and utilize government-owned large optics coating capability
- Continue improvements to bulkhead window production capability
- Continue optical coatings process and chamber control improvements

	FY 2006	FY 2007	FY 2008	FY 2009
Technology Insertion	0	0	11,716	14,152
RDT&E Articles (Quantity)	0	0	0	0

Develop promising technologies for possible incorporation into the 1st ABL weapon system and later ABLs. Efforts will focus on technologies that will improve ABL lethality, reliability, maintainability and improve ABL's contribution to the Ballistic Missile Defense System (BMDS). Provide technical/schedule/cost risk reduction for the 1st ABL and future ABLs. Focus on critical performance risk items and areas for high-payoff to operational utility.

FY08 Planned Program:
- Continue next-generation tracking laser development
- Develop 1/10 scale High Energy Laser (HEL) testbed
- Develop and build next generation mirrors, cameras, and navigation aids
- Continue improvements to bulkhead window production capability
- Continue optical coatings process and chamber control improvements
- Continue efforts to reduce optical jitter and improve beam control performance
- Continue development of next generation Singlet Oxygen Generator

FY09 Planned Program:
- Complete next-generation tracking laser development
- Continue testing on 1/10 scale High Energy Laser (HEL) testbed
- Integrate advanced steering mirrors on the first aircraft
- Continue development and production of next generation mirrors, cameras, and navigation aids

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2007
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- Continue efforts to reduce optical jitter and improve beam control performance
- Continue development of next generation Singlet Oxygen Generator

	FY 2006	FY 2007	FY 2008	FY 2009
Direct Support Activities	0	0	61,100	44,200
RDT&E Articles (Quantity)	0	0	0	0

Direct support activities include support for the increased operations tempo for the Combined Test Force (CTF), ground test activities at Edwards AFB, diagnostics for flight tests, boost diagnostics and lethality and survivability efforts.

FY08 Planned Program:
Combined Test Force ($20.5 million):

- Support integration of the High Energy Laser (HEL) into the ABL aircraft
- Conduct planning for and support High Power System Integration (HPSI) ground test activities
- Conduct planning for and support High Power System Integration (HPSI) flight test activities

Lethality and Survivability ($10.6 million):

- Continue sub-scale and full-scale lethality evaluation testing to support lethal demonstration
- Continue intelligence, lethality data collection, assessments and evaluation per Title 10 lethality and survivability requirements
- Continue traditional susceptibility-driven survivability assessment in support of Title 10 lethality and survivability requirements

Diagnostics/Instrumentation ($30.0 million):

- Integrate Terrier Lynx missiles for High Power System Integration (HPSI) (up to 2)
- Integrate low power Missile Alternative Range Target Instrumentation (MARTI) missiles for HPSI (up to 3)
- Integrate and launch high power MARTI missile for HPSI (up to 3)
- Fabricate, integrate and test high power MARTI missiles (up to 5)
- Continue storage of Lance and Foreign Military Asset (FMA) missiles
- Continue development of the high power loiter target

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2007
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FY09 Planned Program:

Combined Test Force ($18.5 million):

- Conduct planning for and support High Power System Integration (HPSI) flight test activities to include system demonstration
- Conduct planning for and support contract close-out test activities
- Conduct planning for Envelope Expansion flight testing to include increased participation in Ballistic Missile Defense System (BMDS) level testing

Lethality and Survivability ($12.1 million):

- Continue sub-scale and full-scale lethality evaluation testing to support lethal demonstration
- Continue intelligence, lethality data collection, assessments and evaluation per Title 10 lethality and survivability requirements
- Begin aircraft vulnerability assessments and investigations per Title 10 lethality and survivability requirements

Diagnostics/Instrumentation ($13.6 million):

- Integrate and launch low power and high power Missile Alternative Range Target Instrumentation (MARTI) missiles (up to 2 each)
- Complete fabrication, integration and testing of high power MARTI missiles (up to 5)
- Perform post mission analysis of ABL system performance

	FY 2006	FY 2007	FY 2008	FY 2009
Targets	0	0	11,527	12,155
RDT&E Articles (Quantity)	0	0	0	0

This effort provides the Missile Defense Agency with ballistic missile target hardware, target range support, logistics support, target integration, and associated launch services to support ABL Low Power System Integration-Active (LPSI-A) and High Power System Integration (HPSI) flight tests, as well as other system wide tests to support the development of the Ballistic Missile Defense System (BMDS).

