PERFORMANCE SPECIFICATION FOR THE EOSS TO SUPPORT THE MK34 AND MK48 GUN WEAPON SYSTEMS

1 (U) SCOPE

(U) This performance specification identifies the required characteristics and defines the critical performance, physical, interface, logistic, quality, and qualification requirements for Electro-Optic/ Infrared (EO/IR) Sight System (EOSS) for the U.S. Navy MK 34 Gun Weapon System (GWS), the U.S. Coast Guard (USCG) MK 48 GWS, and future U.S. Navy, USCG, and Foreign Military Sales (FMS) GWSs.

1.1 (U) Background

(U) This program has been initiated to create a competitive environment for the replacement the MK 20 MOD 1 EOSS whose predecessors were MK 20 MOD 0 EOSS and MK 46 Optical Sight System (OSS).

(U) The EOSS is not a stand-alone system. The EOSS SHALL interface with the GWS Local Area Network (LAN) and be remotely controlled by government furnished MK 160 Gun Computer System (GCS) console(s) for both operations and maintenance.

(U) The EOSS will be installed on at least U.S. Navy Ticonderoga class cruisers (CG-47), U.S. Navy Arleigh Burke class destroyers (DDG-51), USCG Legend class National Security Cutters (NSC) (WMSL-750), and USCG Heritage class Off-shore Patrol Cutter (OPC) (WMSM-915).

(U) Primary use of the EOSS is to act as the gun sight for the MK34 and MK48 GWS in the visible and thermal spectrum.

(U) Ancillary uses of the EOSS may include enhancing the following: low-visibility and night navigation; coastal observation and surveillance; identification (ID) friend or foe; real-time situational awareness and threat warning; reconnaissance and surveillance; and documenting navigational hazards.

1.2 (U) ID

(U) The major Configuration Items (CI)s comprising the EOSS will be identified by specific Navy nomenclature. Official nomenclature assignments will be determined following any acquisition using this specification.

2 (U) LISTING OF APPLICABLE DOCUMENTS

(U) The following specifications and documents form a part of this specification to the extent specified herein. Unless otherwise specified, the version of these documents current as of March 24, 2025 SHALL be applicable. Updates to these specifications and documents will be monitored by both the government and contractor and updates after the date SHALL be discussed for relevance.

2.1 (U) Program Specific Documents

(U) Table 1 Program Specific Documents

Document Number	Document Title
PRF-WS-35951	Gun Computer System MK160 to Electro Optical Sensor System MK20 MOD 1 Interface Design Document

2.2 (U) Military References

(U) Table 2 Military References

Document Number	Document Title
CJCSI 3225.01B	Illumination Of Objects In Space By Lasers
DoD Directive 5200.47E	Anti-Tamper (AT)
DoD Instruction 3100.11	Illumination of Objects in Space by Lasers
DoD Instruction 4245.15	Diminishing Manufacturing Sources and Material Shortages Management (DMSMS)
DoD Instruction 5200.39	Critical Program Information (CPI) Identification and Protection Within Research, Development, Test, and Evaluation (RDT&E)
DoD Instruction 6055.11	Protecting Personnel from Electromagnetic Fields
DoD Instruction 8500.01	Cybersecurity
DoD Instruction 8510.01	Risk Management Framework (RMF) for DoD Information Technology (IT)
DoD Instruction 8310.01	Information Technology Standards in the DoD
DoD Instruction 8523.01	Communications Security
DoD Manual 4245.15	Management of Diminishing Manufacturing Sources and Material Shortages
	DoD Reliability, Availability, Maintainability and Cost Rationale Report Manual 1 June 2009

MIL-STD-1399 Section 407	Department of Defense Interface Standard Section 407 DC Magnetic Field Environment
MIL-DTL-24643D	Cables, Electric, Low Smoke Halogen-Free, for Shipboard Use, General Specification for
MIL-DTL-24749C	Grounding Straps and Studs, Electrical Bonding
MIL-DTL-38999N w/Amendment 1	Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect (Bayonet, Threaded or Breech Coupling), Environment Resistant With Crimp Removable Contacts or Hermetically Sealed With Fixed, Solderable Contacts General Specification for
MIL-DTL-901E	Shock Tests, High Impact; Shipboard Machinery, Equipment and Systems, Requirements for
MIL-HDBK-61B	Configuration Management Guidance
MIL-HDBK-189C	Reliability Growth Management
MIL-HDBK-454C	General Guidelines for Electronic Equipment
MIL-HDBK-502	Product Support Analysis
MIL-HDBK-781A	Reliability Test Methods, Plans, and Environments for Engineering, Development Qualification and Production
MIL-HDBK-1390	Level of Repair Analysis (LORA)
MIL-HDBK-2036	Preparation of Electronic Equipment Specifications
MIL-HDBK-29612	Instructional Systems Development/Systems Approach to Training and Education
MIL-PRF-13830B	Optical Components for Fire Control Instruments; General Specification Governing the Manufacture, Assembly, and Inspection of
MIL-PRF-24635F	Coating System, Weather-Resistant, Exterior Use
MIL-PRF-28876F w/Amendment 2	Connectors, Fiber Optic, Circular, Plug And Receptacle Style, Multiple Removable Termini, General Specification For
MIL-PRF-32482A	Watertight Door, Quick-Acting, Interior
MIL-PRF-49291D w/Amendment 2	Fiber, Optical, (Metric) General Specification for
MIL-PRF-85045H	Cables, Fiber Optic, General Specification for
MIL-STD-129R w/Change 3	Military Marking for Shipment and Storage
MIL-STD-130N w/Change 1	Identification Marking of U.S. Military Property

MIL-STD-167-1A	Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited)
MIL-STD-331D	Test Method Standard Fuzes, Ignition Safety Devices and Other Related Components Environmental and Performance Tests for
MIL-STD-461G	Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment
MIL-STD-464D	Electromagnetic Environmental Effects Requirements for Systems
MIL-STD-740-2	Structureborne Vibratory Acceleration Measurement and Acceptance Criteria of Shipboard Equipment
MIL-STD-810H Change 1	Environmental Engineering Considerations and Laboratory Tests
MIL-STD-882E Change 1	Standard Practice for System Safety
MIL-STD-1310H	Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility (EMC), Electromagnetic Pulse (EMP) Mitigation, and Safety
MIL-STD-1399C	Interface Standard for Shipboard Systems
MIL-STD-1399A Section 072.2	Interface Standard for Shipboard Systems. Blast Environment, Gun Muzzle
MIL-STD-1425A	Safety Design Requirements for Military Lasers and Associated Support Equipment
MIL-STD-1474E	Noise Limits
MIL-STD-1678-1D	Department of Defense Standard Practice Fiber Optic Cabling Systems Requirements and Measurements
MIL-STD-2003B	Electric Plant Installation Standard Methods for Surface Ships and Submarines
MIL-STD-2042C	Fiber Optic Cable Topology Installation Standard Methods for Surface Ships and Submarines
MIL-STD-2073-1E w/Change 4	Standard Practice for Military Packaging
MIL-STD-2401	World Geodetic System (WGS)
MIL-STD-2525E	Joint Military Symbology
MIL-STD-3010C	Test Procedures for Packaging Materials and Containers
MIL-STD-3034A	Reliability-Centered Maintenance (RCM) Process

MIL-STD-31000B	Technical Data Packages
NAVSEA 9400.2A-M	NAVSEA Afloat Information Assurance Governance and Guidance Implementation Manual
NAVSEA Standard Item 009-32	Cleaning and Painting Requirements; Accomplish
NSWC CRANE STD/17/JXQ/101	Shipboard EO/IR Sensor Management Interface Design Description
NSWC CRANE STD/17/JXQ/102	Surface EO/IR HMI Conceptual Standards
NSWCCD-80-TR-2021-003 Fleet_Motion_SS3_5_Rpt	Ship Motions for Selected U.S. Navy Ships: CVN76, LPD 17, DDG 51 IIA and LCS Independence
OPNAV 5100.27B	Navy Laser Hazards Control Program
PEO IWS Instruction 5239.1	IWS Surface Navy Combat System Cybersecurity
SD-22	Diminishing Manufacturing Sources and Material Shortages Guidebook
SD-26	DMSMS and Parts Management Contracting Guide
SPAWAR 3090.1	C4ISR System Criteria for Shipboard Topside Integration
T9070-BY-DPC-010/457-1	NAVSEA Design Practices And Criteria Manual Surface Electro-Optic And Infrared (EO/IR) Sensor Standards
PRF-WS-35951	Gun Computer System MK160 to Electro Optical Sensor System MK20 MOD 1 Interface Design Document

2.3 (U) Other Publications For Reference

(U) Table 3 Other Publications

Document Number	Document Title
	National Geospatial-Intelligence Agency (NGA) Conformance Program Plan for Motion Imagery
	NGA Conformance Test Plan for Motion Imagery
10 USC Subtitle A, PART V, Subpart F, CHAPTER 327, SUBCHAPTER I	MODULAR OPEN SYSTEM APPROACH IN DEVELOPMENT OF WEAPON SYSTEMS
22 Code of Federal Regulations (CFR) Part 120.45 1/17/2025	Foreign Relations – Department of State – International Traffic in Arms Regulations – Purpose and Definitions – Definitions – Maintenance Levels

46 CFR Part 111	Electric Systems – General Requirements
48 CFR Part 239	Acquisition of Information Technology
ASTM D1083 1998	Standard Test Methods for Mechanical Handling of Unitized Loads and Large Shipping Cases and Crates
ASTM D4976 2012	Standard Specification for Polyethylene Plastics Molding and Extrusion Materials
ASTM D5276 2016	Standard Test Method for Drop Test of Loaded Containers by Free Fall
ASTM D5414 2016	Standard Test Method for Evaluation of Horizontal Impact Performance of Load Unitizing Stretch Wrap Materials
ASTM D642 2020	Standard Test Method for Determining Compressive Resistance of Shipping Containers, Components, and Unit Loads
ASTM D880 2015	Standard Test Method for Impact Testing for Shipping Containers and Systems
ASTM D999 2015	Standard Methods for Vibration Testing of Shipping Containers
EIA/ECA-310E	Cabinets, Racks, Panels, and Associated Equipment
GEIA-STD-0009	Reliability Program Standard for Systems Design, Development, and Manufacturing
IEC 60529 2013	Degrees of Protection Provided by Enclosures (IP Code)
IEEE 802.3-2004	IEEE Standards for Local Area Networks Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specification
IEEE 1588-2019	Precision Clock Synchronization Protocol for Networked Measurement and Control Systems
IETF RFC 1112	Host Extensions for IP Multicasting
ISO/CIE 11664-6:2014	Colorimetry-Part 6: CIEDE2000 Color-difference formula
ISO/IEC 13818-1 / ITU-T REC H.222.0	Generic coding of moving pictures and associated audio information Part 1: Systems
ISO/IEC 13818-4	Generic Coding of Moving Pictures and Associated Audio Information - Part 4: Conformance testing
ISO/IEC 14496-10 / ITU-T REC H.264	Coding of audio-visual objects Part 10: Advanced video coding
ISO/IEC 15408 (Parts 1, 2, and 3)	Information technology – Security techniques – Evaluation criteria for IT security

ISO/IEC 23000-19:2020	Multimedia application format (MPEG-A) Part 19: Common media application format (CMAF) for segmented media
ISO/IEC JBP	Information Technology – Computer Graphics, Image Processing and Environmental Data Representation – Registered Item, Class: BIIF Profile ISO/IEC Joint BIIF Profile (JBP)
LIA Z136.1-2022	American National Standard for Safe Use of Lasers
MISB ST 0102.12	Security Metadata Universal and Local Sets for Motion Imagery Data
MISB ST 0301.5	MISB Profile of Aerial Surveillance and Photogrammetry Applications (ASPA)
MISB ST 0404.1	Compression for Infrared Motion Imagery
MISB ST 0601.19	UAS Datalink Local Set
MISB ST 0603.5	MISP Time System and Timestamps
MISB ST 0604.6	Timestamps for Class 1/Class 2 Motion Imagery
MISB TRM 0703.1	Low Bandwidth Motion Imagery - Technologies
MISB RP 0802.2	H.264 Advanced Video Coding (AVC) Motion Imagery Coding
MISB ST 0804.4	Real-Time Protocol for Motion Imagery and Metadata
MISB ST 0805.1	KLV to Cursor-on-Target (CoT) Conversions
MISB ST 0902.8	Motion Imagery Sensor Minimum Metadata Set
MISB ST 0903.6	Video Moving Target Indicator and Track Metadata
MISB ST 1010.3	Generalized Standard Deviation and Correlation Coefficient Metadata
MISB ST 1101	STANAG 4586 Control of UAS Motion Imagery Payloads
MISB ST 1107.4	Metric Geopositioning Metadata
MISB ST 1202.3	Generalized Transformation Parameters
MISB ST 1204.3	Motion Imagery Identification System (MIIS) - Core Identifier
MISB ST 1301.2	Motion Imagery Identification System (MIIS) - Augmentation Identifiers
MISB ST 1402.2	MPEG-2 Transport Stream for Class 1 / Class 2 Motion Imagery, Audio and Metadata
MISB ST 1606.1	MXF Profile for High Performance Motion Imagery Applications
MISB ST 1607.1	Constructs to Amend/Segment KLV Metadata
MISB ST 1608.1	Transport of Motion Imagery and Metadata over GigE Vision
MISB ST 1801.2	Motion Imagery Metadata

MISB ST 1906.2	Motion Imagery Metadata (MIMD): Staging System
MISB ST 1910.1	Adaptive Bitrate (ABR) Content Encoding
MISB ST 2101	Core Identifier for Class 1/Class 2 Motion Imagery
MISP-2023.2	Motion Imagery Standards Profile
NASM51834 Rev 2	Stud, Locked In, Key-Locked, Heavy Duty
NATO STANAG 4545	NATO Secondary Imagery Standard
NGA.STND.0044 _1.3.2_MIE4NITF	NGA – National Imagery Transmission Format 2.1 Motion Imagery Extension
NIAP product compliant list	https://www.niaP-ccevs.org/Product/
S1000D	International Standard for Technical Publications
SAE AS6165 2012	Interface Standard, Airborne EO/IR Systems, Maintenance and Test
SAE AS26860	Indicator, Humidity, Plug, Color Change
SMPTE ST 274	For Television – 1920x1080 Image Sample Structure, Digital Representation and Digital Timing Reference Sequences for Multiple Picture Rates
SMPTE ST 378	MXF – Operational Pattern 1A (Single Item, Single Package)
SMPTE ST 379-1	MXF Generic Container
SMPTE ST 381-1	Mapping MPEG Streams into the MXF Generic Container
SMPTE ST 391	MXF – Operational Pattern 1B (Single Item, Ganged Packages)
SMPTE ST 2036-1	Ultra High Definition Television – Image Parameter Values for Program Production
X11R6	Direct X-Windows protocol https://www.x.org/wiki/

2.4 (U) Order Of Precedence

(U) In the event of a conflict between the text of this document and the references cited herein, the text of this document takes greater precedence to referenced EOSS SOW when conflicting data arises only. Nothing in this document supersedes applicable Federal, State or Local Laws and regulations unless a specific exemption has been obtained.

2.5 (U) Availability Of DOD Documents

(U) Government standards and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.

3 (U) REQUIREMENTS AND VERIFICATION METHOD

(U) Threshold is a minimum requirement. Thresholds throughout this document have a bracketed Unique Identification (UID) number beginning with "T-" (e.g., [T-9999]), which appears near the end of each requirement before the verification methods.

(U) Objectives are desired capabilities rather than requirements. Objectives throughout this document have a bracketed UID number beginning with "O-" (e.g., [O-9998]), which appears near the end of each requirement before the verification methods.

(U) Verification methods are located at the end of each requirement.

