

## **SECTION C – DESCRIPTION/SPECIFICATION/WORK STATEMENT**

### **STATEMENT OF WORK FOR TRIDENT II (D5) SSP SHIPBOARD INTEGRATION (SSI) STRATEGIC WEAPON SYSTEM (SWS) NAVIGATION SUBSYSTEM SD&D AND ESGN REFRESH COMPETITIVE PROCUREMENT**

#### **INTRODUCTION**

This Statement of Work (SOW) defines the efforts required to complete development of the Strategic Systems Programs (SSP) Shipboard Integration (SSI) Increment 4 Navigation (NAV) Program and to initiate the SSP SSI Increment 8 Program. Program management and processes shall be in accordance with T9001B - Technical Program Management Requirements for Strategic Systems Programs Acquisitions and SSP OD 65406 Strategic Systems Programs Systems Engineering Management Guidance unless specifically modified by this SOW or by the Contractor with approval by SSP. As part of this contract, the Contractor shall complete the development, testing and delivery through Initial Operating Capability (IOC) for Increment 4. Also as part of this contract, the Contractor shall initiate Increment 8 development activities to support transition to and initiation of a Final Design and Demonstration phase as specified in this SOW. These activities include development of program planning documents, requirements analysis, prototyping, and testing of hardware and software items to demonstrate capability to meet Navigation Subsystem Specification (SS) requirements.

#### **BACKGROUND**

##### **SSI Program Overview**

Navigation is a Subsystem of the Trident Strategic Weapon System (SWS) implemented on the Submersible Ship Ballistic Nuclear (SSBN) 726 Class submarine and on the UK Trident SSBN's. The mission of the Navigation Subsystem is to provide navigation data for the Trident Fire Control (FC) and SSBN Command and Control Subsystems (CCS). The Navigation Subsystem is comprised of inertial equipment (e.g., inertial navigators) and non-inertial equipment which collectively are capable of satisfying the requirements as defined in OD 66157- Navigation Subsystem Specification (SS). The currently deployed configuration on both the Trident US and UK SSBN's is the D5BF (D5Backfit) system.

SSP is developing and deploying coordinated upgrades between all SWS subsystems, referred to as the Strategic System Integrated Program (SSIP), to address technology obsolescence, cost avoidance, and support future needs through the planned Trident SSBN life to 2042. The SSIP programs are structured in accordance with OD 63767 SWS Shipboard Integration Program. The overall SSI Increment definition and integrated schedules are specified in the SSI Program Notebook. The SWS Navigation Subsystem is being updated in two increments – 4 and 8 as defined in this SOW. In addition to the requirements defined for the two increments, each increment will incorporate appropriate changes to support US SSBN(R) and UK SSBN successor commitments as well as the Navy's Navigation Joint Vision 2025 goals. W

##### **Increment 4 Overview**

The objective of the Navigation Subsystem Increment 4 is to upgrade the Trident II (D5) Strategic Weapons System (SWS) Navigation Subsystem by replacing obsolete components and implementing changes to comply with the Department of Defense (DOD) Global Positioning System (GPS) modernization program. The technology refresh aspects of Increment 4 comprise those hardware and software changes that are needed in order to maintain the supportability of the non-inertial sensors and equipment in support of the SSIP plan. This includes updates for the Navigation Sonar and Frequency Standard functions as well as the replacement of the workstations, processors, and inter and intra-subsystem interfaces through the common elements program (see OD 63768 Common Elements). The GPS Modernization goals of SSI Increment 4 will address the refresh and requirements changes imposed by the

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DOD for military platforms that utilize GPS services. GPS Modernization initiatives take into account the support and migration paths needed to support Selective Availability Anti-Spoofing Module (SAASM) based receivers. GPS Modernization efforts also include those aspects of subsystem design that address the antenna requirements, data transfer and timing propagation requirements and mechanizations (Test Instrumentation data) that are needed to support the Navigation Subsystem. The Increment 4 subsystem will be based on requirements that drive the architecture and design to support both the Electrostatically Supported Gyro Navigator (ESGN) and a future Inertial Navigation System (INS). To this end the subsystem architecture provides the migration path and support needed to achieve the full Increment 8 solution.

