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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy** **Date:** May 2021

|  |   |
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| <b>Appropriation/Budget Activity</b><br>1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 5: System Development &amp; Demonstration (SDD)</i> | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / <i>Navigation/Id System</i> |
|--|---|

| COST (\$ in Millions)                       | Prior Years | FY 2020 | FY 2021 | FY 2022 Base | FY 2022 OCO | FY 2022 Total | FY 2023 | FY 2024 | FY 2025 | FY 2026 | Cost To Complete | Total Cost |
|---|-------------|---------|---------|--------------|-------------|---------------|---------|---------|---------|---------|------------------|------------|
| Total Program Element                       | 338.727     | 44.207  | 49.862  | 48.837       | -           | 48.837        | -       | -       | -       | -       | -                | -          |
| 0253: <i>Nav &amp; Electro-Optical Supt</i> | 92.640      | 35.226  | 37.224  | 37.091       | -           | 37.091        | -       | -       | -       | -       | -                | -          |
| 0676: <i>Improve ID Development</i>         | 52.619      | 2.274   | 10.868  | 10.263       | -           | 10.263        | -       | -       | -       | -       | -                | -          |
| 1253: <i>Combat Ident System</i>            | 188.641     | 1.880   | 1.770   | 1.483        | -           | 1.483         | -       | -       | -       | -       | -                | -          |
| 9999: <i>Congressional Adds</i>             | 4.827       | 4.827   | 0.000   | 0.000        | -           | 0.000         | -       | -       | -       | -       | -                | -          |

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

Reliable and secure navigation and positive identification (ID) systems are essential elements of battle management in the naval environment. The Photonics Imaging System (0253) is a non-hull penetrating replacement for existing optical periscopes. The Photonics Imaging System exploits a wide portion of the electro-magnetic spectrum utilizing advanced Electro-Optic/thermal imaging, and communications intercept/Electronic Warfare Support (ES). The Integrated Submarine Imaging System (ISIS) (0253) is a back fit system to integrate all imaging capabilities on existing submarine classes. The Combat Identification System (CIS) project (1253) for Mark XIIA, and Improved Identification Development (0676) for AN/UPX-29(V), covers the Mark XIIA Mode 5 upgrade to the existing Mark XII family of systems that is Joint and North Atlantic Treaty Organization (NATO) interoperable. Per OSD direction, NATO participation is encouraged and performance data is exchanged to ensure the opportunity for interoperability with allied identification systems is maximized. In addition to distinguishing friend from foe for weapons employment, the Navy requires secure, jam resistant Identification Friend or Foe (IFF) systems for battle group air defense management and air traffic control. Identification is multifaceted and includes information received from several sensors (both cooperative and non-cooperative systems).

**B. Program Change Summary (\$ in Millions)**

|                                     | <u>FY 2020</u> | <u>FY 2021</u> | <u>FY 2022 Base</u> | <u>FY 2022 OCO</u> | <u>FY 2022 Total</u> |
|-------------------------------------|----------------|----------------|---------------------|--------------------|----------------------|
| Previous President's Budget         | 45.755         | 50.180         | 50.204              | -                  | 50.204               |
| Current President's Budget          | 44.207         | 49.862         | 48.837              | -                  | 48.837               |
| Total Adjustments                   | -1.548         | -0.318         | -1.367              | -                  | -1.367               |
| • Congressional General Reductions  | -              | -0.318         |                     |                    |                      |
| • Congressional Directed Reductions | -              | -              |                     |                    |                      |
| • Congressional Rescissions         | -              | -              |                     |                    |                      |
| • Congressional Adds                | -              | -              |                     |                    |                      |
| • Congressional Directed Transfers  | -              | -              |                     |                    |                      |
| • Reprogrammings                    | -              | -              |                     |                    |                      |
| • SBIR/STTR Transfer                | -1.548         | 0.000          |                     |                    |                      |
| • Program Adjustments               | 0.000          | 0.000          | -0.617              | -                  | -0.617               |
| • Rate/Misc Adjustments             | 0.000          | 0.000          | -0.750              | -                  | -0.750               |

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Navy | <b>Date:</b> May 2021 |
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| <b>Appropriation/Budget Activity</b><br>1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 5: System Development &amp; Demonstration (SDD)</i> | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / <i>Navigation/Id System</i> |
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 9999: *Congressional Adds*

Congressional Add: *Development of lightweight security Identification Friend or Foe transmitter*

Congressional Add Subtotals for Project: 9999

Congressional Add Totals for all Projects

|  | FY 2020 | FY 2021 |
|--|---------|---------|
|  |         |         |
|  | 4.827   | 0.000   |
|  | 4.827   | 0.000   |
|  | 4.827   | 0.000   |

**Change Summary Explanation**

FY2020 net decrease of -\$1.548M reflects the Small Business Innovative Research (SBIR) transfer.

FY2021 net decrease of -\$0.318M reflects General Congressional Reductions.

FY2022 net decrease of -\$1.367M reflects Miscellaneous Rate Adjustments.

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|--|--------------------|----------------|----------------|---------------------|--|----------------------|----------------|----------------|---|-----------------------|-------------------------|-------------------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy |                    |                |                |                     |  |                      |                |                |   | <b>Date:</b> May 2021 |                         |                   |
| <b>Appropriation/Budget Activity</b><br>1319 / 5                   |                    |                |                |                     | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System |                      |                |                | <b>Project (Number/Name)</b><br>0253 / Nav & Electro-Optical Supt |                       |                         |                   |
| <b>COST (\$ in Millions)</b>                                       | <b>Prior Years</b> | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022 Base</b> | <b>FY 2022 OCO</b>   | <b>FY 2022 Total</b> | <b>FY 2023</b> | <b>FY 2024</b> | <b>FY 2025</b>  | <b>FY 2026</b>        | <b>Cost To Complete</b> | <b>Total Cost</b> |
| 0253: Nav & Electro-Optical Supt                                   | 92.640             | 35.226         | 37.224         | 37.091              | -  | 37.091               | -              | -              | -   | -                     | -                       | -                 |
| Quantity of RDT&E Articles   |                    | -              | -              | -                   | -  | -                    | -              | -              | -   | -                     | -                       | -                 |

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

AN/BVY-1 Integrated Submarine Imaging System (ISIS) will continue to add new capabilities via Technical Insertion (TI)/Advanced Processing Build (APB) process while working across Submarine Warfare Federated Tactical System (SWFTS) programs to transition to Development Security Operations (DevSecOps) software processes and migrate to a cloud based architecture. The Navy is pursuing a transformation across SWFTS (PE 0604503N Project 0219, PE 0604562N Project 0236, PE 0604777N Project 0253 and PE 0604503N Project 0775) to maximize cyber-resiliency and the speed of capability delivery. FY22 maintains the investment in imaging sensors and algorithms to improve submarine operations in high intensity littoral environments, intelligence gathering, real time imagery and support the safe and effective employment of surveillance and weapons systems. In FY22 these funds will complete work on the Type 20 Mast and its Mast Capability Enhancements and launch the development of the Type 24 Mast. Furthermore, this funding will continue to improve the software algorithms and inboard hardware for processing outboard mast data, including the Type 20 mast, and support non-recurring inboard hardware engineering activities which develop the Technical Insertion kits installed in all submarine classes. Finally, FY22 funds the TI-18/APB-19 OT and TI-20/APB-19 OT tests that verify software improvements funded in previous fiscal years.

The Navigation and Electro-Optical (E-O) program enables littoral operations by procuring ISIS, production of low profile masts (Low Profile Photonics Mast, Type 20, and Type 24), maintenance and sustainment of periscope and legacy photonic masts, production and sustainment of Universal Modular Mast Systems and Dip Loops, and development of the ISIS inboard processing component of Submarine Warfare Federated Tactical Systems (SWFTS). The Department of the Navy established the ISIS to rapidly field the Type 18 periscope, RADAR rangefinder, Type 8 Mod 4 Infra-Red (IR) periscope systems, and integrate existing periscope imagery systems into a single imaging system for installation on board SSN 688 class and SEAWOLF class submarines. The ISIS baseline also includes the Imaging System with the Photonics mast (PM) and all configurations of low profile masts onboard VIRGINIA and Photonics Mast Variant (PMV) onboard SSGN class submarines. The PM, LPPM, and PMV design exploit a wide portion of the electro-magnetic spectrum through advanced E-O and thermal imaging and Electronic Warfare Support (ES)/communications intercept. The Common Submarine Imaging System (CSIS) capability development document (CDD), that covers both ISIS and Legacy Imaging systems was approved 22 Dec 2011 with an updated CDD approved on 15 Mar 2018. The CDD Annex for Low Profile Digital Photonics Mast, approved on 02 Dec 2019, provides additional specifications for the development of low profile masts within the ISIS system.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

|  | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022 Base</b> | <b>FY 2022 OCO</b> | <b>FY 2022 Total</b> |
|--|----------------|----------------|---------------------|--------------------|----------------------|
| <b>Title:</b> ISIS and Photonics common software and hardware capabilities development and obsolescence  | 21.283         | 27.611         | 27.648              | 0.000              | 27.648               |
| <b>Articles:</b>   | -              | -              | -                   | -                  | -                    |
| <b>FY 2021 Plans:</b><br>Commence the TI-22 capability development process, which provides the necessary engineering, technical program, project and configuration management of the hardware and software baseline to incorporate additional sensitive software imaging algorithms, while concluding the development of TI-20. Modify the ISIS architecture |                |                |                     |                    |                      |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy |  | <b>Date:</b> May 2021   |
| <b>Appropriation/Budget Activity</b><br>1319 / 5                   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0253 / Nav & Electro-Optical Supt |