FY08 Planned Program:

- Begin procurement activities for one Medium Range Ballistic Missile (MRBM) class target, as well as begin MRBM target redesign for launch in FY10
- Continue coordination efforts with launch range and mission management activities for MRBM missions (FY10)
- Begin range coordination and mission management planning for Foreign Military Asset (FMA) missions (FY09) and Missile Alternative Range Target Instrumentation (MARTI) and Terrier Lynx missions (FY10)

- Begin procurement effort for Terrier Lynx and Black Brant target vehicles as well as for MARTI instrumentation payloads
- Begin range coordination and mission management planning for Terrier Lynx missions (FY10)

FY09 Planned Program:
- Integrate and test Medium Range Ballistic Missile (MRBM) launch vehicles
- Perform initial Foreign Military Asset (FMA) vehicle preparation and testing
- Integrate and test FMA launch vehicle prior to transporting to launch range
- Transport FMA target vehicle and support systems to/from the launch range
- Continue range coordination and mission management activities for the FMA mission and Terrier Lynx and Missile Alternative Range Target Instrumentation (MARTI) missions (FY10)
- Perform launch base preparations for the FMA mission Launch FMA vehicle and perform FMA post mission analysis
- Continue procurement effort for Terrier Lynx vehicles, Terrier Black Brant vehicles, MARTI Instrumentation payloads and perform initial Terrier Lynx vehicle preparation and testing
- Perform initial MARTI vehicle preparation and testing as well as payload testing

	FY 2006	FY 2007	FY 2008	FY 2009
2nd ABL	0	0	0	15,800
RDT&E Articles (Quantity)	0	0	0	0

The 2nd ABL effort focuses on developing and producing an ABL that will demonstrate enhancements to the 1st ABL prototype aircraft effort. The 2nd ABL aircraft will be a “production-like” ABL weapon system.

FY09 Planned Program:
- Establish a new contract and initiate engineering trade studies for the 2nd ABL aircraft

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603883C Ballistic Missile Defense Boost Defense Segment

C. Other Program Funding Summary

	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Total Cost
PE 0603175C Ballistic Missile Defense Technology	147,270	193,307	118,569	109,540	116,014	121,008	127,917	131,291	1,064,916
PE 0603881C Ballistic Missile Defense Terminal Defense Segment	1,120,879	1,092,076	962,585	1,004,282	924,101	851,213	678,694	501,147	7,134,977
PE 0603882C Ballistic Missile Defense Midcourse Defense Segment	2,391,246	3,043,058	2,520,064	2,359,665	2,179,602	1,699,963	1,153,082	1,183,003	16,529,683
PE 0603884C Ballistic Missile Defense Sensors	284,297	514,129	778,163	984,963	939,417	791,701	723,843	603,585	5,620,098
PE 0603886C Ballistic Missile Defense System Interceptors	200,446	356,004	227,499	393,317	522,388	730,236	836,029	570,206	3,836,125
PE 0603888C Ballistic Missile Defense Test and Targets	610,619	601,782	586,150	628,364	662,984	681,511	696,037	705,210	5,172,657
PE 0603889C Ballistic Missile Defense Products	387,402	0	0	0	0	0	0	0	387,402
PE 0603890C Ballistic Missile Defense System Core	409,993	429,420	482,016	511,147	558,746	579,571	579,316	588,481	4,138,690
PE 0603891C Special Programs - MDA	271,021	353,031	323,250	305,409	369,073	526,966	789,017	792,271	3,730,038
PE 0603892C Ballistic Missile Defense Aegis	893,040	1,122,669	1,059,103	1,129,425	1,221,650	1,067,587	1,054,753	1,089,078	8,637,305
PE 0603893C Space Tracking & Surveillance System	220,048	322,220	331,525	347,811	412,623	501,197	778,067	981,424	3,894,915
PE 0603894C Multiple Kill Vehicle	48,370	144,362	271,151	352,741	461,179	618,263	673,477	842,905	3,412,448
PE 0603895C BMD System Space Program	0	0	27,666	35,093	46,849	56,183	133,617	157,117	456,525
PE 0603896C BMD C2BMC	0	246,852	258,913	294,627	300,847	282,615	267,275	269,420	1,920,549
PE 0603897C BMD Hercules	0	49,674	53,658	54,264	54,405	55,142	53,355	54,198	374,696
PE 0603898C BMD Joint Warfighter Support	0	54,935	48,787	50,428	54,086	56,603	58,890	60,206	383,935
PE 0603904C BMD Joint National Integration Center (JNIC)	0	110,629	104,012	106,985	111,542	111,947	113,592	115,287	773,994
PE 0603905C BMD Concurrent Test and Operations	0	23,159	0	0	0	0	0	0	23,159
PE 0603906C Regarding Trench	0	0	2,000	3,000	5,000	5,000	9,000	9,000	33,000
PE 0605502C Small Business Innovative Research - MDA	133,105	0	0	0	0	0	0	0	133,105
PE 0901585C Pentagon Reservation	14,874	15,527	6,058	6,376	4,490	4,725	4,801	4,877	61,728
PE 0901598C Management Headquarters - MDA	98,609	87,059	85,906	86,453	70,355	69,855	69,855	69,855	637,947