Upon completion of the SOW efforts associated with this RFP, the Contractor will have developed, tested, and delivered through Initial Operating Capability (IOC) an Increment 4 Navigation Subsystem which satisfies all requirements specified in the Trident SSI Increment 4 Navigation Subsystem Specification (SS), in accordance with the approved Increment 4 architecture and design. As part of the SOW, the selected Contractor will transition responsibility for the Increment 4 development activities from the current contract (with Lockheed Martin) to this contract. The selected Contractor will assume responsibility for the completion of the Increment 4 program starting with the first option year of this contract. For the purpose of responding to this RFP, it can be assumed that all activities associated with FY10 in the Increment 4 Integrated Master Plan (IMP) and Integrated Master Schedule (IMS) will be completed under a separate contract and will be delivered as part of the transition period under this contract.

Below is a high level schedule/roadmap for the Increment 4 program. It forms the basis for responding to this RFP.

	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
	Design and Prototype		Final Design and Demonstration				Production/Installation		
<b>SSI Milestones</b>			CR Proj Plan △						
<b>Navigation Subsystem</b>		SRR △	SDR △ △	Transition △		TRR △ FQR △		IOC △	→
<b>Requirements</b>		Segment Requirements Development △	SSRR/SSDR △						
<b>SW Development</b>		Prototype Software △	SWRR △ Software Design	SWPD △ SWCDR △		Software Code/Test △			
<b>HW Development</b>		Prototypes △	HWRR △ EDM	HWPD △ Pre-Prod	HWCDR △	Qual/FAT △	PRR △	Production △	→
<b>Fleet Documentation</b>						Update/Verify △			
<b>System Test</b>						System Acceptance Testing △ NAV SWS Integration Test △ USNS Waters Testing △	SSBN Validation Testing △		
<b>Trainers</b>				Training Curricula/Trainers/Tech Documentation △		RFT △			
<b>SPALT/SHIPALT Dev</b>			SPALT Proposal △ SPALT Approval △		Submit SHIPALT △	Approval △ SHIPALT Ready △			

### Increment 8 Overview

The Navigation Subsystem Increment 8 update addresses inertial Navigation subsystem obsolescence by replacing the present ESGN (ESG Navigator) with a replacement inertial navigator using the Increment 4 architecture as a baseline. For the purpose of this RFP, it is assumed that the IOC for the Increment 8 subsystem is mid FY2020 with Full Operational Capability (FOC) within 5 years.

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Upon completion of the SOW efforts associated with this RFP, the Contractor will have completed activities necessary to enter into and initiate a Final Design and Demonstration phase for an Increment 8 Subsystem. This includes:

- Establishment of the appropriate plans, schedules, and processes for the Increment 8 program
- Selection and demonstration of a gyroscope technology for the ESGN replacement navigator
- Development and testing of a prototype INS to demonstrate its capability to meet SSBN requirements in a laboratory environment
- Design and build of an Engineering Development Model (EDM) INS
- Design, build, and initial testing of EDM gyroscopes

SP-24 has been developing Fiber Optic Gyroscope technology for an ESGN Replacement Inertial Navigation System with Honeywell under previous contracts. As part of this RFP package, the government is providing information obtained from the previous contracts as Government Furnished Information (GFI). In addition, the government is planning to procure additional gyroscopes of the Environmental Sensitivity Evaluation (ESE) 2 design. These gyroscopes, in addition to previous Advanced Development Model (ADM) II and III units will be provided as Government Furnished Equipment (GFE) after contract award.

Below is a high level schedule/roadmap for the Increment 8 program which forms the basis for responding to this RFP.

	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22
	Design and Prototype			Final Design and Demonstration					Production/Installation				
SSI Milestones				CR Pre-Plan △									
Navigation Subsystem			ΔSR	ΔSR					TRR △	FDR △	IOC △		FOC △
Requirements/Design			Design Analysis/Update △										
SW Development			Prototype Software △		SWRR △	SWPDR △	SWCDR △						
Fleet Documentation								Update/Verify △					
System Testing			Integrated Test Planning/ITEPP △					System Acceptance Testing △					
Trainers								NAV SWS Integration Test △	USNS Waters Testing △	SSBN Validation Testing △			
SPALT/SHIPALT Dev					SPALT Proposal △	SPALT Approval △							
Navigator	INS RR △	INS DR △	Prototype INS △		INS PDR △	EDM INS △	INS CDR △	INS PRR1 △	INS PRR2 △				
Gyro	RR △	DR △	Gyro Demo △	Gyro PDR △		Gyro CDR △	Gyro PRR1 △		Gyro PRR2 △				
INS Laboratory Testing			POC Gyro Design/Build/Test △	EDM Gyro Design/Build/Test △			Pre-Prod Gyro △			Gyro Production △			
INS USNS Waters Testing			Prototype System Testing △	Laboratory Demo △	EDM System Testing △		Pre-Prod Qual Testing △						
SSBN TEMPALT Testing							EDM AL-Sea System Testing △	CSS Demo △		Pre-Prod AL-Sea System Testing △	SSBN Demo △		