(U) Verification Methods

(U) **A** (By Analysis) – Produce documentation via calculations or other form of study to verify compliance with requirement
(U) **M** (Modeling and Simulation) – Predictive M&S to prove or verify compliance with requirement
(U) **I** (Inspection) – Visual verification of compliance with requirement
(U) **D** (Demonstration) – Requirement compliance verified through functional observation to verify expected output or function
(U) **L** (Lab Testing) – Quantitative data measurements in a controlled environment
(U) **R** (Range Testing) – Field data gathered from test events in a relevant environment (i.e., representative of the operational environment for the purposes of the test)
(U) **P** (Platform Test and Evaluation) – Data gathered from test events on the intended platform (e.g., ship)
(U) **V** (Post Test M&S Validation) – Post-test update and confirmation of predictive model

(U) DESCRIPTOR

(U) **T** (Threshold) – SHALL/Mandatory
(U) **O** (Objective) – SHOULD/Recommended

(U) RESPONSIBLE PARTY

(U) **C** (Contractor) – Contracted personnel should perform work and produce appropriate documentation to prove compliance with requirement

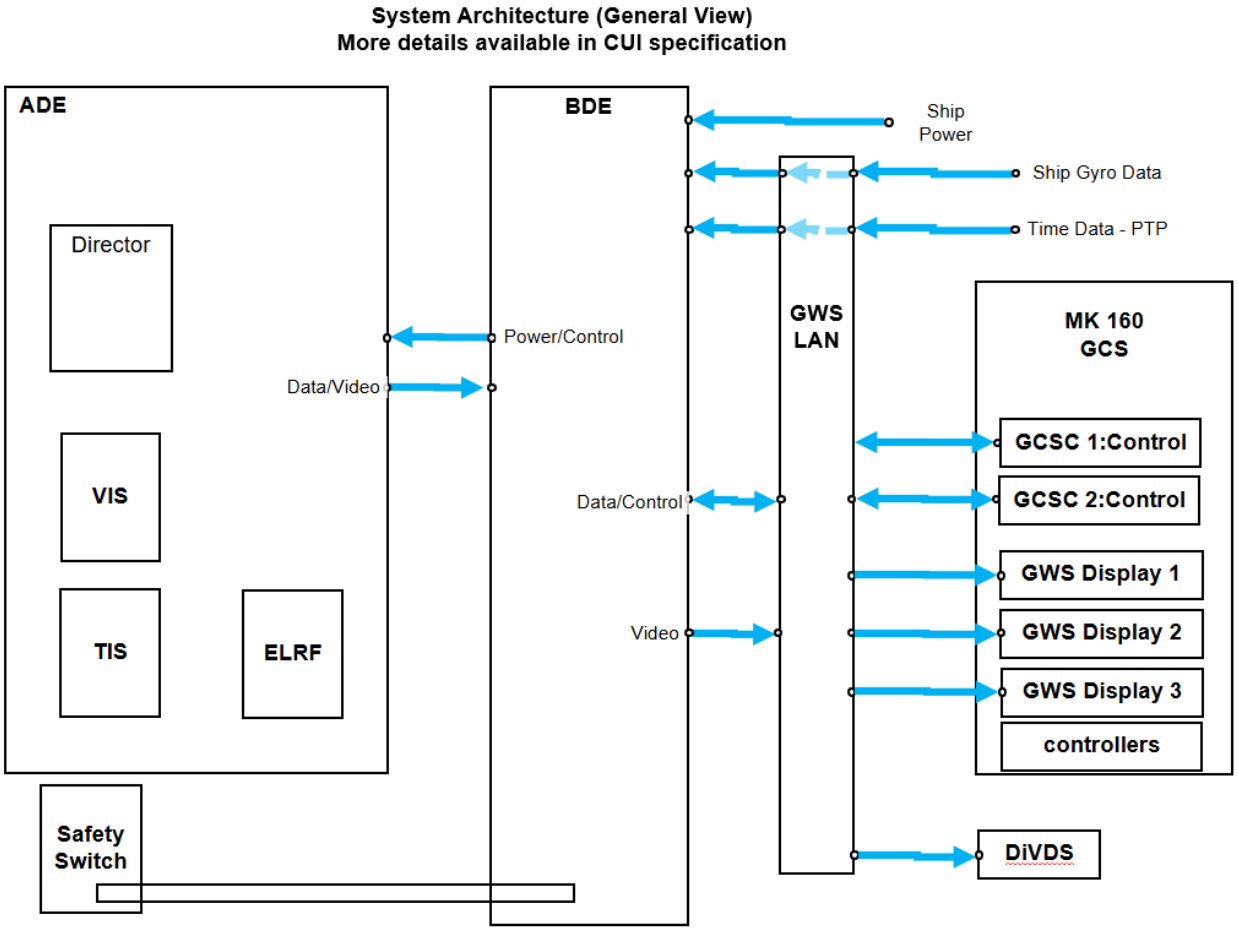
(U) **G** (Government) – Government personnel will perform work and produce documentation to verify compliance with requirement

(U) EXAMPLES
(U) L[T].C – Mandatory Contractor Lab Testing
(U) L[T].CG – Mandatory Lab Testing for both Contractor and Government
(U) L[T].C/G – Mandatory Lab Testing for either Contractor, Government, or both at program discretion

3.1 (U) Functional Architecture Diagrams

(U) The EOSS, subsystems, sensors, and components SHALL conform to the architecture shown in the Figures below. [T-0001] A[T].CG

(U) Figure 1



ADE – Above Deck Equipment
BDE – Below Deck Equipment
VIS – Visible Imaging System
TIS – Thermal Imaging System
ELRF – Eye-Safe Laser Range Finder
LAN – Local Area Network
DiVDS – Digital Video Distribution System
PTP – Precision Time Protocol

(U) The EOSS, subsystems, sensors, and components SHOULD conform to the architecture shown in the Figures below. [O-0002] A[T].CG

(U) Figure 2

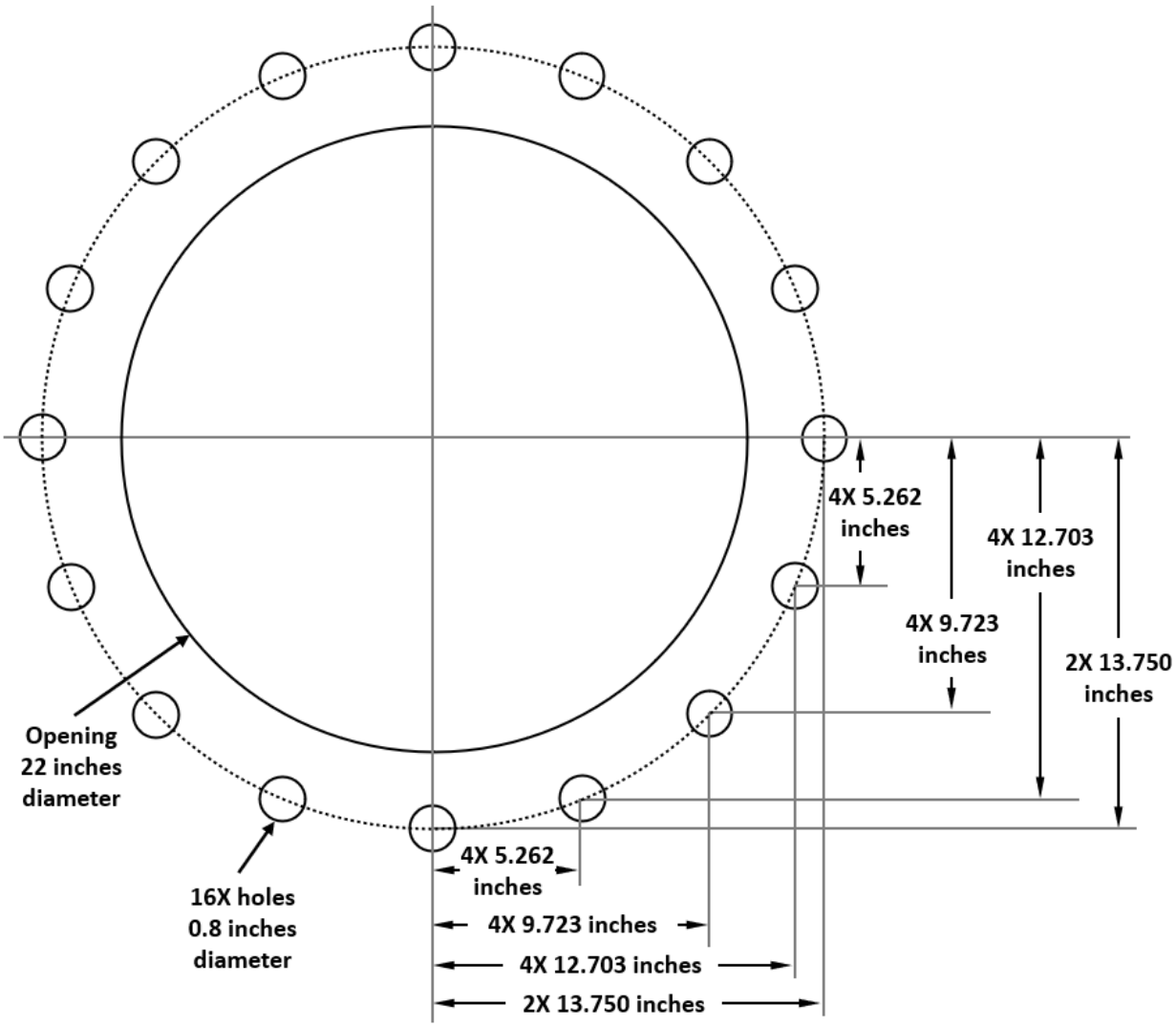
CUI objective diagram redacted for (U) version of this performance specification.

3.2 (U) Modular Open Systems Approach (MOSA) Sensor Architecture And Interfaces

(U) Whenever possible, the sensor architecture and interfaces SHALL support the MOSA architecture and interface standards per 10 USC Subtitle A, Part V, Subpart F, Chapter 327, Subchapter I [T-0003] A[T].C, M[O].C, D[O].C, L[T].C, L[O].G

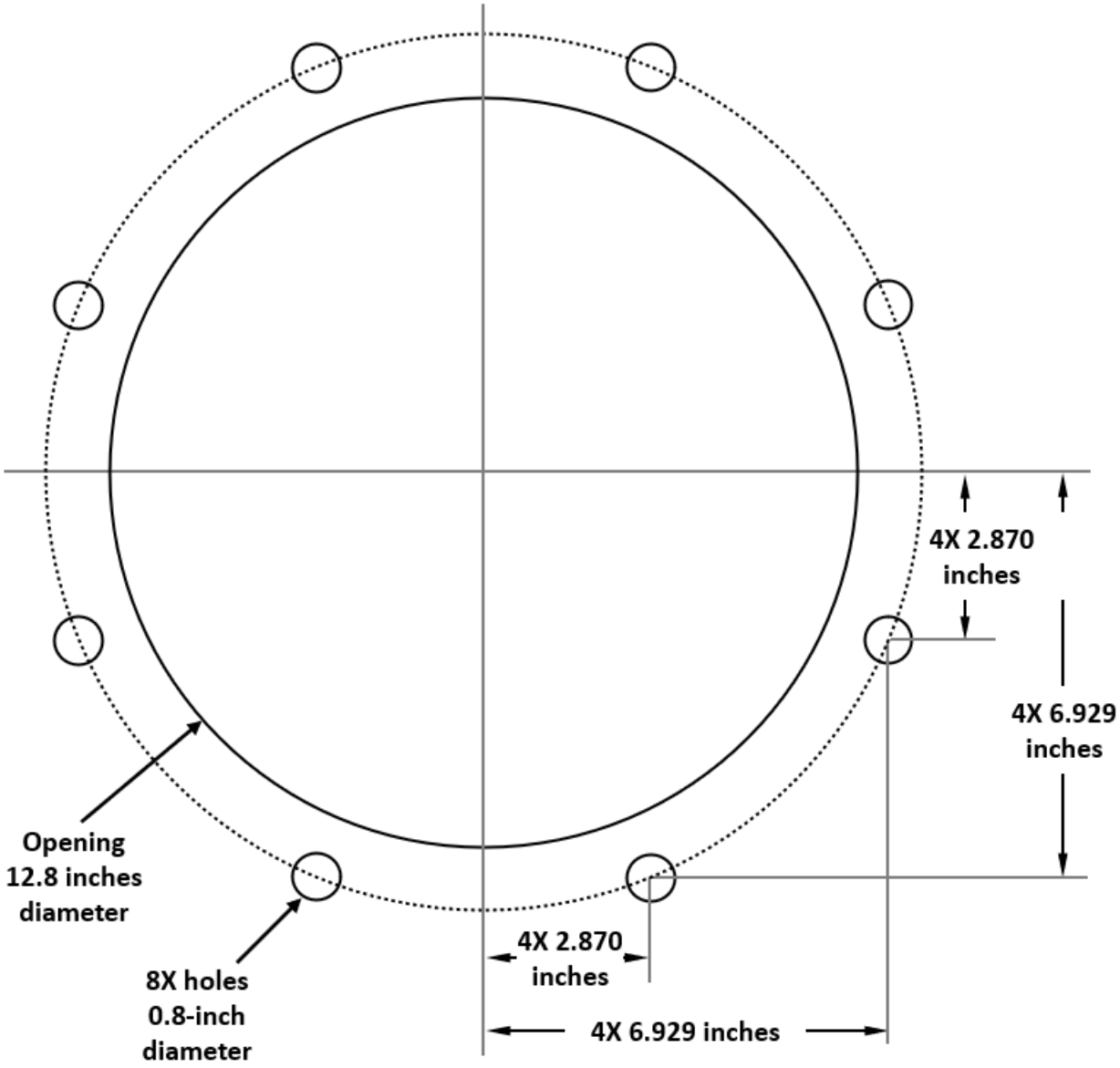
(U) The Grade A shock configuration ADE portion of the EOSS SHALL physically interface with the ship deck using the following hole patterns. Adapter plates are acceptable. [T-0004] A[T].C

(U) Figure 3 Ship deck hole pattern for Grade A shock configuration



(U) The Grade B shock configuration ADE portion of the EOSS SHALL physically interface with the ship deck using the following hole patterns. Adapter plates are acceptable. [T-0005] A[T].C

(U) Figure 4 Ship deck hole pattern for Grade B Shock configuration



(U) The EOSS SHALL interface with the MK160 Gun Computer System (GCS) in conformance with Interface Design Document (IDD) PRF-WS-35951 [T-0006] A[T].CG, P[T].CG

(U) Note: An LRU is any item which can be readily accessed in the field (via removal of access covers, environmental shrouds, etc.) and replaced in situ without further removal or disassembly of the CI of which the item is a component part.

(U) Any component, inseparable assembly or functional sub-system with a system de-rated (under powered) operational life of four thousand five hundred hours (4,500 hrs.) or less SHALL be an Organizational level (O-level) LRU per 22 CFR Part 120.45. [T-0007] A[T].CG, M[O].C

(U) LRUs SHALL be plug-in/plug-out modules and include waterproof, quick-connect protective caps. MIL-HDBK-454 provides guidance on interchangeability. [T-0008] A[T].C, D[O].C

(U) LRUs of common nomenclature and part number SHALL be designed to be interchangeable and interoperable. [T-0009] A[T].C

(U) Any engineering changes (software, hardware, and firmware) incorporated into an LRU SHALL be reverse compatible with all non-upgraded system LRUs. [T-0010] A[T].C, M[T].C, D[O].C, P[T].G

(U) The VIS SHALL be designed as an LRU. [T-0011] A[T].CG, M[O].C

(U) The TIS SHALL be designed as an LRU. [T-0012] A[T].CG, M[O].C

(U) The ELRF SHALL be designed as an LRU. [T-0013] A[T].CG, M[O].C

(U) The Director SHALL be designed as an LRU. [T-0014] A[T].CG, M[O].C

(U) Applicable electronic units SHALL be designed as LRUs. [T-0015] A[T].CG, M[O].C

3.2.1 (U) Motion Imagery (MI) / Metadata (MD)

(U) All EOSS element(s) and their subcomponents (LRUs or modules) SHALL comply with the requirements of the Motion Imagery Standards Profile (MISP) 2023.2 [T-0016] A[T].C, M[O].C, L[T].C, L[O].G

(U) MI/MD SHALL be verified as MISP compliant In Accordance With (IAW) the National Geospatial-Intelligence Agency (NGA) Conformance Program Plan for Motion Imagery and NGA Conformance Test Plan for Motion Imagery. [T-0017] A[T].CG, M[O].C, L[T].C, L[O].G

(U) The MI Source Aspect Ratio (SAR) SHALL be in the range [0.25, 4.0] IAW MISB TRM 1404 and MISP-2023.2: MISP-2015.1-01. [T-0018] A[T].CG, M[O].C, L[T].C, L[O].G

(U) The MI format at the imager (Sensor) and for any MI conversions or transcodes SHALL be a progressive-scan format IAW MISP-2023.2: MISP-2015.1-02. [T-0019] A[T].CG, M[O].C, L[T].C, L[O].G

(U) Every MI frame SHALL include a timestamp representing Absolute Time consistent with MISB ST 0603.5 IAW MISP-2023.2: MISP-2018.3-116. [T-0020] A[T].CG, M[O].C, L[T].C, L[O].G

(U) Where MD contains a timestamp item representing Absolute Time, the timestamp SHALL be IAW MISB ST 0603.5 IAW MISP-2023.2: MISP-2018.1-97. [T-0021] A[T].CG, M[O].C, L[T].C, L[O].G

(U) An instantiation of MI SHALL have only one (1) timestamp representation which represents Absolute Time IAW MISP-2023.2: MISP-2018.1-98. [T-0022] A[T].CG, M[O].C, L[T].C, L[O].G

(U) MI in digital form SHALL remain in digital form IAW MISP-2023.2: MISP-2015.1-06. [T-0023] A[T].CG, M[O].C, L[T].C, L[O].G

(U) KLV MD SHALL be encoded IAW SMPTE ST 336 IAW MISP-2023.2: MISP-2015.1-07. [T-0024] A[T].CG, M[O].C, L[T].C, L[O].G

(U) KLV MD SHALL be formatted IAW MISB ST 0107 and MISP-2023.2: MISP-2015.1-08. [T-0025] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When using KLV and mapping between floating point values and integer values, the mapping SHALL comply with MISB ST 1201 IAW MISP-2023.2: MISP-2015.1-09. [T-0026] A[T].CG, M[O].C, L[T].C, L[O].G

(U) Multi-dimensional arrays of data expressed in KLV SHALL be formatted IAW MISB ST 1303 and MISP-2023.2: MISP-2015.1-10. [T-0027] A[T].CG, M[O].C, L[T].C, L[O].G

(U) Only those containers specified in MISP-2023.2 SHALL be used for Class 0 MI, Class 1 MI, and Class 2 MI IAW MISP-2023.2: MISP-2015.1-11. [T-0028] A[T].CG, M[O].C, L[T].C, L[O].G

(U) Digital images extracted from Motion Imagery as a NITF (National Imagery Transmission Format) / NSIF (NATO Secondary Imagery Format) SHALL comply with ISO/IEC Joint BIIF Profile / NATO STANAG 4545 respectively IAW MISP 2023.2: MISP-2022.2-133. [T-0029] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, the MI sampling format for 1920x1080 progressive-scan High Definition (HD) MI SHALL be defined by SMPTE ST 274 IAW MISP-2023.2: MISP-2015.1-21. [T-0030] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, The MI sampling structures for 3840x2160 and 7680x4320 progressive-scan Ultra High Definition (UHD) MI SHALL be defined by SMPTE ST 2036-1 IAW MISP-2023.2: MISP-2015.1-22. [T-0031] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, Class 0 MI encapsulated in Material eXchange Format (MXF) SHALL comply with MISB ST 1606.1 IAW MISP-2023.2: MISP-2021.1-121. [T-0032] A[T].CG, M[O].C, L[T].C, L[O].G