| <b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>   | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022 Base</b> | <b>FY 2022 OCO</b> | <b>FY 2022 Total</b> |
|---|----------------|----------------|---------------------|--------------------|----------------------|
| <p>to support rapid insertion of new war fighting capabilities and enhanced cyber security protection which are imperative to ensure all systems are protected from cyber security attacks.</p> <p><b>FY 2022 Base Plans:</b><br/>The \$0.037M increase is to continue the development of TI-22 capabilities which includes the engineering, technical program, project and configuration management for the hardware and software baseline and modifying the ISIS architecture to support rapid insertion of new war fighting capabilities and enhanced cyber security protection.</p> <p><b>FY 2022 OCO Plans:</b><br/>N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b><br/>The \$0.037M increase is for the development of sensitive software Imaging algorithms to maintain imaging system superiority.</p>  |                |                |                     |                    |                      |
| <p><b>Title:</b> Type 20 Mast</p> <p align="right"><b>Articles:</b></p> <p><b>FY 2021 Plans:</b><br/>Funding required for follow-on Type 20 Mast Capability Enhancement development efforts including:<br/>- Development of specialized materials for the Type 20 Mast.<br/>- Selecting and developing technology candidates to engineering change proposals and improvements.</p> <p><b>FY 2022 Base Plans:</b><br/>The \$5.686M reduction is to complete the entire Type 20 Mast development cycle including the mast and the mast capability enhancements. Efforts include test and evaluation of Type 20 enhancements and design finalization.</p> <p><b>FY 2022 OCO Plans:</b><br/>N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b><br/>The \$5.686M reduction will complete the Type 20 Mast development effort and finalize the baseline for the Type 24 design launch.</p> | 13.234         | 8.889          | 3.203               | 0.000              | 3.203                |
|   | -              | -              | -                   | -                  | -                    |
| <p><b>Title:</b> Type 24 Mast</p> <p align="right"><b>Articles:</b></p> <p><b>FY 2021 Plans:</b></p>  | 0.000          | 0.000          | 5.502               | 0.000              | 5.502                |
|   | -              | -              | -                   | -                  | -                    |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy   |  |   | <b>Date:</b> May 2021 |       |        |
| <b>Appropriation/Budget Activity</b><br>1319 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0253 / Nav & Electro-Optical Supt |                       |       |        |
| <b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>  |  |   |                       |       |        |
|  |  |   |                       |       |        |
| N/A  |  |   |                       |       |        |
| <b>FY 2022 Base Plans:</b><br>The \$5.502M increase is to design, develop, fabricate, and verify testing of the Type 24 mast. Development will add additional capability to the baseline established in Type 20. Specific efforts include:<br>-Start development of the Type 24 technical data package<br>-Execute design reviews<br>-Start developing of the test plans<br>-Execute initial test events and environmental qualification testing   |  |   |                       |       |        |
| <b>FY 2022 OCO Plans:</b><br>N/A   |  |   |                       |       |        |
| <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b><br>The \$5.502M increase is for initial design and development of the Type 24 mast. This mast will include increased imaging capabilities and more resilient design. More specifically, this mast will leverage advanced development activities to combine capabilities in a low profile form factor which will increase situational awareness (particularly in high contact density littoral operations) to improve combat effectiveness, safety of navigation, and tactical decision making, while reducing probability of counter detection. |  |   |                       |       |        |
| <b>Title:</b> Imaging Systems Test Efforts   |  |   |                       |       |        |
| <b>Articles:</b>   |  |   |                       |       |        |
|  | 0.709  | 0.724   | 0.738                 | 0.000 | 0.738  |
|  | -  | -   | -                     | -     | -      |
| <b>FY 2021 Plans:</b><br>Inflationary increase to fund ISIS and mast system testing including the TI-20/APB-19 MDEMO and the TI-20/APB-19 VADT.  |  |   |                       |       |        |
| <b>FY 2022 Base Plans:</b><br>The \$0.014M increase is an inflationary increase to fund ISIS and mast system testing including the TI-18/APB-19 OT and the TI-20/APB-19 OT.  |  |   |                       |       |        |
| <b>FY 2022 OCO Plans:</b><br>N/A   |  |   |                       |       |        |
| <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b><br>The \$0.014M increase is an inflation adjustment which will fund the design, management, and evaluation results of the TI-18/APB-19 OT and TI-20/APB-19 OT tests for modernizing boats.  |  |   |                       |       |        |
| <b>Accomplishments/Planned Programs Subtotals</b>  |  |   |                       |       |        |
|  | 35.226   | 37.224  | 37.091                | 0.000 | 37.091 |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy | <b>Date:</b> May 2021 |
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| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0253 / Nav & Electro-Optical Supt |
|--|--|---|

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

| <u>Line Item</u>   | <u>FY 2020</u> | <u>FY 2021</u> | <u>FY 2022</u><br><u>Base</u> | <u>FY 2022</u><br><u>OCO</u> | <u>FY 2022</u><br><u>Total</u> | <u>FY 2023</u> | <u>FY 2024</u> | <u>FY 2025</u> | <u>FY 2026</u> | <u>Cost To</u><br><u>Complete</u> | <u>Total Cost</u> |
|--|----------------|----------------|-------------------------------|------------------------------|--------------------------------|----------------|----------------|----------------|----------------|-----------------------------------|-------------------|
| • OPN/0840: Sub Periscope, Imaging Equip. and Supt Equip Program | 160.803        | 190.954        | 234.932                       | -                            | 234.932                        | -              | -              | -              | -              | -                                 | -                 |

**Remarks**

**D. Acquisition Strategy**

The Acquisition Strategy for AN/BVY-1 Integrated Submarine Imaging System (ISIS) is dated 07 Jul 2003. The Acquisition Program Baseline Agreement for ISIS Advanced Processor Builds 11, 13 and 15 is dated 07 Mar 2013. The Single Acquisition Management Plan (SAMP) for the LPPM is dated 01 Jul 2013. The ISIS will provide mission critical, all weather, visual, and electronic search, digital image management, indication, warning, and platform architecture interface capabilities for SSN 688, SSN 21, SSN 774 and SSGN class submarines. The Single Acquisition Management Plan (SAMP) for the Type 20 Mast is dated 07 Jul 2017.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy** **Date:** May 2021

|  |  |   |
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| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0253 / Nav & Electro-Optical Supt |
|--|--|---|

| <b>Product Development (\$ in Millions)</b>                 |                                   |   |                    | <b>FY 2020</b> |                   | <b>FY 2021</b> |                   | <b>FY 2022 Base</b> |                   | <b>FY 2022 OCO</b> |                   | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|---|-----------------------------------|---|--------------------|----------------|-------------------|----------------|-------------------|---------------------|-------------------|--------------------|-------------------|----------------------|-------------------------|-------------------|---------------------------------|
| <b>Cost Category Item</b>                                   | <b>Contract Method &amp; Type</b> | <b>Performing Activity &amp; Location</b> | <b>Prior Years</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>         | <b>Award Date</b> | <b>Cost</b>        | <b>Award Date</b> | <b>Cost</b>          |                         |                   |                                 |
| Software Development  | C/CPIF                            | Lockheed Martin : Manassas, VA            | 21.017             | 9.250          | Dec 2019          | 12.129         | Dec 2020          | 11.978              | Dec 2021          | -                  |                   | 11.978               | -                       | -                 | -                               |
| Systems Engineering   | WR                                | NUWC : Newport, RI                        | 19.857             | 1.242          | Nov 2019          | 4.672          | Dec 2020          | 4.756               | Nov 2021          | -                  |                   | 4.756                | -                       | -                 | -                               |
| Hardware Development  | C/CPIF                            | Lockheed Martin : Manassas, VA            | 12.613             | 10.743         | Dec 2019          | 10.761         | Dec 2020          | 10.864              | Dec 2021          | -                  |                   | 10.864               | -                       | -                 | -                               |
| Hardware Development - Type 20/Mast Capability Enhancements | C/CPIF                            | Lockheed Martin : Manassas, VA            | 28.127             | 13.234         | Dec 2019          | 8.889          | Dec 2020          | 3.203               | Dec 2021          | -                  |                   | 3.203                | -                       | -                 | -                               |
| Hardware Development - Type 24                              | C/CPIF                            | L-3 KEO : Northampton, MA                 | 0.000              | 0.000          |                   | 0.000          |                   | 5.502               | Jun 2022          | -                  |                   | 5.502                | -                       | -                 | -                               |
| <b>Subtotal</b>   |                                   |   | 81.614             | 34.469         |                   | 36.451         |                   | 36.303              |                   | -                  |                   | 36.303               | -                       | -                 | N/A                             |

| <b>Test and Evaluation (\$ in Millions)</b> |                                   |   |                    | <b>FY 2020</b> |                   | <b>FY 2021</b> |                   | <b>FY 2022 Base</b> |                   | <b>FY 2022 OCO</b> |                   | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|---|-----------------------------------|---|--------------------|----------------|-------------------|----------------|-------------------|---------------------|-------------------|--------------------|-------------------|----------------------|-------------------------|-------------------|---------------------------------|
| <b>Cost Category Item</b>                   | <b>Contract Method &amp; Type</b> | <b>Performing Activity &amp; Location</b> | <b>Prior Years</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>         | <b>Award Date</b> | <b>Cost</b>        | <b>Award Date</b> | <b>Cost</b>          |                         |                   |                                 |
| Development Test & Evaluation               | WR                                | NUWC : Newport, RI                        | 8.679              | 0.444          | Oct 2019          | 0.453          | Oct 2020          | 0.462               | Oct 2021          | -                  |                   | 0.462                | -                       | -                 | -                               |
| Development Test & Evaluation               | WR                                | COMOPTEVFOR : Norfolk, VA                 | 1.675              | 0.265          | Oct 2019          | 0.271          | Oct 2020          | 0.276               | Oct 2021          | -                  |                   | 0.276                | -                       | -                 | -                               |
| <b>Subtotal</b>                             |                                   |   | 10.354             | 0.709          |                   | 0.724          |                   | 0.738               |                   | -                  |                   | 0.738                | -                       | -                 | N/A                             |

