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

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>
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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	773.938	628.169	256.970	268.937	-	268.937	-	-	-	-	-	-
3278: <i>MQ-25 Air System (AS)</i>	716.677	571.134	205.614	222.373	-	222.373	-	-	-	-	-	-
3279: <i>Unmanned Carrier Aviation Mission Control System</i>	57.261	57.035	51.356	46.564	-	46.564	-	-	-	-	-	-

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): P462

Note

PE 0605414N Unmanned Carrier Aviation (UCA) is comprised of two separated programs:
 PU 3278 MQ-25 Development is directly related to the MQ-25 Air System (AS) development ACAT I Program.
 PU 3279 UMCS is directly related to the Unmanned Carrier Aviation Mission Control System (UMCS) ACAT II program. UMCS develops the control station and integrates it with the MQ-25 AS along with multiple networks and systems both afloat and on shore.

MQ-25 PU 3278 execution is dependent upon the success of UMCS PU 3279 execution. This submission for PU 3278 has been coordinated with UMCS PU 3279.

The prime contractor for MQ-25 development declared a loss on the MQ-25 contract in Oct 2018 and thereby invoked Federal Acquisition Regulation clause 32.503-6(g). Per the loss contract clause, a loss ratio factor must be applied to all progress payments to protect the government by ensuring the amount of unliquidated progress payments does not exceed the fair value of undelivered work. The reduced progress payments will prevent the program from meeting expenditure benchmarks in the near years.

Prior to FY21, PMA-268 had been developing a government-furnished Ground Control Station (GCS) known as MD-5 as part of its UMCS program, the system-of-systems required for command and control of the MQ-25A air vehicle and payload. In September 2020, Navy leadership directed the MQ-25 program to transition to an already mature, industry-developed GCS solution that supports Joint All Domain Command and Control (JADC2) interoperability and multi-level security requirements. The modified hardware will streamline software development, readily support multiple classification levels, and position the MQ-25 for interoperability with other DoD systems. With the decision to switch to an industry developed GCS, work associated with integrating the new GCS into the MQ-25 air-vehicle and payload was put on contract with Boeing (integration) in December 2020 and Lockheed Martin (via NSMA) in April 2021.

A. Mission Description and Budget Item Justification

The MQ-25 program, PU 3278, rapidly develops an unmanned capability to embark on Carrier Vessel, Nuclear (CVN) as part of the Carrier Air Wing (CVW) to conduct aerial refueling as a primary mission and provide Intelligence, Surveillance, and Reconnaissance (ISR) capability for a secondary mission. MQ-25 extends CVW mission effectiveness range, partially mitigates the current Carrier Strike Group (CSG) organic ISR shortfall and fills the future CVW-tanker gap, mitigating Strike Fighter shortfall

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<p>and preserving F/A-18E/F Fatigue Life Expenditure for its primary missions. As the first carrier-based, Group 5 Unmanned Aircraft System (UAS), MQ-25 will pioneer the integration of manned and unmanned operations, utilize mature, complex sea-based Command, Control, Communications, Computers, and Intelligence (C4I) technologies, and pave the way for future multi-faceted, multi-mission UASs to pace emerging threats.</p> <p>The MQ-25 system will enhance CVN capability and versatility for the Joint Forces Commander through the integration of a persistent, sea-based, multi-mission aerial refueling and ISR UAS into the CVW. MQ-25 is comprised of an Air System which will integrate with the UCA Mission Control System (UMCS) program. These architectural segments will be managed by the PMA-268 Government Lead Systems Integrator (LSI) that provides system-of-systems integration and is also responsible for managing enterprise-level UCA architecture and associated interfaces. MQ-25 Development includes development and test of the air vehicle to include software, peculiar support equipment, training systems and other logistics elements.</p> <p>In FY 2022, the first Engineering Development Model (EDM) will conduct the initial UMCS-controlled flight with the new GCS. The program will integrate new software into the A/C in support of the new GCS and initial flight. The remaining three EDMs will complete production and begin flight test. The three System Demonstration Test Articles will be produced.</p> <p>The Unmanned Carrier Aviation (UCA) Mission Control System (UMCS) program, PU 3279, is the system-of-systems required for MQ-25 vehicle and payload control both shipboard and shore based. The UMCS consists of all ground and ship based hardware, software, and networks associated with the planning and execution of flight operations and tactical missions, and includes the control stations, displays, computers, and servers as well as line of sight (LOS) communications and beyond line of sight (BLOS) satellite communications (SATCOM) systems. Additionally, UMCS includes the human interface for Air Vehicle Operators (AVOs) with the MQ-25A Air Vehicle (AV) and external C4I systems that allow for establishing, maintaining, sharing, and passing command and control of the MQ-25A AV, its subsystems, and associated external systems. The new ground control station (GCS) hardware will streamline software development, readily support multiple classification levels, and position the MQ-25A for interoperability with other DoD systems. UMCS develops and integrates the MQ-25 control station, and auxiliary communications systems using ARC-210 and Mobile User Objective System (MUOS) capable radios as well as a situational awareness display called the Video Management System (VidMS). UMCS also develops control station software and integrates that software with MQ-25A unique software. UMCS performs CVN infrastructure modifications by reconfiguring several spaces within the CVN in order to install the GCS, auxiliary communications systems, and VidMS in support of MQ-25A test events and operations aboard select NIMITZ Class CVNs. The UMCS modifies and integrates with existing NAVWAR C4I systems to provide network paths for AV and mission payload data using a variety of wideband and narrowband communication paths. UMCS accomplishes this by integrating the GCS and the MQ-25A AV, with multiple networks and systems both afloat and on shore.</p> <p>In FY 2022, UMCS will continue developing ground control station (GCS) software and building/integrating hardware for ship and shore installations. UMCS will begin assembling an embarkable system consisting of GCS hardware and associated communication systems into multiple CONEX boxes (purchased in FY21). Planning for and installation of CVN</p>		

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modifications to support future MQ-25A test events will begin in FY22 and continue into FY23. UMCS will redesign portions of the CVN infrastructure based on new GCS hardware and updated installation guidance documents for future installations. The UMCS will continue development and integration activities with multiple NAVWAR C4I networks and communications, CVN and shore exploitation systems, and common datalink systems (e.g. Consolidated Afloat Network Enterprise System (CANES), Wideband Military and Commercial SATCOM, Distributed Common Ground System Navy (DCGS-N) and Classic Reach).