(U) Class 0 Motion Imagery placed into a JBP (Joint BIIF Profile) NITF (National Imagery Transmission Format) / STANAG 4545 NSIF (NATO Secondary Imagery Format) SHALL comply with MIE4NITF IAW MISP-2023.2: MISP-2022.2-132. [T-0033] A[T].CG, M[O].C, L[T].C, L[O].G

(U) While compressing Class 1 MI with H.264/AVC, the compression SHALL comply with ISO/IEC 14496-10 | ITU-T Rec. H.264 IAW MISP-2023.2: MISP-2015.1-32. [T-0034] A[T].CG, M[O].C, L[T].C, L[O].G

(U) While compressing Class 1 MI with H.264/AVC, the compression SHALL be profile Constrained Baseline, Main or High in the range of Level 1 to Level 4 inclusive IAW MISP-2023.2: MISP-2018.2-114. [T-0035] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When infrared MI with a pixel value range greater than 8 bits is converted into Class 1 MI and compressed using H.262/MPEG-2 or H.264/AVC the compressed imagery SHALL comply with MISB ST 0404.1 IAW MISP-2023.2: MISP-2015.1-37. [T-0036] A[T].CG, M[O].C, L[T].C, L[O].G

(U) Class 1 MI SHALL contain a timestamp based on Absolute Time IAW MISB ST 0604.6 and MISP-2023.2: MISP-2018.1-104. [T-0037] A[T].CG, M[O].C, L[T].C, L[O].G

(U) A MIIS Core ID inserted into Class 1 Motion Imagery SHALL be in accordance with MISB ST 2101 IAW MISP-2023.2: MISP-2021.2-128. [T-0038] A[T].CG, M[O].C, L[T].C, L[O].G

(U) A MIIS Core ID inserted into Class 1 Motion Imagery SHALL be the same Core ID in its corresponding metadata IAW MISP-2023.2: MISP-2021.2-129. [T-0039] A[T].CG, M[O].C, L[T].C, L[O].G

(U) Class 1 MI MD SHALL be represented using Key Length Value (KLV) IAW MISP-2023.2: MISP-2015.1-45. [T-0040] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, Class 1 MI encapsulated in a MPEG-2 Transport Stream container SHALL comply with ISO/IEC 13818-1 | ITU-T Rec H.222.0 IAW MISP-2023.2: MISP-2015.1-47. [T-0041] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, Class 1 MI encapsulated in a MPEG-2 Transport Stream container SHALL comply with MISB ST 1402.2 IAW MISP-2023.2: MISP-2015.1-48. [T-0042] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, Security MD encapsulated in a MPEG-2 Transport Stream container SHALL be inserted into only one (1) of the two (2) carriage mechanisms available: The Synchronous Stream Multiplex Method or the Asynchronous Stream Multiplex Method IAW MISB ST 1402.2 and MISP-2023.2: MISP-2015.1-49. [T-0043] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, Class 1 MI encapsulated in a MPEG-2 Transport Stream container SHALL meet the conformance requirements of ISO/IEC 13818-4 IAW MISP-2023.2: MISP-2015.1-50. [T-0044] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, Class 1 MI encapsulated in a Common Media Application Format (CMAF) container SHALL comply with ISO/IEC 23000-19 IAW MISP-2023.2: MISP-2021.1-122. [T-0045] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, Class 1 MI encapsulated in a CMAF container SHALL comply with MISB ST 1910.1 IAW MISP-2023.2: MISP-2021.1-123. [T-0046] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, Security MD encapsulated in a CMAF container SHALL be present in either the synchronous or asynchronous MD message boxes, but not both IAW MISP-2023.2: MISP-2021.1-124. [T-0047] A[T].CG, M[O].C, L[T].C

(U) Where graphic and text information are overlaid onto MI, the information SHALL be nondestructive to the MI content (i.e., “burned-in MD” is not allowed) IAW MISP-2023.2: MISP-2015.1-67. [T-0048] A[T].CG, M[O].C, L[T].C

(U) A MISB MD set SHALL conform to all requirements as specified for that MD set except where noted IAW MISP-2023.2: MISP-2016.1-92. [T-0049] A[T].CG, M[O].C, L[T].C

(U) MI SHALL contain a Core Identifier IAW MISB ST 1204.3 and MISP-2023.2: MISP-2015.1-68. [T-0050] A[T].CG, M[O].C, L[T].C

(U) Where supplemental identifiers are used with MISB ST 1204.3, the supplemental identifiers SHALL be defined by MISB ST 1301.2 IAW MISP-2023.2: MISP-2015.1-69. [T-0051] A[T].CG, M[O].C, L[T].C

(U) When implementing MISB ST 0801 the threshold and objective profiles for photogrammetric MD items, the items SHALL be defined by MISB ST 1107.4 IAW MISP-2023.2: MISP-2015.1-70. [T-0052] A[T].CG, M[O].C, L[T].C

(U) Transforming two-dimensional (2D) MI from one (1) coordinate system into a second two-dimensional (2D) coordinate system SHALL comply with MISB ST 1202.3 IAW MISP-2023.2: MISP-2015.1-71. [T-0053] A[T].CG, M[O].C, L[T].C

(U) Where Standard Deviation and Correlation Coefficient MD is available, such MD SHALL be provided IAW MISB ST 1010.3 and MISP-2023.2: MISP-2015.1-72. [T-0054] A[T].CG, M[O].C, L[T].C

(U) MI SHALL include security MD IAW MISB ST 0102.12 and MISP-2023.2: MISP-2015.1-73. [T-0055] A[T].CG, M[O].C, L[T].C

(U) MI SHALL contain the MI Sensor Minimum MD Set IAW MISB ST 0902.8 and MISP-2023.2: MISP-2015.1-75. [T-0056] A[T].CG, M[O].C, L[T].C

(U) When MD items within an instantiating MD set are changed, the changed MD SHALL be signaled using the Amend Local Set and Segment Local Set as defined in MISB ST 1607.1 IAW MISP-2023.2: MISP-2017.1-95. [T-0057] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, A MPEG-2 Transport Stream encapsulated in Real Time Protocol (RTP) SHALL comply with MISB ST 0804.4 IAW MISP-2023.2: MISP-2015.1-76. [T-0058] A[T].CG, M[O].C, L[T].C

(U) When applicable, Class 1 MI encapsulated in Real Time Protocol (RTP) SHALL comply with MISB ST 0804.4 IAW MISP-2023.2: MISP-2015.1-77. [T-0059] A[T].CG, M[O].C, L[T].C

(U) When applicable, Class 1 MI and MD encapsulated per CMAF ISO/IEC 23000-19 for adaptive bitrate streaming SHALL comply with MISB ST 1910.1 IAW MISP-2023.2: MISP-2020.3-120. [T-0060] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, KLV to Cursor-on-Target (CoT) encoding SHALL be IAW MISB ST 0805.1 and MISP-2023.2: MISP-2015.1-80. [T-0061] A[T].CG, M[O].C, L[T].C, L[O].G

(U) When applicable, when requesting Class 1 MI or Class 2 MI from a platform that supports MISB ST 1101, the messages SHALL comply with MISB ST 1101 IAW MISP-2023.2: MISP-2015.1-81. [T-0062] A[T].CG, M[O].C, L[T].C

(U) When applicable, for file exchange, operational patterns 1a (OP-1a) and 1b (OP-1b) as per SMPTE ST 378 and SMPTE ST 391, respectively, SHALL be used IAW MISP-2023.2: MISP-2015.1-12. [T-0063] A[T].CG, M[O].C, L[T].C

(U) When applicable, MI and MD SHALL use the method of frame-based mapping within the generic container IAW SMPTE ST 379-1 and SMPTE ST 381-1 and MISP-2023.2: MISP-2015.1-13. [T-0064] A[T].CG, M[O].C, L[T].C

(U) When applicable, all data constraints for an Aerial Surveillance and Photogrammetry Applications (ASPA) MXF file SHALL comply with MISB ST 0301.5 IAW MISP-2023.2: MISP-2015.1-14. [T-0065] A[T].CG, M[O].C, L[T].C, L[O].G

(U) The EOSS ADE and their subcomponents (LRUs or modules) SHALL output Class 0 MI to the BDE IAW MISB ST 1608.1. [T-0066] A[T].CG, M[O].C, L[T].C

(U) The EOSS BDE SHALL be capable of receiving and disseminating MISB compliant Class 0, 1, and 2 MI. [T-0067] A[T].CG, M[O].C, L[T].C, P[T].G

(U) The EOSS BDE SHALL encode Class 0 MI in such a way to preserve the highest sampling format produced by the sensor to include, but not limited to, native frame rate, aspect ratio, color sampling, and quantization bits. [T-0068] A[T].CG, M[O].C, L[T].C, L[O].G

(U) The EOSS BDE SHALL encode Class 1 MI with larger than 10-bit imagery using High Efficiency Video Coding (HEVC) / H.265 compression using the Main 4:4:4 16 Intra profile. [T-0069] A[T].CG, M[O].C, L[T].C, L[O].G

(U) The EOSS BDE SHALL encode Class 2 MI with using HEVC / H.265 compression using the profile Main 4:4:4 16 Intra for large format imagery. [T-0070] A[T].CG, M[O].C, L[T].C, L[O].G

(U) The EOSS BDE SHALL be capable of transcoding MI/MD after initial encoding IAW MISB TRM 0703.1 [T-0071] A[T].CG, M[O].C, L[T].C, L[O].G

(U) All EOSS ADE and their subcomponents (LRUs or modules) SHALL generate and insert MD IAW MISB ST 1801.2, but omit Mission ID, Platform Number, and Platform Designation. [T-0072] A[T].CG, M[O].C, L[T].C, L[O].G

(U) All EOSS ADE and their subcomponents (LRUs or modules) SHOULD generate and insert any additional MD required to communicate image content information to the Sensor Electronics Suite's image processing capabilities such as distortion maps, Non-Uniformity Correction (NUC) tables, Bayer filter, coefficients, frame rate, exposure/integration times, etc. [O-0073] A[T].CG, M[O].C, L[T].C, L[O].G

(U) The EOSS BDE SHALL insert Mission ID, Platform Number, and Platform Designation and populate the Security Local Set and any applicable elements (i.e., Sensor Electronics Suite elements) as appropriate for full compliance with MISP and MISB ST 1801.2. [T-0074] A[T].CG, M[O].C, L[T].C, L[O].G

(U) All EOSS ADE and their subcomponents (LRUs or modules) and Automatic Video Tracker (AVT) processing SHALL generate and insert MI Track MD (MISB ST 0903.6) IAW MISB ST 1608.1, MISB ST 1107.4, and MISB ST 1801.2. [T-0075] A[T].C, M[O].C, L[T].C, R[O].G, P[T].G

(U) The EOSS BDE electronics suite processing equipment that incorporates AVT SHALL generate MI Track MD IAW MISB ST 1801.2. [T-0076] A[T].CG, M[O].C, L[T].C, L[O].G

(U) EOSS AVT processing SHALL incorporate MI Track MD (i.e., MISB ST 0903.6) IAW MISB ST 1608.1 and MISB ST 1801.2. [T-0077] A[T].C, M[O].C, L[T].C, R[O].G, P[T].G

(U) Sensors using LOS for track localization SHALL provide MD with the MI in conformance with MISB ST 0903.6 and MISB ST 1608.1. [T-0078] A[T].CG, M[O].C, L[T].C, L[O].G

(U) The EOSS BDE SHALL utilize the staging system standards in MISB ST 1801.2 and MISB ST 1906.2 to report all applicable constellation stages of sensor positional and alignment MD from ADE to BDE. [T-0079] A[T].C, M[O].C, L[T].C, R[O].G, P[T].G

(U) The VIS and TIS SHALL output GigE Class 0 MI and MD from sensors to BDE IAW MISB ST 1608.1. [T-0080] A[T].CG, M[O].C, L[T].C, L[O].G

(U) Any MISB ST 0601.19 MD elements that are available SHOULD be included in the EOSS MD stream except for Mission ID, Platform Number, and Platform Designation. [O-0081] A[T].CG, M[O].C, L[T].C, L[O].G

(U) The compression ratio and bitrates SHALL be programmable between the ranges specified in MISB RP 0802.2 for shipboard distribution. [T-0082] A[T].C, M[O].C, L[T].C, R[O].G, P[T].G

(U) The EOSS SHALL provide all MD that will allow the Navy to generate its own symbology for operations modes and apply them to unmarked MI. [T-0083] A[T].C, M[O].C, L[T].C, R[O].G, P[T].G

(U) The EOSS SHALL provide all command and control data in the MD that will allow the Navy to generate its own symbology for operations modes and apply them to unmarked MI. [T-0084] A[T].C, M[O].C, L[T].C, R[O].G, P[T].G

3.2.2 (U) No EOSS Components in the GCS

(U) All EOSS components SHALL exist at one (1) end of the GWS LAN. EOSS components SHALL NOT reside in the GCS. [T-0085] A[T].C

3.2.3 (U) EOSS Sensor Management

(U) Whenever possible, the EOSS SHALL comply with Army Integrated Sensor Architecture (ISA). [T-0086] A[T].CG, M[T].C, D[O].C, P[T].G

3.3 (U) Safety

(U) The EOSS SHALL be designed for safety IAW MIL-STD-882E Change 1. [T-0087] A[T].C, M[O].C, L[T].C/G, P[T].G

(U) Where EOSS safety design features must be compromised to achieve performance, alternate means for risk mitigation IAW MIL-STD-882E Change 1 SHALL be followed. [T-0088] A[T].CG, M[O].C, D[O].C, L[T].CG, R[O].G, P[T].G

(U) Known hazards SHALL be controlled to protect personnel, equipment, and ship's facilities without compromising the operational requirements of the ship. [T-0089] A[T].CG, M[O].C, D[O].C, L[T].CG, R[O].G, P[T].G

(U) The EOSS SHALL be designed so that no single failure (human, mechanical, or electrical) can produce a sudden and total failure from which recovery is impossible. [T-0090] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) When power to the main EOSS power bus is interrupted, automatic restraint of the director SHALL occur (regardless of state or mode) until power is restored and the operator selects the operate mode. [T-0091] A[T].C, M[O].C, D[O].C, L[T].C

(U) Electrical, mechanical, and software interlocks SHALL be provided to prevent personnel, equipment, and ship system damage during failures. [T-0092] A[T].CG, M[O].C, D[O].C, P[T].G

(U) Note: MIL-HDBK-454C, Requirement 1 may be used for guidance on equipment safety design criteria.

3.3.1 (U) Safety Switch

(U) In the case of the EOSS having protruding sensors, cables, components, or any items that could strike, pinch, smash, crush a user when they are in with the rotational arch of the EOSS, the system SHALL have a safety switch. [T-0093] A[T].C

(U) In the case of the EOSS having protruding sensors, cables, components, or any items that could strike, pinch, smash, crush a user when they are in with the rotational arch of the EOSS, the safety switch SHALL be installed outside the working volume of the EOSS. [T-0094] A[T].CG, M[O].C, D[O].C

(U) In the case of the EOSS having protruding sensors, cables, components, or any items that could strike, pinch, smash, crush a user when they are in with the rotational arch of the EOSS, activation of the safety switch SHALL prevent any movement of the EOSS from the GCS console commands. [T-0095] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) In the case of the EOSS having protruding sensors, cables, components, or any items that could strike, pinch, smash, crush a user when they are in with the rotational arch of the EOSS, activation of the safety switch SHALL engage the power off brakes. [T-0096] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) In the case of the EOSS having protruding sensors, cables, components, or any items that could strike, pinch, smash, crush a user when they are in with the rotational arch of the EOSS, activation of the safety switch SHALL send an indication to the GCS that the safety switch has been enabled. [T-0097] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) In the case of the EOSS having protruding sensors, cables, components, or any items that could strike, pinch, smash, crush a user when they are in with the rotational arch of the EOSS, the safety switch activation indication SHALL be displayed as part of the EOSS situational awareness display. [T-0098] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) In the case of the EOSS having protruding sensors, cables, components, or any items that could strike, pinch, smash, crush a user when they are in with the rotational arch of the EOSS, activation of the safety switch SHALL disable all EOSS power including disabling the ELRF. [T-0099] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) In the case of the EOSS having protruding sensors, cables, components, or any items that could strike, pinch, smash, crush a user when they are in with the rotational arch of the EOSS, the safety switch SHALL have some redundancy so that a failed switch does not disable the EOSS. [T-0100] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

3.3.2 (U) Electrical Safety

(U) All high voltage electrical equipment SHALL have fail-safe interlocks to prevent injury to personnel during installation, operation, maintenance, and repair functions. [T-0101] A[T].CG, M[O].C, D[O].C, L[T].C/G

(U) Electrical connectors SHALL be designed or specified so as to prevent connections that will cause the system to work improperly. [T-0102] A[T].CG, D[O].C

(U) All cabinets SHALL be grounded IAW MIL-STD-1310H. [T-0103] A[T].C, D[O].C, L[T].C/G, P[O].G

(U) All EOSS cables and cable assemblies SHALL meet the electrical safety requirements in Title 46 CFR Part 111 for the voltage and current loads of the system. [T-0104] A[T].C, M[O].C, L[T].C/G

(U) The EOSS SHALL not produce an electromagnetic environment, which can cause safety and reliability degradation of ordnance items or a hazard to personnel. [T-0105] A[T].C, M[O].C, L[T].C/G

(U) The EOSS design SHALL protect personnel, fuels, and ordnance from hazardous effects of electromagnetic radiation using MIL-STD-464D. [T-0106] A[T].C, M[O].C, L[T].C/G

(U) The EOSS SHALL comply with current requirements for the protection of personnel against the effect of electromagnetic radiation IAW DODI 6055.11. [T-0107] A[T].C, M[O].C, L[T].C/G

If the EOSS contains lithium battery(s), the EOSS SHALL operate in accordance with NAVSEAINST 9310.1accordance with NAVSEAINST 9310.1. [T-0108] A[T].C, M[O].C, L[T].C/G