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**

D. Acquisition Strategy

The overall strategy of the 1st ABL aircraft is to apply a building block approach to a dual-path integration and test process. This parallel approach provides earlier opportunities to characterize the key High Energy Laser weapon system parameters and identify and mitigate development risk. Furthermore, in order to mitigate risk and optimize cost, schedule, and technical objectives, the Airborne Laser program is using a knowledge based acquisition approach consisting of yearly Knowledge Points. The focus of the program is on near-term activities that will incrementally step the program through key technical challenges leading to a successful lethal demonstration in Fiscal Year 2009. Further actions planned for the 1st Airborne Laser aircraft after lethal demonstration include: contract closeout activities and envelope expansion tests (beginning in FY10) to demonstrate and verify Airborne Laser integration into the Ballistic Missile Defense System. Combined, all these activities provide the framework for mitigating cost, schedule, and technical challenges within the Future-Years Defense Program (FYDP).

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603883C Ballistic Missile Defense Boost Defense Segment

I. Product Development Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
1st ABL										
Prime Contract	C/CPAF	Boeing Defense & Space Group/ Seattle, WA	0	0	N/A	362,090	1/4Q	246,287	1/4Q	608,377
1st AC Maintenance	C/CPAF	Boeing Defense & Space Group/ Seattle, WA	0	0	N/A	5,200	1/4Q	5,000	1/4Q	10,200
BMDS Security	C/CPAF	Boeing Defense & Space Group/ Seattle, WA	0	0	N/A	7,500	1/4Q	6,000	1/4Q	13,500
1st ABL Spares	C/CPAF	Boeing Defense & Space Group/ Seattle, WA	0	0	N/A	7,500	1/4Q	6,000	1/4Q	13,500
Ground Support	C/CPAF	Boeing Defense & Space Group/ Seattle, WA	0	0	N/A	0	4Q	0	1/4Q	
Technical Support Costs	C/CPAF	Northrop Grumman/ Kirtland AFB/ Various	0	0	N/A	19,786	1/4Q	20,762	1/4Q	40,548
FFRDC Support	MIPR	Aerospace/MITRE /Kirtland AFB	0	0	N/A	1,966	1/4Q	2,012	1/4Q	3,978
Technical Support Costs	C/MIPR	Tecolote Research/ Kirtland AFB	0	0	N/A	2,462	1/4Q	2,516	1/4Q	4,978
Logistics Costs	C/CPAF	Boeing Defense & Space / Seattle, WA	0	0	N/A	3,649	4Q	3,949	1/4Q	7,598

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Government and Other Support Costs	MIPR	AFRL/Kirtland AFB/ MA, Multiple	0	0	N/A	3,290	1/4Q	3,474	1/4Q	6,764
Government and Other Support Costs	MIPR	NAVAIR/ CA	0	0	N/A	425	1/4Q	450	1/4Q	875
Government and Other Support Costs	C/FP	ABL SPO/Kirtland AFB/ Multiple	0	0	N/A	4,898	1/4Q	5,005	1/4Q	9,903
Government and Other Support Costs	MIPR	ABL SPO/Kirtland AFB/ Multiple	0	0	N/A	1,064	1/4Q	1,071	1/4Q	2,135
Government and Other Support Costs	MIPR	ACC/Virginia	0	0	N/A	530	1/4Q	546	1/4Q	1,076
Government and Other Support Costs	MIPR	Brooks City Base/ TX	0	0	N/A	475	1/4Q	480	1/4Q	955
Other Support Costs	MIPR	AFRL/Tyndall AFB/FL	0	0	N/A	635	1/4Q	335	1/4Q	970
CCMWG/Program Integration Support	CPAF	Boeing Defense & Space / Seattle, WA	0	0	N/A	1,459	1/4Q	2,813	1/4Q	4,272
Industrial Base										
Contract	SS/MIPR	Multiple, i.e. Lockheed Martin/Multiple/ MD, CA	0	0	N/A	8,000	N/A	8,100	N/A	16,100
Technical Support Costs	C/CPAF	Northrop Grumman/ Kirtland AFB, Multiple	0	0	N/A	1,373	N/A	3,363	N/A	4,736

