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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy										Date: March 2019		
Appropriation/Budget Activity 1319: Research, Development, Test & Evaluation, Navy I BA 5: System Development & Demonstration (SDD)					R-1 Program Element (Number/Name) PE 0604530N I (U)Advanced Arresting Gear (AAG)							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	172.173	123.490	-	123.490	65.981	22.116	0.303	0.288	0.000	384.351
2367: Advanced Arresting Gear	0.000	0.000	172.173	123.490	-	123.490	65.981	22.116	0.303	0.288	0.000	384.351
Program MDAP/MAIS Code: Project MDAP/MAIS Code(s): 529												
Note FY18 and prior year funding for Advanced Arresting Gear (AAG) is funded under Shipboard Aviation Systems program element 0604512N, CV/CVN Launch and Recover project unit 2232. All Prior Years RDTEN funding for the program is \$711.700M; FY17 is \$100.402M; and FY18 is \$166.634M.												
A. Mission Description and Budget Item Justification The Advanced Arresting Gear (AAG) program designs, develops, tests and fields an aircraft arrestment system to replace the legacy Mark 7 arresting gear. AAG systems will be installed on all new construction aircraft carriers. AAG will provide the U.S. Navy with improved operational capability, while reducing operating and support costs. The AAG system will recover all existing and projected carrier based tail hook-equipped air vehicles well into the 21st century. This program is funded under SYSTEM DEVELOPMENT AND DEMONSTRATION because it includes those projects that have passed Milestone B approval and are conducting engineering and manufacturing development tasks aimed at meeting validated requirement prior to full-rate production decision.												
B. Program Change Summary (\$ in Millions)				FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total				
Previous President's Budget				0.000	184.106	147.435	-	147.435				
Current President's Budget				0.000	172.173	123.490	-	123.490				
Total Adjustments				0.000	-11.933	-23.945	-	-23.945				
• Congressional General Reductions				-	-							
• Congressional Directed Reductions				-	-11.933							
• Congressional Rescissions				-	-							
• Congressional Adds				-	-							
• Congressional Directed Transfers				-	-							
• Reprogrammings				-	-							
• SBIR/STTR Transfer				-	-							
• Program Adjustments				0.000	0.000	-23.986	-	-23.986				
• Rate/Misc Adjustments				0.000	0.000	0.041	-	0.041				

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<u>Change Summary Explanation</u> Technical: AAG established in its own Program Element and Project Unit in FY19 and out. The Department reduced funding in FY 2020 by \$23.945M for Full Envelope Testing and 3 Engine NRE. Schedule updated to reflect these changes. Cost: N/A Schedule: Updates include, - The Schoolhouse Curriculum Training Start date shift from 4QFY19 to 1QFY19 - Correction of Deficiencies efforts in FY20-21 - Addition of Software J1 Regression Testing in 1QFY20, J2 Software Regression Testing in 3QFY20 and Software K Regression Testing in 4QFY20 Software Release K moved from 1QFY20 and 3QFY30 to 3QFY20 and 4QFY20 Software Release I added in 2QFY19 T-45 JCTS testing start date moved from 1QFY20 to 3QFY19 E2/C2 RALS testing end date moved 3QFY18 to 2QFY19 F/A 18 E/F/G testing end date moved 4QFY18 to 1QFY19 Hi/Lo Operating Temp moved 1QFY20 to 2QFY21 RS 105 EMP moved from 3QFY20 to 3QFY21 CVN78 Events were updated to reflect the most current Post Delivery Test & Trials (PDT&T) schedule from PMS378.		