3.3.3 (U) Laser Safety

(U) ELRF laser(s) SHALL be certified as a Class 1 system while operating at or below 1 (one) pulse per second and Class 1 or 1M system while operating above 1 (one) pulse per second per ANSI Z136.1 and verified by the Navy/Marine Corps Laser Safety Review Board (LSRB). [T-0109] A[T].C, M[O].C, L[T].C/G

(U) The ELRF SHALL be certified as Class 1 system while operating at or below 1 (one) pulse per second and Class 1M system while operating above 1 (one) pulse per second by the LSRB as specified in OPNAV 5100.27/MCO5104.1. [T-0110] A[T].CG, M[T].C, L[T].C/G, R[O].G, P[T].G

(U) The laser subsystem SHALL comply with the design standards of MIL-STD-1425. [T-0111] A[T].CG, M[O].C, L[T].C/G, R[O].G, P[T].G

(U) The ELRF laser(s) SHALL meet Laser Clearinghouse (LCH) requirements and register basic system parameters and concepts of operation with the Commander, United States Strategic Command (CDRUSSTRATCOM) per DoDI 3100.11 and Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3225.01. [T-0112] A[T].CG, M[O].C, L[T].C/G, R[O].G, P[T].G

(U) The ELRF SHALL emit a wavelength in the one and five tenths micron (1.5µm) to one and sixty-five hundredths micron (1.65µm) band that allows for EOSS to meet the safety requirements. [T-0113] A[T].CG, M[T].C, D[O].C, L[T].C

(U) The EOSS system SHALL allow installation and maintenance personnel to set Laser cutout zones in Az and El and be programmable to enable inhibit regions to be established and maintained. [T-0114] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In the case where the ELRF cannot be fired because of the maintenance set cutout zones, the EOSS SHALL report that these maintenance set cutout zones are preventing the laser from firing. [T-0115] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The maintenance set Cutout Zones SHALL be comprised of at least 32 coordinates to compile the cutout zone polygon or be approved by the Government if coordinate method is not used. [T-0116] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHALL remember the previously recorded maintenance cutout zone coordinates so that when an LRU is swapped that it does not need to be reconfigured. [T-0117] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS system SHALL allow installation and maintenance personnel the capability to set Geodetic Lasing Cutouts that take into account the dynamics of the ship as well as Relative Lasing Cutouts set for Az and El that can be overridden in need (i.e. battle conditions). [T-0118] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In the case where the ELRF cannot be fired because of the Geodetic Lasing Cutouts, the EOSS SHALL report that these Geodetic Lasing Cutouts are preventing the laser from firing. [T-0119] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS system SHALL provide an interface to a Deconfliction Safety System (DSS) IAW JLLDS-DSS_LS-IRS-0025-R and inhibit laser firings if indicated by the published message. [T-0120] A[T].CG, M[O].C, P[T].G

(U) In the case where the ELRF cannot be fired because of the DSS, the EOSS SHALL report that this DSS is preventing the laser from firing. [T-0121] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The ELRF SHALL only output the designed wavelength across all environmental and look angles and be filtered below safe levels IAW ANSI-Z136.1. [T-0122] A[T].C, M[T].C, D[O].C, L[T].C

(U) Any ELRF pump wavelength(s) SHALL be filtered below safe levels as determined per LIA Z136.1. [T-0123] A[T].C, M[T].C, D[O].C, L[T].C

(U) ELRF SHALL ensure that lasers only fire when commanded to fire. [T-0124] A[T].C, M[T].C, L[T].C, P[T].G

(U) ELRF laser(s) SHALL have a label stating whether they are registered with the FDA as FDA compliant or MIL-EXEMPT. [T-0125] A[T].CG, I[T].C

(U) Class 1 laser(s) SHALL be labeled stating they are Class 1. [T-0126] A[T].CG, I[T].C

3.4 (U) Computer Hardware Requirements

(U) The EOSS SHALL use commercially available military / industrial quality server class Central Processing Unit (CPU) motherboards. [T-0127] A[T].CG

(U) The EOSS system SHALL reserve sufficient space in a below-deck processing rack to accommodate a specified DSS server. [T-0128] A[T].CG

(U) The EOSS SHALL use commercially available graphics processing units. [T-0129] A[T].CG

(U) The EOSS SHALL use commercially available video processing boards. [T-0130] A[T].C, L[T].C, P[T].G

(U) The EOSS SHALL at no time exceed fifty percent (50%) utilization of the system processing resources while meeting all image processing and dissemination requirements. [T-0131] A[T].CG, M[T].C, L[T].C, P[T].G

(U) The EOSS architecture SHALL be capable of future expansion to support one hundred percent (100%) growth in delivered capacity for computational processing, memory, and internal network bandwidth. [T-0132] A[T].CG, M[O].C

(U) The hardware to support this one hundred percent (100%) spare capacity need not be initially installed to support this requirement. [T-0133] A[T].CG

(U) The EOSS data, video, imagery, and MD storage capability SHALL be approved, certified per the Joint Interoperability Test Command (JITC), and listed on the Defense Information System Agency (DISA) DoD Unified Capabilities (UC) Approved Product List (APL) per DoDI 8100.04 and the UC APL Process Guide Version 2.4, or most current. [T-0134] A[T].CG, L[T].C

(U) The EOSS data, video, imagery, and MD storage capability SHALL meet and be certified to TEMPEST standard IAW Title 48 CFR, Part 239. [T-0135] A[T].C, L[T].C/G

(U) The EOSS data storage capability SHALL be evaluated and certified by the National Information Assurance Partnership (NIAP) to be accredited and conform to the Common Criteria for IT Security [T-0136] A[T].C, L[T].C

(U) The EOSS data storage capability SHALL be evaluated per ISO/IEC 15408 (Parts 1, 2, and 3) with the removable hard drives being listed on the NIAP product compliant list. [T-0137] A[T].C, L[T].C

3.5 (U) EOSS Network Infrastructure

(U) Due to the high bitrates associated with combined VIS and TIS architecture, a ten (10) Gigabit Ethernet network infrastructure or greater SHOULD be used within the EOSS. [O-0138] A[T].C, L[T].C, P[T].G

(U) The EOSS BDE SHALL have separate MI/MD outputs that are software configurable as to the Class of video that is output for external system video interfaces, the number of required ports are defined by the number of external systems interfaced, the required display presets, and individual imager feeds required with room for inclusion of additional ports for video distribution growth, with a minimum number related to the number of Human Machine Interface (HMI) display presets and number of imagers included. [T-0139] A[T].CG, M[O].C, L[T].C, P[T].G

(U) The EOSS SHALL provide any MI/MD to the GWS LAN that an operator may command through a DiVDS console. [T-0140] A[T].CG, M[O].C, P[T].G

(U) The EOSS SHALL provide any MI/MD to the GWS LAN that the DiVDS system may select. [T-0141] A[T].CG, M[O].C, P[T].G

(U) The EOSS SHALL receive ship's Positioning, Navigation, and Timing (PNT) via the Combat System's LAN IAW navigation message definitions and formats. [T-0142] A[T].C, M[O].C, L[T].C/G, P[T].G

(U) The EOSS ADE and BDE SHALL provide software and user interface access to sensor raw image count value arrays within real time constraints. [T-0143] A[T].CG, M[O].C, L[T].CG, P[T].G

(U) The EOSS ADE and BDE SHALL provide software and user interface access to inject virtual image count value arrays within real time constraints. [T-0144] A[T].CG, M[O].C, L[T].CG, P[T].G

(U) The EOSS communications connections SHOULD comply with T9070-BY-DPC-010/457-1, hereby known as DPC (Design Practices and Criteria), section 3-1.3.3. [O-0145] A[T].CG, M[O].C

(U) The EOSS video connections SHOULD comply with section 3-1.3.3 of the DPC. [O-0146] A[T].CG, M[O].C

(U) The EOSS auxiliary (if used) connections SHOULD comply with section 3-1.3.3 of the DPC. [O-0147] A[T].CG, M[O].C

(U) The EOSS SHOULD have a dedicated port for testing and maintenance of the VIS. [O-0148] A[T].CG, M[O].C, L[T].C

(U) Note: see section 3.25.5.

(U) The EOSS SHOULD have a dedicated port for testing and maintenance of the TIS. [O-0149] A[T].CG, M[O].C, L[T].C

(U) Note: see section 3.25.5.

(U) The EOSS SHOULD have a dedicated port for testing and maintenance of the ELRF. [O-0150] A[T].CG, M[O].C, L[T].C

(U) Note: see section 3.25.5.

(U) The EOSS SHOULD have a dedicated port for testing and maintenance of the Director. [O-0151] A[T].CG, M[O].C, L[T].C

(U) Note: see section 3.25.5.

(U) The EOSS SHALL have a dedicated port for testing and maintenance of the BDE. [T-0152] A[T].CG, M[O].C, L[T].C

(U) Note: see section 3.25.5.

(U) The EOSS SHALL have a dedicated port for testing and maintenance of the AVT. [T-0153] A[T].CG, M[O].C, L[T].C

(U) Note: see section 3.25.5.

3.6 (U) Built In Test (BIT)

(U) The EOSS SHALL have Built In Tests (BITs). [T-0154] A[T].CG, M[O].C, L[T].C, P[T].G

(U) The EOSS BITs SHALL detect and report faults to the appropriate LRU or module level. [T-0155] A[T].CG, M[O].C, L[T].C, P[T].G

(U) Note: A critical fault is defined as a fault which impacts a critical function and prevents the system from completing any one or more assigned mission tasks below.

a. Observe the target

b. Ability to maintain the EOSS line of sight on the target

c. Target bearing, elevation and range measurement

d. Confirmation of clear line of sight

e. Weapon aim adjustments

(U) The EOSS SHALL detect critical faults, which result in the loss of mission essential functionality while preparing for and performing the mission. [T-0156] A[T].CG, M[O].C, L[T].C, P[T].G

(U) All faults, regardless of criticality, SHALL be identified with enough terminology precision to support maintenance activity. [T-0157] A[T].CG, L[T].C, P[T].G

(U) All faults SHALL be traceable to the Failure Modes Effects and Criticality Analysis (FMECA), which will be the single point of failure mode determination. [T-0158] A[T].CG

(U) Note: Fault detection rate is defined as the number of correct detections divided by the total number of confirmed faults, with the result multiplied by one hundred (100) (to express the quotient as a percentage).

(U) The EOSS SHALL have a BIT hardware fault detection rate of ninety nine percent (99%) while in the Maintenance State. [T-0159] A[T].CG, M[O].C, L[T].C

(U) The EOSS SHOULD have a BIT hardware fault detection rate of one hundred percent (100%) while in the Maintenance State. [O-0160] A[T].CG, M[O].C, L[T].C

(U) The EOSS SHALL have a BIT critical fault detection rate of ninety five percent (95%) when installed on host platform. [T-0161] A[T].CG, M[O].C, L[T].C

(U) The EOSS SHOULD have a BIT critical fault detection rate of one hundred percent (100%) when installed on host platform. [O-0162] A[T].CG, M[O].C, L[T].C

(U) Note: BIT fault isolation rate is defined as the total number of failures correctly isolated by BIT to the faulty LRU or module divided by the total number of failures detected by BIT, with the result multiplied by one hundred (100) (to express the quotient as a percentage).

(U) The EOSS SHALL have a BIT fault isolation rate of greater than or equal to ninety percent (90%). [T-0163] A[T].CG, M[O].C, L[T].C

(U) The EOSS SHOULD have a BIT fault isolation rate of greater than or equal to ninety five percent (95%). [O-0164] A[T].CG, M[O].C, L[T].C

(U) BIT functions automatically initiated during system initialization SHALL not exceed the power state transition times of this specification. [T-0165] A[T].CG, M[O].C, L[T].C, P[T].G

(U) Multiple point failures and/or wiring faults SHALL be diagnosed by the collective use of BIT, equipment specific trouble shooting guides, general trouble shooting procedures, cable assembly and wiring schematics and operating procedures. [T-0166] A[T].C, M[O].C, L[T].C

(U) BIT reports SHOULD be recorded for use in analyzing and improving the EOSS as well as predicting issues. [O-0167] A[T].CG, L[T].C

(U) BIT error messages SHOULD be provided in a way that the operator will not require additional documentation (i.e., maintenance manual). [O-0168] A[T].CG, M[O].C, L[T].C

(U) BIT error messages SHOULD provide solutions as applicable. [O-0169] A[T].CG, M[O].C, L[T].C

(U) The comprehensive BIT SHALL test all functionalities of the EOSS. [T-0170] A[T].CG, M[O].C, L[T].C

(U) A comprehensive BIT SHALL be performed automatically upon power-up. [T-0171] A[T].CG, M[O].C, L[T].C

(U) The Operator SHALL be capable initiating a comprehensive BIT. [T-0172] A[T].CG, M[O].C, L[T].C

(U) The EOSS SHALL continuously run a subsection of the comprehensive BIT. [T-0173] A[T].CG, M[O].C, L[T].C

(U) The continuous BIT SHALL run in the background in a way that does not affect the Operator's ability to use the System. [T-0174] A[T].CG, M[O].C, L[T].C

(U) The Operator SHOULD retain full functionality while the BIT is being performed. [O-0175] A[T].CG

3.7 (U) Usage Tracking

(U) The EOSS SHOULD monitor and report the configuration status of system LRUs to the user console and allow the maintenance crew to update the Shipboard maintenance database. [O-0176] A[T].CG, M[O].C, L[T].C

(U) The configuration status of EOSS SHALL include as a minimum: part number, serial number, software version, and firmware version. [T-0177] A[T].CG, M[O].C, L[T].C

(U) The EOSS SHALL record all system configuration files for backup, recovery, and configuration tracking. [T-0178] A[T].CG, M[O].C, L[T].C

(U) The EOSS SHALL record the individual cumulative energized time of each EOSS state for the life of the EOSS. [T-0179] A[T].CG, M[O].C, L[T].C

(U) The EOSS SHALL record the individual cumulative energized time of each EOSS state with an accuracy of plus or minus ten hours (10hrs). [T-0180] A[T].CG, M[O].C, L[T].C

(U) The EOSS SHOULD record the individual cumulative energized time of each EOSS state with an accuracy of plus or minus one hour (1hr). [O-0181] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the current drawn by the energized EOSS from the ship for the life of the EOSS. [T-0182] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure the current drawn by the energized EOSS from the ship with an accuracy of plus or minus five percent (5%). [T-0183] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the current drawn by the energized EOSS from the ship every twenty minutes (20min) with an accuracy of plus or minus two minutes (2min). [T-0184] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the individual cumulative energized times of each heater for the life of the EOSS. [T-0185] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the individual cumulative energized time of each heater with an accuracy of plus or minus five percent (5%). [T-0186] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the individual cumulative energized times of each cooler for the life of the EOSS. [T-0187] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the individual cumulative energized time of each cooler with an accuracy of plus or minus five percent (5%). [T-0188] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the current drawn by each individual energized heater for the life of the EOSS. [T-0189] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure the current drawn by each individual energized heater with an accuracy of plus or minus five percent (5%). [T-0190] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the current drawn by each individual energized heater every twenty minutes (20min) with an accuracy of plus or minus two minutes (2min). [T-0191] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the current drawn by each individual energized cooler for the life of the EOSS. [T-0192] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure the current drawn by each individual energized cooler with an accuracy of plus or minus five percent (5%). [T-0193] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the current drawn by each individual energized cooler every twenty minutes (20min) with an accuracy of plus or minus two minutes (2min). [T-0194] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the current drawn by the Az motor for the life of the EOSS. [T-0195] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure the current drawn by the Az motor with each operator-initiated change in direction of the motor. [T-0196] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure the current drawn by the Az motor with an accuracy of plus or minus five percent (5%). [T-0197] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the current drawn by the El motor for the life of the EOSS. [T-0198] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure the current drawn by the El motor with each operator-initiated change in direction of the motor. [T-0199] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure the current drawn by the El motor with an accuracy of plus or minus five percent (5%). [T-0200] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative energized time of the ELRF LRU or module for the life of the EOSS. [T-0201] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative energized time of the ELRF LRU or module with an accuracy of plus or minus five percent (5%). [T-0202] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF reference beam amplitude for the life of the EOSS. [T-0203] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF reference beam amplitude of each laser shot. [T-0204] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF reference beam amplitude with an accuracy of plus or minus one percent (1%) of initial beam amplitude by design. [T-0205] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative count of ELRF laser shots for the life of the EOSS. [T-0206] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative count of ELRF laser shots with an accuracy of plus or minus one percent (1%) of the cumulative count. [T-0207] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF laser current draw for the life of the EOSS. [T-0208] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF laser current draw for each laser shot. [T-0209] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF laser current draw with an accuracy of plus or minus five percent (5%). [T-0210] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF internal absolute humidity when the ELRF is energized for the life of the EOSS. [T-0211] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF internal absolute humidity when the ELRF is energized at twenty-minute (20min) intervals with an accuracy of plus or minus two minutes (2min). [T-0212] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF internal absolute humidity when the ELRF is energized with an accuracy of plus or minus five percent (5%). [T-0213] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF internal air temperature when the ELRF is energized for the life of the EOSS. [T-0214] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF internal air temperature when the ELRF is energized at twenty-minute (20min) intervals with an accuracy of plus or minus two minutes (2min). [T-0215] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF internal air temperature when the ELRF is energized with an accuracy of plus or minus five percent (5%). [T-0216] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHOULD measure and record the ELRF internal optics surface temperature when the ELRF is energized for the life of the EOSS. [O-0217] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHOULD measure and record the ELRF internal optics surface temperature when the ELRF is energized at twenty-minute (20min) intervals with an accuracy of plus or minus two minutes (2min). [O-0218] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHOULD measure and record the ELRF internal optics surface temperature when the ELRF is energized with an accuracy of plus or minus five percent (5%). [O-0219] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF internal vapor pressure when the ELRF is energized for the life of the EOSS. [T-0220] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF internal vapor pressure when the ELRF is energized at twenty-minute (20min) intervals with an accuracy of plus or minus two minutes (2min). [T-0221] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the ELRF internal vapor pressure when the ELRF is energized with an accuracy of plus or minus five percent (5%). [T-0222] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative energized time of the VIS LRU or module for the life of the EOSS. [T-0223] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative energized time of the VIS LRU or module with an accuracy of plus or minus five percent (5%). [T-0224] A[T].C, M[O].C, L[T].C, L[O].G

(U) Note: Mechanism cycling is defined as a change in direction within this section of this document.