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603883C Ballistic Missile Defense Boost Defense Segment

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Technology Insertion										
Contract	SS/MIPR	Multiple, i.e. Lockheed Martin/Multiple/ MD, CA	0	0	N/A	10,000	1/4Q	10,000	1/4Q	20,000
Technical Support Costs	C/CPAF	Northrop Grumman/ Kirtland AFB, Multiple	0	0	N/A	1,716	N/A	4,152	N/A	5,868
2nd ABL										
2nd ABL Contract	C/CPAF	Boeing Defense & Space Group/ Seattle, WA	0	0	N/A	0	N/A	15,800	1/4Q	15,800
Subtotal Product Development			0	0		444,018		348,115		792,133

Remarks

II. Support Costs Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Subtotal Support Costs										

Remarks

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**

III. Test and Evaluation Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Direct Support Activities										
Combined Test Force	MIPR	AFFTC/ Edwards AFB	0	0	N/A	20,500	1/4Q	18,500	1/4Q	39,000
Lethality & Survivability Baseline Tests	MIPR	AFRL/Eglin AFB/ NM, FL	0	0	N/A	10,600	N/A	12,100	N/A	22,700
Diagnostics/Instrumentation	MIPR	Hanscom AFB, Peterson AFB, Hill AFB, Kirtland AFB/ MA, VA, NM	0	0	N/A	30,000	N/A	13,600	N/A	43,600
Targets										
Targets	MIPR	Multiple	0	0	N/A	11,527	N/A	12,155	N/A	23,682
Subtotal Test and Evaluation			0	0		72,627		56,355		128,982

Remarks

IV. Management Services Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2007 Cost	FY 2007 Award/ Oblg Date	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Subtotal Management Services										