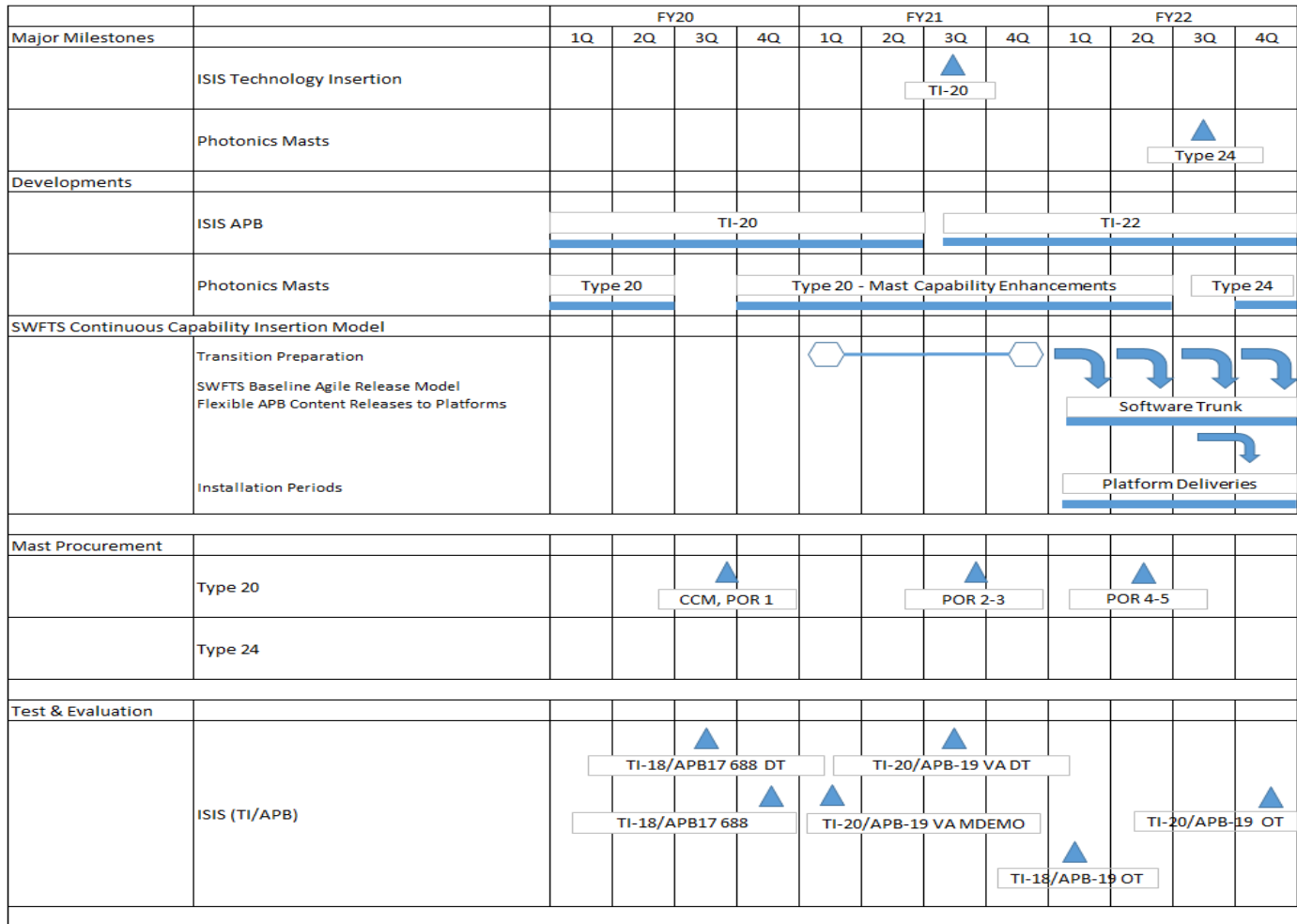
| <b>Management Services (\$ in Millions)</b> |                                   |   |                    | <b>FY 2020</b> |                   | <b>FY 2021</b> |                   | <b>FY 2022 Base</b> |                   | <b>FY 2022 OCO</b> |                   | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|---|-----------------------------------|---|--------------------|----------------|-------------------|----------------|-------------------|---------------------|-------------------|--------------------|-------------------|----------------------|-------------------------|-------------------|---------------------------------|
| <b>Cost Category Item</b>                   | <b>Contract Method &amp; Type</b> | <b>Performing Activity &amp; Location</b> | <b>Prior Years</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>         | <b>Award Date</b> | <b>Cost</b>        | <b>Award Date</b> | <b>Cost</b>          |                         |                   |                                 |
| Travel                                      | WR                                | NAVSEA : Washington, DC                   | 0.672              | 0.048          | Oct 2019          | 0.049          | Oct 2020          | 0.050               | Oct 2021          | -                  |                   | 0.050                | -                       | -                 | -                               |
| <b>Subtotal</b>                             |                                   |   | 0.672              | 0.048          |                   | 0.049          |                   | 0.050               |                   | -                  |                   | 0.050                | -                       | -                 | N/A                             |



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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy** **Date: May 2021**

|  |  |   |
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| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0253 / Nav & Electro-Optical Supt |
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**Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy** **Date:** May 2021

|  |  |   |
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| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0253 / Nav & Electro-Optical Supt |
|--|--|---|

Schedule Details

| Events by Sub Project   | Start   |      | End     |      |
|---|---------|------|---------|------|
|   | Quarter | Year | Quarter | Year |
| <b>Nav &amp; Electro-Optical Supt</b>   |         |      |         |      |
| Major Milestones: ISIS Technology Insertion: ISIS Technology Insertion Fielding (TI-20) | 3       | 2021 | 3       | 2021 |
| Major Milestones: ISIS Technology Insertion: Type 24: Contract Award                    | 3       | 2022 | 3       | 2022 |
| Developments: ISIS APB: ISIS TI-20  | 1       | 2020 | 2       | 2021 |
| Developments: ISIS APB: ISIS TI-22  | 3       | 2021 | 4       | 2022 |
| Developments: Mast Development: Type 20   | 1       | 2020 | 2       | 2020 |
| Developments: Mast Development: Type 20 Mast Capability Enhancements (MCE)              | 4       | 2020 | 2       | 2022 |
| Developments: Mast Development: Type 24   | 4       | 2022 | 4       | 2022 |
| Mast Procurement: Type 20 (Buy): CCM / POR 1  | 3       | 2020 | 3       | 2020 |
| Mast Procurement: Type 20 (Buy): POR 2-3  | 3       | 2021 | 3       | 2021 |
| Mast Procurement: Type 20 (Buy): POR 4-5  | 2       | 2022 | 2       | 2022 |
| Test & Evaluation: ISIS (TI/APB): ISIS TI-18/APB-17 688 DT                              | 3       | 2020 | 3       | 2020 |
| Test & Evaluation: ISIS (TI/APB): ISIS TI-18/APB-17 688 OPEVAL                          | 4       | 2020 | 4       | 2020 |
| Test & Evaluation: ISIS (TI/APB): ISIS TI-20/APB-19 VA MDEMO                            | 1       | 2021 | 1       | 2021 |
| Test & Evaluation: ISIS (TI/APB): ISIS TI-20/APB-19 VA DT                               | 3       | 2021 | 3       | 2021 |
| Test & Evaluation: ISIS (TI/APB): ISIS TI-18/APB-19 OT                                  | 1       | 2022 | 1       | 2022 |
| Test & Evaluation: ISIS (TI/APB): ISIS TI-20/APB-19 OT                                  | 4       | 2022 | 4       | 2022 |

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|  |                    |                |                |                     |  |                      |                |                |   |                       |                         |                   |
|--|--------------------|----------------|----------------|---------------------|--|----------------------|----------------|----------------|---|-----------------------|-------------------------|-------------------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy |                    |                |                |                     |  |                      |                |                |   | <b>Date:</b> May 2021 |                         |                   |
| <b>Appropriation/Budget Activity</b><br>1319 / 5                   |                    |                |                |                     | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System |                      |                |                | <b>Project (Number/Name)</b><br>0676 / Improve ID Development |                       |                         |                   |
| <b>COST (\$ in Millions)</b>                                       | <b>Prior Years</b> | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022 Base</b> | <b>FY 2022 OCO</b>   | <b>FY 2022 Total</b> | <b>FY 2023</b> | <b>FY 2024</b> | <b>FY 2025</b>  | <b>FY 2026</b>        | <b>Cost To Complete</b> | <b>Total Cost</b> |
| 0676: <i>Improve ID Development</i>                                | 52.619             | 2.274          | 10.868         | 10.263              | -  | 10.263               | -              | -              | -   | -                     | -                       | -                 |
| Quantity of RDT&E Articles   |                    | -              | -              | -                   | -  | -                    | -              | -              | -   | -                     | -                       | -                 |