(U) The EOSS SHALL record the cumulative count of VIS focus mechanism cycling for the life of the EOSS. [T-0225] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative count of VIS focus mechanism cycling with an accuracy of plus or minus one percent (1%). [T-0226] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative count of VIS FOV mechanism cycling for the life of the EOSS. [T-0227] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative count of VIS FOV mechanism cycling with an accuracy of plus or minus one percent (1%). [T-0228] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative count of VIS optical filter mechanism cycling for the life of the EOSS. [T-0229] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative count of VIS optical filter mechanism cycling with an accuracy of plus or minus one percent (1%). [T-0230] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the VIS internal absolute humidity when the VIS is energized for the life of the EOSS. [T-0231] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the VIS internal absolute humidity when the VIS is energized at twenty-minute (20min) intervals with an accuracy of plus or minus two minutes (2min). [T-0232] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the VIS internal absolute humidity when the VIS is energized with an accuracy of plus or minus five percent (5%). [T-0233] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the VIS internal air temperature when the VIS is energized for the life of the EOSS. [T-0234] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the VIS internal air temperature when the VIS is energized at twenty-minute (20min) intervals with an accuracy of plus or minus two minutes (2min). [T-0235] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the VIS internal air temperature when the VIS is energized with an accuracy of plus or minus five percent (5%). [T-0236] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHOULD measure and record the VIS internal optics surface temperature when the VIS is energized for the life of the EOSS. [O-0237] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHOULD measure and record the VIS internal optics surface temperature when the VIS is energized at twenty-minute (20min) intervals with an accuracy of plus or minus two minutes (2min). [O-0238] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHOULD measure and record the VIS internal optics surface temperature when the VIS is energized with an accuracy of plus or minus five percent (5%). [O-0239] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the VIS internal vapor pressure when the VIS is energized for the life of the EOSS. [T-0240] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the VIS internal vapor pressure when the VIS is energized at twenty-minute (20min) intervals with an accuracy of plus or minus two minutes (2min). [T-0241] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the VIS internal vapor pressure when the VIS is energized with an accuracy of plus or minus five percent (5%). [T-0242] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative energized time of the TIS LRU or module for the life of the EOSS. [T-0243] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative energized time of the TIS LRU or module with an accuracy of plus or minus five percent (5%). [T-0244] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative count of TIS focus mechanism cycling for the life of the EOSS. [T-0245] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative count of TIS focus mechanism cycling with an accuracy of plus or minus one percent (1%). [T-0246] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative count of TIS FOV mechanism cycling for the life of the EOSS. [T-0247] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL record the cumulative count of TIS FOV mechanism cycling with an accuracy of plus or minus one percent (1%). [T-0248] A[T].C, M[O].C, L[T].C, L[O].G

(U) If applicable, the EOSS SHALL record the cumulative count of TIS optical filter mechanism cycling for the life of the EOSS. [T-0249] A[T].C, M[O].C, L[T].C, L[O].G

(U) If applicable, the EOSS SHALL record the cumulative count of TIS optical filter mechanism cycling with an accuracy of plus or minus one percent (1%). [T-0250] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the TIS internal absolute humidity when the TIS is energized for the life of the EOSS. [T-0251] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the TIS internal absolute humidity when the TIS is energized at twenty-minute (20min) intervals with an accuracy of plus or minus two minutes (2min). [T-0252] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the TIS internal absolute humidity when the TIS is energized with an accuracy of plus or minus five percent (5%). [T-0253] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the TIS internal air temperature when the TIS is energized for the life of the EOSS. [T-0254] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the TIS internal air temperature when the TIS is energized at twenty-minute (20min) intervals with an accuracy of plus or minus two minutes (2min). [T-0255] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the TIS internal air temperature when the TIS is energized with an accuracy of plus or minus five percent (5%). [T-0256] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHOULD measure and record the TIS internal optics surface temperature when the TIS is energized for the life of the EOSS. [O-0257] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHOULD measure and record the TIS internal optics surface temperature when the TIS is energized at twenty-minute (20min) intervals with an accuracy of plus or minus two minutes (2min). [O-0258] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHOULD measure and record the TIS internal optics surface temperature when the TIS is energized with an accuracy of plus or minus five percent (5%). [O-0259] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the TIS internal vapor pressure when the TIS is energized for the life of the EOSS. [T-0260] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the TIS internal vapor pressure when the TIS is energized at twenty-minute (20min) intervals with an accuracy of plus or minus two minutes (2min). [T-0261] A[T].C, M[O].C, L[T].C, L[O].G

(U) The EOSS SHALL measure and record the TIS internal vapor pressure when the TIS is energized with an accuracy of plus or minus five percent (5%). [T-0262] A[T].C, M[O].C, L[T].C, L[O].G

(U) Data for each item to be recorded SHALL be stored in its own file unless otherwise noted. [T-0263] A[T].C, M[O].C, L[T].C, L[O].G

(U) The data files SHALL be able to be accessed via test ports of the units where the data is physically stored. [T-0264] A[T].C, M[O].C, L[T].C, L[O].G

(U) The data files SHALL be able to be accessible by command from the GCS. [T-0265] A[T].C, M[O].C, L[T].C, L[O].G

(U) Usage tracking data SHALL be in ASCII text format using commas as delimiters. [T-0266] A[T].C, M[O].C, L[T].C, L[O].G

(U) Usage tracking data SHALL include a timestamp using the PTP time for each data point. [T-0267] A[T].C, M[O].C, L[T].C, L[O].G

(U) Usage tracking data SHALL include a hierarchical series of serial numbers with each data point (i.e., EOSS serial number, ADE serial number, Director serial number, heater name and serial number, etc.). [T-0268] A[T].C, M[O].C, L[T].C, L[O].G

(U) The internal absolute humidity, internal air temperature, internal vapor pressure, and internal optical surface temperature SHOULD be monitored in the VIS, TIS, and ELRF LRUs or modules as part of the BIT process and create a fault when condensation could be formed on the internal optics. [O-0269] A[T].C, M[O].C, L[T].C, L[O].G

3.8 (U) Annual Operational Profile

(U) Note: The EOSS Annual Operational Profile is defined as follows:

- One hundred eighty (180) days of twenty-four hour per day operation (24hr/day) with a period of one hundred twenty (120) continuous days, a period of thirty (30) continuous days, and another period of thirty (30) continuous days operation.
- One hundred eighty-five (185) days of one hour per day (1hr/day) operation
- Four thousand five hundred five hours per year (4,505hrs/year) operation.
- Operating mode allocation of seventy five percent (75%) Manual or Scan, twenty percent (20%) Follower and five percent (5%) Auto Track.

(U) The EOSS SHALL sustain the annual operational profile. [T-0270] A[T].CG, M[O].C, D[O].C

(U) All EOSS reliability, maintainability and availability calculations SHALL be based on the annual operational profile. [T-0271] A[T].CG, M[O].C, D[O].C

(U) The EOSS system SHALL be designed to operate in the naval environment for a minimum life of twenty (20) years. [T-0272] A[T].CG, M[O].C, D[O].C

3.9 (U) Mean Time Between Failure (MTBF) Specifications

(U) Note: MTBF of a block as determined by the reliability block diagram is defined as follows:

Equation 1

$$MTBF_{block} = \frac{T_{e_{block}}}{N_{block}}$$

(U) Note: Where: $T_{e_{block}}$ is the failure time of the block
N_{block} is the number of failures of the block

(U) Note: A failure is defined as any event causing the EOSS to fail to perform to the requirements of this specification, including any unscheduled adjustments, maintenance, and calibration.

(U) Note: BIT false alarms or degraded operation as a result of external system failures are not considered EOSS failures.

(U) Motors SHALL be included in the MTBF calculations. [T-0273] A[T].CG, M[O].C

(U) Imaging sensors SHALL be included in the MTBF calculations. [T-0274] A[T].CG, M[O].C

(U) Lasers SHALL be included in the MTBF calculations. [T-0275] A[T].CG, M[O].C

(U) Coolers SHALL be included in the MTBF calculations. [T-0276] A[T].CG, M[O].C

(U) Heaters SHALL be included in the MTBF calculations. [T-0277] A[T].CG, M[O].C

(U) Electronics SHALL be included in the MTBF calculations. [T-0278] A[T].CG, M[O].C

(U) The block containing the VIS SHALL have a MTBF of greater than or equal to nine thousand hours (9,000hrs). [T-0279] A[T].CG, M[O].C, D[O].C

(U) The block containing the VIS SHOULD have a MTBF of greater than or equal to eighteen thousand hours (18,000hrs). [O-0280] A[T].CG, M[O].C, D[O].C

(U) The block containing the TIS, including sensor cooler if applicable, SHALL have a MTBF of greater than or equal to nine thousand hours (9,000hrs). [T-0281] A[T].CG, M[O].C, D[O].C

(U) The block containing the TIS, including sensor cooler if applicable, SHOULD have a MTBF of greater than or equal to eighteen thousand hours (18,000hrs). [O-0282] A[T].CG, M[O].C, D[O].C

3.10 (U) Mechanical Reliability Thresholds And Objectives

(U) Note: Cycle is defined as any physical movement of mechanical elements from one limit of its range to the other limit of its range and back again for this section of this document.

(U) Each individual FOV mechanism SHALL have a reliability of greater than or equal to one million (1,000,000) cycles [T-0283] A[T].CG, M[O].C, D[O].C

(U) Each individual FOV mechanism SHOULD have a reliability of greater than or equal to ten million (10,000,000) cycles [O-0284] A[T].CG, M[O].C, D[O].C

(U) Each individual iris mechanism SHALL have a reliability of greater than or equal to one million (1,000,000) cycles [T-0285] A[T].CG, M[O].C, D[O].C

(U) Each individual iris mechanism SHOULD have a reliability of greater than or equal to ten million (10,000,000) cycles [O-0286] A[T].CG, M[O].C, D[O].C

(U) Each individual filter mechanism SHALL have a reliability of greater than or equal to one million (1,000,000) cycles [T-0287] A[T].CG, M[O].C, D[O].C

(U) Each individual filter mechanism SHOULD have a reliability of greater than or equal to ten million (10,000,000) cycles [O-0288] A[T].CG, M[O].C, D[O].C

(U) Each individual focus mechanism SHALL have a reliability of greater than or equal to one million (1,000,000) cycles [T-0289] A[T].CG, M[O].C, D[O].C

(U) Each individual focus mechanism SHOULD have a reliability of greater than or equal to ten million (10,000,000) cycles [O-0290] A[T].CG, M[O].C, D[O].C

3.10.1 (U) Operation Availability

(U) Note: System Ao is determined using the Markov model and is defined as follows using:

Equation 2

$$System\ A_0 = \frac{1}{1 + \sum_{i=1}^{n} \frac{N_i D_i}{N_{m_i} T_{m_i}} D_{f_i}}$$

Where: n is the total number of blocks as determined by the reliability block diagram
N_i is the number of failure events for the block *i*
N_{m_i} is the number of failure events with measured downtime for block *i*
D_i is the total downtime resulting from N_{m_i} failure events for block *i*
D_i includes MTTR, MLDT, and any other causes of downtime.
T_{m_i} is the total energized/stress time for block *i*
D_{f_i} is the demand factor for block *i*.
The relevant PEO approves the demand factor for each block in the system.
The demand factor is based on a 120-day wartime mission usage.

(U) Df for each block SHALL be equal to 1 until contractor can justify using a value less than 1 and the Government agrees. [T-0291] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL have a System Ao greater than or equal to eighty-five hundredths (0.85) when the Government's portion of MLDT is equal to two hundred twenty hours (220hrs). [T-0292] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHOULD have a System Ao greater than or equal to ninety hundredths (0.90) when the Government's portion of MLDT is equal to two hundred twenty hours (220hrs). [O-0293] A[T].CG, M[O].C, D[O].C

3.11 (U) Battle Short

(U) The EOSS SHALL incorporate a battle short ability to allow the bypass of protective devices. The purpose of the battle short ability SHALL be to keep defective equipment on-line for the duration of the current mission. [T-0294] A[T].CG, M[O].C, D[O].C

(U) Battle short SHALL be operator initiated from the GCS console. [T-0295] A[T].CG, M[O].C, D[O].C

(U) When in battle short mode, the EOSS SHALL send an indication to the GCS that the system is operating in a battle short condition. [T-0296] A[T].CG, M[O].C, D[O].C

3.12 (U) Maintenance

(U) EOSS SHOULD be designed such that all maintenance can be performed at the Organizational or depot levels. [O-0297] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL support an overall maintenance concept based on the isolation and in situ replacement of defective LRU at the O-level (i.e., trained users). [T-0298] A[T].CG, M[O].C, D[O].C

(U) Repair of failed LRUs SHALL be at the depot level. [T-0299] A[T].CG, M[O].C

(U) Corrective maintenance actions requiring in situ equipment repair SHALL be condition specific and will be accomplished by specialized field service representatives (e.g., Navy, Coast Guard, civilian or factory technicians). [T-0300] A[T].CG, M[O].C

(U) Both operational and maintenance training materials SHOULD be programmed into the EOSS to allow Operators and maintenance crew to refresh their knowledge and learn more in-depth skills while underway. [O-0301] A[T].C, I[T].C

(U) All technical data associated with the EOSS SHOULD be programmed into the EOSS for the maintenance crew to access. [O-0302] A[T].C, I[T].C

3.13 (U) MTTR Specifications

(U) The EOSS MTTR at the O-level SHALL not exceed sixteen hours (16hrs). [T-0303] A[T].CG, M[O].C, D[O].C

(U) The EOSS MTTR at the O-level SHOULD not exceed twelve hours (12hrs). [O-0304] A[T].CG, M[O].C, D[O].C

(U) The MTTR SHALL assume the availability of the necessary LRU(s) and include, as a minimum, the following corrective maintenance actions [T-0305] A[T].CG:

a. Preparation time;
b. Analysis of fault information;
c. Fault localization time;
d. Fault isolation time;
e. Remove and replace time or remove, repair, and replace time;
f. Recalibration/alignment/adjustment time;
g. Repair validation time.
h. System startup time, excluding any imaging sensor cooldown time if sensor elements were required to shut down as part of the repair.

3.14 (U) Preventive Maintenance (PM)

(U) Note: MIL-STD-3034A may be used as guidance on PM.

(U) All EOSS operational level PM SHALL be accomplished by one (1) qualified person. [T-0306] A[T].CG, M[O].C, D[O].C

(U) PM requirements SHALL be scheduled on a daily, weekly, monthly, quarterly, semi-annual, annual and recurring basis as necessary. [T-0307] A[T].CG, M[O].C

(U) The EOSS SHALL require no daily PM other than a system operability test to assess system condition. [T-0308] A[T].CG, M[O].C, D[O].C

(U) Unique weekly and monthly PM requirements for BDE SHALL not exceed one hour (1hr) (each). [T-0309] A[T].CG, M[O].C, D[O].C

(U) There SHALL be no weekly PM requirement for the ADE. [T-0310] A[T].CG, M[O].C

(U) The EOSS SHALL support a monthly freshwater wash down of the externally mounted components and as required by fouling of the external optics. [T-0311] A[T].CG, M[O].C, D[O].C

(U) Unique quarterly, semi-annual and annual PM requirements SHALL not exceed two hours (2hrs) (each). [T-0312] A[T].CG, M[O].C, D[O].C

(U) There SHALL be no adverse performance or irreparable damage to equipment as a result of deferral of any PM action by one (1) maintenance cycle for weekly and monthly requirements and by forty-five (45) days for all other maintenance requirements. [T-0313] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL operate with graceful degradation of functionality (maintaining mission essential function(s) and performance) during system overload conditions. [T-0314] A[T].CG, M[O].C, D[O].C

3.15 (U) Security

(U) The EOSS SHALL comply with the DoDI 8510.01 RMF. [T-0315] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL implement Cybersecurity IAW DoDI 8500.01. [T-0316] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL utilize cryptography that conforms to DoDI 8523.01. [T-0317] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL comply with NAVSEA 9400.2-M. [T-0318] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL comply with PEO IWS Instr 5239.1. [T-0319] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL comply with CS TA Defense-in-Depth Functional Implementation Architecture (DFIA) regarding assessment and authorization of all interconnections. [T-0320] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL, and its components SHALL comply with the SECNAV CYBERSAFE instruction and associated IA TAB standards for CYBERSAFE implementation, grading criteria, and grade requirements. [T-0321] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL implement a secure configuration using the appropriate Security Technical Implementation Guides (STIGs). [T-0322] A[T].CG, M[O].C, D[O].C

(U) The EOSS hosts SHALL utilize secure boot technologies. [T-0323] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL prevent installation of unauthorized programs and executables. [T-0324] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL contain only the minimum services and applications required for operation. [T-0325] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL prevent unauthorized changes to system files and applications. [T-0326] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL include appropriate AT features to protect CPI and Critical Technology (CT) from Reverse Engineering IAW DoDD 5200.47E and DoDI 5200.39 [T-0327] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL validate the integrity of the system kernel. [T-0328] A[T].CG, M[O].C, D[O].C

(U) If the system kernel has changed, the EOSS SHALL record the security event in the Security Log, display a Integrity Violation of System Kernel Report & Suggested Resolution(s), and produce a Security Notification and Log [T-0329] A[T].CG, M[O].C, D[O].C

