| Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Missile Defense Agency | | | | | | | | | | | Date: May 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603177C / *Discrimination Sensor Technology* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2016** | **FY 2017** | **FY 2018 Base** | **FY 2018 OCO** | **FY 2018 Total** | **FY 2019** | **FY 2020** | **FY 2021** | **FY 2022** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 64.614 | 27.981 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |
| MD95: *Discrimination Sensor Technology* | 62.781 | 23.141 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |
| MT95: *Discrimination Sensor Tech-Flight Test Execution* | - | 3.693 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 | 3.693 |
| MD40: *Program-Wide Support* | 1.833 | 1.147 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |
| **Program MDAP/MAIS Code:** 362 | | | | | | | | | | | | |

**Note**

As of FY 2017 no funding is requested in this Program Element. The technology developed in the Discrimination Sensors Technology Program Element is technically mature enough to develop prototype systems. The follow on activity for the Program Element is captured in Technology Maturation Initiatives, Program Element 0604115C.

**A. Mission Description and Budget Item Justification**

As of FY 2017 no funding is requested in this Program Element. The technology developed in the Discrimination Sensors Technology Program Element is technically mature enough to develop prototype systems. The follow on activity for the Program Element is captured in Technology Maturation Initiatives, Program Element 0604115C.

| B. Program Change Summary ($ in Millions) | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 28.200 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 27.981 | 0.000 | 0.000 | - | 0.000 |
| Total Adjustments | -0.219 | 0.000 | 0.000 | - | 0.000 |
| • Congressional General Reductions | 0.000 | 0.000 | | | |
| • Congressional Directed Reductions | 0.000 | 0.000 | | | |
| • Congressional Rescissions | 0.000 | 0.000 | | | |
| • Congressional Adds | 0.000 | 0.000 | | | |
| • Congressional Directed Transfers | 0.000 | 0.000 | | | |
| • Reprogrammings | 0.312 | 0.000 | | | |
| • SBIR/STTR Transfer | -0.531 | 0.000 | | | |
| • Other Adjustment | 0.000 | 0.000 | 0.000 | - | 0.000 |

| Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Missile Defense Agency | Date: May 2017 |
|---|---|
| **Appropriation/Budget Activity**<br>0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)* | **R-1 Program Element (Number/Name)**<br>PE 0603177C *I Discrimination Sensor Technology* |

**Change Summary Explanation**

N/A

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency | | | Date: May 2017 |
|---|---|---|---|
| Appropriation/Budget Activity<br>0400 / 3 | R-1 Program Element (Number/Name)<br>PE 0603177C / *Discrimination Sensor Technology* | Project (Number/Name)<br>MD95 / *Discrimination Sensor Technology* | |

| COST ($ in Millions) | Prior Years | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total | FY 2019 | FY 2020 | FY 2021 | FY 2022 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MD95: *Discrimination Sensor Technology* | 62.781 | 23.141 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |

**Note**

FY 2018 funding is requested in the Technology Maturation Initiatives Program Element, 0604115C, for follow on MTS-C advanced sensor development and prototype development and test.