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under SYSTEM DEVELOPMENT AND DEMONSTRATION because it includes projects that have passed Milestone B approval and are conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full-rate production decision.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	649.055	266.970	232.719	-	232.719
Current President's Budget	628.169	256.970	268.937	-	268.937
Total Adjustments	-20.886	-10.000	36.218	-	36.218
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-10.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-20.886	0.000			
• Program Adjustments	0.000	0.000	40.800	-	40.800
• Rate/Misc Adjustments	0.000	0.000	-4.582	-	-4.582

Change Summary Explanation

The FY 2022 funding request was increased by (\$36.218M): From PB21 to PB22

PU 3278, (\$35.384M): (\$41.894M) increase due to the development and integration of a modified Ground Control Station (GCS) (hardware and software);(-\$2.500M) was reduced to fund higher priority efforts within the department; (\$-4.010M) was reduced for other rate/misc. adjustments.

PU 3279, (\$0.834M): (1.406M) increase due to the development and integration of modified GCS; (-\$0.572M) reduced for other rate/misc. adjustments.

Schedule:

PU 3278: R-4 schedule

- Acquisition Milestone Knowledge Points have shifted based on the transition to a mature, industry-developed GCS to support JADC2 interoperability, multi-level security, and mitigated much of the 10-month delay anticipated when the number of operationally-equipped CVNs available for shipboard testing was

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Appropriation/Budget Activity
1319: *Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)*

R-1 Program Element (Number/Name)
PE 0605414N / *Unmanned Carrier Aviation (UCA)*

reduced from four to two.

- Air Vehicle (AV) Deliveries - Multiple factors have resulted in delays to the delivery of EDM aircraft. The aircraft design was intentionally paused to optimize weight and strength; a quality issue was identified during the build process and appropriately driven back to the supplier for correction; and finally, COVID has had an impact on the manufacture and delivery of parts from suppliers thus impacting the aircraft build timeline.

PU 3279: R-4 schedule - Schedule updated to reflect GCS MD-5C/D/E strategy along with updated integration due to CVN availability. UCA test windows, CVN test availability, software development, and NAVWAR integration all updated.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy										Date: May 2021		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>				Project (Number/Name) 3278 / MQ-25 Air System (AS)			
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
3278: MQ-25 Air System (AS)	716.677	571.134	205.614	222.373	-	222.373	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		
Project MDAP/MAIS Code: P462												

A. Mission Description and Budget Item Justification

The scope of the program includes, but is not limited to, system level requirements identification, allocation of requirements to segments and components, design, development, integration, fabrication, test, training, and support activities to provide the MQ-25 capabilities. To provide these capabilities, MQ-25 will transition technologies from other programs and adapt them into the carrier environment. MQ-25 will deliver the necessary air vehicles, command, control, connectivity, shipboard and land-based launch and recovery control systems, associated support systems, interfaces, and upgrades to other Navy systems (as required) to meet the required capabilities.

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

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Air Segment Product Development	503.160	76.621	90.640	0.000	90.640
Articles:	3	-	-	-	-
Description: Air Segment Product Development efforts include, but are not limited to, design, development, integration, fabrication, test and training to deliver a carrier-suitable, semi-autonomous, unmanned vehicle capable of aerial refueling (give) and persistent Intelligence, Surveillance, and Reconnaissance (ISR) operations.					
FY 2021 Plans: Continue to perform Air Segment system integration and interface development activities. Continue design and fabrication of Air Vehicle subsystem and begin assembly of Air Vehicles. Continuation of software qualifications, contractor testing, test readiness review and final test preparations for first flight. Continue Engineering and Manufacturing Development (EMD) studies and analysis, and build of three System Demonstration Test Articles (SDTAs). Conduct additional test activities to support the delivery of Engineering Development Model (EDM). Integrate new network interface unit into aircraft in support of new GCS. Integrate new software suite associated with new GCS.					
FY 2022 Base Plans: Continue Air Vehicle development, design, and integration. Continue production of EDMs and System Demonstration Test					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)																							
Articles (SDTAs) air vehicles. Continue development of technical publication source data. Continue ground / software lab testing and begin flight test. Begin software correction of deficiency efforts. Begin development of software and hardware to support post IOC additive capabilities to account for current threats identified post EMD contract award. Continue efforts to support post IOC such as advanced training tactics and techniques; sustainment and other studies related to operational employment learned since EMD contract award. Continue software integration efforts related to new GCS.																							
FY 2022 OCO Plans: N/A																							
FY 2021 to FY 2022 Increase/Decrease Statement: FY 2021 to FY 2022 increase due to the development and integration of a modified control station (hardware and software).																							
Title: Lead Systems Integration (LSI) Product Development																							
Articles:																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 65%;"></th> <th style="width: 10%;">FY 2020</th> <th style="width: 10%;">FY 2021</th> <th style="width: 10%;">FY 2022 Base</th> <th style="width: 10%;">FY 2022 OCO</th> <th style="width: 10%;">FY 2022 Total</th> </tr> </thead> <tbody> <tr> <td></td> <td align="right">37.785</td> <td align="right">58.457</td> <td align="right">62.772</td> <td align="right">0.000</td> <td align="right">62.772</td> </tr> <tr> <td></td> <td align="right">-</td> <td align="right">-</td> <td align="right">-</td> <td align="right">-</td> <td align="right">-</td> </tr> </tbody> </table>							FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total		37.785	58.457	62.772	0.000	62.772		-	-	-	-	-
	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total																		
	37.785	58.457	62.772	0.000	62.772																		
	-	-	-	-	-																		
Description: Lead Systems Integration (LSI) is a Government-led effort including, but not limited to, advanced development, architecture development, interface definition, integration, system level test and evaluation, science and technology investments, roadmap refinement, and coordination of all MQ-25 capabilities across system segments and stakeholders.																							
FY 2021 Plans: Continue to perform Air Segment and UMCS development, design, and integration to include government led efforts that support science and technology investments and roadmap refinement. Continue Cyber Security efforts to achieve Authority to Operate (ATO) certifications for the System Test Integration Lab (STIL), the Lab Revitalization Program (LRP), and test facilities. Continue operation of the STIL in support of government led hardware & software development and test activities. Procure LRP infrastructure communications and telemetry hardware to support test activities. Continue government and contractor STIL integration activities in support of software verification and validation. Connect STIL and LRP to air system contractor labs. Conduct and support flight test activities at contractor facilities. Conduct and support laboratory tests in support of EMD aircraft systems. Transition to the new GCS in all locations and update software.																							
FY 2022 Base Plans:																							