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy										Date: March 2019		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604530N / (U)Advanced Arresting Gear (AAG)				Project (Number/Name) 2367 / Advanced Arresting Gear			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2367: Advanced Arresting Gear	0.000	0.000	172.173	123.490	-	123.490	65.981	22.116	0.303	0.288	0.000	384.351
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		
Project MDAP/MAIS Code: 529												
Note Advanced Arresting Gear (AAG) was previously funded under Shipboard Aviation Systems program element 0604512N, CV/CVN Launch and Recovery project unit 2232 in FY 2018 and prior.												
A. Mission Description and Budget Item Justification The Advanced Arresting Gear (AAG) program will design, develop, test and field an aircraft arrestment system to replace the legacy Mark 7 arresting gear. AAG systems will be installed on all new construction aircraft carriers. AAG will provide the U.S. Navy with improved operational capability, while reducing operating and support costs. The AAG system will recover all existing and projected carrier based tail hook-equipped air vehicles well into the 21st century. The AAG Program's SDD phase test article consists of a single wire configured aircraft arresting system, which includes associated hardware and software needed to conduct system integrated testing by arresting both dead-loads and aircraft.												
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)								FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Advanced Arresting Gear (AAG) Primary Hardware Development Articles: FY 2019 Plans: Continue AAG System Development and Demonstration including hardware and software analysis and design efforts for system controls, electrical and mechanical components to meet the requirements of the AAG performance specification. Complete developmental component, environmental qualification testing. Complete developmental efforts including deadload and aircraft recoveries required to issue the CVN 78 Post Shakedown Availability (PSA) Aircraft Recovery Bulletins (ARB). Complete requirements verification efforts necessary to certify the AAG System. Continue the development of AAG logistics products including the Final Interactive Electronic Technical Manual In Process Review and issuance. FY 2020 Base Plans: Continue AAG System Development and Demonstration including hardware and software analysis and design efforts for system controls, electrical and mechanical components to meet the requirements of the AAG performance specification. Complete developmental component, environmental and shock qualification testing.								0.000	92.382	89.761	0.000	89.761
								-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Complete developmental efforts including deadload and aircraft recoveries required to issue the Barricade and T-45 Aircraft Recovery Bulletins (ARB). Complete requirements verification efforts necessary to certify the AAG System. Continue the development of AAG logistics products including the Final Interactive Electronic Technical Manual In Process Review and issuance. FY 2020 OCO Plans: N/A FY 2019 to FY 2020 Increase/Decrease Statement: The decrease from FY 2019 to FY 2020 is due to the completion of deadload and aircraft recovery testing that completed and were required to issue the CVN 78 Post Shakedown Availability (PSA) Aircraft Recovery Bulletin (ARB). Additionally, software release J was separated into two releases; J1 and J2. J1 was accelerated into FY 2019, and only one event for software release J2 remains in FY 2020. Software release L was removed.						
Title: Advanced Arresting Gear Test & Evaluation Articles: FY 2019 Plans: Perform Integrated Test and Evaluation (IT&E) for AAG barricade testing, T-45 Aircraft Compatibility Testing. Develop IT&E test plans, procure hardware to support barricade testing. Initiate barricade testing at the Jet Car Track Site (JCTS) for the issuance of the barricade ARB in FY20. Initiate Dynamic Control System (DCS) software development tests in support of T-45 testing. Initiate the installation of T-45 aircraft test instrumentation in preparation for manned aircraft arrestment testing at the Runway Arrested Landing Site (RALS). FY 2020 Base Plans: Deliver a completed Barricade Test ARB. Complete T-45 aircraft Compatibility Testing at the RALS and deliver a completed ARB. Begin Regression deadload testing required to verify/validate software after each release prior to shipboard use. Includes site preparations, loading of software, charge and dumps, Purchase Cable state change pullouts and retracts, spin testing, and deadload testing to verify functionality and compatibility FY 2020 OCO Plans: N/A FY 2019 to FY 2020 Increase/Decrease Statement:		0.000 -	50.116 -	12.037 -	0.000 -	12.037 -

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)				FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The decrease from FY 2019 to FY 2020 is due to the removal of Full Envelope Testing, the removal of software development and testing associated with the system's current three wire design, and reduction of development and test work required as the system reaches increased maturity.								
Title: Advanced Arresting Gear Depot Planning				0.000	14.229	9.008	0.000	9.008
Articles:				-	-	-	-	-
FY 2019 Plans: Begin the development of the required processes and procedures to plan for Depot level activities (i.e. Depot Interactive Electronic Technical Manuals (IETM) and Depot Task Analysis). Initiate the planning and analysis necessary to standup AAG Depot Level maintenance, overhaul and repair facility/facilities for AAG components.								
FY 2020 Base Plans: Complete the development of the required processes and procedures to plan for Depot level activities. Complete the planning and analysis and verify the material necessary to standup AAG Depot Level maintenance, overhaul and repair facility/facilities for AAG components. Perform the Depot Facility Business Case Analysis to ensure the most effective/efficient depot business operation is established for AAG.								
FY 2020 OCO Plans: N/A								
FY 2019 to FY 2020 Increase/Decrease Statement: The decrease from FY 2019 to FY 2020 is due to the completion of Depot level development activities leading to the verification of developed material in FY 2020.								
Title: Advanced Arresting Gear Software Support Activity (SSA)				0.000	11.468	3.766	0.000	3.766
Articles:				-	-	-	-	-
FY 2019 Plans: Initiate the establishment of an Organic Software Support Activity (SSA) for modifications to the system's software following initial fielding. Initiate the design and development of laboratory hardware necessary to establish an organic software development and test capability. Begin the development of organic software development, test, release and quality assurance processes.								
FY 2020 Base Plans:								