(U) Upon receipt of a Command to Acknowledge Authorized Change the EOSS SHALL update the Security Log [T-0330] A[T].CG, M[O].C, D[O].C

(U) Upon receipt of a Command to Acknowledge Unauthorized System Kernel Change the EOSS SHALL update the Security Log [T-0331] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL monitor for malicious files. [T-0332] A[T].CG, M[O].C, D[O].C

(U) If malicious files are detected, the EOSS SHALL record the security event in the security log, display a Malicious File Report & Suggested Resolution(s) and produce a Security Notification & Log. [T-0333] A[T].CG, M[O].C, D[O].C

(U) Upon receipt of a Command to Run Virus Scan, EOSS SHALL run a Virus Scan, producing Virus Scan Results. [T-0334] A[T].CG, M[O].C, D[O].C

(U) While a Virus Scan is Running, EOSS SHALL produce a Persistent Indication of Virus Scan Running [T-0335] A[T].CG, M[O].C, D[O].C

(U) Upon receipt of a Command to Remediate Malicious Files, the EOSS SHALL remediate the malicious files [T-0336] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL validate the integrity of persistent operating system application software files and firmware. [T-0337] A[T].CG, M[O].C, D[O].C

(U) If the persistent operating system application software files or firmware has changed, The EOSS System SHALL record the security event in the security log, display a Integrity Violation Report & Suggested Resolution(s) and produce a Security Notification & Log. [T-0338] A[T].CG, M[O].C, D[O].C

(U) Upon receipt of a Command to Acknowledge Authorized Software/Firmware Change, EOSS SHALL update the Security Log [T-0339] A[T].CG, M[O].C, D[O].C

(U) Upon receipt of a Command to Acknowledge Unauthorized Software/Firmware Change, EOSS SHALL update the Security Log [T-0340] A[T].CG, M[O].C, D[O].C

(U) The EOSS SHALL log security relevant events updating the security log. [T-0341] A[T].CG, M[O].C, D[O].C

(U) If a Security Event is a COMmunication SECurity (COMSEC) Management System (CMS) Relevant Security Event, the EOSS SHALL produce a CMS Security Event Notification [T-0342] A[T].CG, M[O].C, D[O].C

(U) The EOSS's Media Transfer capability SHALL provide outputs to USB Mass Storage Device connections, USB digital disk connections, and/or maintenance equipment. [T-0343] A[T].CG, M[O].C, D[O].C

(U) The BDE SHOULD provide a media transfer capability to transfer the Health and Usage to external media sources. [O-0344] A[T].CG, M[O].C, D[O].C

(U) Upon the Insertion of Removable Media, the EOSS SHALL detect the removable media device. [T-0345] A[T].CG, M[O].C, D[O].C, L[T].C, L[O].G

(U) Upon detecting a removable media device, the EOSS SHALL validate the removable media, updating the security log [T-0346] A[T].CG, M[O].C, D[O].C, L[T].C, L[O].G

(U) When validating a removable device, if the removable media device validated, EOSS SHALL allow access, displaying Notification of Authorized Device [T-0347] A[T].CG, M[O].C, D[O].C, L[T].C, L[O].G

(U) When validating a removable device, if the removable media device did not validate, the EOSS SHALL deny access, displaying a Notification of Denied Device and producing a Rogue Node Notification & Log [T-0348] A[T].CG, M[O].C, D[O].C, L[T].C, L[O].G

(U) The EOSS SHALL have the ability to restore host configurations to a known good state. [T-0349] A[T].CG, M[O].C, D[O].C, L[T].C, L[O].G

3.16 (U) Power

(U) The BDE SHOULD be the single point primary power interface to the ship. [O-0350] A[T].CG

(U) The BDE SHALL host all components supporting EOSS intra-system power conditioning requirements. [T-0351] A[T].CG, D[O].C

(U) The primary system power for the EOSS SHALL be one hundred fifteen volts (115V), sixty Hertz (60Hz), single or three phase, ungrounded Type I power, as specified in DOD-STD-1399. [T-0352] A[T].CG, L[T].C/G

(U) The EOSS SHALL meet the performance requirements specified herein when supplied with power having transient and steady state noise and harmonic content specified in DOD-STD-1399C, Section 300. [T-0353] A[T].C, M[O].C, D[O].C, L[T].C/G

(U) The EOSS harmonic current SHALL be IAW DOD-STD-1399C, Section 300, Paragraph G.2.7. [T-0354] A[T].C, M[O].C, D[O].C, L[T].C/G

(U) The EOSS and its equipment enclosures SHALL not emit conducted power line noise at a level greater than that defined in DOD-STD-1399C, Section 300. [T-0355] A[T].CG, M[O].C, D[O].C, L[T].C/G

(U) The operational load on the ship's power system SHALL not exceed four kilovolt amperes (4kVA). [T-0356] A[T].CG, M[O].C, D[O].C, L[T].C/G

(U) The system power factor SHALL not be less than ninety-four hundredths (0.94) lagging. [T-0357] A[T].CG, M[O].C, D[O].C, L[T].C/G

(U) The EOSS system ground current leakage SHALL not exceed five milliamps (5mA) when measured at maximum steady state line voltage and frequency for each voltage and frequency at which the equipment/components operate. [T-0358] A[T].C, M[O].C, D[O].C, L[T].C/G

(U) If power is required for de-icing equipment, it SHALL operate at the same voltage as the rest of the EOSS with an independent circuit breaker from system power. [T-0359] A[T].C, D[O].C, L[T].C, P[O].G

(U) The EOSS SHALL be capable of withstanding sudden loss of primary power without damage to the circuit or the EOSS. [T-0360] A[T].C, M[O].C, D[O].C, L[T].C

(U) The EOSS SHALL be initialized by a sequential power up procedure. [T-0361] A[T].CG, D[O].C

(U) The EOSS SHALL be initialized by operator commands from the controlling GCS console, after GCS console and LAN initialization. [T-0362] A[T].CG, D[O].C

3.17 (U) Cables

(U) All shipboard cables, cable assemblies, and connectors SHOULD be suitable for use in a continuous maritime environment (twenty-four hours (24hrs) a day for the life of the system) without degradation. [O-0363] A[T].C, M[O].C, D[O].C, P[O].G

(U) All cables and cable assemblies SHALL be manufactured with non-spliced, continuous conductors with low smoke outer and inner insulating jacket IAW MIL-DTL-24643D, MIL-PRF-85045G, and MIL-PRF-49291D w/Amendment 2. [T-0364] A[T].C, D[O].C

(U) There SHALL be no reduction in system performance when using the complete set of cables and cable assemblies at the maximum cable and cable assembly lengths of seventy-six meters (76m). [T-0365] A[T].C, M[O].C, D[O].C, P[O].G

(U) No shipboard electrical cable SHOULD have a bend radius of less than thirteen centimeters (13cm). [O-0366] A[T].C, M[T].C, D[O].C

(U) The short-term minimum bend radius of any cable containing fiber optics SHALL be greater than or equal to the cable manufacturer's specification. [T-0367] A[T].C, M[T].C, D[O].C, P[O].G

(U) The short term minimum bend radius of any cable containing fiber optics SHALL be greater than or equal to four times (4X) the diameter of the cable per MIL-STD-1678-1D. [T-0368] A[T].C, M[T].C, D[O].C, P[O].G

(U) The short-term minimum bend radius of any cable containing fiber optics SHOULD be greater than or equal to sixteen times (16X) the diameter of the cable. [O-0369] A[T].C, M[T].C, D[O].C, P[O].G

(U) The long-term minimum bend radius of any cable containing fiber optics SHALL be greater than or equal to the cable manufacturer's specification. [T-0370] A[T].C, M[T].C, D[O].C, P[O].G

(U) The long term minimum bend radius of any cable containing fiber optics SHALL be greater than or equal to eight times (8X) the diameter of the cable per MIL-STD-1678-1D. [T-0371] A[T].C, M[T].C, D[O].C, P[O].G

(U) The long-term minimum bend radius of any cable containing fiber optics SHOULD be greater than or equal to sixteen times (16X) the diameter of the cable. [O-0372] A[T].C, M[T].C, D[O].C, P[O].G

(U) Interface cable assemblies SHALL comply with MIL-STD-2003B, MIL-DTL-24643D, and MIL-STD-461G. [T-0373] A[T].C, D[O].C, P[T].G

(U) Fiber optic cable assemblies SHALL comply with MIL-STD-2042C and MIL-PRF-85045. [T-0374] A[T].C, D[O].C

(U) Fiber optics cables SHALL be single-mode and IAW MIL-PRF-49291D w/Amendment 2. [T-0375] A[T].C, D[O].C

(U) All shipboard cables and cable assemblies SHALL be shielded. [T-0376] A[T].C, D[O].C

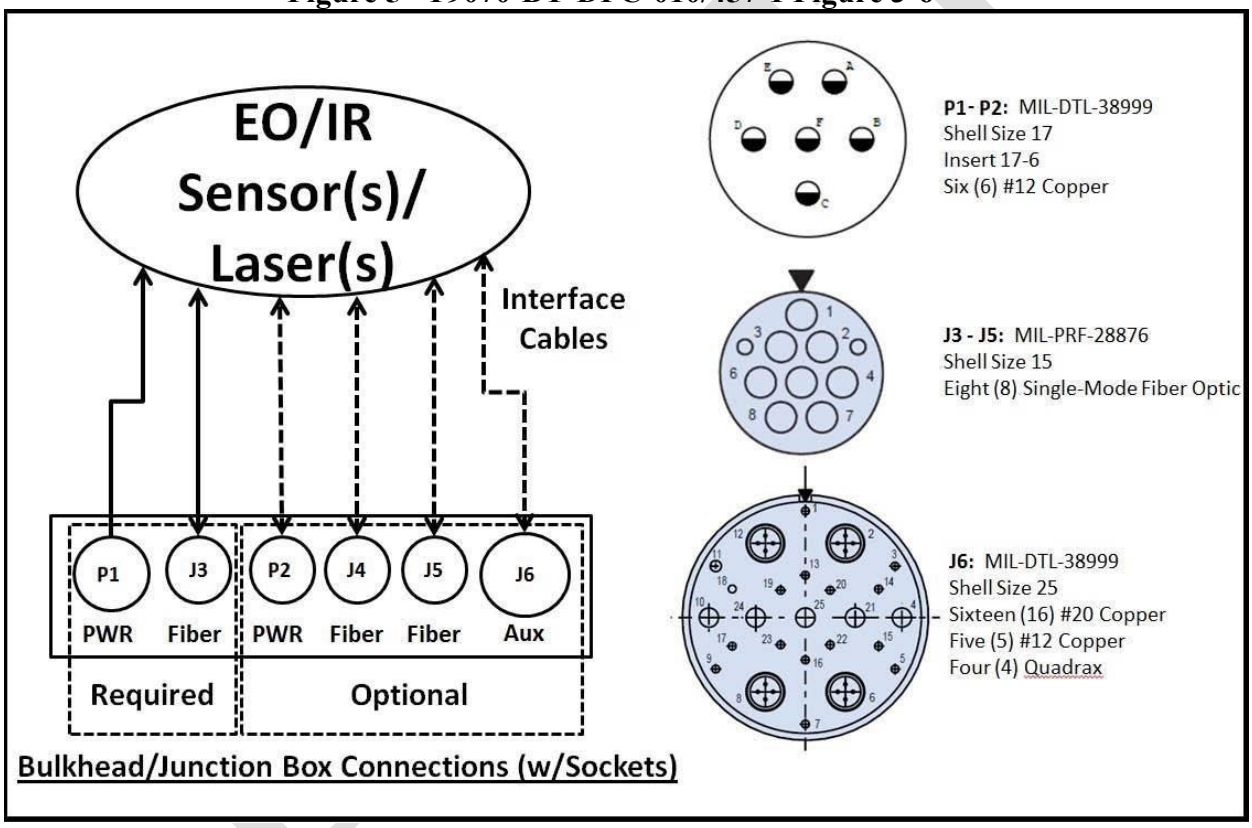
(U) All EOSS video connections SHALL be by fiber optics. [T-0377] A[T].CG, D[O].C

(U) The EOSS SHOULD use optical fiber cable for the transmission of all data to BDE. [O-0378] A[T].CG, D[O].C

3.18 (U) Connections

(U) The physical connections between BDE and ADE SHOULD comply with the following figure. [O-0379] A[T].CG, D[O].C

Figure 5 "T9070-BY-DPC-010/457-1 Figure 3-6"



(U) Note: Multiple identical cables may be used for sensors that require more video channels than allowed for each cable. An optional auxiliary connection may be utilized in special cases, such as discrete circuits for laser interlocks, Global Positioning System (GPS) input, and other special circumstances.

(U) The EOSS system SHALL use Junction Box(es) (J-Box)(es) as defined in the following sections. [T-0380] A[T].CG, D[O].C

(U) All EOSS ADE and BDE SHALL have an accompanying J-Box designed to be located in a bulkhead or within six meters (6m) of the element. [T-0381] A[T].CG, D[O].C

(U) Each J-Box SHOULD be configured IAW Figure 15. [O-0382] A[T].C, D[O].C

(U) The EOSS system SHOULD utilize the connector configurations described in Figure 15. [O-0383] A[T].C, D[O].C

(U) The EOSS system SHOULD utilize the pinout configuration described in Figure 15 required connectors P1 has normal keying (N position) and if any of the optional connections are utilized, the size and pinout configuration SHALL comply with Figure 15 with unique keying for each additional connection. [O-0384] A[T].C, D[O].C

(U) All shipboard electrical cables and cable assemblies SHALL utilize quick connect/disconnect connectors that are shock and vibration, salt water and corrosion resistant IAW MIL-DTL-38999. [T-0385] A[T].C, D[O].C, L[T].C/G

(U) All shipboard fiber optic cables and cable assemblies SHALL utilize quick connect/disconnect connectors that are shock and vibration, salt water and corrosion resistant IAW MIL-PRF-28876F Amendment 2. [T-0386] A[T].C, D[O].C, L[T].C/G

(U) All shipboard cables and cable assemblies SHALL include waterproof, quick connect protective caps to protect the connectors on the cables during shipping and storage. [T-0387] A[T].C, D[O].C, L[T].C

(U) All shipboard cables and cable assemblies SHALL be designed and manufactured such that the installation team can perform on-site connectorization of both ends. [T-0388] A[T].C, D[O].C, P[O].G

(U) All connectors SHALL be keyed to prevent a plug from being inserted into an incorrect receptacle. [T-0389] A[T].C, D[O].C, L[T].C, P[O].G

(U) All connectors SHALL be identified by color, shape, size, or equivalent means to facilitate identification when multiple, similar connectors are used in proximity to each other. [T-0390] A[T].C, I[T].C

3.19 (U) Grounding, Bonding, And Shielding

(U) Grounding Straps and Bosses SHALL be IAW MIL-DTL-24749C. MIL-HDBK-454C provides guidance on Grounding, Bonding, and Shielding. [T-0391] A[T].C, D[O].C, P[O].G

(U) All system LRUs, external parts, surfaces, and shields SHALL be at ground potential at all times during normal operation. [T-0392] A[T].C, D[O].C, P[O].G

(U) Grounding, bonding, and shielding provisions SHALL be incorporated to enable sensor electronics units to be installed and operated safely with an external flexible half inch (½ in) wide six inch (6 in) long ground strap for connection to the ship's hull. [T-0393] A[T].C, P[O].G

(U) The ground strap SHOULD end in a connector point (i.e., connector) that will accept a ⅜ inch bolt/stack stud. [O-0394] A[T].C, P[O].G

(U) Directors SHOULD utilize a grounding strap for protection against lightning by providing a ⅜ inch bolt for the connector of a Government Furnished Material ground strap at the time of installation. [O-0395] A[T].C, P[O].G

(U) Electrical bonding SHOULD be IAW MIL-STD-1310. [O-0396] A[T].C, M[O].C, D[O].C, P[O].G

(U) Above deck non-electrical equipment SHALL have provisions to be bonded to ground IAW MIL-STD-1310. The modification of single point ground connections to ship structure is permitted in order to achieve required Electro Magnetic Compatibility (EMC) / Electro Magnetic Pulse (EMP) performance. [T-0397] A[T].C, D[O].C, P[O].G

3.20 (U) BDE Physical Characteristics

(U) Components and assembly equipment for installation of BDE SHALL be able to easily pass through an opening one hundred thirty-seven centimeter (137cm) high and sixty-six centimeter (66cm) wide with twenty centimeter (20cm) radiused corners IAW MIL-PRF-32482. [T-0398] A[T].C, M[T].C, D[O].C, P[O].G

(U) The total volume of the below-deck ancillary equipment suite SHALL not exceed two hundred eighty-five thousandths of a cubic meter (0.285m3). [T-0399] A[T].CG, M[T].C

(U) The total weight of the below-deck ancillary equipment suite SHALL not exceed one hundred fifty-nine kilograms (159kg). [T-0400] A[T].C, M[T].C, D[O].C

(U) Each EOSS below-deck equipment rack/cabinet SHOULD have an increase of less than five and 6 tenths degrees Celsius (5.6°C) between air inlet and air outlet. [O-0401] A[T].CG, M[T].C, D[O].C

(U) Each EOSS below-deck rack/cabinet SHALL have all cabling connected to the rear of the rack/cabinet. [T-0402] A[T].CG

(U) The BDE SHALL be located in an environmentally controlled space (i.e., Naval Sheltered Environment) [T-0403] A[T].CG

(U) The BDE SHOULD be mounted within standard equipment racks as described by EIA/ECA-310. [O-0404] A[T].CG

(U) The maintenance access of the below-deck ancillary equipment suite SHALL be forward relative to the installed orientation. [T-0405] A[T].CG

(U) Enclosure protection SHOULD be at least International Electrotechnical Commission (IEC) 60529 rating Ingress Protection 32. [O-0406] A[T].CG, M[O].C, D[O].C, L[T].C