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Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>	Project (Number/Name) 3278 / <i>MQ-25 Air System (AS)</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Continue transition to new GCS and software. Continue Air Segment and UMCS development, design, and integration with the new GCS. Continue government led efforts that support science and technology investments and roadmap refinement. Complete Cyber Security efforts to achieve Authority to Operate (ATO) certifications for the System Test and Integration Lab (STIL), the Lab Revitalization Program (LRP), and test facilities. Continue operation of the STIL in support of government led hardware and software development and test activities. Begin STIL activities in support of correction of deficiencies. Continue government and contractor STIL integration activities in support of software verification and validation. Maintain connection between STIL and LRP to air system contractor labs. Continue to conduct and support flight test activities at contractor facilities. Continue to conduct and support laboratory tests in support of EMD aircraft systems.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase of \$4.315M from FY 2021 to FY 2022 aligns to updated contracting and execution strategy and supports new GCS efforts.</p>					
<p>Title: Management</p> <p align="right">Articles:</p> <p>Description: Efforts include program, engineering, test, and logistics management to include travel.</p> <p>FY 2021 Plans: Continue oversight, coordination, and management of MQ-25 acquisition, system interface and integration activities. Oversee contract activities, including execution of the EMD contract; including travel and training. Conduct logistics management tasks. Maintain security and program office environments.</p> <p>FY 2022 Base Plans: Continue oversight, coordination, and management of MQ-25 acquisition, system interface and integration activities.</p>	6.630	7.321	7.475	0.000	7.475
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Oversee contract activities, including execution of the EMD contract and travel and training. Conduct logistics management tasks. Maintain security and program office environments. FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: Increase of \$0.154M from FY 2021 to FY 2022 due to inflation.					
Title: Test and Evaluation Articles: Description: Description: Provide Government Integrated testing and evaluation and Performance Based Specifications (PBS) compliance verification; support equipment evaluations and assessments, instrumentation development and support, and Integrated Test support. FY 2021 Plans: Continue to support development and implementation of test facilities, range, and lab test requirements. Support updates to the Test and Evaluation Master Plan (TEMP), support engineering events, and program management activities. Support surrogate test activities for landing systems demonstrations. Support activities in Modeling and Simulation development to include validation and verification. Continue support of the Government Systems Test & Integration Lab (STIL) and continue stand up of the integrated test facilities in support of the Engineering & Manufacturing Development (EMD) contract, to include test facility installation, integration, procurement of support equipment and accreditation activities. Provide government engineering to support contractor testing; support first test flight of the government's EDMs integration testing of the new GCS with EDMs. FY 2022 Base Plans: Continue to support development, implementation, and sustainment of test facilities, range, and lab test requirements. Support updates to the TEMP, support engineering events, and program management activities. Support activities in Modeling and Simulation development to include validation and verification. Continue support of the Government STIL and continue stand up of the integrated test facilities in support of the EMD contract, to include test facility installation, integration, procurement of support equipment, and accreditation activities. Provide government engineering to support contractor testing; support the integration of the new GCSs and initial UMCS flights with the government's EDMs; support flight test of EDMs; conduct EMD test program including aeromechanical	22.000	58.055	55.710	0.000	55.710
	-	-	-	-	-

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Appropriation/Budget Activity 1319 / 5		R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>		Project (Number/Name) 3278 / <i>MQ-25 Air System (AS)</i>	
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
evaluation, mission systems evaluation, aerial refueling, aircraft carrier suitability, environmental, and supportability testing.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Decrease of \$2.345M from FY 2021 to FY 2022 will reduce staffing in support of test and delay flight execution activities intended to support Developmental Test.					
Title: Support					
Articles:					
	1.559	5.160	5.776	0.000	5.776
	-	-	-	-	-
Description: Efforts include studies, analyses, and training development support.					
FY 2021 Plans: Refine logistics supportability and begin development of spares models with NAVSUP in support of Initial Operational Capability (IOC). Begin training of Initial Operational Test and Evaluation (IOT&E) and initial Fleet operators and maintainers in support of IOTE activities. Begin development of logistics products associated with new GCS.					
FY 2022 Base Plans: Mature the Logistics Product Database, Technical publications, NATOPS publications, and continue to build a Product Lifecycle system to share air system data and resources in an efficient configuration managed environment. Finalize FY22 spares models with NAVSUP and FST in support of IOC. Train IOT&E and Squadron (VUQ-10) Fleet operators and maintainers and begin training NATEC services in support of post IOT&E activities ("train the trainer" events). Continue development of logistics products associated with new GCS.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Increase of \$0.616M from FY 2021 to FY 2022 is for continuation of Air Vehicle Operator (AVO) Trainer development started in FY21 with additional procurement and integration efforts in FY22.					
Accomplishments/Planned Programs Subtotals					
	571.134	205.614	222.373	0.000	222.373

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

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>			<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• APN/0449: <i>MQ-25 Unmanned Carrier Aviation, APN-4</i>	0.000	0.000	0.000	-	0.000	-	-	-	-	-	-
• APN/0449C: <i>MQ-25 Unmanned Carrier Aviation, AP</i>	0.000	0.000	47.468	-	47.468	-	-	-	-	-	-
• APN/0605 J0449: <i>MQ-25 APN SPARES</i>	0.000	0.000	57.750	-	57.750	-	-	-	-	-	-

Remarks

APN 0449 is APN-4 regular supporting the manufacturing and production of MQ-25 Air Systems (AS) Low Rate Initial Production (LRIP) aircraft.
 APN 0449C is advanced procurement for the MQ-25A AS to procure LRIP long-lead items.
 APN 0605 spares supports the APN-4 efforts for sparing.

D. Acquisition Strategy

Based on the Government's acquisition strategy approved in April 2017, the MQ-25 program is an evolution from the previous Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS) program and is an Acquisition Category (ACAT) IB program managed by Program Executive Office, Unmanned Aviation & Strike Weapons (PEO(U&W)), PMA-268 Unmanned Carrier Aviation (UCA) Program Office. Pursuant to 10 U.S.C. 2430(d)(1), the Milestone Decision Authority (MDA) is ASN(RDA).