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue the design and development of laboratory hardware necessary to establish an organic software development and test capability. Continue the development of organic software development, test, release and quality assurance processes. Begin the delivery, installation and set up of the Software Support Activity (SSA). FY 2020 OCO Plans: N/A FY 2019 to FY 2020 Increase/Decrease Statement: The decrease from FY 2019 to FY 2020 is due to the completion of a significant portion of the design and development efforts for the lab hardware required for SSA.						
Title: Advanced Arresting Gear Training Articles:		0.000 -	3.978 -	8.918 -	0.000 -	8.918 -
FY 2019 Plans: Continue the Formal Training System Development. Begin the Schoolhouse Training system development of the AAG Multipurpose Reconfigurable Training System (MRTS) necessary for the Center for Naval Aviation Technical Training (CNATT) to declare Ready For Training (RFT) in FY22. Initiate schoolhouse training curriculum development. FY 2020 Base Plans: Continue the Formal Training System Development. Continue the Schoolhouse Training system development of the AAG Multipurpose Reconfigurable Training System (MRTS) necessary for the Center for Naval Aviation Technical Training (CNATT) to declare Ready For Training (RFT) in FY22. Continue the schoolhouse training curriculum development necessary for CNATT instructors to deliver training to the fleet sailors along with the MRTS training system. FY 2020 OCO Plans: N/A FY 2019 to FY 2020 Increase/Decrease Statement: The increase from FY 2019 to FY2020 supports the Schoolhouse Training system development of the AAG Multipurpose Reconfigurable Training System (MRTS).						
Accomplishments/Planned Programs Subtotals		0.000	172.173	123.490	0.000	123.490

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPN/4217: <i>Advanced Arresting Gear (AAG)</i>	10.900	11.054	4.725	-	4.725	3.118	2.442	2.491	2.540	262.094	299.364
• SCN/2001: <i>Carrier Replacement Program</i>	4,130.704	1,573.181	2,347.000	-	2,347.000	2,644.700	2,323.613	1,929.000	1,718.000	8,634.858	47,926.932

Remarks

D. Acquisition Strategy

The Navy competitively awarded two Cost Plus Fixed Fee Technical Development phase contracts to develop the Advanced Arresting Gear (AAG) system. Upon completion of the Preliminary Design and Integrated Baseline reviews, the Navy awarded a single Cost Plus Award Fee option to General Atomics for the System Development and Demonstration (SDD) phase to develop and demonstrate a production representative AAG at the NAVAIR Lakehurst Jet Car Track Site and Runway Arrested Landing Site. Continuing development on the SDD contract awarded in 2004.

E. Performance Metrics

Will complete System Development and Demonstration integrated testing at Jet Car Track Site and Runway Arrested Landing Site. AAG will demonstrate its key performance parameters and readiness for operational test.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy **Date:** March 2019

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604530N / (U)Advanced Arresting Gear (AAG)	Project (Number/Name) 2367 / Advanced Arresting Gear
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Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary HW Development	C/CPAF	General Atomics : San Diego, CA	0.000	0.000		87.150	Oct 2018	62.176	Nov 2019	-		62.176	16.299	165.625	165.625
Primary HW Development	C/CPAF	ESL : Cranston, RI	0.000	0.000		2.714	Dec 2018	0.000		-		0.000	0.000	2.714	2.714
Primary HW Development	WR	NAWCAD : Lakehurst, NJ	0.000	0.000		24.226	Dec 2018	19.051	Nov 2019	-		19.051	8.713	51.990	-
Systems Engineering	WR	NAWCAD : Lakehurst, NJ	0.000	0.000		6.995	Nov 2018	3.085	Nov 2019	-		3.085	2.525	12.605	-
Training Development	TBD	TBD : TBD	0.000	0.000		3.640	Mar 2019	7.032	Nov 2019	-		7.032	0.840	11.512	-
Subtotal			0.000	0.000		124.725		91.344		-		91.344	28.377	244.446	N/A