3.21 (U) LRU Physical Characteristics

(U) ADE LRU weight SHOULD be less than twenty-eight kilograms (28kg). [O-0407] A[T].C, M[T].C, D[O].C

(U) LRUs in excess of eighteen kilograms (18kg) SHALL be equipped with grips, handles, or provisions to attach lifting aids. [T-0408] A[T].CG

(U) ADE LRU size SHOULD be smaller than a cubic volume of sixty-one centimeters by forty one centimeters by forty one centimeters (61cm x 41cm x 41cm). [O-0409] A[T].CG, M[T].C

(U) LRUs SHALL use captive fasteners if they are to be located in confined equipment spaces where a dropped fastener cannot be recovered without disassembly. [T-0410] A[T].CG

(U) The EOSS SHALL provide access to any check points, adjustment points, test points, cables, and connectors when the EOSS is in its installed location. [T-0411] A[T].C, I[T].C, D[O].C

(U) The EOSS SHALL permit the maintenance crew to distinguish the intended location of each fastener when more than one size or type fastener is used on the same equipment or cover. [T-0412] A[T].C, I[T].C, D[O].C

(U) The EOSS interface cables assemblies' connectors SHALL be spaced so that the maintenance crew can remove and replace the associated LRU while wearing cold weather gloves and/or NBC gloves. [T-0413] A[T].C, I[T].C, D[O].C

3.22 (U) ADE Physical Characteristics

(U) ADE fully assembled weight including shrouds, adapter plates, and isolation assemblies, SHALL be less than three hundred kilograms (300kg). [T-0414] A[T].CG, M[T].C, D[O].C

(U) The ADE SHALL operate within the envelope bounded by the following: A hollow sphere of seventy-five centimeter (75cm) radius, truncated by the mounting plane (i.e.; deck) at a distance of fifty five centimeters (55cm) from the center. [T-0415] A[T].CG, M[T].C

(U) Deck penetration SHALL not exceed thirty centimeters (30cm) as measured from the mounting surface of the EOSS stabilized director. [T-0416] A[T].CG, M[T].C

(U) The fully assembled ADE SHALL accommodate one inch (1in.) nylon strap(s) for lifting with a crane. [T-0417] A[T].CG, M[T].C

(U) The fully assembled ADE SHALL be able to be lifted by crane in the same orientation as it shall be permanently placed on ship. [T-0418] A[T].CG, M[T].C

(U) The physical characteristics of ADE SHALL consider impacts to the Radar Cross-Section (RCS) to limit the adversary's ability to detect and determine the ship's capabilities and limitations IAW classified SPAWARINST 3090.1, RCS Reduction Guidelines, and RCS Verification Requirements for Above Deck system revision 5 dated 15 February 2005. [T-0419] A[T].C, M[T].C, D[O].C, L[T].CG

(U) The design of ADE SHALL consider thermal, audible, and radio frequency (RF) emissions to limit the adversary's ability to detect and determine ship's location, capabilities, and limitations. [T-0420] A[T].C, M[T].C, D[O].C, L[T].CG

(U) The ADE SHALL not actively emit light in the ultraviolet, visible, or infrared spectral bands without Operator activation. [T-0421] A[T].CG, M[T].C, D[O].C, L[T].CG

(U) The external surface of the ADE SHOULD not exceed 5 °C from the exterior surface of the ship. [O-0422] A[T].CG, M[T].C, P[T].G

(U) EOSS sensors SHALL be mounted to provide sufficient rigidity for electromechanical LOS stabilization to function properly by meeting all of the related requirements. [T-0423] A[T].C, M[T].C, D[O].C, L[T].C/G

(U) The primary mounting structure for any ADE EOSS equipment SHALL have a natural frequency greater than twenty-five hertz (25Hz) with equipment installed. [T-0424] A[T].C, M[T].C, L[T].C/G

(U) ADE SHALL adapt to a standard mounting bolt pattern installed in the ship's structure. [T-0425] A[T].CG

(U) Installations SHALL utilize an adapter plate bolted to the ship's structure. [T-0426] A[T].CG

(U) Nuts and bolts used to attach adapter plates to the ship's structure SHALL be Type A286 corrosion-resistant steel per NASM51834 or equivalent. [T-0427] A[T].C

(U) Nuts and bolts used to attach adapter plates to the ship's structure SHALL be 3/8-16UNC or larger. [T-0428] A[T].C

(U) The size and number of bolts SHALL be designed to meet structural integrity requirements with one and a half times (1.5x) safety margin. [T-0429] A[T].C, M[O].C

3.23 (U) Internal Atmosphere

(U) ADE components and LRUs SHOULD not require nitrogen or other dry air purge at the O-level. [O-0430] A[T].C, M[O].C, D[O].C

(U) The ELRF, VIS, and TIS SHALL be designed to prevent condensation on the internal surfaces of the optics. [T-0431] A[T].C, M[O].C, D[O].C, L[T].C/G

(U) Note: Desiccant is an acceptable means to control humidity in non-optical cavities.

(U) If desiccant is used in the EOSS design, it SHALL not require scheduled maintenance more often than any other scheduled maintenance. [T-0432] A[T].C, D[O].C

(U) If desiccant is used in the EOSS design, it SHOULD be replaceable at the O-level. [O-0433] A[T].C, D[O].C

(U) If applicable, all hermetically sealed EOSS equipment SHALL not exceed a leak rate of one hundred-thousandths atmosphere cubic centimeters per second (1 x 10-5 atm-cm3/s). [T-0434] A[T].C, M[O].C, D[O].C, L[T].C/G

(U) Hermetically sealed equipment SHALL be tested for seal integrity before and after any tests which require a temperature environment outside of ambient conditions of twenty-five degrees Celsius plus or minus five and five tenths degrees Celsius (25°C +/- 5.5°C). [T-0435] A[T].CG, D[O].C, L[T].C/G

(U) If applicable, compliance with the hermetically sealed equipment leakage requirement SHALL be verified by a test similar in scope and process to the leak test of MIL-STD-331B, Test C-8, fine leak test, using halogen gas. [T-0436] A[T].CG, D[O].C, L[T].C/G

3.24 (U) Paint Colors, Schemes, And Coatings

(U) The exterior surfaces of the ADE SHALL have a base primer coating of two-part epoxy from NAVSEA approved QPL list and meeting MIL-PRF-23236D, Type V, Class 7, Grade C. [T-0437] A[T].C, I[T].C

(U) The exterior surfaces of the ADE SHALL have a top coating from NAVSEA approved QPL list and meeting MIL-PRF-24635F, Type VI, Class 2, Grade B, Composition 2. [T-0438] A[T].C, I[T].C

(U) The exterior surfaces of the ADE SHOULD have a top coating of PSX-700 SG from NAVSEA approved QPL list and meeting MIL-PRF-24635F, Type VI, Class 2, Grade B, Composition 2. [O-0439] A[T].C, I[T].C

(U) The exterior coatings of the ADE SHALL have a combined thickness equal to or less than two hundred microns (200um). [T-0440] A[T].C, I[T].C

(U) EOSS system components external to the skin of the ship SHOULD conform to paint color(s) and scheme(s) IAW NAVSEA Standard Item 009-32. [O-0441] A[T].C, I[T].C

(U) The exterior surfaces of ADE SHALL be haze gray IAW MIL-PRF-24635F. [T-0442] A[T].C, I[T].C

(U) The exterior surface paint color SHALL remain consistent throughout the entire production run IAW MIL-PRF-24635F. [T-0443] A[T].C, I[T].C

3.25 (U) Environmental Design And Qualification

(U) The EOSS SHALL include de-icing/anti-icing measures for both the optics and the rotating and elevating bearings. [T-0444] A[T].CG, M[O].C, D[O].C, L[T].C/G

3.25.1 (U) Corrosion Management

(U) The program SHALL effectively manage corrosion IAW DoDI 5000.67. [T-0445] A[T].CG, D[O].C

(U) The EOSS SHALL limit the use of dissimilar metals in contact and any application where dissimilar metals are in contact the metals are adequately protected against galvanic corrosion. [T-0446] A[T].CG

(U) All EOSS system components mounted outside the skin of the ship SHALL be treated/coated to protect against harsh marine environments (e.g., salt fog and saltwater) as well as driven sand IAW the environmental requirements, and MIL-PRF-24635F. [T-0447] A[T].C, L[T].C/G

3.25.2 (U) Externally Exposed Optical Materials Hardness

(U) The EOSS ADE, environmentally exposed optical material SHALL meet one or more of the following hardness requirements. [T-0448] A[T].C, D[O].C, P[O].G

Mohs greater than or equal to five (5)

Knoop greater than or equal to five hundred fifty (550)

Vickers(N100) greater than or equal to five hundred thirty (530)

(U) The EOSS ADE, environmentally exposed optical material SHOULD meet one or more of the following hardness requirements. [O-0449] A[T].C, D[O].C, P[O].G

Mohs greater than or equal to seven (7)

Knoop greater than or equal to one thousand one hundred (1100)

Vickers(N100) greater than or equal to one thousand five hundred (1500)

(U) The EOSS ADE environmentally exposed optical coatings SHALL meet the adhesion requirements IAW MIL-PRF-13830. [T-0450] A[T].CG, D[O].C

(U) A single optical material/coating cleaning procedure SHALL be specified in the maintenance documentation that is independent of the type of window material and coating. [T-0451] A[T].C, D[O].C, P[O].G

3.25.3 (U) Precipitation Removal

(U) The EOSS SHALL support precipitation removal from sensor windows. [T-0452] A[T].CG, M[T].C, D[O].C, L[T].C

(U) Sensor window precipitation removal SHOULD NOT use wiper blades. [O-0453] A[T].CG

(U) Sensor window precipitation removal SHALL be compatible with all exterior coatings on the windows. [T-0454] A[T].CG, D[O].C, L[T].C

(U) Sensor window precipitation removal final design method SHALL be approved by the Government. [T-0455] A[T].CG, D[O].C

3.25.4 (U) Heater Thermostatic Control

(U) All heating elements SHALL incorporate automatic thermostatic control. [T-0456] A[T].CG, D[O].C, L[T].C

3.25.5 (U) Dedicated Testing Ports

(U) If applicable, the dedicated ports for testing (UIDs O-0148, O-0149, O-0150, O-0151, T-0152, and T-0153) SHALL not compromise the EOSS, ADE, BDE, and LRU's ability to meet the environmental tests. [T-0457] A[T].CG, D[O].C, L[T].C

3.26 (U) Environmental Tests

3.26.1 (U) Operational High Temperature ADE

(U) The ADE SHALL satisfy all performance requirements during and after exposure to temperature extremes of sixty-six degrees Celsius (66°C). [T-0458] A[T].C, M[T].C, L[T].C/G

(U) ADE operational high temperature compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0459] A[T].C, L[T].C/G

(U) The ADE operational high temperature test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 501.7, Procedure II with the following tailoring and clarifications. [T-0460] A[T].C, L[T].C/G

(U) The ADE SHALL be operated during the ADE operational high temperature test. [T-0461] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 501.7, Procedure II Step 2, the temperature SHALL be sixty-six degrees Celsius (66°C) and constant. [T-0462] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 501.7, Procedure II Step 3, the humidity SHALL be uncontrolled. [T-0463] A[T].C, L[T].C/G

3.26.2 (U) Operational Low Temperature ADE

(U) The ADE SHALL satisfy all performance requirements during and after exposure to temperature extremes of negative twenty-nine degrees Celsius (-29°C). [T-0464] A[T].C, M[T].C, L[T].C/G

(U) ADE operational low temperature compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0465] A[T].C, L[T].C/G

(U) The ADE operational low temperature test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 502.7, Procedure II with the following tailoring and clarifications. [T-0466] A[T].C, L[T].C/G

(U) The ADE SHALL be operated during ADE operational low temperature test. [T-0467] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 502.7, Procedure II Step 1 low temperature extreme SHALL be negative twenty-nine degrees Celsius (-29°C). [T-0468] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 502.7, Procedure II Step 6 SHALL be omitted. [T-0469] A[T].C, L[T].C/G

3.26.3 (U) Operational High Temperature BDE

(U) The BDE SHALL satisfy all performance requirements during and after exposure to temperature extremes of fifty degrees Celsius (50°C). [T-0470] A[T].C, M[T].C, L[T].C/G

(U) BDE operational high temperature compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0471] A[T].C, L[T].C/G

(U) The BDE operational high temperature test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 501.7, Procedure II with the following tailoring and clarifications. [T-0472] A[T].C, L[T].C/G

(U) The BDE SHALL be operated during the BDE operational high temperature test. [T-0473] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 501.7, Procedure II Step 2 operational temperature SHALL be fifty degrees Celsius (50°C) and constant. [T-0474] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 501.7, Procedure II Step 3 humidity SHALL be uncontrolled. [T-0475] A[T].C, L[T].C/G

3.26.4 (U) Operational Low Temperature BDE

(U) The BDE SHALL satisfy all performance requirements during and after exposure to temperature extremes of zero degrees Celsius (0°C). [T-0476] A[T].C, M[T].C, L[T].C/G

(U) BDE operational low temperature compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0477] A[T].C, L[T].C/G

(U) The BDE operational low temperature test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 502.7, Procedure II with the following tailoring and clarifications. [T-0478] A[T].C, L[T].C/G

(U) The BDE SHALL be operated during the BDE operational low temperature test. [T-0479] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 502.7, Procedure II Step 1 low temperature extreme SHALL be zero degrees Celsius (0°C). [T-0480] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 502.7, Procedure II Step 6 SHALL be omitted. [T-0481] A[T].C, L[T].C/G

3.26.5 (U) Storage High Temperature

(U) The EOSS SHALL satisfy all performance requirements after exposure to temperature extremes of seventy-one degrees Celsius (71°C). [T-0482] A[T].C, M[T].C, L[T].C/G

(U) Compliance with storage high temperatures SHALL be verified by a test developed by the contractor and approved by the government. [T-0483] A[T].C, L[T].C/G

(U) The storage high temperature test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 501.7, Procedure I with the following tailoring and clarifications. [T-0484] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 501.7, Procedure I Step 1, the storage configurations SHOULD be used for testing. [O-0485] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 501.7, Procedure I Step 2 temperature SHALL be seventy-one degrees Celsius (71°C). [T-0486] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 501.7, Procedure I Step 3b total test time SHALL be fourteen (14) days with constant temperature throughout the duration of the test. [T-0487] A[T].C, L[T].C/G

3.26.6 (U) Storage Low Temperature

(U) The EOSS SHALL satisfy all performance requirements during and after exposure to temperature extremes of negative sixty-two degrees Celsius (-62°C). [T-0488] A[T].C, M[T].C, L[T].C/G

(U) Compliance with the storage low temperature SHALL be verified by a test developed by the contractor and approved by the government. [T-0489] A[T].C, L[T].C/G

(U) The storage low temperature test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 502.7, Procedure I with the following tailoring and clarifications. [T-0490] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 502.7, Procedure I Step 1, the storage configuration SHOULD be used for testing. [O-0491] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 502.7, Procedure I Step 2 temperature SHALL be negative sixty-two degrees Celsius (-62°C). [T-0492] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 502.7, Procedure I Step 3 total test time SHALL be fourteen (14) days with constant temperature throughout the duration of the test. [T-0493] A[T].C, L[T].C/G

3.26.7 (U) Temperature Shock

(U) The EOSS SHALL satisfy all performance requirements after temperature shock from negative ten degrees Celsius (-10°C) and positive fifty degrees Celsius (50°C). [T-0494] A[T].C, M[O].C, L[T].C/G

(U) Compliance with the temperature shock SHALL be verified by a test developed by the contractor and approved by the government. [T-0495] A[T].C, L[T].C/G

(U) The storage low temperature test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 503.7, Procedure I-D with the following tailoring and clarifications. [T-0496] A[T].C, L[T].C/G

3.26.8 (U) Solar Radiation ADE

(U) The EOSS ADE SHALL satisfy all performance requirements, without actinic effects, during and after continuous, prolonged exposure to direct sunlight. [T-0497] A[T].C, M[O].C, L[T].C/G

(U) ADE solar radiation compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0498] A[T].C, L[T].C/G

(U) The ADE solar radiation test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 505.7, Procedure II with the following tailoring and clarifications. [T-0499] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 505.7 Procedure II Step 1 SHALL use Zone A1. [T-0500] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 505.7 Procedure II Step 3 operational checks SHALL be conducted. [T-0501] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 505.7 Procedure II Step 5, the number of cycles SHALL be ten (10). [T-0502] A[T].C, L[T].C/G

3.26.9 (U) Blowing Rain ADE

(U) The ADE, including all test ports, SHALL satisfy all performance requirements during and after exposure to blowing rain with a velocity of thirty-eight meters per second (38m/s) and fifty-one meters per second (51m/s). [T-0503] A[T].C, M[O].C, L[T].C/G

(U) ADE blowing rain compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0504] A[T].C, L[T].C/G

(U) The ADE blowing rain test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 506.6, Procedure I with the following tailoring and clarifications. [T-0505] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 506.6, Procedure I Step 3 rainfall rate SHALL be one hundred nineteen millimeters per hour (119mm/hr). [T-0506] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 506.6, Procedure I Step 3 wind velocity SHALL be thirty-eight meters per second (38m/s). [T-0507] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 506.6, Procedure I Step 3 the ADE SHALL be operated to verify compliance with performance requirements. [T-0508] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 506.6, Procedure I Step 6 SHALL be run after Steps 3 through 5 are re-run with rainfall rate of one hundred nineteen millimeters per hour (119mm/hr) AND a wind velocity of fifty-one meters per second (51m/s) AND the ADE operated to verify compliance with performance requirements. [T-0509] A[T].C, L[T].C/G

(U) The ADE SHALL meet all performance specifications during testing with the exception of the following:

When precipitation is present on the outer surface of the outside window of the ELRF, VIS, or TIS, degradation of the performance based on the optics of the corresponding unit SHALL be allowed. [T-0510] A[T].C, L[T].C/G