## Exhibit E - ACRONYM and ABBREVIATION LIST

ACN	Activity Control Number
CCS	Command and Control System
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CEP	Circular Error Probability
CFSR	Contract Funds Status Report
CI	Configuration Item
CLIN	Contract Line Item Number
CM	Configuration Management
CON	Central Operational Navigation Program
COTS	Commercial Off The Shelf
CPR	Contract Performance Report
CR	Concept Review
CSS	Consolidated Support Ship
D5	Trident II SSBN Missile
D5BF	Trident II Backfit
DCMA	Defense Contract Management Agency
DD	Defense Document
DDP	Design Disclosure Package
DIRSSP	Director Strategic Systems Programs
DLD	Data Logging Document
DMS	Data Management System
DOD	Department of Defense
DON	Documentation Operational Navigation Program
DOORS	Dynamic Object Oriented Requirements System
EB	Electric Boat
EDM	Engineering Development Model
EEC	Electronics Equipment Console
EM	Electromagnetic
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ESE	Environment Sensitive Evaluation
ESG	Electrostatically Supported Gyro
ESGN	Electrostatically Supported Gyro Navigator
EVMS	Earned Value Management System
FAR	Federal Acquisition Regulations
FAT	Factory Acceptance Test
FBM	Fleet Ballistic Missile
FC	Fire Control
FCA	Functional Configuration Audit
FDDI	Fiber Distributed Data Interface
FDPP	Fleet Documentation Process Plan
FOC	Fully Operational Capability
FOG	Fiber Optic Gyro
FON	Frequency Standard Operational Navigation Program
FQR	Formal Qualification Review
FS	Frequency Standard
FY	Fiscal Year
GD	General Dynamics
GFE	Government Furnished Equipment
GFI	Government Furnished Information
GFM	Government Furnished Material

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GPS	Global Positioning System
GPSP	Global Positioning System Software Program
GPTE	General Purpose Test Equipment
HDD	Hardware Design Document
HDP	Hardware Development Plan
HRS	Hardware Requirements Specification
IA	Information Assurance
I&Q	In phase and Quadrature
IBR	Integrated Baseline Review
IDD	Interface Design Document
IETM	Integrated Electronic Tech Manual
ILSP	Integrated Logistic Support Plan
IMP	Integrated Master Plan
IMS	Integrated Master Schedule
INS	Inertial Navigation System
INST	Instruction
IOC	Initial Operating Capability
IPT	Integrated Product Team
IRS	Interface Requirements Specification
ISO	International Organization for Standardization
ITP	Integrated Test Plan
IV&V	Independent Verification and Validation
LAN	Local Area Network
LAPNOT	Standalone PC Training Tool for Navigation Operational Trainer
LM	Lockheed Martin
LOE	Level of Effort
MFC	Missile Fire Control
MIL-STD	Military Standard
MOTS	Military Off The Shelf
MTEPP	Master Test and Evaluation Program Plan
NAV	Navigation
NAVICPINST	NAVICP Instruction- why is this needed , where is it in the SOW
NIF	Navigation Interface Function
NISPOM	National Industrial Security Program Operating Manual
NIU	Navigation Interface Unit
NON	NSS Operational Navigation Program
NOPS	Navigation Standard Operating Procedures
NOT	Navigation Operational Trainer
NSN	National Stock Number
NSS	Navigation Sonar System
NSWCCD	Naval Surface Warfare Center, Crane Division
NSWCDD	Naval Surface Warfare Center, Dahlgren Division
OD	Operational Directive
OS	Operating System
PCA	Physical Configuration Audit
PDR	Preliminary Design Review
PM	Program Manager
PMO	Program Management Office
PMP	Problem Management Plan
POC	Proof-of-Concept
PPS	Program Performance Specification
PPS	Pulse Per Second
PRR	Production Readiness Review
PSA	Polaris Sales Agreement
QA	Quality Assurance