MQ-25 requirements are aligned with the Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) Initial Capabilities Document (ICD) and the Next Generation Air Dominance (NGAD) Family of Systems (FoS) ICD, which highlight the need for carrier-based refueling and persistent ISR capabilities. The Joint Requirements Oversight Council (JROC) endorsed the UCLASS ICD in April 2011 and formally approved it on 9 June 2011 via Joint Requirements Oversight Council Memorandum (JROCM) 087-11. The NGAD FoS ICD was validated by the JROC on 18 August 2015 and formally approved by JROCM 087-15. The JROC's guidance delineated in the validated ICDs and subsequent JROCMs was to establish a requirement for a versatile platform that supports myriad organic Naval missions such as aerial refueling and ISR for the CVW. The JROC validated the Capability Development Document for MQ-25 Carrier Based Unmanned Air System on 21 July 2017. Through a highly competitive source selection, the EMD contract was awarded in August 2018, and moved the Initial Operational Capability (IOC) four years earlier to 2024. The Navy recognized investments were required to support the shorter schedule and received support to increase the number of test CVN installs from two to four and exercising an option for System Demonstration Test Article (SDTA) production to start in FY20. Due to the UMCS FY20 budget reduction (PU 3279) in PB20, modifications ceased on two of the four test CVNs which made it highly likely IOC would be delayed by at least 10 months. The shift to a mature, industry developed ground control station (GCS) mitigated much of this risk, by providing an embarkable GCS that can be used for testing on any JPALS-equipped CVN. The latest projection for MQ-25A IOC is Feb 2025 and the program continues to look for opportunities to mitigate additional schedule risk. A stable funding base for both MQ-25 (PU 3278) and UMCS (PU 3279) remains critical to successfully delivering MQ-25A on an aggressive timeline as the two programs are tightly linked.

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<p>MQ-25 is implementing an evolutionary acquisition strategy to develop, fly, deploy, and evolve the MQ-25 Air Vehicle for Initial Operational Capability and fleet integration. This MQ-25 acquisition strategy continues with entry into flight test, correction of deficiencies work, and stand up of logistics and training efforts in conjunction with continued CVN modifications required for IOTE and IOC in 2024 and 2025, respectively.</p> <p>MQ-25, as part of the evolutionary acquisition strategy, will begin to utilize a Corporate Basic Ordering Agreement (BOA) for engineering studies, development work to pace emerging threats and capabilities needed for operational environment, sustainment, and training efforts.</p> <p>MQ-25 awarded a fixed price incentive, firm target (FPIF) contract for the AS EMD contract to Boeing in August 2018.</p> <p>MQ-25 is dependent upon the UMCS program to provide CVN-based Ground Control Stations (GCSs) and integration into CVN networks.</p>		

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

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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Air Segment - Primary Hardware Development	C/FPIF	Boeing : St. Louis, MO	429.893	394.400	Oct 2019	6.590	May 2021	27.330	Dec 2021	-		27.330	-	-	-
Air Segment - Primary Hardware SDTA	C/FPIF	Boeing : St. Louis, MO	0.000	63.500	Mar 2020	21.200	Mar 2021	0.000		-		0.000	-	-	-
Air Segment - Primary Hardware ESA	C/CPIF	Boeing : St. Louis, MO	10.000	5.572	Mar 2020	1.000	Mar 2021	5.695	Mar 2022	-		5.695	-	-	-
Air Segment- Primary Hardware Development	C/CPIF	Boeing : St. Louis, MO	0.000	11.324	Dec 2020	20.165	May 2021	24.945	May 2022	-		24.945	-	-	-
Air Segment - Systems Engineering	WR	NAWCAD : Patuxent River, MD	14.922	21.000	Nov 2019	22.000	Nov 2020	30.030	Nov 2021	-		30.030	-	-	-
Air Segment - Systems Engineering	WR	NAWCWD : China Lake, CA	1.654	1.337	Nov 2019	1.360	Nov 2020	1.360	Nov 2021	-		1.360	-	-	-
Air Segment - Systems Engineering	Various	Various : Various	1.491	1.253	Nov 2019	1.280	Nov 2020	1.280	Nov 2021	-		1.280	-	-	-
CS&C Segment	Various	Various : Various	58.911	0.000		0.000		0.000		-		0.000	-	-	-
Carrier Segment (Ship Integration)	Various	Various : Various	42.882	0.000		0.000		0.000		-		0.000	-	-	-
LSI - Advanced Development (Primary Hardware Development)	Various	Various : Various	1.272	0.000		0.000		0.000		-		0.000	-	-	-
LSI - Systems Engineering	Various	Various : Various	10.852	5.548	Nov 2019	5.410	Nov 2020	5.119	Nov 2021	-		5.119	-	-	-
LSI - Systems Engineering	WR	NAWCAD : Patuxent River, MD	54.544	25.528	Nov 2019	45.980	Nov 2020	54.153	Nov 2021	-		54.153	-	-	-
LSI - Systems Engineering	Various	NAVWAR : San Diego, CA	7.751	3.510	Nov 2019	3.638	Nov 2020	2.000	Nov 2021	-		2.000	-	-	-
LSI - Integrated Digital Environment	SS/FFP	NAWCAD : Lakehurst, NJ	8.202	3.199	Mar 2020	3.429	Mar 2021	1.500	Mar 2022	-		1.500	-	-	-
Air Segment -Primary Hardware Development	WR	NSMA : Washington, DC	0.000	4.774	Apr 2021	3.026	Apr 2021	0.000		-		0.000	-	-	-
Subtotal			642.374	540.945		135.078		153.412		-		153.412	-	-	N/A

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

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>	Project (Number/Name) 3278 / <i>MQ-25 Air System (AS)</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Remarks
FY 22: Updates in the Product Development Category support the new GCS efforts and contracting strategies. In addition, a G/WR element was added for NSMA which supports the Lockheed Martin efforts on the new GCS. Reductions were made from the LSI and Air Segment NAWCAD elements and Boeing CPIF ESA to support funding for new GCS hardware and software efforts.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Manpower Studies & Analyses	Various	Various : Various	0.334	0.156	Nov 2019	0.200	Nov 2020	0.200	Nov 2021	-		0.200	-	-	-
Training Development	Various	Various : Various	6.639	1.403	Nov 2019	4.960	Nov 2020	5.576	Nov 2021	-		5.576	-	-	-
Subtotal			6.973	1.559		5.160		5.776		-		5.776	-	-	N/A

Remarks
FY22: Training Development dollar value updated in FY22 for offsets used for new GCS. FY22 supports hardware procurements and integration of contractor software deliverables.