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

Reliable and secure navigation and positive identification (ID) systems are essential elements of battle management in the naval environment. In addition to providing platform identification for weapons employment, the Navy requires secure, jam resistant Identification Friend or Foe (IFF) systems for battle group air defense management and Air Traffic Control. The Improved ID Development project addresses the Mark XIIA Mode 5 and Mode S upgrades to the existing AN/UPX-29(V) Mark XII family of systems that is Joint and North Atlantic Treaty Organization interoperable, as well as modernization of the DDG 1000 Zumwalt Class IFF Sensor Suite . The AN/UPX-29(V) Interrogator System is comprised of the Interrogator Set AN/UPX-24(V), OE-120()/UPX Antenna Group, and Mark XII or Mark XIIA equipment such as AN/UPX-37, AN/UPX-41(C) or AN/UPX-45(C) Digital Interrogators and associated equipment. The DDG 1000 IFF Sensor Suite is comprised of three electronically scanned array (ESA) antennas, one UPX-42(C) Interrogator, and three RT-1912(C)/APX Transponders. Additionally, the Improved ID Development project may include product improvements designed to be installed through upgrade and deficiency correction studies, which in turn become engineering changes to other IFF solutions.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

|  | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022 Base</b> | <b>FY 2022 OCO</b> | <b>FY 2022 Total</b> |
|--|----------------|----------------|---------------------|--------------------|----------------------|
| <b>Title:</b> AN/UPX-29 (V) - OE-120()/UPX Antenna Tech Refresh  | 1.483          | 1.080          | 0.000               | 0.000              | 0.000                |
| <b>Articles:</b>   | -              | -              | -                   | -                  | -                    |
| <b>Description:</b> Engineering and integration development for antenna group OE-120()/UPX antenna tech refresh. Develop design studies and Analysis of Alternatives, draft specifications, and perform system development and integration efforts and support mission requirements, to include engineering investigations and Engineering Change Proposal (ECP) development to support mission readiness for IFF systems. |                |                |                     |                    |                      |
| <b>FY 2021 Plans:</b><br>Complete platform integration testing at In-Service Engineering Activity lab and land-based test sites.   |                |                |                     |                    |                      |
| <b>FY 2022 Base Plans:</b><br>N/A  |                |                |                     |                    |                      |
| <b>FY 2022 OCO Plans:</b><br>N/A   |                |                |                     |                    |                      |
| <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b><br>Decrease is due transition of the OE-120()/UPX antenna tech refresh design to production.  |                |                |                     |                    |                      |
| <b>Title:</b> Mark XIIA Mode 5 and Mode S Improvement for AN/UPX-29(V)   | 0.378          | 0.672          | 0.692               | 0.000              | 0.692                |
| <b>Articles:</b>   | -              | -              | -                   | -                  | -                    |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy | <b>Date:</b> May 2021 |
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| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0676 / Improve ID Development |
|--|--|---|

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

|   | FY 2020    | FY 2021    | FY 2022 Base | FY 2022 OCO | FY 2022 Total |
|---|------------|------------|--------------|-------------|---------------|
| <p><b>Description:</b> Engineering, development, and integration of improvements to Mark XIIA Shipboard Identification Friend or Foe (IFF) Systems, including, but not limited to the AN/UPX-29(V) Interrogator System, which is comprised of the Interrogator Set AN/UPX-24, OE-120()/UPX Antenna Group, and Mark XII or Mark XIIA equipment such as AN/UPX-37, AN/UPX-41 or AN/UPX-45 Digital Interrogators. Funds development and integration of Mark XIIA Mode 5 and Mode Select (S) Improvements to the AN/UPX-29(V) systems on CG47, DDG51, LHD1, LPD17, LHA6, and CVN68, CVN78, and future ship classes. Correct software and performance deficiencies from Integrated Test and Operational Test, Aegis, and other Combat System Integration events to support Combat System integration with Aegis Weapon Systems (AWS), Ship Self Defense System (SSDS), Advanced Combat Direction System (ACDS), or Air Traffic Control Systems using Mark XIIA equipment to include engineering investigations, Engineering Change Proposal development, and testing. Provides core Integrated Logistics Support documentation; formalizes hardware/software configuration: finalizes technical/ design data, resolves testing anomalies, and integrates with shipboard training systems.</p> <p><b>FY 2021 Plans:</b><br/>Continue AN/UPX-29(V) Interrogator System integration testing with Mode 5/Mode S capable AN/UPX-45 Digital Interrogator in preparation for deployment to Aegis platforms. Begin integration testing on Ship Self Defense System (SSDS) platforms. Evaluate inter-operability test data to validate planned combat system software design changes.</p> <p><b>FY 2022 Base Plans:</b><br/>Continue AN/UPX-29(V) Interrogator System integration testing with Mode 5/Mode S capable AN/UPX-45 Digital Interrogator in preparation for deployment to Aegis platforms. Continue planning for and conducting integration testing on Ship Self Defense System (SSDS) platforms. Evaluate inter-operability test data to validate planned combat system software design changes</p> <p><b>FY 2022 OCO Plans:</b><br/>N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b><br/>Increase due to the additional integration testing required for multiple ship classes with Ship Self Defense System (SSDS) Aegis Weapon System configurations.</p> |            |            |              |             |               |
| <p><b>Title:</b> AN/UPX-29(V) Management Support</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> Engineering and Program Management of the AN/UPX 29(V). Perform system integration efforts.</p>   | 0.413<br>- | 0.681<br>- | 0.695<br>-   | 0.000<br>-  | 0.695<br>-    |

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Navy **Date:** May 2021

|  |  |   |
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| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0676 / Improve ID Development |
|--|--|---|

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

|   | FY 2020    | FY 2021    | FY 2022 Base | FY 2022 OCO | FY 2022 Total |
|---|------------|------------|--------------|-------------|---------------|
| <p><b>FY 2021 Plans:</b><br/>Continue logistics and technical data management for the AN/UPX 29(V) Mode 5/Mode S integration. Develop and submit ship change documents for OE-120 and AN/UPX-45 retro-fit. Evaluate designs and implementations of cyber security controls.</p> <p><b>FY 2022 Base Plans:</b><br/>Continue logistics and technical data management for the AN/UPX 29(V) Mode 5/Mode S integration. Develop and submit ship change documents for OE-120 and AN/UPX-45 retro-fit. Implement designs and implementations of cyber security controls.</p> <p><b>FY 2022 OCO Plans:</b><br/>N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b><br/>Increase for inflation.</p>  |            |            |              |             |               |
| <p><b>Title:</b> DDG 1000 Modernization</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> The IFF System will transition from a Contractor Furnished Equipment (CFE) suite to a government (organically) supported IFF System. Establish engineering support and Integrated Product Support (IPS) elements for transition of the DDG 1000 ship class' Contractor Furnished Equipment (CFE) IFF sensor suite to an organically supported and documented system.</p> <p><b>FY 2021 Plans:</b><br/>Develop IPS elements, artifacts, and plans needed to transition DDG 1000 IFF sensor suite to organic support. Evaluate Diminishing Manufacturing Sources and Material Shortages (DMSMS), obsolescence, and performance risks.</p> <p><b>FY 2022 Base Plans:</b><br/>Continue to develop IPS elements, artifacts, and plans needed to transition DDG 1000 IFF sensor suite to organic support. Evaluate Diminishing Manufacturing Sources and Material Shortages (DMSMS), obsolescence, and performance risks.</p> <p><b>FY 2022 OCO Plans:</b><br/>N/A</p> | 0.000<br>- | 1.600<br>- | 1.600<br>-   | 0.000<br>-  | 1.600<br>-    |
| <p><b>Title:</b> UPX-36 Engineering Change Proposal - Mode 5 Capable</p>  | 0.000      | 1.483      | 1.817        | 0.000       | 1.817         |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy |  | <b>Date:</b> May 2021   |
| <b>Appropriation/Budget Activity</b><br>1319 / 5                   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0676 / Improve ID Development |

| <b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>  | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022 Base</b> | <b>FY 2022 OCO</b> | <b>FY 2022 Total</b> |
|--|----------------|----------------|---------------------|--------------------|----------------------|
| <p align="right"><b>Articles:</b></p> <p><b>Description:</b> Upgrade the AN/UPX-36(V) from Mark XII to Mark XIIA with Mode 5 capability. The AN/UPX-36(V) is a centralized Identification Friend or Foe (IFF) interrogator system consisting of a processor, dedicated IFF antennas, and Mark XII interrogation capability providing identification of friendly and neutral contacts via cooperative means. System installations are limited to the 12 LSD41/49 class ships currently in-service.</p> <p><b>FY 2021 Plans:</b><br/>Begin ECP to upgrade platform unique Mode 4 Shipboard IFF interrogator systems to a common Mark XIIA Mode 5 configuration.</p> <p><b>FY 2022 Base Plans:</b><br/>Commence planning for system integration testing with LSD 41 and LSD 49 class combat system integration testing. Schedule inter-operability tests at land based test sites to validate introduction of Mode 5 IFF capability with corresponding combat system software design changes. Develop Ship Change Documents for review and approval by NAVSEA.</p> <p><b>FY 2022 OCO Plans:</b><br/>N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b><br/>Increase due to planning and testing with external commands for interoperability and design validation as the ECP development continues to ramp up.</p> | -              | -              | -                   | -                  | -                    |
| <p><b>Title:</b> Radar Track Discriminator System (RTDS) UPX-34A ECP Part I</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> Capability upgrades to the AN/UPX-34A(V) RTDS, which is installed on CG47 Class Aegis Cruisers and provides high fidelity, long range, Non-cooperative Target Recognition (NCTR) capability to support the Air-Sea battle by providing timely tactical engagement decisions by Aegis action officers.</p> <p><b>FY 2021 Plans:</b><br/>Expand established library databases and perform hardware updates to reduce Rules of Engagement (ROE) concerns. These changes will provide enhanced overall Combat ID capability within the Battle Group.</p> <p><b>FY 2022 Base Plans:</b></p>  | 0.000          | 5.352          | 5.459               | 0.000              | 5.459                |
|  | -              | -              | -                   | -                  | -                    |

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Navy **Date:** May 2021

|  |  |   |
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| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0676 / Improve ID Development |
|--|--|---|