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R&R	Repair and Return
RAM	Requirements Allocation Matrix
RFP	Request for Proposal
RFT	Ready for Training
RMDT	Refit Management Data Tracking
RMP	Risk Management Plan
RR	Requirements Review
RTVM	Requirements Trace and Verification Matrix
SAASM	Selective Availability Anti- Spoofing Module
SAN	Storage Area Network
SAT	System Acceptance Test
SC	Sonar Cabinet
SD&D	System Design & Development
SDD	Subsystem Design Document
SDP	Software Development Plan
SDR	System Design Review- should we have this as an SSDR
SEM-E	Standard Electronic Module Type E
SEMP	System Engineering Management Plan
SHIPALT	Ship-Alteration
SOW	Statement of Work
SP	Strategic Programs
SPALT	Strategic Systems Programs Alteration
SRR	Subsystem Requirements Review
SRS	Software Requirements Specification
SS	Subsystem Specification
SSBN	Submersible Ship Ballistic Nuclear
SSBN (R)	SSBN replacement
SSDD	Subsystem Segment Design Document
SSDR	Subsystem Segment Design Review
SSI	Strategic Systems Shipboard Integration
SSIP	Strategic System Shipboard Integrated Program-
SSP	Strategic Systems Programs
SSPINST	Strategic Systems Programs Instruction
SSS	Subsystem Segment Specification
SW	Software
SWS	Strategic Weapons System
TBA	To Be Assigned
TBD	To Be Determined
TES	Training Effectiveness Surveillance
TFR	Trouble Failure Report
TFS	Trainer Faulting Software
TR	Test Report
TRR	Test Readiness and /or Test Results Review
TS	Top Secret
TTF	Trident Training Facility
UK	United Kingdom
USNS	United States Naval Ship
USS	United States Ship
VME	Virtual Machine Environment- Open System Standard Operating system
WG	Working Group
WON	Workstation Operational Navigation program
WON	Workstation Operational Navigation Program
WS	Weapon System





## SECTION B – SUPPLIES OR SERVICES AND PRICES/COSTS

Item(s)	Description
0001	Strategic Systems Programs Shipboard Integration Program Support (CPFF LOE)
0002	Strategic Systems Programs Shipboard Integration Program Increment 8 Development (CPIF Completion)
0003	RESERVED
0004	Strategic Systems Programs Shipboard Integration Program Support (CPFF LOE – Option)
0005	Strategic Systems Programs Shipboard Integration Program Increment 4 Development (CPIF Completion – Option)
0006	Strategic Systems Programs Shipboard Integration Program Increment 8 Development (CPIF Completion – Option)
0007	Strategic Systems Programs Shipboard Integration Program Increment 4 UK Trainer Unique (CPFF Completion – Option)
0008	RESERVED
0009	Strategic Systems Programs Shipboard Integration Program Support (CPFF LOE – Option)
0010	Strategic Systems Programs Shipboard Integration Program Increment 4 Development (CPIF Completion – Option)
0011	Strategic Systems Programs Shipboard Integration Program Increment 8 Development (CPIF Completion – Option)
0012	Strategic Systems Programs Shipboard Integration Program Increment 4 UK Production and Trainer Unique (CPFF Completion – Option)
0013	RESERVED
0014	Strategic Systems Programs Shipboard Integration Program Support (CPFF LOE – Option)
0015	Strategic Systems Programs Shipboard Integration Program Increment 4 Development (CPIF Completion – Option)
0016	Strategic Systems Programs Shipboard Integration Program Increment 8 Development (CPIF Completion – Option)
0017	Strategic Systems Programs Shipboard Integration Program Increment 4 UK Production and Trainer Unique (CPFF Completion – Option)
0018	RESERVED
0019	Strategic Systems Programs Shipboard Integration Program Support (CPFF LOE – Option)
0020	Strategic Systems Programs Shipboard Integration Program Increment 4 Development (CPIF Completion – Option)
0021	Strategic Systems Programs Shipboard Integration Program Increment 8 Development (CPIF Completion – Option)
0022	Strategic Systems Programs Shipboard Integration Program Increment 4 UK Trainer Unique (CPFF Completion – Option)
0023	Contract Data Requirements List (CDRL), Exhibit A

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