Remarks

Project Total Cost			0	0		516,645		404,470		921,115

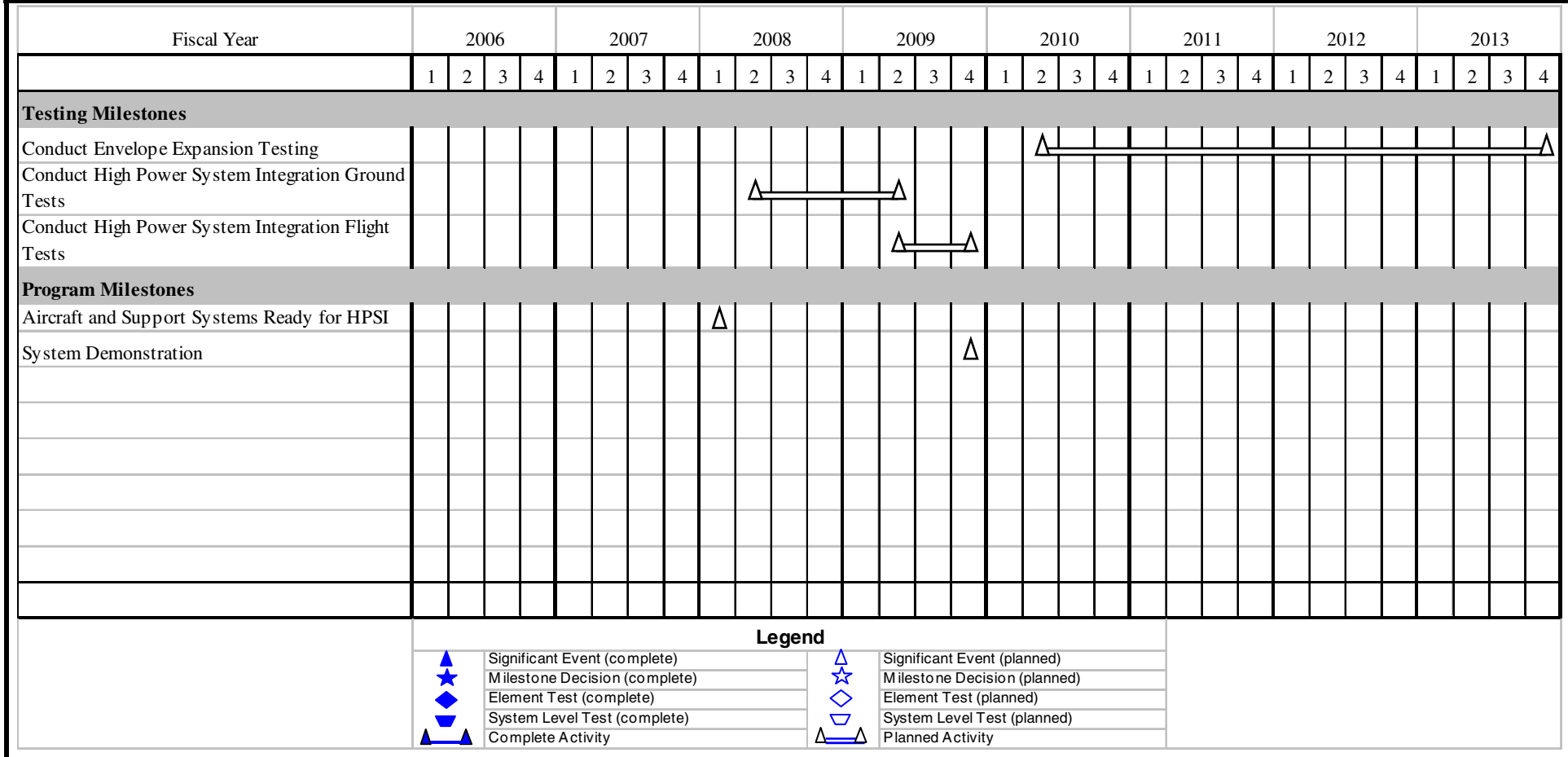
Remarks

Missile Defense Agency (MDA) Exhibit R-4 Schedule Profile

Date: **February 2007**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**

R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**



Missile Defense Agency (MDA) Exhibit R-4A Schedule Detail	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**

Schedule Profile	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Testing Milestones								
Conduct Envelope Expansion Testing					2Q-4Q	1Q-4Q	1Q-4Q	1Q-4Q
Conduct High Power System Integration Ground Tests			2Q-4Q	1Q-2Q				
Conduct High Power System Integration Flight Tests				2Q-4Q				
Program Milestones								
Aircraft and Support Systems Ready for HPSI			1Q					
System Demonstration				4Q				

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603883C Ballistic Missile Defense Boost Defense Segment**

COST ($ in Thousands)	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
0602 Program-Wide Support	23,725	33,531	32,114	27,962	36,310	40,195	47,304	56,736
RDT&E Articles Qty	0	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification

Program-Wide Support provides funding for common non-headquarters support functions across the entire program such as strategic planning, program integration, business management, cost estimating, contracting, and financial management, to include preparation of financial statements, reimbursement of financial services provided by DFAS, internal review and audit, earned-value management, and program assessment. Includes costs for both government civilians performing these functions, as well as outside services and support contractors that augment government staff in these areas. Many of these costs reside within the Missile Defense Agency Executing Agents in the Services: Army Space and Missile Defense Command, Army PEO Space and Missile Defense, Office of Naval Research, and various Air Force laboratory and acquisition activities, although some functions and costs within this program element are performed by MDA employees assigned within the National Capital Region (NCR). Other costs included herein provide facility capabilities for MDA Executing Agent locations, such as physical and technical security, legal services, travel and training, office and equipment leases, utilities and communications, supplies and maintenance, and similar operating expenses. Also includes funding for charges on canceled appropriations in accordance with Public Law 101-510, legal settlements, and foreign currency fluctuation on a limited number of foreign contracts.