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	WR	NAWCAD : Patuxent River, MD	46.563	20.000	Nov 2019	55.985	Nov 2020	53.976	Nov 2021	-		53.976	-	-	-
Test and Evaluation	Various	Various : Various	3.038	2.000	Jan 2020	2.070	Nov 2020	1.734	Nov 2021	-		1.734	-	-	-
Subtotal			49.601	22.000		58.055		55.710		-		55.710	-	-	N/A

Remarks
Decrease from FY21 to FY22 supports risk in DT and OT efforts and NAWC adjustments.

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

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>	Project (Number/Name) 3278 / <i>MQ-25 Air System (AS)</i>
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management	Various	Various : Various	4.673	1.804	Nov 2019	1.840	Nov 2020	1.840	Nov 2021	-		1.840	-	-	-
Management	WR	NAWCAD : Patuxent River, MD	12.739	4.693	Nov 2019	5.346	Nov 2020	5.500	Nov 2021	-		5.500	-	-	-
Management	Various	NAVAIR : Patuxent River, MD	0.317	0.133	Oct 2019	0.135	Oct 2020	0.135	Oct 2021	-		0.135	-	-	-
Subtotal			17.729	6.630		7.321		7.475		-		7.475	-	-	N/A

Remarks
FY21 to FY22 increase due to inflation.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	716.677	571.134	205.614	222.373	-	222.373	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy

Date: May 2021

Appropriation/Budget Activity
1319 / 5

R-1 Program Element (Number/Name)
PE 0605414N / Unmanned Carrier Aviation
(UCA)

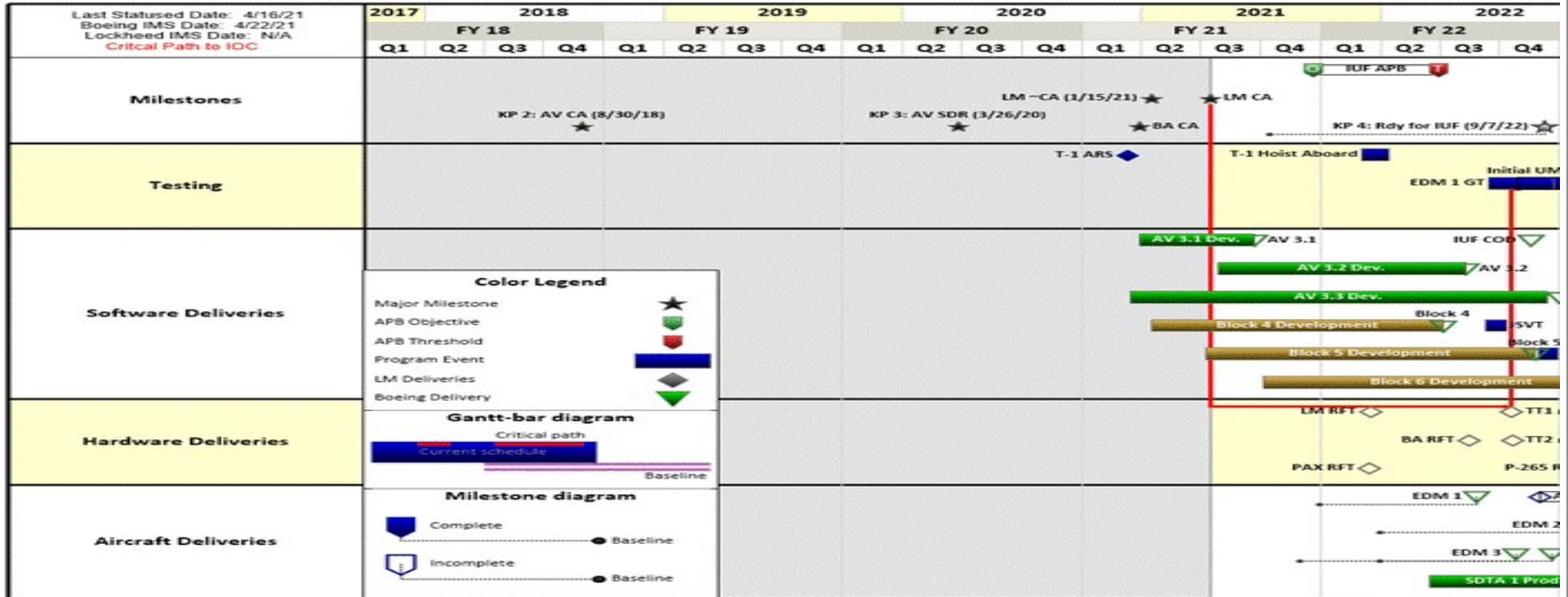
Project (Number/Name)
3278 / MQ-25 Air System (AS)



PMA-268 PROGRAM SCHEDULE

As of: 4/30/21

CUI



Note: This depiction of the program integrated master schedule is a resource for Government planning purposes only and shall not be construed as a modification to delivery or performance requirements set forth in the contract

NAVAIR

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>	Project (Number/Name) 3278 / <i>MQ-25 Air System (AS)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
MQ-25				
Acquisition Milestones: Milestones & Reviews: KP3 System Design Review	2	2020	2	2020
Acquisition Milestones: Milestones & Reviews: EDM Delivery 1	3	2022	3	2022
Acquisition Milestones: Milestones & Reviews: EDM Delivery 3	4	2022	4	2022
Acquisition Milestones: Milestones & Reviews: EDM Delivery 4	4	2022	4	2022
Acquisition Milestones: Milestones & Reviews: KP4 First Ready for IUF	4	2022	4	2022
Acquisition Milestones: Milestones & Reviews: T-1 Hoist Aboard	1	2022	1	2022
Systems Development: MQ-25 System Design & Integration: MQ-25 Architecture Development and Integration	2	2021	4	2022
Systems Development: MQ-25 System Design & Integration: Software Integration	2	2021	4	2022
Systems Development: Air Segment: ITT and Integration Support	3	2022	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy										Date: May 2021		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>				Project (Number/Name) 3279 / <i>Unmanned Carrier Aviation Mission Control 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
3279: <i>Unmanned Carrier Aviation Mission Control System</i>	57.261	57.035	51.356	46.564	-	46.564	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Unmanned Carrier Aviation (UCA) Mission Control System (UMCS) program builds, integrates, and installs control systems required to operate the MQ-25A. The UMCS program includes what was previously identified as the Control System & Connectivity (CS&C) and Carrier Vessel, Nuclear (CVN) Integration (CVNI) Segments previously captured under the MQ-25 Development PU 3278.