**A. Mission Description and Budget Item Justification**

As of FY 2017 no funding is requested in this Program Element. The technology developed in the Discrimination Sensors Technology Program Element is technically mature enough to develop prototype systems. The follow on activity for the Program Element is captured in Technology Maturation Initiatives, Program Element 0604115C.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2016 | FY 2017 | FY 2018 |
|---|---|---|---|
| ***Title:*** Discrimination Sensor Technology | 23.141 | 0.000 | 0.000 |
| ***Description:*** As of FY 2017 no funding is requested in this Program Element. The technology developed in the Discrimination Sensors Technology Program Element is technically mature enough to develop prototype systems. The follow on activity for the Program Element is captured in Technology Maturation Initiatives, Program Element 0604115C.<br><br>***FY 2016 Accomplishments:***<br>- Completed MTS-C sensor tests to demonstrate Aegis Launch on Remote quality of track performance:<br>-- Conducted Continental United States (CONUS) checkout flights to collect data for Hardware-in-the-Loop simulations, sensor characterization and confirm system readiness in preparation for the 2Q FY 2016 Control Test Vehicle (CTV)-02+ BMDS test<br>-- Conducted MTS-C Control Test Vehicle (CTV)-02+ pre and post-test performance analysis<br>-- Analyzed BMDS test data to verify demonstration of quality of service to meet Aegis Launch on Remote requirements<br>-- Analyzed airborne sensor BMDS test data to demonstrate MTS-C discrimination performance<br>- Partnered with the Air Force to characterize MTS-C performance for air dominance<br><br>***FY 2017 Plans:***<br>N/A<br><br>***FY 2018 Plans:***<br>N/A | | | |
| **Accomplishments/Planned Programs Subtotals** | 23.141 | 0.000 | 0.000 |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>0400 / 3 | **R-1 Program Element (Number/Name)**<br>PE 0603177C / *Discrimination Sensor Technology* | **Project (Number/Name)**<br>MD95 / *Discrimination Sensor Technology* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total | FY 2019 | FY 2020 | FY 2021 | FY 2022 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 0603176C: *Advanced Concepts and Performance Assessment* | 11.853 | 17.880 | 12.996 | - | 12.996 | 13.741 | 15.048 | 15.319 | 16.361 | Continuing | Continuing |
| • 0603178C: *Weapons Technology* | 50.263 | 71.843 | 5.495 | - | 5.495 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |
| • 0603179C: *Advanced C4ISR* | 9.661 | 3.626 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 | 13.287 |
| • 0603180C: *Advanced Research* | 16.987 | 27.733 | 20.184 | - | 20.184 | 20.695 | 21.555 | 21.936 | 22.361 | Continuing | Continuing |
| • 0603294C: *Common Kill Vehicle Technology* | 60.851 | 0.000 | 252.879 | - | 252.879 | 321.175 | 110.934 | 0.000 | 0.000 | Continuing | Continuing |
| • 0603884C: *Ballistic Missile Defense Sensors* | 233.020 | 230.077 | 247.345 | - | 247.345 | 247.643 | 362.850 | 401.267 | 497.503 | Continuing | Continuing |
| • 0603890C: *BMD Enabling Programs* | 406.326 | 408.594 | 449.442 | - | 449.442 | 466.760 | 540.409 | 629.864 | 501.915 | Continuing | Continuing |
| • 0603892C: *AEGIS BMD* | 804.211 | 959.066 | 852.052 | - | 852.052 | 805.051 | 789.217 | 656.164 | 695.306 | Continuing | Continuing |
| • 0603896C: *Ballistic Missile Defense Command and Control, Battle Management & Communication* | 425.996 | 456.267 | 430.115 | - | 430.115 | 461.275 | 501.956 | 496.411 | 514.139 | Continuing | Continuing |
| • 0604115C: *Technology Maturation Initiatives* | 24.743 | 99.366 | 128.406 | - | 128.406 | 168.388 | 174.432 | 176.660 | 177.264 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

The acquisition strategy for Discrimination Sensor Technology consisted of contracts to industry via the Advanced Technology Innovation Broad Agency Announcement and agreements with Federally Funded Research and Development Centers and University Affiliated Research Centers. The MDA leveraged Agency and partner subject matter experts and used government model based assessments to inform Better Buying Power philosophy acquisition decisions. The MDA awarded contracts to industry and universities via the Advanced Technology Innovation Broad Agency Announcement to develop and demonstrate promising components and integrated systems in realistic test environments. Discrimination Sensor Technology shaped future BMDS acquisition decisions by advancing and documenting the technology readiness levels of emerging and developing technology, while simultaneously assessing the performance and contributions of the technology to the BMDS architecture.