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

|   | FY 2020 | FY 2021 | FY 2022 Base | FY 2022 OCO | FY 2022 Total |
|---|---------|---------|--------------|-------------|---------------|
| Continue hardware updates to reduce Rules of Engagement (ROE) concerns. Coordinate with Aegis Weapon System Baseline Managers to implement upgrades to related external combat system elements. Plan and Schedule inter-operability tests at land based test sites to validate RTDS updates with corresponding combat system design changes. Develop Ship Change Documents for review and approval by NAVSEA. |         |         |              |             |               |
| <b><i>FY 2022 OCO Plans:</i></b><br>N/A   |         |         |              |             |               |
| <b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b><br>Increase due to inflation.   |         |         |              |             |               |
| <b>Accomplishments/Planned Programs Subtotals</b>   | 2.274   | 10.868  | 10.263       | 0.000       | 10.263        |

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

| <u>Line Item</u>       | <u>FY 2020</u> | <u>FY 2021</u> | <u>FY 2022 Base</u> | <u>FY 2022 OCO</u> | <u>FY 2022 Total</u> | <u>FY 2023</u> | <u>FY 2024</u> | <u>FY 2025</u> | <u>FY 2026</u> | <u>Cost To Complete</u> | <u>Total Cost</u> |
|------------------------|----------------|----------------|---------------------|--------------------|----------------------|----------------|----------------|----------------|----------------|-------------------------|-------------------|
| • OPN/2851: ID Systems | 24.926         | 23.815         | 46.918              | -                  | 46.918               | -              | -              | -              | -              | -                       | -                 |

**Remarks**

**D. Acquisition Strategy**

The acquisition strategy is to develop Mode 5 Engineering Change Proposals for modern Mark XII Identification Friend or Foe (IFF) equipment and integrate into all Navy Combat Weapons systems platforms and augment the Navy's Cooperative Identification Capability to include Mode 5.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy** **Date:** May 2021

|  |  |   |
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| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0676 / Improve ID Development |
|--|--|---|

| <b>Product Development (\$ in Millions)</b> |                                   |   |                    | <b>FY 2020</b> |                   | <b>FY 2021</b> |                   | <b>FY 2022 Base</b> |                   | <b>FY 2022 OCO</b> |                   | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|---|-----------------------------------|---|--------------------|----------------|-------------------|----------------|-------------------|---------------------|-------------------|--------------------|-------------------|----------------------|-------------------------|-------------------|---------------------------------|
| <b>Cost Category Item</b>                   | <b>Contract Method &amp; Type</b> | <b>Performing Activity &amp; Location</b> | <b>Prior Years</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>         | <b>Award Date</b> | <b>Cost</b>        | <b>Award Date</b> | <b>Cost</b>          |                         |                   |                                 |
| Primary Hardware Development                | WR                                | NAWCAD : St Inigoes, MD                   | 9.313              | 0.312          | Nov 2019          | 1.118          | Nov 2020          | 0.625               | Nov 2021          | -                  |                   | 0.625                | -                       | -                 | -                               |
| Ship Integration                            | WR                                | NAWCAD : St Inigoes, MD                   | 2.462              | 0.117          | Nov 2019          | 0.120          | Nov 2020          | 0.122               | Nov 2021          | -                  |                   | 0.122                | -                       | -                 | -                               |
| Systems Engineering                         | WR                                | NAWCAD : St Inigoes, MD                   | 6.229              | 0.304          | Nov 2019          | 0.774          | Nov 2020          | 0.789               | Nov 2021          | -                  |                   | 0.789                | -                       | -                 | -                               |
| DDG 1000 Development                        | C/FFP                             | Raytheon : Tewksbury, MA                  | 0.000              | 0.000          |                   | 1.262          | Dec 2020          | 1.287               | Nov 2021          | -                  |                   | 1.287                | -                       | -                 | -                               |
| OE-120 Tech Refresh                         | SS/FFP                            | BAE : Nashua, NH                          | 18.060             | 0.750          | Nov 2019          | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| RTDS UPX-34A ECP Part I                     | WR                                | NAWCAD : St Inigoes, MD                   | 0.000              | 0.000          |                   | 5.152          | Nov 2020          | 5.022               | Nov 2021          | -                  |                   | 5.022                | -                       | -                 | -                               |
| UPX-36 ECP Part I                           | WR                                | NAWCAD : St Inigoes, MD                   | 0.000              | 0.000          |                   | 1.283          | Nov 2020          | 1.239               | Nov 2021          | -                  |                   | 1.239                | -                       | -                 | -                               |
| <b>Subtotal</b>                             |                                   |   | 36.064             | 1.483          |                   | 9.709          |                   | 9.084               |                   | -                  |                   | 9.084                | -                       | -                 | N/A                             |

| <b>Support (\$ in Millions)</b> |                                   |   |                    | <b>FY 2020</b> |                   | <b>FY 2021</b> |                   | <b>FY 2022 Base</b> |                   | <b>FY 2022 OCO</b> |                   | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|---------------------------------|-----------------------------------|---|--------------------|----------------|-------------------|----------------|-------------------|---------------------|-------------------|--------------------|-------------------|----------------------|-------------------------|-------------------|---------------------------------|
| <b>Cost Category Item</b>       | <b>Contract Method &amp; Type</b> | <b>Performing Activity &amp; Location</b> | <b>Prior Years</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>         | <b>Award Date</b> | <b>Cost</b>        | <b>Award Date</b> | <b>Cost</b>          |                         |                   |                                 |
| Configuration Management        | WR                                | NAWCAD : St Inigoes, MD                   | 0.169              | 0.000          |                   | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| ILS                             | WR                                | NAWCAD : St Inigoes, MD                   | 2.861              | 0.076          | Nov 2019          | 0.078          | Nov 2020          | 0.080               | Nov 2021          | -                  |                   | 0.080                | -                       | -                 | -                               |
| Software Development            | WR                                | NAWCAD : St Inigoes, MD                   | 5.732              | 0.201          | Nov 2019          | 0.297          | Nov 2020          | 0.303               | Nov 2021          | -                  |                   | 0.303                | -                       | -                 | -                               |
| Technical Data                  | WR                                | NAWCAD : St Inigoes, MD                   | 2.068              | 0.101          | Nov 2019          | 0.103          | Nov 2020          | 0.105               | Nov 2021          | -                  |                   | 0.105                | -                       | -                 | -                               |
| Training                        | WR                                | NAWCAD : St Inigoes, MD                   | 0.200              | 0.000          |                   | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| Engineering                     | WR                                | NAWCAD : PAX River, MD                    | 0.244              | 0.000          |                   | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| <b>Subtotal</b>                 |                                   |   | 11.274             | 0.378          |                   | 0.478          |                   | 0.488               |                   | -                  |                   | 0.488                | -                       | -                 | N/A                             |

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy** **Date:** May 2021

|  |  |   |
|--|--|---|
| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0676 / Improve ID Development |
|--|--|---|

| <b>Test and Evaluation (\$ in Millions)</b>   |                                   |   |                    | <b>FY 2020</b> |                   | <b>FY 2021</b> |                   | <b>FY 2022 Base</b> |                   | <b>FY 2022 OCO</b> |                   | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|---|-----------------------------------|---|--------------------|----------------|-------------------|----------------|-------------------|---------------------|-------------------|--------------------|-------------------|----------------------|-------------------------|-------------------|---------------------------------|
| <b>Cost Category Item</b>                     | <b>Contract Method &amp; Type</b> | <b>Performing Activity &amp; Location</b> | <b>Prior Years</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>         | <b>Award Date</b> | <b>Cost</b>        | <b>Award Date</b> | <b>Cost</b>          |                         |                   |                                 |
| Prior Year T&E costs no longer funded in FYDP | WR                                | NAWCAD : St Inigoes, MD                   | 2.559              | 0.000          |                   | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| <b>Subtotal</b>                               |                                   |   | 2.559              | 0.000          |                   | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | N/A                             |

| <b>Management Services (\$ in Millions)</b> |                                   |   |                    | <b>FY 2020</b> |                   | <b>FY 2021</b> |                   | <b>FY 2022 Base</b> |                   | <b>FY 2022 OCO</b> |                   | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|---|-----------------------------------|---|--------------------|----------------|-------------------|----------------|-------------------|---------------------|-------------------|--------------------|-------------------|----------------------|-------------------------|-------------------|---------------------------------|
| <b>Cost Category Item</b>                   | <b>Contract Method &amp; Type</b> | <b>Performing Activity &amp; Location</b> | <b>Prior Years</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>         | <b>Award Date</b> | <b>Cost</b>        | <b>Award Date</b> | <b>Cost</b>          |                         |                   |                                 |
| Program Management Support                  | C/CPFF                            | Various : California, MD                  | 2.722              | 0.413          | Nov 2019          | 0.681          | Nov 2020          | 0.691               | Nov 2021          | -                  |                   | 0.691                | -                       | -                 | -                               |
| <b>Subtotal</b>                             |                                   |   | 2.722              | 0.413          |                   | 0.681          |                   | 0.691               |                   | -                  |                   | 0.691                | -                       | -                 | N/A                             |

| <b>Prior Years</b>         | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022 Base</b> | <b>FY 2022 OCO</b> | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |   |   |     |
|----------------------------|----------------|----------------|---------------------|--------------------|----------------------|-------------------------|-------------------|---------------------------------|---|---|-----|
| <b>Project Cost Totals</b> |                |                | 52.619              | 2.274              | 10.868               | 10.263                  | -                 | 10.263                          | - | - | N/A |

