Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Navy									DATE: February 2012	

APPROPRIATION/BUDGET ACTIVITY
1319: *Research, Development, Test & Evaluation, Navy*
BA 7: *Operational Systems Development*

R-1 ITEM NOMENCLATURE
PE 0204228N: *Surface Support*

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
Total Program Element	-	3.377	4.171	-	4.171	2.963	2.756	2.357	2.397	Continuing	Continuing
3311: *Navigation Systems*	-	3.377	4.171	-	4.171	2.963	2.756	2.357	2.397	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Surface Support RDT&E funding will be used for the research, design, development, integration testing, and documentation of a new AN/WSN-7 Inertial Measuring Unit (IMU) to support the Ballistic Missile Defense (BMD) mission. The program will implement systems engineering processes to identify specific BMD performance requirements, investigate major navigation system error sources, define new IMU functions, research new Inertial Navigation System (INS) technologies, algorithms, and techniques to improve system performance, conduct analyses of alternatives, create preliminary and final design concepts, develop new hardware components and associated software, and conduct land based and shipboard testing.

The AN/WSN-7(V) RLGN is a legacy, 1980's design that was first installed in 1998 and is now obsolete. The design is reaching its limit with respect to providing the high-accuracy navigation solution required to meet known and emerging mission requirements. Navigator of the Navy's Vision 2025 identifies emergent requirements with respect to improved navigation in a GPS denied environment, littoral warfare, mine countermeasures, and manned and unmanned vehicle operations that cannot be met with existing systems. The AN/WSN-7(V) Ring Laser Gyro Navigator (RLGN) system is a self-contained inertial navigator designed for U.S. Navy surface ships. The RLGN employs an Inertial Measuring Unit (IMU) with three single-axis ring laser gyros that allow the system to provide continuous and automatic data outputs of the ship's geographic position (latitude, longitude), horizontal and vertical linear velocity (Ve, Vn, Vv), attitude (heading, roll, and pitch) and attitude rates. The RLGN provides mission critical ship's position and attitude data to shipboard sensors (such as radars), combat systems, gun and missile systems. The RLGN uses data from the Global Positioning System (GPS) to periodically update (i.e., reset) its position and internal clock. The RLGN is the ship's primary position source in absence of GPS.

B. Program Change Summary ($ in Millions)

	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	-	3.377	4.173	-	4.173
Current President's Budget	-	3.377	4.171	-	4.171
Total Adjustments	-	-	-0.002	-	-0.002
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Rate/Misc Adjustments	-	-	-0.002	-	-0.002

Exhibit R-2A, **RDT&E Project Justification:** PB 2013 Navy		**DATE:** February 2012	

APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 7: *Operational Systems Development*	**R-1 ITEM NOMENCLATURE** PE 0204228N: *Surface Support*	**PROJECT** 3311: *Navigation Systems*

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
3311: *Navigation Systems*	-	3.377	4.171	-	4.171	2.963	2.756	2.357	2.397	Continuing	Continuing
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0		

A. Mission Description and Budget Item Justification

The Surface Support RDT&E funding will be used for the research, design, development, integration testing, and documentation of a new AN/WSN-7 Inertial Measuring Unit (IMU) to support the Ballistic Missile Defense (BMD) mission. The program will implement systems engineering processes to identify specific BMD performance requirements, investigate major navigation system error sources, define new IMU functions, research new INS technologies, algorithms, and techniques to improve system performance, conduct analyses of alternatives, create preliminary and final design concepts, develop new hardware components and associated software, and conduct land based and shipboard testing.

The AN/WSN-7(V) RLGN is a legacy, 1980's design that was first installed in 1998 and is now obsolete. The design is reaching its limit with respect to providing the high-accuracy navigation solution required to meet known and emerging mission requirements. Navigator of the Navy's Vision 2025 identifies emergent requirements with respect to improved navigation in a GPS denied environment, littoral warfare, mine countermeasures, and manned and unmanned vehicle operations that cannot be met with existing systems. The AN/WSN-7(V) Ring Laser Gyro Navigator (RLGN) system is a self-contained inertial navigator designed for U.S. Navy surface ships. The RLGN employs an Inertial Measuring Unit (IMU) with three single-axis ring laser gyros that allow the system to provide continuous and automatic data outputs of the ship's geographic position (latitude, longitude), horizontal and vertical linear velocity (Ve, Vn, Vv), attitude (heading, roll, and pitch) and attitude rates. The RLGN provides mission critical ship's position and attitude data to shipboard sensors (such as radars), combat systems, gun and missile systems. The RLGN uses data from the Global Positioning System (GPS) to periodically update (i.e., reset) its position and internal clock. The RLGN is the ship's primary position source in absence of GPS.

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

	FY 2011	FY 2012	FY 2013
Title: Systems Engineering	-	3.377	4.171
Articles:		0	0

FY 2012 Plans:
Assess current AN/WSN-7(V) design, performance, and support gaps. Based on Request For Information/Request For Proposal (RFI/RFP) responses, identify modernization solutions and evaluate technology readiness levels.