Remarks

Updated Primary HW Development for NAWCAD Lakehurst, NJ to move the Integrated Test and Evaluation (IT&E) support from the Product Development section to the Test & Evaluation section.

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Logistics Support	WR	NAWCAD : Lakehurst, NJ	0.000	0.000		4.483	Dec 2018	1.863	Nov 2019	-		1.863	0.385	6.731	-
Government Engineering Support	WR	Various : Various	0.000	0.000		0.425	Nov 2018	0.412	Nov 2019	-		0.412	0.414	1.251	-
Training Support	WR	NAWCAD : Orlando, FL	0.000	0.000		0.338	Nov 2018	1.886	Nov 2019	-		1.886	0.390	2.614	-
Software Development	TBD	General Atomics : San Diego, CA	0.000	0.000		9.174	Feb 2019	4.366	Nov 2019	-		4.366	2.100	15.640	15.640
Government Engineering Support	WR	NAWCAD : Lakehurst, NJ	0.000	0.000		5.851	Feb 2019	5.928	Nov 2019	-		5.928	5.558	17.337	-
Depot Planning	TBD	General Atomics : San Diego, CA	0.000	0.000		10.672	Mar 2019	6.846	Nov 2019	-		6.846	5.200	22.718	22.718
Subtotal			0.000	0.000		30.943		21.301		-		21.301	14.047	66.291	N/A

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Appropriation/Budget Activity 1319 / 5						R-1 Program Element (Number/Name) PE 0604530N / (U)Advanced Arresting Gear (AAG)				Project (Number/Name) 2367 / Advanced Arresting Gear					
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental T&E	WR	NAWCAD : Lakehurst, NJ	0.000	0.000		15.717	Dec 2018	7.150	Nov 2019	-		7.150	15.334	38.201	-
Operational T&E	WR	Various : Various	0.000	0.000		0.312	Nov 2018	0.305	Nov 2019	-		0.305	0.370	0.987	-
Integrated Test & Evaluation	WR	NAWCAD : Lakehurst, NJ	0.000	0.000		0.000	Dec 2018	3.075	Nov 2019	-		3.075	30.250	33.325	-
Subtotal			0.000	0.000		16.029		10.530		-		10.530	45.954	72.513	N/A
Remarks															
Moved Integrated Test & Evaluation (IT&E) support from Product Development to the Test & Evaluation section.															
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Mgmt Support	C/CPFF	Sierra Management & Technologies : California, MD	0.000	0.000		0.306	Nov 2018	0.215	Nov 2019	-		0.215	0.275	0.796	0.796
Travel	Various	Various : Various	0.000	0.000		0.042	Oct 2018	0.025	Oct 2019	-		0.025	0.035	0.102	-
Program Management Support	WR	Various : Various	0.000	0.000		0.128	Nov 2018	0.075	Nov 2019	-		0.075	0.000	0.203	-
Subtotal			0.000	0.000		0.476		0.315		-		0.315	0.310	1.101	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	0.000		172.173		123.490		-		123.490	88.688	384.351	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy

Date: March 2019

Appropriation/Budget Activity

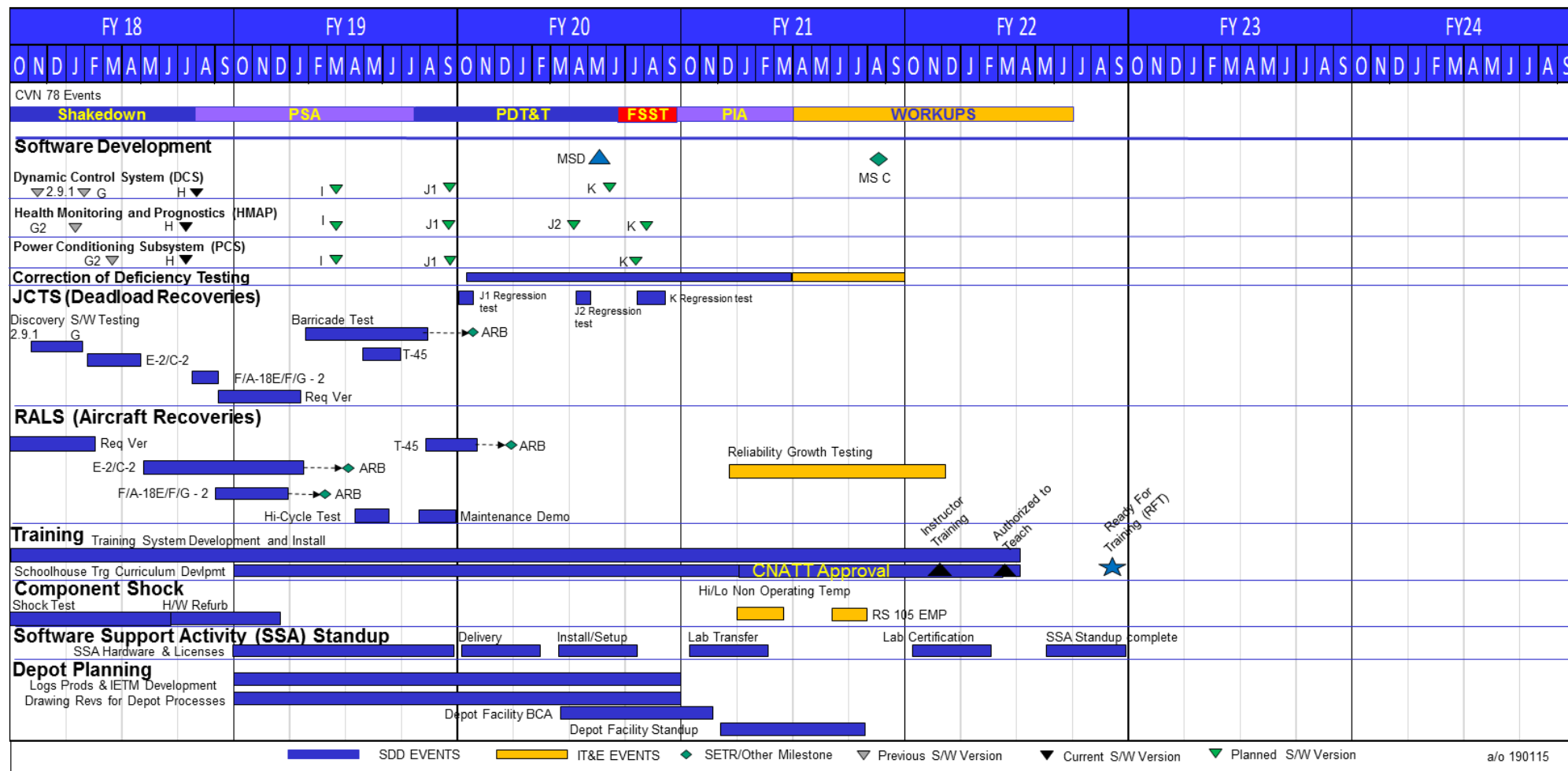
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R-1 Program Element (Number/Name)

PE 0604530N / (U)Advanced Arresting Gear (AAG)

Project (Number/Name)

2367 / Advanced Arresting Gear



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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604530N / (U)Advanced Arresting Gear (AAG)	Project (Number/Name) 2367 / Advanced Arresting Gear	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
ADVANCED ARRESTING GEAR (AAG)				
Acquisition Milestones: Milestones: Milestone C	4	2021	4	2021
Test & Evaluation: Technical Evaluation: Jet Car Test Site (JCTS) Test	1	2018	1	2020
Test & Evaluation: Technical Evaluation: Runway Arrested Landing Site Test (RALS)	1	2018	1	2022
Test & Evaluation: Technical Evaluation: Training Systems Development	1	2018	3	2022
Test & Evaluation: Technical Evaluation: Depot Planning	1	2019	4	2020