The Unmanned Carrier Aviation (UCA) Mission Control System (UMCS) program, PU 3279, is the system-of-systems required for MQ-25 vehicle and payload control both shipboard and shore based. The UMCS consists of all ground and ship based hardware, software, and networks associated with the planning and execution of flight operations and tactical missions; including the Ground Control Stations (GCSs), displays, computers, and servers as well as line of sight (LOS) communications and beyond line of sight (BLOS) satellite communications (SATCOM). Additionally, UMCS contains the human interface for Air Vehicle Operators (AVOs) with the MQ-25A Air Vehicle (AV) and external C4I systems. The new GCS hardware will streamline software development, readily support multiple classification levels, and position the MQ-25A for interoperability with other DoD systems. UMCS develops GCS software and integrates that software with MQ-25A unique software. UMCS modifies CVN spaces in order to install the GCS, auxiliary communications systems, and VidMS. The UMCS integrates with existing NAVWAR C4I systems to provide network paths for AV and mission payload data using a variety of wideband and narrowband communication paths.

UMCS builds the following hardware: MQ-25A GCS, Video Management System (VidMS), ARC-210 Radio Communication System (RCS), and Ashore Routing Communication System (ARCS). The new GCS has three variants, with the nomenclature of MD-5: one for CVNs (MD-5C), one for shore sites (MD-5D), and an embarkable system (MD-5E). The GCS consists of the following components: air vehicle operator (AVO) workstations, server racks, network interface racks, integrated communication system (ICS), Data Transfer System (DTS), and software. The ship variant (MD-5C) will leverage shore system components but will have slight manufacturing differences to account for the CVN environment. The VidMS provides MQ-25A AVOs with situational awareness video and displays of the CVN environment. The ARC-210 and Mobile User Objective System (MUOS) radio systems provide narrowband command and control (C2) and communications between the GCS and the MQ-25A Air Vehicle (AV). An ICS 1/2 rack integrates the GCS with existing carrier communication systems. The ARCS provides an interface between the shore sites and the Command, Control, Communication, Computers, and Intelligence (C4I) networks to enable wide-band LOS and BLOS communications with the MQ-25A. The UMCS program is leveraging NAVWAR baseline systems on board the CVNs and at the MQ-25A shore sites.

UMCS leads development, modification, engineering, and integration activities, facilitating seamless voice, data, and C2 exchanges with the MQ-25A AV, local networks, voice networks, C2 networks, tactical networks, intelligence systems, and launch and recovery systems. To accomplish this, the UMCS Program works closely with existing NAVWAR Programs of Record (PoRs).

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>	Project (Number/Name) 3279 / <i>Unmanned Carrier Aviation Mission Control System</i>

UMCS modifies CVN spaces to install GCS and communication hardware mentioned above, as well as the embarkable GCS (MD-5E), to support MQ-25A test events aboard select NIMITZ class carriers. The Naval Sea Systems Command (NAVSEA) Navy Modernization Process (NMP) provides guidance for CVN installation activities. This process identifies schedules and deadlines for documentation, drawings, and hardware availability to support CVN modifications. The CVN availability schedule (revised at least twice per year) identifies pre-planned maintenance periods for NIMITZ and FORD-Class CVNs. Changes to the maintenance periods could drive changes to the UMCS installation schedule. The process consists of multiple phases. Phase 1 is characterized by the development of technical data packages (TDPs), general installation guidance documents, and the Ship Change Documents (SCDs); this phase begins approximately three years, or more, before the start of the CVN maintenance period. Phase 2 is characterized by the performance of hull specific Ship Checks, development of hull specific Ship Installation Drawings (SIDs), and the purchase of Ground Control Station (GCS), VidMS, and LOS/BLOS subsystems; this phase begins two years before the start of the CVN maintenance period. Phase 3 is characterized by the approval of the SIDs, development of installation schedules, completion of cybersecurity and logistics documentation, and the integration and testing of the GCS and associated subsystems. This phase begins approximately one year prior to the start of the CVN maintenance period. Phase 4 is characterized by the modification of the CVN infrastructure, installation of the GCS and associated subsystems, and completion of the System Operational Verification Testing (SOVT); tasking is scheduled based on the number of SCDs being installed and the length of the planned CVN Maintenance Availability period. When availability periods are only six months long, activities will begin at the start of the CVN maintenance period. Due to the size and complexity of the UMCS modifications, a minimum of two 6-month maintenance periods is required for a full installation.

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

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Unmanned Carrier Aviation (UCA) Mission Control System	57.035	51.356	46.564	0.000	46.564
Articles:	-	-	-	-	-
<p>Description: Description: The UMCS program is a Government-led effort which includes, but is not limited to, development, integration, installation, and testing of the UMCS hardware and software, upgrades to existing CVN infrastructure to support accelerated delivery of MQ-25 capabilities, unique modifications to the Joint Precision Approach Landing System (JPALS) and the Aircraft Launch and Recovery Equipment (ALRE) to support specific MQ-25A capabilities, and integration with C4I systems.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> -Develop software for the new GCS; develop designs for ship, shore, and Embarkable variants of the new GCS -Complete ARC-210 Gen 6 radio software modifications and begin certification -Continue Cybersecurity efforts/certifications for the VidMS and the ARC-210 RCS -Begin Development of ICS .50 rack and modify ancillary systems to integrate with the new GCS 					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>	Project (Number/Name) 3279 / <i>Unmanned Carrier Aviation Mission Control System</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<ul style="list-style-type: none"> -Begin Embarkable design effort and procure CONEX boxes -Complete infrastructure modifications on two carriers -Develop installation guidance documentation based on new GCS design -Complete ALRE development and integration with JPALS to safely recover the MQ-25 -Install ALRE system modifications on CVN A -Begin redesigning the VidMS display system due to end of life component issues -Complete development of Air Traffic Control (ATC) situational awareness capability; integrate with Embarkable GCS -Modify integration design between the new GCS and the ARC-210 and MUOS systems -Build the data transfer system (enables mission plan upload from GCS to AV) and integrate with the lab -Develop a new interface rack between the GCS and existing ship/shore networks and communication systems -Modify and integrate with two ISR exploitation systems (DCGS-N, NTCS) -Continue to develop and integrate with common data link systems (CDLS TR & NTCDL) and Military/Commercial Satellite Communication systems <p><i>FY 2022 Base Plans:</i></p> <ul style="list-style-type: none"> - Continue GCS software development efforts and integration with MQ-25A AV software - Complete VidMS redesign and integration of the DTS-1 into the GCS baseline - Continue cybersecurity efforts to achieve Authority to Operate (ATO) certifications for the GCS, the VidMS, the ARC-210 RCS, and the ARC - Assemble and integrate one GCS and ancillary equipment for the LRP 					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>	Project (Number/Name) 3279 / <i>Unmanned Carrier Aviation Mission Control System</i>