FY 2013 Plans:
Develop an Interface Design Specification for the WSN-7(V) processor/WSN-7(V) sensor interface. Develop the ECDU hardware/ software design for the updated WSN-7 architecture. Perform Modeling and Simulation.

	FY 2011	FY 2012	FY 2013
Accomplishments/Planned Programs Subtotals	-	3.377	4.171

Exhibit R-2A, **RDT&E Project Justification:** PB 2013 Navy		**DATE:** February 2012
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 7: *Operational Systems Development*	**R-1 ITEM NOMENCLATURE** PE 0204228N: *Surface Support*	**PROJECT** 3311: *Navigation Systems*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• OPN/0670: *Other Navigation*	23.042	20.582	23.392	0.000	23.392	28.411	27.757	29.159	29.648	0.000	220.571

D. Acquisition Strategy

Procurement of AN/WSN-7 modernization upgrades planned to begin in FY14.

E. Performance Metrics

FY12:
- AN/WSN-7(V) design, performance, and support gap analysis.
- Based on Request For Information/Request For Proposal (RFI/RFP) responses, identify modernization solutions.
- Technology readiness level evaluations.

FY13:
- Interface Design Specification for the WSN-7(V) processor/WSN-7(V) sensor interface.
- Enhanced Control Display Unit (ECDU) hardware/software design for the updated WSN-7 architecture.
- Preliminary Design Review for the AN/WSN-7(V) sensor.
- RFP for the AN/WSN-7(V) sensor.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2013 Navy		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 7: *Operational Systems Development*	**R-1 ITEM NOMENCLATURE** PE 0204228N: *Surface Support*	**PROJECT** 3311: *Navigation Systems*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2012 Cost	FY 2012 Award Date	FY 2013 Base Cost	FY 2013 Base Award Date	FY 2013 OCO Cost	FY 2013 OCO Award Date	FY 2013 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	SPAWAR Atlantic:Little Creek, VA	-	0.827	Feb 2012	1.032	Oct 2012	-		1.032	0.000	1.859	
Systems Engineering	C/CPFF	Penn State/ARL:Warminster, PA	-	0.250	Feb 2012	0.312	Oct 2012	-		0.312	0.000	0.562	
Systems Engineering	C/CPFF	Northrop Grumman Sys Corp:Charlottesville, VA	-	0.800	Feb 2012	1.000	Oct 2012	-		1.000	0.000	1.800	
Systems Engineering/Design	WR	SPAWAR, Atlantic:Little Creek, VA	-	0.200	Feb 2012	0.250	Oct 2012	-		0.250	0.000	0.450	
Systems Engineering/Design	C/CPFF	Penn State/ARL:Warminster, PA	-	0.200	Feb 2012	0.250	Oct 2012	-		0.250	0.000	0.450	
Systems Engineering/Design	C/CPFF	Northrop Grumman Sys Corp:Charlottesville, VA	-	1.000	Apr 2012	1.202	Apr 2013	-		1.202	0.000	2.202	
Subtotal			-	3.277		4.046		-		4.046	0.000	7.323	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2012 Cost	FY 2012 Award Date	FY 2013 Base Cost	FY 2013 Base Award Date	FY 2013 OCO Cost	FY 2013 OCO Award Date	FY 2013 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	C/CPFF	BAH/Tech Marine:Wasington, DC	-	0.100	Feb 2012	0.125	Dec 2012	-		0.125	0.000	0.225	
Subtotal			-	0.100		0.125		-		0.125	0.000	0.225	

	Total Prior Years Cost	FY 2012		FY 2013 Base		FY 2013 OCO		FY 2013 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	3.377		4.171		-		4.171	0.000	7.548	

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2013 Navy		**DATE:** February 2012
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 7: *Operational Systems Development*	**R-1 ITEM NOMENCLATURE** PE 0204228N: *Surface Support*	**PROJECT** 3311: *Navigation Systems*

Exhibit R-4A, RDT&E Schedule Details: PB 2013 Navy		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 7: *Operational Systems Development*	**R-1 ITEM NOMENCLATURE** PE 0204228N: *Surface Support*	**PROJECT** 3311: *Navigation Systems*

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 3311				
Requirements Definition	2	2012	4	2012
Technical Requirements Document	3	2012	1	2013
Interface Design Specification	2	2013	3	2013
Enhanced Control Display Unit (ECDU) Hardware/Software Design	2	2013	1	2014
Initial Architectural Design	4	2012	3	2013
Final Architectural Design	4	2013	2	2014
Modeling & Simulation	2	2013	2	2014
Coding & Testing	3	2014	1	2015
Low Rate Initial Production	2	2014	1	2015
Integration/Land Based Engineering Site (LBES) Testing	2	2015	1	2016
Environmental Qualification Testing	4	2015	1	2016
Technical Evaluation	2	2016	3	2016
Operational Testing	4	2016	1	2017
Follow-on Development/Testing	2	2017	4	2017