**E. Performance Metrics**

N/A

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency | | | Date: May 2017 |
|---|---|---|---|
| Appropriation/Budget Activity<br>0400 / 3 | R-1 Program Element (Number/Name)<br>PE 0603177C / *Discrimination Sensor Technology* | Project (Number/Name)<br>MT95 / *Discrimination Sensor Tech-Flight Test Execution* | |

| COST ($ in Millions) | Prior Years | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total | FY 2019 | FY 2020 | FY 2021 | FY 2022 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MT95: *Discrimination Sensor Tech-Flight Test Execution* | - | 3.693 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 | 3.693 |

**Note**

The Discrimination Sensor Technology Flight Test Execution project will complete technology demonstration of real time stereo tracking with MTS-Cs. FY 2018 funding is requested in the Technology Maturation Initiatives Program Element, 0604115C, for follow on MTS-C advanced sensor prototype development and test.

**A. Mission Description and Budget Item Justification**

The Discrimination Sensor Technology Flight Test project funded management and execution of Discrimination Sensor Technology testing through technology demonstration of Aegis Launch-on-Remote real time stereo tracking with Multi-Spectral Targeting System - Cs. The Discrimination Sensor Technology flight test project leveraged other BMDS tests as an associated operation to gather sensor data.

In FY 2015, the MDA successfully tested two MTS-B sensors integrated into MQ-9 Reapers. The Discrimination Sensor Technology tests used the BMDS operational architecture, proving that the Aegis weapon system could launch a Standard Missile - 3 against a ballistic missile target and achieve intercept using the tracking data from the airborne MTS sensors.

In FY 2016, the Discrimination Sensor Technology Flight Test project tested two MTS-Cs integrated into MQ-9 Reapers to demonstrate increased track precision and discrimination capability for the BMDS. As a precursor to the BMDS testing, the MDA is partnering with the Air Force to characterize MTS performance and provide data for Air Force air dominance development planning.

The Discrimination Sensor Technology Flight Test project funded flight, operations and maintenance costs for Unmanned Aerial Vehicles, ground control stations and ground support equipment. It also funded shipping of the test assets to test ranges, labor, travel, range support and Command, Control, Battle Management and Communications test support specific to Discrimination Sensor Technology.