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

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Finalize ship, shore, and embarkable GCS design packages - Begin design and integration of the embarkable GCS; includes connectivity plan with existing CVN networks - Complete temporary CVN installation in support of T1 hoist aboard and JPALS surrogate testing - Begin guidance documentation for the temporary installation of the embarkable GCS on multiple CVNs - Begin modifying multiple CVNs (up to 4) for installation of the GCS to support future MQ-25A testing - Continue developing interfaces between the embarkable GCS and ALRE systems and the ATC Picture Provide Non-Recurring Engineering (NRE), integration, installation, and test support for CVN C4I systems (e.g. Wideband Commercial and Military SATCOM, Narrowband Military SATCOM, Common Data Link Systems) - Provide NRE, integration, cybersecurity, and test support for ARCS for sustained end-to-end C4I communications from CVN to MQ-25A and to operational fixed control shore stations - Provide for NRE and integration of C4I systems at operational fixed control shore stations - Modify, integrate and test CVN and shore exploitation systems (e.g. DCGS-N and Classic Reach) - Provide C4I test support for PoR systems installed on CVN A and integrated with UMCS during at sea test events FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: FY 2021 to FY 2022 decrease due to updated acquisition strategy with the new GCS, which reduces the RDTE CVN installs and is primarily for basic infrastructure to support the embarkable GCS.					
Accomplishments/Planned Programs Subtotals	57.035	51.356	46.564	0.000	46.564

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/4269: <i>UMCS- Unman Carrier Aviation (UCA) Mission Cntrl Stn</i>	17.568	40.070	86.584	-	86.584	-	-	-	-	-	-
• OPN/9020/J4269: <i>Spares for Unmanned Carrier Aviation (UCA)</i>	0.000	0.000	3.705	-	3.705	-	-	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>	Project (Number/Name) 3279 / <i>Unmanned Carrier Aviation Mission Control System</i>

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

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

The Unmanned Carrier Aviation (UCA) Mission Control System (UMCS) program builds, integrates, installs, and sustains GCSs required to operate the MQ-25A AV via CVNs or shore sites.

- RDTE will fund the redesign of the CVN infrastructure; design, assembly, and installation of an embarkable GCS to support testing; software development to support MQ-25A AV development and certification of new software for UMCS on Navy IT systems/platforms; product development modifying existing systems with new capabilities for integration with or utilization by UMCS.
- OPN will fund the modification of CVN infrastructure and installation of hardware on CVNs and operational shore sites; incorporation of UMCS into existing Post MS-C PoRs (i.e. NAVWAR - C4I, ADNS, SATCOM, Secure Shore Integration; NAVAIR - ALRE, JPALS); Tech Refresh which includes replacement of a portion of selected hardware components on a three year recurring schedule.

D. Acquisition Strategy

In February 2019, the UMCS program was designated an ACAT II program, a separate PoR from the MQ-25 Air System (AS) ACAT IB. However both PoRs, UMCS and MQ-25, are required to field a Carrier Based Unmanned Air system (CBUAS) capability. MQ-25 AS is dependent on UMCS to meet the program's 2025 IOC.

- Due to the close alignment of requirements with MQ-25 AS, interoperability, and parent documentation, the UMCS PoR will leverage MQ-25 PoR acquisition events and milestones as part of the acquisition strategy for oversight and approvals.
- The MQ-25 CBUAS Program was designated a Maritime Accelerated Acquisition (MAA) Program by the CNO and the Assistant Secretary of the Navy for Research, Development, and Acquisition (ASN(RDA)). This designation expedites the acquisition and fielding of the MQ-25 system and directs all associated organizations to support the MQ-25 Program on a priority basis.
- The UMCS government team is performing the role of the Lead Systems Integrator (LSI) for the Ground Control System (GCS).
- In order to expedite fielding of UMCS per MAA policy and to align with the IOC requirements for the MQ-25 SoS, the program team has and will continue to leverage systems with high Technology Readiness Levels, largely consisting of Commercial and Government Off the Shelf systems (i.e. COTS and GOTS) to the greatest extent possible.

The latest UMCS acquisition strategy was approved on 25 July 2019. The UMCS PoR will use an evolutionary acquisition approach to develop, integrate, test, deploy, and evolve the capabilities throughout the life of the system. The UMCS requires integration of multiple products with the primary developmental system being the software dominant GCS.

Prior to FY21, PMA-268 had been developing a government-furnished Ground Control Station (GCS) known as MD-5A and MD-5B as part of its UMCS program, the system-of systems required for command and control of the MQ-25A Air Vehicle (AV) and payload. In September 2020, Navy leadership directed the MQ-25

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>	Project (Number/Name) 3279 / <i>Unmanned Carrier Aviation Mission Control System</i>
<p>program to transition to a mature, industry-developed GCS capable of Joint All Domain Command and Control (JADC2) interoperability and meeting multi-level security requirements. The new GCS will streamline software development, readily support multiple classification levels, and position the MQ-25 for interoperability with other DoD systems. With the decision to switch to an industry developed GCS, work associated with integrating the new GCS into the MQ-25A AV and payload was put on contract with Boeing (for integration) in December 2020 and Lockheed Martin (via NSMA) in April 2021.</p> <p>UMCS hardware procurements will accommodate CVN installation, testing, and deployment constraints as well as ship modification schedule constraints.</p> <p>- Because the UMCS is integrated and installed aboard CVNs, PMA-268 must follow the ship modernization process, which directs delivery dates for deliverables and installation milestones associated with a CVN maintenance availability period. The lead-time associated with this process drives the timeline to design, develop, and procure equipment ahead of the planned installation date.</p> <p>UMCS testing will occur in multiple stages, progressing from standalone testing with an AV simulator, to operating in conjunction with a hardware-in-the-loop air vehicle (hot bench), to shipboard evaluation of Unmanned Air Warfare Center (UAWC) installations. Each version of UMCS will be evaluated for system functionality and usability through a series of capabilities-based test events focused on the execution of mission tanking, recovery tanking, and Intelligence, Surveillance, and Reconnaissance missions. Additional testing to include mission planning, supportability, and reliability will be conducted during dedicated events when not captured concurrently with other tests.</p>		