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy** **Date:** May 2021

|  |  |   |
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| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0676 / Improve ID Development |
|--|--|---|

|  | FY 2020 |    |    |    | FY 2021 |    |    |    | FY 2022 |    |    |    |
|--|---------|----|----|----|---------|----|----|----|---------|----|----|----|
|  | 1Q      | 2Q | 3Q | 4Q | 1Q      | 2Q | 3Q | 4Q | 1Q      | 2Q | 3Q | 4Q |
| <b>Mode 5 Improv Identification Dev</b>            |         |    |    |    |         |    |    |    |         |    |    |    |
| <b>Acquisition Milestones</b>                      |         |    |    |    |         |    |    |    |         |    |    |    |
| Milestones   |         |    |    |    |         |    |    |    |         |    |    |    |
| <b>Test &amp; Evaluation Milestones</b>            |         |    |    |    |         |    |    |    |         |    |    |    |
| IT Events for additional platforms                 |         |    |    |    |         |    |    |    |         |    |    |    |
| <b>Deliveries</b>                                  |         |    |    |    |         |    |    |    |         |    |    |    |
| Mode 5 Prod. Line Insertion                        |         |    |    |    |         |    |    |    |         |    |    |    |
| Mode 5 SCDs  |         |    |    |    |         |    |    |    |         |    |    |    |
| Mode 5 Host Platform Integration                   |         |    |    |    |         |    |    |    |         |    |    |    |
| Mode 5 FRP Deliveries                              |         |    |    |    |         |    |    |    |         |    |    |    |
| <b>System Development</b>                          |         |    |    |    |         |    |    |    |         |    |    |    |
| Establish OE-120 test labs                         |         |    |    |    |         |    |    |    |         |    |    |    |
| Platform integration testing                       |         |    |    |    |         |    |    |    |         |    |    |    |
| <b>RTDS UPX-34A</b>                                |         |    |    |    |         |    |    |    |         |    |    |    |
| System Development (UPX-34A ECP)                   |         |    |    |    |         |    |    |    |         |    |    |    |
| <b>UPX-36</b>                                      |         |    |    |    |         |    |    |    |         |    |    |    |
| System Development (UPX-36 ECP)                    |         |    |    |    |         |    |    |    |         |    |    |    |
| <b>DDG 1000 Modernization</b>                      |         |    |    |    |         |    |    |    |         |    |    |    |
| Development of Integrated Product Support elements |         |    |    |    |         |    |    |    |         |    |    |    |

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**Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy** **Date:** May 2021

|  |  |   |
|--|--|---|
| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>0676 / Improve ID Development |
|--|--|---|

Schedule Details

| Events by Sub Project  | Start   |      | End     |      |
|--|---------|------|---------|------|
|  | Quarter | Year | Quarter | Year |
| <b>Mode 5 Improv Identification Dev</b>                                    |         |      |         |      |
| Test & Evaluation Milestones: IT Events for additional platforms           | 1       | 2020 | 3       | 2021 |
| Deliveries: Mode 5 - Production Line Insertion                             | 1       | 2020 | 4       | 2022 |
| Deliveries: Mode 5 - Prepare and Evaluate ECPs/SCDs                        | 1       | 2020 | 4       | 2022 |
| Deliveries: Mode 5 - Host Platform Integrations                            | 1       | 2020 | 4       | 2022 |
| Deliveries: Mode 5 - FRP Deliveries  | 1       | 2020 | 4       | 2022 |
| System Development: Establish ISEA and LBTS OE-120 tech refresh labs.      | 1       | 2020 | 1       | 2020 |
| System Development: Platform integration testing                           | 1       | 2020 | 2       | 2021 |
| RTDS UPX-34A: System Development (UPX-34A ECP)                             | 1       | 2021 | 4       | 2022 |
| UPX-36: System Development (UPX-36 ECP)                                    | 1       | 2021 | 4       | 2022 |
| DDG 1000 Modernization: Development of Integrated Product Support elements | 1       | 2021 | 4       | 2022 |

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|  |                    |                |                |                     |  |                      |                |                |  |                       |                         |                   |
|--|--------------------|----------------|----------------|---------------------|--|----------------------|----------------|----------------|--|-----------------------|-------------------------|-------------------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy |                    |                |                |                     |  |                      |                |                |  | <b>Date:</b> May 2021 |                         |                   |
| <b>Appropriation/Budget Activity</b><br>1319 / 5                   |                    |                |                |                     | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System |                      |                |                | <b>Project (Number/Name)</b><br>1253 / Combat Ident System |                       |                         |                   |
| <b>COST (\$ in Millions)</b>                                       | <b>Prior Years</b> | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022 Base</b> | <b>FY 2022 OCO</b>   | <b>FY 2022 Total</b> | <b>FY 2023</b> | <b>FY 2024</b> | <b>FY 2025</b>   | <b>FY 2026</b>        | <b>Cost To Complete</b> | <b>Total Cost</b> |
| 1253: <i>Combat Ident System</i>                                   | 188.641            | 1.880          | 1.770          | 1.483               | -  | 1.483                | -              | -              | -  | -                     | -                       | -                 |
| Quantity of RDT&E Articles   |                    | -              | -              | -                   | -  | -                    | -              | -              | -  | -                     |                         |                   |

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

MARK (MK) XIIA Mode 5 provides improved secure cooperative combat identification via Identification Friend or Foe (IFF). Mode 5 is developed in cooperation with North Atlantic Treaty Organization, with the DoD implementation governed by AIMS 03-1000A, AIMS 03-1000B and USN requirements defined in ORD # 577-06-01. IFF product improvements are designed to be installed through upgrade and deficiency correction studies, which in turn, become engineering changes to IFF interrogators and transponders and their associated cryptographic material.

The Navy MK XIIA Mode 5 program was approved for entry in Systems Development and Demonstration phase in August 2003 and into the Production and Deployment Phase and Low Rate Initial Production in July 2006, and Full Rate Production July 2012. The Navy Mode 5 program achieved Initial Operational Capability (IOC) in 2012 in accordance with the ORD. Mode 5 capable equipment was fielded in USN/USMC platforms in accordance with Joint Requirements Oversight Council Memorandums (047-07, 122-08 and 108-13) in support of Joint Mode 5 IOC in 2014 and Joint Full Operational Capability in FY2020.

RDT&E articles include Mode 5 cryptographic modules and associated hardware and software changes for IFF interrogators and transponders, including, but not limited to: AN/APX-118/123, AN/APX-119, and AN/APX-111 equipment. RDT&E units are required for government and contractor labs to support aircraft and ship integrations, test sites, test aircraft, and unmanned aircraft systems.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

|   | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022 Base</b> | <b>FY 2022 OCO</b> | <b>FY 2022 Total</b> |
|---|----------------|----------------|---------------------|--------------------|----------------------|
| <b>Title:</b> Mode 5 prototype hardware, cryptographic module   | 0.096          | 0.000          | 0.000               | 0.000              | 0.000                |
| <b>Articles:</b>  | -              | -              | -                   | -                  | -                    |
| <b>Description:</b> Develop kits for installation into existing fleet assets including AN/APX-118/123 Common Digital Transponder, and AN/APX-111 Combined Interrogator Transponder or other interrogator/transponder equipment to include small form factors. Repair and correct deficiencies identified during integration and test. Procure IFF interrogators and transponders, including, but not limited to: AN/APX-123, AN/APX-119, AN/APX-111, cryptographic modules and Mode 5 modification kits to support platform integration and testing. Perform platform integration efforts of Mode 5 equipment for various Type/Model/Series aircraft. |                |                |                     |                    |                      |
| <b>FY 2021 Plans:</b><br>N/A  |                |                |                     |                    |                      |
| <b>FY 2022 Base Plans:</b>  |                |                |                     |                    |                      |

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|   |       |  |       |  |       |
|---|-------|--|-------|--|-------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy  |       |  |       | <b>Date:</b> May 2021                                      |       |
| <b>Appropriation/Budget Activity</b><br>1319 / 5  |       | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System |       | <b>Project (Number/Name)</b><br>1253 / Combat Ident System |       |
| <b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>   |       |  |       |  |       |
|   |       |  |       |  |       |
| N/A   |       |  |       |  |       |
| <b>FY 2022 OCO Plans:</b><br>N/A  |       |  |       |  |       |
| <b>Title:</b> Mode 5 Systems Engineering and Integrated Logistics Support (ILS)   |       |  |       |  |       |
| <b>Articles:</b>  |       |  |       |  |       |
|   | 0.757 | 0.237  | 0.239 | 0.000  | 0.239 |
|   | -     | -  | -     | -  | -     |
| <b>Description:</b> Performed systems engineering and analysis in support of Mode 5 hardware/software development and engineering change proposals on Identification Friend or Foe (IFF) interrogators and transponders, including but not limited to: AN/APX-123 Common Digital Transponder, AN/APX-119 Transponder, AN/APX-111 Combined Interrogator Transponder, Cryptographic Modules, Mode 5 Engineering Test Equipment, and Mode 5 support equipment. |       |  |       |  |       |
| <b>FY 2021 Plans:</b><br>Expected completion of development of the small form factor IFF transponder for unmanned aircraft systems. Continue research and development of APX-123 modernization to address cyber security, protective technologies, compliance with updated standards, and hardware obsolescence redesign.   |       |  |       |  |       |
| <b>FY 2022 Base Plans:</b><br>Continue research and development of APX-123 modernization to address cyber security, protective technologies, compliance with updated standards, and hardware obsolescence redesign.   |       |  |       |  |       |
| <b>FY 2022 OCO Plans:</b><br>N/A  |       |  |       |  |       |
| <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b><br>Expected completion of development of the small form factor IFF transponder for unmanned aircraft systems in FY21, the ILS requirements increase in FY22.   |       |  |       |  |       |
| <b>Title:</b> Mode 5 Upgrade Developmental Test & Operational Test  |       |  |       |  |       |
| <b>Articles:</b>  |       |  |       |  |       |
|   | 1.027 | 1.533  | 1.244 | 0.000  | 1.244 |
|   | -     | -  | -     | -  | -     |
| <b>Description:</b> Perform Mode 5 integrated and operational test phases for AN/APX-123 Common Transponder, AN/APX-119 Transponder, small form factor IFF for unmanned aircraft systems, and AN/APX-111 Combined Interrogator Transponder.   |       |  |       |  |       |
| <b>FY 2021 Plans:</b>   |       |  |       |  |       |