The results from this airborne MTS-C Launch on Remote test sequence mature the critical technologies necessary for prototype development under the Technology Maturation Initiatives Program Element 0604115C. Launch on Remote is the precursor to Engage on Remote, which significantly expands BMD reach and the defended area.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2016 | FY 2017 | FY 2018 |
|---|---|---|---|
| ***Title:*** Discrimination Sensor Technology Flight Test Execution | 3.693 | 0.000 | 0.000 |
| ***Description:*** N/A | | | |
| ***FY 2016 Accomplishments:*** | | | |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>0400 / 3 | **R-1 Program Element (Number/Name)**<br>PE 0603177C / *Discrimination Sensor Technology* | **Project (Number/Name)**<br>MT95 / *Discrimination Sensor Tech-Flight Test Execution* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2016 | FY 2017 | FY 2018 |
|---|---|---|---|
| - Conducted system level Hardware-in-the-Loop (HWIL) testing in conjunction with the Enterprise Sensor Laboratory (ESL) and the Experimental Laboratory (X-Lab) for the Pacific Dragon test<br>- Shipped two MQ-9 Reapers, MTS-Cs and ground support equipment<br>- Conducted Pacific Dragon checkout flights, dry-runs, and dress rehearsals and operate and maintain the Unmanned Aerial Vehicles (UAVs), test equipment, ground control stations and ground support equipment<br>- Conducted real time stereo track test to provide Aegis Launch on Remote quality of track using MTS-Cs installed on two MQ-9 Reaper UAVs in conjunction with the Pacific Dragon test and identified system tracking improvements<br>***FY 2017 Plans:***<br>N/A<br>***FY 2018 Plans:***<br>N/A | | | |
| **Accomplishments/Planned Programs Subtotals** | 3.693 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total | FY 2019 | FY 2020 | FY 2021 | FY 2022 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 0603176C: *Advanced Concepts and Performance Assessment* | 11.853 | 17.880 | 12.996 | - | 12.996 | 13.741 | 15.048 | 15.319 | 16.361 | Continuing | Continuing |
| • 0603178C: *Weapons Technology* | 50.263 | 71.843 | 5.495 | - | 5.495 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |
| • 0603179C: *Advanced C4ISR* | 9.661 | 3.626 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 | 13.287 |
| • 0603180C: *Advanced Research* | 16.987 | 27.733 | 20.184 | - | 20.184 | 20.695 | 21.555 | 21.936 | 22.361 | Continuing | Continuing |
| • 0603294C: *Common Kill Vehicle Technology* | 60.851 | 0.000 | 252.879 | - | 252.879 | 321.175 | 110.934 | 0.000 | 0.000 | Continuing | Continuing |
| • 0603884C: *Ballistic Missile Defense Sensors* | 233.020 | 230.077 | 247.345 | - | 247.345 | 247.643 | 362.850 | 401.267 | 497.503 | Continuing | Continuing |
| • 0603890C: *BMD Enabling Programs* | 406.326 | 408.594 | 449.442 | - | 449.442 | 466.760 | 540.409 | 629.864 | 501.915 | Continuing | Continuing |
| • 0603892C: *AEGIS BMD* | 804.211 | 959.066 | 852.052 | - | 852.052 | 805.051 | 789.217 | 656.164 | 695.306 | Continuing | Continuing |
| • 0603896C: *Ballistic Missile Defense Command and Control, Battle Management & Communication* | 425.996 | 456.267 | 430.115 | - | 430.115 | 461.275 | 501.956 | 496.411 | 514.139 | Continuing | Continuing |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>0400 / 3 | **R-1 Program Element (Number/Name)**<br>PE 0603177C / *Discrimination Sensor Technology* | **Project (Number/Name)**<br>MT95 / *Discrimination Sensor Tech-Flight Test Execution* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total | FY 2019 | FY 2020 | FY 2021 | FY 2022 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 0603914C: *Ballistic Missile Defense Test* | 290.267 | 293.441 | 305.791 | - | 305.791 | 295.042 | 351.626 | 336.137 | 334.678 | Continuing | Continuing |
| • 0603915C: *Ballistic Missile Defense Targets* | 517.589 | 563.576 | 410.425 | - | 410.425 | 373.203 | 407.909 | 405.458 | 427.508 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

The MDA Integrated Master Test Plan establishes and documents the test requirements for the BMDS with the specific focus on collecting the data needed for the Verification, Validation, and Accreditation of the BMDS models & simulations. This paradigm uses critical factor analysis to drive test design, planning, and execution for accrediting models & simulations, which is used to validate and assess system performance. With this test approach, the MDA will establish confidence that the models & simulations used to evaluate the BMDS represent real world behavior, thereby enabling simulation-based performance assessment to verify system functionality.

**E. Performance Metrics**

N/A

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency | | | | | | | | | | | Date: May 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>0400 / 3 | | | | | R-1 Program Element (Number/Name)<br>PE 0603177C / *Discrimination Sensor Technology* | | | | Project (Number/Name)<br>MD40 / *Program-Wide Support* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2016** | **FY 2017** | **FY 2018 Base** | **FY 2018 OCO** | **FY 2018 Total** | **FY 2019** | **FY 2020** | **FY 2021** | **FY 2022** | **Cost To Complete** | **Total Cost** |
| MD40: *Program-Wide Support* | 1.833 | 1.147 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

As of FY 2017 no funding is requested in this Program Element. The technology developed in the Discrimination Sensors Technology Program Element is technically mature enough to develop prototype systems. The follow on activity for the Program Element is captured in Technology Maturation Initiatives, Program Element 0604115C.