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

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>	Project (Number/Name) 3279 / <i>Unmanned Carrier Aviation Mission Control System</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
UMCS (Ship Integration)	Various	Various : Various	15.746	9.026	Jan 2020	8.883	Nov 2020	7.338	Nov 2021	-		7.338	-	-	-
UMCS (Ship Integration)	WR	NAWCAD : Patuxent River, MD	32.896	27.285	Jan 2020	33.532	Nov 2020	35.460	Nov 2021	-		35.460	-	-	-
UMCS (Ship Integration)	WR	NAWCAD : Lakehurst, NJ	2.630	3.981	Jan 2020	3.199	Nov 2020	1.547	Nov 2021	-		1.547	-	-	-
UMCS - Primary Hardware/Software Development CS	WR	NSMA : Washington, DC	0.000	11.221	Jan 2021	4.000	Apr 2021	0.000		-		0.000	-	-	-
UMCS	SS/FFP	Rockwell Collins : Cedar Rapids, IA	1.403	1.293	Nov 2019	0.160	Nov 2020	0.000		-		0.000	-	-	-
UMCS	Various	NAVWAR : San Diego, CA	4.586	4.229	Jan 2020	1.582	Nov 2020	2.219	Nov 2021	-		2.219	-	-	-
Subtotal			57.261	57.035		51.356		46.564		-		46.564	-	-	N/A

Remarks
 -UMCS (Ship Integration) Patuxent River, MD increases from FY 2021 to FY 2022 due to integration efforts associated with the new GCS.
 -UMCS San Diego, CA increases from FY 2021 to FY 2022 due to funding for NRE, testing and integration of MUOS Digital Modular Radio (DMR) Narrowband beyond line of sight system and test support for Ashore Routing Communication System (ARCS).

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	57.261	57.035	51.356	46.564	-	46.564	-	-	N/A

Remarks

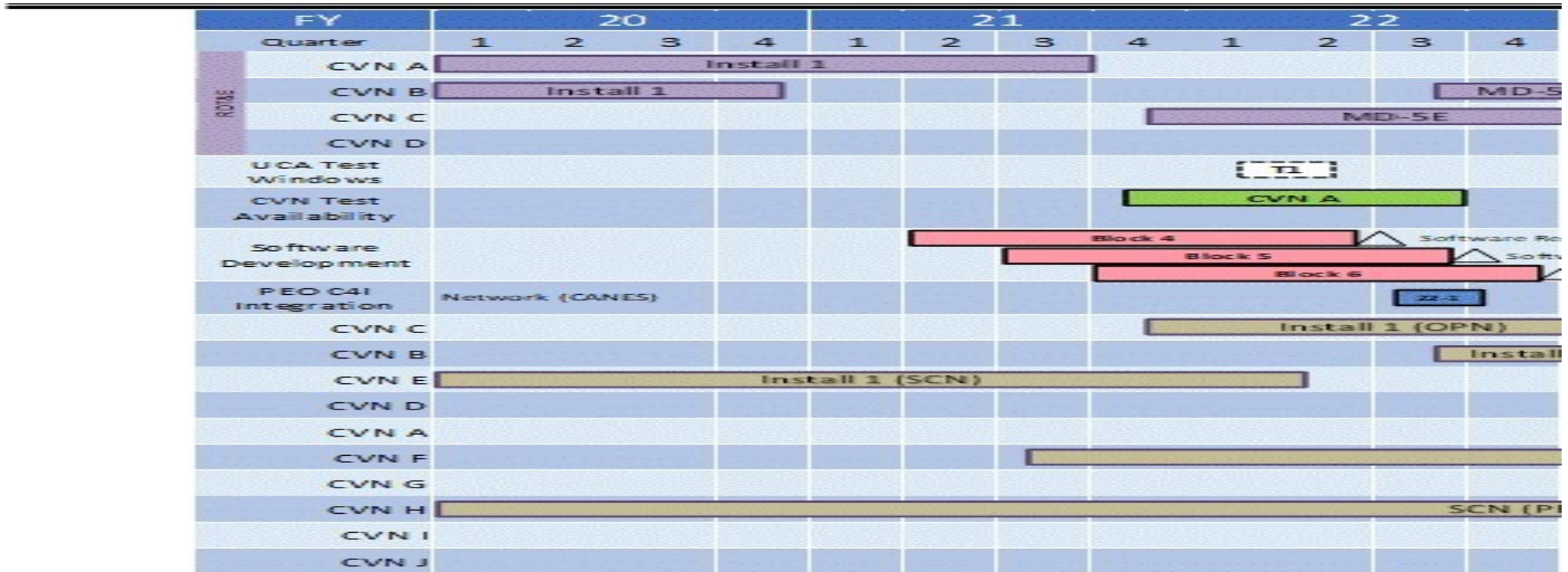
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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>	Project (Number/Name) 3279 / <i>Unmanned Carrier Aviation Mission Control System</i>



CVN Availability Targets

As of 3 May 2021
(PMS 312 CVN Availability Schedule dated 28 January 2021)



DISTRIBUTION STATEMENT D: Distribution authorized to the Department of Defense and U.S. DoD contractors only (Administrative or Operational Use) (May 2021). Other requests shall be referred to Unmanned Carrier Aviation Program Office (PMA 268).

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0605414N / <i>Unmanned Carrier Aviation (UCA)</i>	Project (Number/Name) 3279 / <i>Unmanned Carrier Aviation Mission Control System</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
UMCS				
System Development (RDTE Carriers): UMCS Program (MD-5): CVN A Installation	1	2020	3	2021
System Development (RDTE Carriers): UMCS Program (MD-5): CVN B Installation 1	1	2020	4	2020
System Development (RDTE Carriers): UMCS Program (MD-5): CVN C MD-5E Temporary Installation	4	2021	4	2022
System Development (RDTE Carriers): UMCS Program (MD-5): CVN B MD-5E Temporary Installation	3	2022	4	2022
System Development (RDTE Carriers): UMCS Program (MD-5): UMCS Program: Software (SW) Development/SW Testing/Technology Refresh/SW Integration	2	2021	4	2022
System Development (RDTE Carriers): NAVWAR C4I Integration: AI SIT, ADNS	3	2022	4	2022
Carrier Modifications (OPN Carriers): CVN C Installation 1	4	2021	4	2022
Carrier Modifications (OPN Carriers): CVN B Installation 2	3	2022	4	2022