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Navy **Date:** May 2021

|  |  |  |
|--|--|--|
| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>1253 / Combat Ident System |
|--|--|--|

| <b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>   | FY 2020 | FY 2021 | FY 2022 Base | FY 2022 OCO | FY 2022 Total |
|---|---------|---------|--------------|-------------|---------------|
| Continue small form factor IFF transponder testing. Continue testing of Mode 5 mitigating solutions for deploying platforms that did not meet Joint Full Operational Capability (JFOC).                               |         |         |              |             |               |
| <b>FY 2022 Base Plans:</b><br>Continue small form factor IFF transponder testing. Continue testing of Mode 5 mitigating solutions for deploying platforms that did not meet Joint Full Operational Capability (JFOC). |         |         |              |             |               |
| <b>FY 2022 OCO Plans:</b><br>N/A  |         |         |              |             |               |
| <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b><br>Decrease due to Mode 5 testing tapering off.  |         |         |              |             |               |
| <b>Accomplishments/Planned Programs Subtotals</b>   | 1.880   | 1.770   | 1.483        | 0.000       | 1.483         |

| <b>C. Other Program Funding Summary (\$ in Millions)</b> |                |                |                     |                    |                      |                |                |                |                |                         |                   |
|--|----------------|----------------|---------------------|--------------------|----------------------|----------------|----------------|----------------|----------------|-------------------------|-------------------|
| <u>Line Item</u>   | <u>FY 2020</u> | <u>FY 2021</u> | <u>FY 2022 Base</u> | <u>FY 2022 OCO</u> | <u>FY 2022 Total</u> | <u>FY 2023</u> | <u>FY 2024</u> | <u>FY 2025</u> | <u>FY 2026</u> | <u>Cost To Complete</u> | <u>Total Cost</u> |
| • OPN/2851: ID Systems                                   | 24.926         | 23.815         | 46.918              | -                  | 46.918               | -              | -              | -              | -              | -                       | -                 |
| • APN/0582: ID Sys                                       | 41.384         | 35.999         | 13.154              | -                  | 13.154               | -              | -              | -              | -              | -                       | -                 |

**Remarks**

**D. Acquisition Strategy**  
The Acquisition Strategy is to develop Mode 5 Engineering Change Proposals to modernize Mark XII Identification Friend or Foe (IFF) equipment or insert Mode 5 into existing platforms by JROC memorandums (047-07, 122-08 and 108-13). After integration into all Navy Combat Weapons systems platforms, the Navy will transition Cooperative Identification Capability to Mode 5.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy** **Date:** May 2021

|  |  |  |
|--|--|--|
| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>1253 / Combat Ident System |
|--|--|--|

| <b>Product Development (\$ in Millions)</b>                 |                                   |   |                    | <b>FY 2020</b> |                   | <b>FY 2021</b> |                   | <b>FY 2022 Base</b> |                   | <b>FY 2022 OCO</b> |                   | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|---|-----------------------------------|---|--------------------|----------------|-------------------|----------------|-------------------|---------------------|-------------------|--------------------|-------------------|----------------------|-------------------------|-------------------|---------------------------------|
| <b>Cost Category Item</b>                                   | <b>Contract Method &amp; Type</b> | <b>Performing Activity &amp; Location</b> | <b>Prior Years</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>         | <b>Award Date</b> | <b>Cost</b>        | <b>Award Date</b> | <b>Cost</b>          |                         |                   |                                 |
| Systems Engineering   | WR                                | NAWCAD : PAX River, MD                    | 16.040             | 0.056          | Nov 2019          | 0.006          | Nov 2020          | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| Systems Engineering   | WR                                | NAWCAD : St Inigoes, MD                   | 14.853             | 0.628          | Nov 2019          | 0.231          | Nov 2020          | 0.239               | Nov 2021          | -                  |                   | 0.239                | -                       | -                 | -                               |
| Primary Hardware Development                                | Various                           | Sikorsky : Stratford, CT                  | 3.776              | 0.096          | Jan 2020          | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| Prior Year Prod Dev Services costs no longer funded in FYDP | Various                           | Various : Various                         | 90.857             | 0.000          |                   | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| <b>Subtotal</b>   |                                   |   | 125.526            | 0.780          |                   | 0.237          |                   | 0.239               |                   | -                  |                   | 0.239                | -                       | -                 | N/A                             |

| <b>Support (\$ in Millions)</b>                            |                                   |   |                    | <b>FY 2020</b> |                   | <b>FY 2021</b> |                   | <b>FY 2022 Base</b> |                   | <b>FY 2022 OCO</b> |                   | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|--|-----------------------------------|---|--------------------|----------------|-------------------|----------------|-------------------|---------------------|-------------------|--------------------|-------------------|----------------------|-------------------------|-------------------|---------------------------------|
| <b>Cost Category Item</b>                                  | <b>Contract Method &amp; Type</b> | <b>Performing Activity &amp; Location</b> | <b>Prior Years</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>         | <b>Award Date</b> | <b>Cost</b>        | <b>Award Date</b> | <b>Cost</b>          |                         |                   |                                 |
| ILS  | Various                           | Various : Various                         | 5.271              | 0.073          | Nov 2019          | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| Prior Year Support Services costs no longer funded in FYDP | Various                           | Various : Various                         | 2.761              | 0.000          |                   | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| <b>Subtotal</b>  |                                   |   | 8.032              | 0.073          |                   | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | N/A                             |

| <b>Test and Evaluation (\$ in Millions)</b>   |                                   |   |                    | <b>FY 2020</b> |                   | <b>FY 2021</b> |                   | <b>FY 2022 Base</b> |                   | <b>FY 2022 OCO</b> |                   | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|---|-----------------------------------|---|--------------------|----------------|-------------------|----------------|-------------------|---------------------|-------------------|--------------------|-------------------|----------------------|-------------------------|-------------------|---------------------------------|
| <b>Cost Category Item</b>                     | <b>Contract Method &amp; Type</b> | <b>Performing Activity &amp; Location</b> | <b>Prior Years</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>         | <b>Award Date</b> | <b>Cost</b>        | <b>Award Date</b> | <b>Cost</b>          |                         |                   |                                 |
| Developmental T & E                           | WR                                | NAWCAD : PAX River, MD                    | 30.317             | 1.027          | Nov 2019          | 1.533          | Nov 2020          | 1.244               | Nov 2021          | -                  |                   | 1.244                | -                       | -                 | -                               |
| Prior Year T&E costs no longer funded in FYDP | Various                           | Various : Various                         | 20.370             | 0.000          |                   | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| <b>Subtotal</b>                               |                                   |   | 50.687             | 1.027          |                   | 1.533          |                   | 1.244               |                   | -                  |                   | 1.244                | -                       | -                 | N/A                             |

**Remarks**  
Increase from FY20 to FY21 is due to increased testing requirements of the small form factor IFF transponder.



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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy** **Date: May 2021**

|  |  |  |
|--|--|--|
| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>1253 / Combat Ident System |
|--|--|--|

|                                      | FY 2020         |    |    |                     | FY 2021           |    |    |    | FY 2022 |    |    |    |
|--------------------------------------|-----------------|----|----|---------------------|-------------------|----|----|----|---------|----|----|----|
|                                      | 1Q              | 2Q | 3Q | 4Q                  | 1Q                | 2Q | 3Q | 4Q | 1Q      | 2Q | 3Q | 4Q |
| <b>Combat Identification Systems</b> |                 |    |    |                     |                   |    |    |    |         |    |    |    |
| <b>Acquisition Milestones</b>        |                 |    |    |                     |                   |    |    |    |         |    |    |    |
| Milestones                           |                 |    |    | Mode 5<br>JFOC<br>▲ |                   |    |    |    |         |    |    |    |
| <b>Systems Development</b>           |                 |    |    |                     |                   |    |    |    |         |    |    |    |
| Hardware Development                 | ECPs and SCDs   |    |    |                     |                   |    |    |    |         |    |    |    |
| Small Form Factor Development        |                 |    |    |                     |                   |    |    |    |         |    |    |    |
| Software Development Integration     |                 |    |    |                     |                   |    |    |    |         |    |    |    |
| <b>Test and Evaluation</b>           |                 |    |    |                     |                   |    |    |    |         |    |    |    |
| Technical Evaluation                 |                 |    |    |                     | Small Form Factor |    |    |    |         |    |    |    |
| Operational Evaluation               | Follow-on T & E |    |    |                     |                   |    |    |    |         |    |    |    |
| <b>Production Milestones</b>         |                 |    |    |                     |                   |    |    |    |         |    |    |    |
| Contract Awards                      |                 |    |    |                     |                   |    |    |    |         |    |    |    |
| <b>Deliveries</b>                    |                 |    |    |                     |                   |    |    |    |         |    |    |    |
| FRP Deliveries                       |                 |    |    |                     |                   |    |    |    |         |    |    |    |

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**Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy** **Date:** May 2021

|  |   |   |
|--|---|---|
| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / <i>Navigation/Id System</i> | <b>Project (Number/Name)</b><br>1253 / <i>Combat Ident System</i> |
|--|---|---|