B. Accomplishments/Planned Program

	FY 2006	FY 2007	FY 2008	FY 2009
Civilian Salaries and Support	23,725	33,531	32,114	27,962
RDT&E Articles (Quantity)	0	0	0	0

See Section A: Mission Description and Budget Item Justification

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603883C Ballistic Missile Defense Boost Defense Segment

C. Other Program Funding Summary

	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Total Cost
PE 0603175C Ballistic Missile Defense Technology	147,270	193,307	118,569	109,540	116,014	121,008	127,917	131,291	1,064,916
PE 0603881C Ballistic Missile Defense Terminal Defense Segment	1,120,879	1,092,076	962,585	1,004,282	924,101	851,213	678,694	501,147	7,134,977
PE 0603882C Ballistic Missile Defense Midcourse Defense Segment	2,391,246	3,043,058	2,520,064	2,359,665	2,179,602	1,699,963	1,153,082	1,183,003	16,529,683
PE 0603884C Ballistic Missile Defense Sensors	284,297	514,129	778,163	984,963	939,417	791,701	723,843	603,585	5,620,098
PE 0603886C Ballistic Missile Defense System Interceptors	200,446	356,004	227,499	393,317	522,388	730,236	836,029	570,206	3,836,125
PE 0603888C Ballistic Missile Defense Test and Targets	610,619	601,782	586,150	628,364	662,984	681,511	696,037	705,210	5,172,657
PE 0603889C Ballistic Missile Defense Products	387,402	0	0	0	0	0	0	0	387,402
PE 0603890C Ballistic Missile Defense System Core	409,993	429,420	482,016	511,147	558,746	579,571	579,316	588,481	4,138,690
PE 0603891C Special Programs - MDA	271,021	353,031	323,250	305,409	369,073	526,966	789,017	792,271	3,730,038
PE 0603892C Ballistic Missile Defense Aegis	893,040	1,122,669	1,059,103	1,129,425	1,221,650	1,067,587	1,054,753	1,089,078	8,637,305
PE 0603893C Space Tracking & Surveillance System	220,048	322,220	331,525	347,811	412,623	501,197	778,067	981,424	3,894,915
PE 0603894C Multiple Kill Vehicle	48,370	144,362	271,151	352,741	461,179	618,263	673,477	842,905	3,412,448
PE 0603895C BMD System Space Program	0	0	27,666	35,093	46,849	56,183	133,617	157,117	456,525
PE 0603896C BMD C2BMC	0	246,852	258,913	294,627	300,847	282,615	267,275	269,420	1,920,549
PE 0603897C BMD Hercules	0	49,674	53,658	54,264	54,405	55,142	53,355	54,198	374,696
PE 0603898C BMD Joint Warfighter Support	0	54,935	48,787	50,428	54,086	56,603	58,890	60,206	383,935
PE 0603904C BMD Joint National Integration Center (JNIC)	0	110,629	104,012	106,985	111,542	111,947	113,592	115,287	773,994
PE 0603905C BMD Concurrent Test and Operations	0	23,159	0	0	0	0	0	0	23,159
PE 0603906C Regarding Trench	0	0	2,000	3,000	5,000	5,000	9,000	9,000	33,000
PE 0605502C Small Business Innovative Research - MDA	133,105	0	0	0	0	0	0	0	133,105
PE 0901585C Pentagon Reservation	14,874	15,527	6,058	6,376	4,490	4,725	4,801	4,877	61,728
PE 0901598C Management Headquarters - MDA	98,609	87,059	85,906	86,453	70,355	69,855	69,855	69,855	637,947

Missile Defense Agency (MDA) Exhibit R-2 RDT&E Budget Item Justification	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603884C Ballistic Missile Defense Sensors**

COST ($ in Thousands)	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Total PE Cost	284,297	514,129	778,163	984,963	939,417	791,701	723,843	603,585
0811 Ballistic Missile Defense Radars Block 2006	251,427	223,374	169,258	142,946	0	0	0	0
0911 Ballistic Missile Defense Radars Block 2008	27,568	274,913	543,680	506,892	160,553	195,337	0	0
0011 Ballistic Missile Defense Radars Block 2010	0	7,030	45,031	310,007	660,831	423,722	265,919	270,345
R111 Ballistic Missile Defense Radars Block 2012	0	0	0	0	91,144	154,476	440,827	317,219
0602 Program-Wide Support	5,302	8,812	20,194	25,118	26,889	18,166	17,097	16,021
Amount Included in PE 0904903D					-151,670	-111,212	-120,268	-131,192
Total PE Cost Reflected in R-1	284,297	514,129	778,163	984,963	787,747	680,489	603,575	472,393

Note: During FY06 the FBX-T and THAAD radars were officially assigned the military designation of AN/TPY-2. The new nomenclature is as follows: AN/TPY-2 #1 (THAAD Engineering Manufacturing Development (EMD) #1); AN/TPY-2 #2 (FBX-T #1); AN/TPY-2 #3 (FBX-T #2); AN/TPY-2 #4 (THAAD EMD #2); AN/TPY-2 #5 (FBX-T #3) to THAAD for THAAD use; and AN/TPY-2 #6 (FBX-T #4). THAAD is covered under Program Element (PE) 0603881C.