Schedule Details

| Events by Sub Project  | Start   |      | End     |      |
|--|---------|------|---------|------|
|  | Quarter | Year | Quarter | Year |
| <b><i>Combat Identification Systems</i></b>                                |         |      |         |      |
| Acquisition Milestones: Milestones: Mode 5 JFOC                            | 4       | 2020 | 4       | 2020 |
| Systems Development: Hardware Development: Prepare & Evaluate ECPs/SCDs    | 1       | 2020 | 4       | 2022 |
| Systems Development: Hardware Development: Small Form Factor               | 1       | 2020 | 4       | 2020 |
| Test and Evaluation: Technical Evaluation: Small Form Factor               | 4       | 2020 | 2       | 2022 |
| Test and Evaluation: Operational Evaluation: Follow-on Test and Evaluation | 1       | 2020 | 4       | 2022 |
| Deliveries: FRP Deliveries   | 1       | 2020 | 4       | 2022 |

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Navy **Date:** May 2021

| Appropriation/Budget Activity<br>1319 / 5 |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604777N / Navigation/Id System |               |         |         | Project (Number/Name)<br>9999 / Congressional Adds |         |                  |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|--|---------|------------------|------------|
| COST (\$ in Millions)                     | Prior Years | FY 2020 | FY 2021 | FY 2022 Base | FY 2022 OCO   | FY 2022 Total | FY 2023 | FY 2024 | FY 2025  | FY 2026 | Cost To Complete | Total Cost |
| 9999: <i>Congressional Adds</i>           | 4.827       | 4.827   | 0.000   | 0.000        | -   | 0.000         | -       | -       | -  | -       | -                | -          |
| Quantity of RDT&E Articles                |             | -       | -       | -            | -   | -             | -       | -       | -  | -       |                  |            |

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

MARK (MK) XIIA Mode 5 provides improved secure cooperative combat identification via Identification Friend or Foe (IFF). Mode 5 is developed in cooperation with North Atlantic Treaty Organization, with the DoD implementation governed by AIMS 03-1000A, AIMS 03-1000B and USN requirements defined in ORD # 577-06-01. Research, development, and acquisition to support lightweight and micro IFF transponders with Mode 5 in order to meet the space, weight, and power (SWaP) requirements for Group 2 and 3 Unmanned Aerial Vehicles (UAVs), other unmanned systems, and manned systems.

**B. Accomplishments/Planned Programs (\$ in Millions)**

|  | FY 2020 | FY 2021 |
|--|---------|---------|
| <b>Congressional Add:</b> Development of lightweight security Identification Friend or Foe transmitter | 4.827   | 0.000   |
| <b>FY 2020 Accomplishments:</b> N/A  |         |         |
| <b>FY 2021 Plans:</b> N/A  |         |         |
| <b>Congressional Adds Subtotals</b>  | 4.827   | 0.000   |

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

N/A

**Remarks**

**D. Acquisition Strategy**

The Acquisition Strategy is to develop and certify a micro IFF transponder solution through Small Business Innovation Research (SBIR) and other government development organizations and initiate development of a lightweight security IFF transmitter for manned and unmanned systems.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy** **Date:** May 2021

|  |  |   |
|--|--|---|
| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>9999 / Congressional Adds |
|--|--|---|

| <b>Product Development (\$ in Millions)</b> |                                   |   |                    | <b>FY 2020</b> |                   | <b>FY 2021</b> |                   | <b>FY 2022 Base</b> |                   | <b>FY 2022 OCO</b> |                   | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|---|-----------------------------------|---|--------------------|----------------|-------------------|----------------|-------------------|---------------------|-------------------|--------------------|-------------------|----------------------|-------------------------|-------------------|---------------------------------|
| <b>Cost Category Item</b>                   | <b>Contract Method &amp; Type</b> | <b>Performing Activity &amp; Location</b> | <b>Prior Years</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>         | <b>Award Date</b> | <b>Cost</b>        | <b>Award Date</b> | <b>Cost</b>          |                         |                   |                                 |
| Product Development - SBIR                  | Various                           | R-Cubed Engineering LLC : Palmetto, FL    | 1.994              | 1.500          | Jul 2020          | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| Product Development - SBIR                  | Various                           | Intelligent Automation : Rockville, MD    | 1.994              | 1.500          | Jul 2020          | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| Product Development - Organic               | WR                                | NAWCAD : Patuxent River, MD               | 0.527              | 1.227          | Apr 2020          | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| Certification                               | TBD                               | Various : Various                         | 0.312              | 0.200          | Aug 2020          | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| <b>Subtotal</b>                             |                                   |   | 4.827              | 4.427          |                   | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | N/A                             |

| <b>Management Services (\$ in Millions)</b> |                                   |   |                    | <b>FY 2020</b> |                   | <b>FY 2021</b> |                   | <b>FY 2022 Base</b> |                   | <b>FY 2022 OCO</b> |                   | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|---|-----------------------------------|---|--------------------|----------------|-------------------|----------------|-------------------|---------------------|-------------------|--------------------|-------------------|----------------------|-------------------------|-------------------|---------------------------------|
| <b>Cost Category Item</b>                   | <b>Contract Method &amp; Type</b> | <b>Performing Activity &amp; Location</b> | <b>Prior Years</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>    | <b>Award Date</b> | <b>Cost</b>         | <b>Award Date</b> | <b>Cost</b>        | <b>Award Date</b> | <b>Cost</b>          |                         |                   |                                 |
| Program Management Support                  | WR                                | NAWCAD : Patuxent River                   | 0.000              | 0.400          | Mar 2020          | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | -                               |
| <b>Subtotal</b>                             |                                   |   | 0.000              | 0.400          |                   | 0.000          |                   | 0.000               |                   | -                  |                   | 0.000                | -                       | -                 | N/A                             |

| <b>Project Cost Totals</b> | <b>Prior Years</b> | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022 Base</b> | <b>FY 2022 OCO</b> | <b>FY 2022 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |
|----------------------------|--------------------|----------------|----------------|---------------------|--------------------|----------------------|-------------------------|-------------------|---------------------------------|
|                            | 4.827              | 4.827          | 0.000          | 0.000               | -                  | 0.000                | -                       | -                 | N/A                             |

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy** **Date:** May 2021

|  |  |   |
|--|--|---|
| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / Navigation/Id System | <b>Project (Number/Name)</b><br>9999 / Congressional Adds |
|--|--|---|

| <b>Micro IFF Component Development</b> | <b>FY 2020</b>         |   |                                   |    | <b>FY 2021</b> |    |    |    | <b>FY 2022</b> |    |    |    |
|--|------------------------|---|-----------------------------------|----|----------------|----|----|----|----------------|----|----|----|
|  | 1Q                     | 2Q  | 3Q                                | 4Q | 1Q             | 2Q | 3Q | 4Q | 1Q             | 2Q | 3Q | 4Q |
| <b>Development</b>                     |                        |   | Critical Design Review (CDR)<br>◆ |    |                |    |    |    |                |    |    |    |
|  |                        | Micro IFF Testing<br><hr style="border: 1px solid black;"/> |                                   |    |                |    |    |    |                |    |    |    |
|  | NSA Certification<br>◆ |   | Final Prototype Delivery<br>◆     |    |                |    |    |    |                |    |    |    |

2022PB - 0604777N - 9999

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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy** **Date: May 2021**

|  |   |  |
|--|---|--|
| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / <i>Navigation/Id System</i> | <b>Project (Number/Name)</b><br>9999 / <i>Congressional Adds</i> |
|--|---|--|

| <b>Lightweight security Identification<br/>Friend or Foe transmitter</b><br><br><b>Development</b> | FY 2020 |    |                                   |                     | FY 2021 |              |    |              | FY 2022 |    |    |    |  |
|--|---------|----|-----------------------------------|---------------------|---------|--------------|----|--------------|---------|----|----|----|--|
|  | 1Q      | 2Q | 3Q                                | 4Q                  | 1Q      | 2Q           | 3Q | 4Q           | 1Q      | 2Q | 3Q | 4Q |  |
|  |         |    |                                   | Contract Award<br>◆ |         |              |    |              |         |    |    |    |  |
|  |         |    | Micro IFF Development and Testing |                     |         |              |    |              |         |    |    |    |  |
|  |         |    |                                   |                     |         | SRR/SFR<br>◆ |    | PDR/CDR<br>◆ |         |    |    |    |  |

2022PB - 0604777N - 9999

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**Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy** **Date:** May 2021

|  |   |  |
|--|---|--|
| <b>Appropriation/Budget Activity</b><br>1319 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604777N / <i>Navigation/Id System</i> | <b>Project (Number/Name)</b><br>9999 / <i>Congressional Adds</i> |
|--|---|--|

Schedule Details

| Events by Sub Project   | Start   |      | End     |      |
|---|---------|------|---------|------|
|   | Quarter | Year | Quarter | Year |
| <b><i>Micro IFF Component Development</i></b>                               |         |      |         |      |
| Development: NSA Certification Critical Design Review (CDR)                 | 3       | 2020 | 3       | 2020 |
| Development: Micro IFF Testing  | 2       | 2020 | 3       | 2020 |
| Development: Final Prototype Delivery                                       | 3       | 2020 | 3       | 2020 |
| Development: NSA Certification  | 1       | 2020 | 1       | 2020 |
| <b><i>Lightweight security Identification Friend or Foe transmitter</i></b> |         |      |         |      |
| Development: Contract Award   | 4       | 2020 | 4       | 2020 |
| Development: Micro IFF Testing  | 3       | 2020 | 4       | 2021 |
| Development: Systems Requirement Reviews/Systems Functional Review          | 2       | 2021 | 2       | 2021 |
| Development: Critical Design Review (CDR)                                   | 4       | 2021 | 4       | 2021 |