A. Mission Description and Budget Item Justification

A.1 System Element Description

The Ballistic Missile Defense System (BMDS) architectural objectives of the Sensors Directorate are to close existing sensor coverage gaps and expand the number of Engagement Sequence Groups (ESGs). The Sensors Directorate's mission is to develop, acquire, field, test and operate BMDS sensors utilizing the Block approach to deliver increasing BMDS capabilities. MDA is using an integrated layered approach to develop a sensor network that is integrated with the BMDS through the Command and Control, Battle Management and Communication (C2BMC) system. Sensor networking and data fusion are coordinated efforts between C2BMC and the Sensors. The Sensor Program Element (PE) supports BMDS-level test requirements as delineated through the MDA Integrated Master Test Plan (IMTP) and contributes to BMDS Concurrent Test, Training and Operations (CTTO) activities that will safely separate test, evaluation, and training venues from real-world activities; and allow injection of high-fidelity simulations to run realistic scenarios on operational equipment and networks. CTTO will enable end-to-end testing of the BMDS and enable BMDS training that allows operators to exercise any or all BMDS elements, as needed. The Sensor elements in this PE have been defined in coordination with Systems Engineering. Fielding of these Sensors will occur in conjunction with the BMDS blocks: Block 2006 (Project 0811), Block 2008 (Project 0911), Block 2010 (Project 0011) and Block 2012 (Project R111).

Missile Defense Agency (MDA) Exhibit R-2 RDT&E Budget Item Justification	Date: February 2007
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603884C Ballistic Missile Defense Sensors**

The Ballistic Missile Defense (BMD) Radars Program Element (PE) effort includes:

- Development and delivery of forward-based AN/TPY-2s
- Upgrade to the Thule Early Warning Radar (EWR)
- Demonstrations and experiments with the External Sensors Laboratory (ESL) for forward-based radar
- Upgrade to the European Midcourse Radar (EMR), formerly known as the Ground Based Radar-Prototype (GBR-P)
- Development of the Adjunct Sensor
- Continuation of the Airborne Infrared Sensors (AIRS) program evaluating the military utility of AIRS to the BMDS

All of these projects are providing data to the C2BMC and/or Ground Fire Control (GFC) for sensor networking and distribution to the appropriate weapon system. This approach provides the BMDS the ability to coordinate weapons to extend their effective range beyond local sensors by using more sophisticated engagement strategies.

The AN/TPY-2 provides detection and tracking during the boost phase. This significantly reduces the uncertainty in target discrimination and reaction time, increasing the probability of a successful BMDS engagement. Adding Mechanical Steering Kits (MSKs) to these radars will enable them to slew and increase BMDS sensor coverage.

The Thule Early Warning Radar (EWR) located at Thule Air Base, Greenland, is an Ultra High Frequency (UHF) radar that will be upgraded to match the configuration of the already upgraded EWR sensors at RAF Fylingdales, UK and Beale Air Force Base (AFB), CA. This upgrade includes hardware and software modifications to enhance capabilities and integrate the Thule UEWR into the BMDS Sensors Architecture as a midcourse sensor.

The Beale and Fylingdales EWRs located at Beale Air Force Base (AFB) and RAF Fylingdales, UK respectively, are Ultra High Frequency (UHF) radars that are completing their upgrades for Missile Defense to the UEWR configuration. These upgrades include hardware and software modifications that enhance capabilities and integrate these UEWRs into the BMDS Sensors Architecture. The COBRA DANE radar located at Earekson AFS, Shemya, Alaska is completing its hardware and software upgrades to enhance performance and to integrate this radar into the BMDS. Only EWR and COBRA DANE work beyond FY07 is included in this project. Previous work was accomplished under the BMD Midcourse Defense program element (0603882C).