(U) The ADE SHALL satisfy all performance requirements without degradation after the ADE blowing rain test. [T-0511] A[T].C, L[T].C/G

3.26.10 (U) Blowing Rain BDE

(U) The BDE SHALL satisfy all performance requirements during and after exposure to blowing rain. [T-0512] A[T].C, M[O].C, L[T].C/G

(U) BDE blowing rain compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0513] A[T].C, L[T].C/G

(U) The BDE blowing rain test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1 Method 506.6, Procedure III. [T-0514] A[T].C, L[T].C/G

3.26.11 (U) Operational Humidity

(U) The ADE and BDE SHALL satisfy all performance requirements during and after exposure to humidity extremes. [T-0515] A[T].C, M[O].C, L[T].C/G

(U) Operational humidity compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0516] A[T].C, L[T].C/G

(U) The operational humidity test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1 Method 507.6, Procedure I, Hot Humid (B3), Natural with the following tailoring and clarifications. [T-0517] A[T].C, L[T].C/G

(U) The EOSS SHALL meet all performance specifications during testing with the exception of the following:

When condensation is present on the outer surface of the outside window of the ELRF, VIS, or TIS, degradation of the performance based on the optics of the corresponding unit SHALL be allowed. [T-0518] A[T].C, L[T].C/G

3.26.12 (U) Storage Humidity

(U) The ADE and BDE SHALL satisfy all performance requirements after packaged components are exposed to storage humidity extremes. [T-0519] A[T].C, M[O].C, L[T].C/G

(U) Storage humidity compliance with the TEST SHALL be verified by a test developed by the contractor and approved by the government. [T-0520] A[T].C, L[T].C/G

(U) The storage humidity test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1 Method 507.6, Procedure I, Hot Humid, Induced. [T-0521] A[T].C, L[T].C/G

3.26.13 (U) Salt Fog ADE

(U) The ADE SHALL satisfy all performance requirements after continuous exposure to salt fog. [T-0522] A[T].C, M[O].C, L[T].C/G

(U) ADE salt fog compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0523] A[T].C, L[T].C/G

(U) The ADE salt fog test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 509.8 Procedure 1 with the following tailoring and clarifications. [T-0524] A[T].C, L[T].C/G

(U) The ADE salt fog test duration SHALL be two hundred hours (200hrs). [T-0525] A[T].C, L[T].C/G

(U) The ADE salt fog equipment configuration SHALL be as for use, cyclical conditions are not required, and the salt concentration SHALL be five percent (5%). [T-0526] A[T].C, L[T].C/G

3.26.14 (U) Salt Fog BDE

(U) The finishes and coatings on parts, frames, and enclosure structures representative of the EOSS BDE SHALL satisfy requirements after exposure to salt fog. [T-0527] A[T].C, L[T].C/G

(U) BDE salt fog compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0528] A[T].C, M[O].C, L[T].C/G

(U) The BDE salt fog test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 509.8 Procedure I with the following tailoring and clarifications. [T-0529] A[T].C, L[T].C/G

(U) The BDE salt fog test SHALL be applied to the finishes and coatings on parts, frames, and enclosure structures representative of the BDE, not the full BDE. [T-0530] A[T].C, L[T].C/G

(U) The BDE salt fog test duration SHALL be forty-eight hours (48hrs) for representative BDE. [T-0531] A[T].C, L[T].C/G

(U) The BDE salt fog equipment configuration SHALL be as for use, cyclical conditions are required, and the salt concentration SHALL be five percent (5%). [T-0532] A[T].C, L[T].C/G

3.26.15 (U) Blowing Sand ADE

(U) The ADE SHALL satisfy all performance requirements during and after exposure to blowing sand. [T-0533] A[T].C, M[O].C, L[T].C/G

(U) ADE blowing sand compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0534] A[T].C, L[T].C/G

(U) The ADE blowing sand test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 510.7, Procedure II with the following tailoring and clarifications. [T-0535] A[T].C, L[T].C/G

(U) The ADE portion of the system SHALL meet all performance requirements after exposure to MIL-STD-810H CHANGE 1, Method 510.7, Procedure II. [T-0536] A[T].C, L[T].C/G

(U) ADE blowing sand test sand composition and concentration SHALL be per 4.2.1.3 and 4.2.1.4c, respectively, of MIL-STD-810H CHANGE 1, Method 510.7, Procedure II with the test item configuration and orientation providing equal time duration on each face of the test items and the equipment being operated continuously except when the test is interrupted to re-orient the system. [T-0537] A[T].C, L[T].C/G

3.26.16 (U) Blowing Dust ADE

(U) The ADE SHALL satisfy all performance requirements during and after exposure to blowing sand with a velocity ranging between ninety-one meters per minute (91m/min) and five hundred thirty three meters per minute (533m/min). [T-0538] A[T].C, L[T].C/G

(U) ADE blowing dust compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0539] A[T].C, L[T].C/G

(U) The ADE blowing dust test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 510.7, Procedure I with the following tailoring and clarifications. [T-0540] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 510.7, Procedure I Step 1 temperature for the first six hours (6hrs) SHALL be twenty-three degrees Celsius (23°C). [T-0541] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 510.7, Procedure I Step 1 air velocity SHALL be five hundred thirty-three meters per minute (533m/min). [T-0542] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 510.7, Procedure I Step 2 dust composition and concentration SHALL be per 2.3.2.5a (2) and 2.3.2.6a, respectively. [T-0543] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 510.7, Procedure I Step 3 test item configuration and orientation SHALL be as for use. [T-0544] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 510.7, Procedure I Step 3 SHALL provide equal time duration on each face of the test items. [T-0545] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 510.7, Procedure I Step 4 air velocity SHALL be ninety-one meters per minute (91m/min). [T-0546] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 510.7, Procedure I Step 4 temperature SHALL be sixty-six degrees Celsius (66°C). [T-0547] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 510.7, Procedure I Step 7 total test duration SHALL be twelve hours (12hrs) plus the time required to stabilize the test equipment at the higher temperature. [T-0548] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 510.7, Procedure I Step 7 equipment SHALL be operated continuously for at least ten minutes (10min) during the last hour of the test. [T-0549] A[T].C, L[T].C/G

(U) The ADE SHALL meet all performance specifications during testing with the exception of the following:

When dust is present on the outer surface of the outside window of the ELRF, VIS, or TIS, degradation of the performance based on the optics of the corresponding unit SHALL be allowed. [T-0550] A[T].C, L[T].C/G

3.26.17 (U) Blowing Dust BDE

(U) The BDE SHALL satisfy all performance requirements during and after exposure to blowing dust. [T-0551] A[T].C, M[O].C, L[T].C/G

(U) BDE blowing dust compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0552] A[T].CG, L[T].C/G

(U) The BDE blowing dust test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 510.7, Procedure I with the following tailoring and clarifications. [T-0553] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1 510.7 paragraphs 4.1.1.4d (1) and 4.1.1.5 define the required dust compositions and concentrations with the test item configuration and orientation providing equal time duration on each face of the test items. [T-0554] A[T].C, L[T].C/G

3.26.18 (U) Operational Vibration Above And Below Deck

(U) The EOSS SHALL satisfy all performance requirements during and after exposure to the vibration testing. [T-0555] A[T].CG, M[T].C, L[T].C/G

(U) Operational vibration compliance SHALL be verified by exposure to the vibration environment described in MIL-STD-167/1A. [T-0556] A[T].CG, L[T].C/G

(U) The upper frequency limit for operational vibration testing SHALL be twenty-five hertz (25Hz). [T-0557] A[T].CG, L[T].C/G

(U) The operational vibration test procedure SHALL be developed by the contractor and approved by the government. [T-0558] A[T].CG, L[T].C/G

(U) The EOSS SHALL be operated during the operational vibration test. [T-0559] A[T].CG, L[T].C/G

3.26.19 (U) Additional Operational Vibration – Mechanical Vibrations ADE

(U) The ADE SHALL satisfy all performance requirements during and after exposure to the additional vibration testing. [T-0560] A[T].C, M[T].C, L[T].C/G, R[T].G

(U) Operational vibration compliance SHALL be verified by exposure to the vibration environment described in MIL-STD-810H CHANGE 1 Method 528.1, Type I. Maritime and Navy vessel applications. [T-0561] A[T].C, L[T].C/G, R[T].G

(U) The operational vibration test procedure SHALL be developed by the contractor and approved by the government. [T-0562] A[T].C, L[T].C/G, R[T].G

(U) The EOSS SHALL be operated during the operational vibration test. [T-0563] A[T].C, L[T].C/G, R[T].G

3.26.20 (U) Additional Operational Vibration – Mechanical Vibrations BDE

(U) The BDE SHALL satisfy all performance requirements during and after exposure to the additional vibration testing. [T-0564] A[T].C, M[T].C, L[T].C/G, R[T].G

(U) Operational vibration compliance SHALL be verified by exposure to the vibration environment described in MIL-STD-810H CHANGE 1 Method 528.1, Type I. [T-0565] A[T].C, L[T].C/G, R[T].G

(U) The operational vibration test procedure SHALL be developed by the contractor and approved by the government. [T-0566] A[T].C, L[T].C/G, R[T].G

(U) The EOSS SHALL be operated during the operational vibration test. [T-0567] A[T].C, L[T].C/G, R[T].G

3.26.21 (U) Transportation Low Pressure

(U) The EOSS SHALL satisfy all performance requirements after exposure to low pressure conditions seen during transport. [T-0568] A[T].C, M[O].C, L[T].C/G

(U) Transportation low pressure compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0569] A[T].C, L[T].C/G

(U) The transportation low pressure test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 500.6, Procedure I with the following tailoring and clarifications. [T-0570] A[T].C, L[T].C/G

(U) All EOSS equipment SHALL be packed and packaged for transportation and storage IAW this specification. [T-0571] A[T].C, L[T].C/G

(U) Upon unpacking and assembly, all EOSS equipment SHALL satisfy all performance requirements without repair. [T-0572] A[T].C, L[T].C/G

(U) All EOSS equipment, when packaged in their shipping and transportation configuration, SHALL satisfy all performance requirements after exposure to altitude of fifteen thousand two hundred forty meters (15,240m) for a minimum of one hour (1hr). [T-0573] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 500.6, Procedure I Step 3 rate of change of pressure SHALL be equivalent to three hundred five meters per minute (305m/min) to four hundred fifty-seven meters per minute (457m/min). [T-0574] A[T].C, L[T].C/G

3.26.22 (U) Transportation Vibration

(U) The EOSS SHALL satisfy all performance requirements after exposure to vibration seen in transport. [T-0575] A[T].C, M[T].C, L[T].C/G

(U) Transportation vibration compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0576] A[T].C, L[T].C/G

(U) The transportation vibration test SHALL be similar in scope and process to ASTM D999 Vibration (Repetitive) and Vibration (Sinusoidal). [T-0577] A[T].C, L[T].C/G

(U) All EOSS equipment SHALL be packed and packaged for transportation and storage IAW this specification. [T-0578] A[T].C, L[T].C/G

(U) Upon unpacking and assembly, all EOSS equipment SHALL satisfy all performance requirements without repair. [T-0579] A[T].C, L[T].C/G

3.26.23 (U) Environmental Stress Screening (ESS)

(U) All EOSS production and repaired equipment SHALL satisfy all performance requirements after exposer to ESS. [T-0580] A[T].C, M[O].C, L[T].C

(U) ESS compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0581] A[T].C, L[T].C

(U) The ESS test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1 Method 514.8 Category 3 ESS. [T-0582] A[T].C, L[T].C

3.26.24 (U) Shock Configurations

(U) The EOSS SHALL have no more than two (2) configurations based on shock testing requirements. [T-0583] A[T].C, M[O].C

(U) If there are two (2) configurations, the EOSS Shock Configuration A SHALL meet the requirements of sections 3.26.24.1 (U) Operational Shock Grade A and 3.26.24.2 (U) Operational Shock Non-Grade A. [T-0584] A[T].C, M[O].C

(U) If there are two (2) configurations, the EOSS Shock Configuration B SHALL meet the requirements of section 3.26.24.3 (U) Non-Operational Shock. [T-0585] A[T].C, M[O].C

(U) Rationale: Some ships only require the EOSS to comply with the Non-Operational Shock requirements. Previous programs have had a significant difference in cost between Shock Configuration A and Shock Configuration B equipment.

(U) The EOSS SHOULD have only one (1) configuration that meets the requirements of sections 3.26.24.1 (U) Operational Shock Grade A, 3.26.24.2 (U) Operational Shock Non-Grade A, and 3.26.24.3 (U) Non-Operational Shock. [O-0586] A[T].C, M[O].C

3.26.24.1 (U) Operational Shock Grade A

(U) The EOSS SHALL satisfy all performance requirements before and after exposure to Grade A shock. [T-0587] A[T].C, M[O].C, L[T].C, R[T].G

(U) EOSS Grade A shock compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0588] A[T].C, L[T].C/G, R[T].G

(U) The EOSS Grade A shock test SHALL be similar in scope and process to MIL-DTL-901E with the following tailoring and clarifications. [T-0589] A[T].C, L[T].C/G, R[T].G

(U) MIL-DTL-901E class SHALL be Class II. [T-0590] A[T].C, L[T].C/G, R[T].G

(U) MIL-DTL-901E type SHALL be Type A: Principal Unit. [T-0591] A[T].C, L[T].C/G, R[T].G

(U) MIL-DTL-901E mounting plane SHALL be the base. [T-0592] A[T].C, L[T].C/G, R[T].G

(U) MIL-DTL-901E ADE mounting orientation front to back axis SHALL be Fore/Aft. [T-0593] A[T].C, L[T].C/G, R[T].G

(U) MIL-DTL-901E BDE mounting orientation front to back axis SHALL be Fore/Aft AND Athwartship. [T-0594] A[T].C, L[T].C/G, R[T].G

(U) Test passing criteria SHALL be no unacceptable effect upon performance AND no hazard creation. [T-0595] A[T].C, L[T].C/G, R[T].G

(U) All requirements SHALL be reviewed and confirmed by the Shock Test Technical Warrant Holder (TWH) IAW the latest applicable specifications prior to shock test procedure approval. [T-0596] A[T].C, L[T].C/G, R[T].G

(U) The EOSS SHALL maintain the post-shock sensor LOS position within 1 mrad Root Mean Squared (RMS) of the LOS position before exposure to the shock test. [T-0597] A[T].C, L[T].C/G, R[T].G

(U) Any resilient mount SHALL be considered part of the EOSS and all requirements of this specification SHALL apply. [T-0598] A[T].C, L[T].C/G, R[T].G

3.26.24.2 (U) Operational Shock Non-Grade A

(U) The EOSS SHALL satisfy all performance requirements during and after non-Grade A shock. [T-0599] A[T].C, M[O].C, L[T].C/G, R[T].G

(U) Non-Grade A shock compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0600] A[T].C, L[T].C/G, R[T].G

(U) The Non-Grade A shock test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1 Method 516.8, Procedure I with the following tailoring and clarifications. [T-0601] A[T].C, L[T].C/G, R[T].G

(U) Testing SHALL include twenty (20) G twenty-three millisecond (23ms) half sine shocks. [T-0602] A[T].C, L[T].C/G, R[T].G

(U) All requirements SHALL be reviewed and confirmed by the Shock Test TWH IAW the latest applicable specifications prior to shock test procedure approval. [T-0603] A[T].C, L[T].C/G, R[T].G

(U) The EOSS SHALL maintain the post-shock sensor LOS position within one milliradians (1mrad) RMS of the LOS position before exposure to the shock test. [T-0604] A[T].C, L[T].C/G, R[T].G

(U) Any resilient mount SHALL be considered part of the EOSS and all requirements of this specification SHALL apply. [T-0605] A[T].C, L[T].C/G, R[T].G

3.26.24.3 (U) Non-Operational Shock

(U) The EOSS SHALL satisfy all the requirements of Grade B shock. [T-0606] A[T].C, M[O].C, L[T].C/G

(U) Grade B shock compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0607] A[T].C, L[T].C/G

(U) The Grade B shock test SHALL be similar in scope and process to MIL-DTL-901E with the following tailoring and clarifications. [T-0608] A[T].C, L[T].C/G

(U) All EOSS equipment SHALL satisfy the shock requirements of Grade B, Class I, Type A. [T-0609] A[T].C, L[T].C/G

(U) All requirements SHALL be reviewed and confirmed by the Shock Test TWH IAW the latest applicable specifications prior to shock test procedure approval. [T-0610] A[T].C, L[T].C/G

(U) Any resilient mount SHALL be considered part of the EOSS and all requirements of this specification SHALL apply. [T-0611] A[T].C, L[T].C/G

(U) The test procedure SHALL be developed by the contractor and approved by the government. [T-0612] A[T].C, L[T].C/G

(U) The EOSS SHOULD be operable after exposure to the shock environment. [O-0613] A[T].C, L[T].C/G

3.26.25 (U) Transportation Shock

(U) The EOSS SHALL satisfy all performance requirements after exposure to shock seen in transport. [T-0614] A[T].C, M[O].C, L[T].C/G

(U) Transportation shock compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0615] A[T].C, L[T].C/G

(U) The transportation shock test SHALL be similar in scope and process to ASTM D5276 Corner Drop. [T-0616] A[T].C, L[T].C/G

(U) The transportation shock test SHALL be similar in scope and process to ASTM D5276 Flat Drop. [T-0617] A[T].C, L[T].C/G

(U) The transportation shock test SHALL be similar in scope and process to ASTM D1083 Tipover. [T-0618] A[T].C, L[T].C/G

(U) The transportation shock test SHALL be similar in scope and process to ASTM D1083 Edgewise Rotational Drop. [T-0619] A[T].C, L[T].C/G

(U) The transportation shock test SHALL be similar in scope and process to ASTM D1083 Cornerwise Rotational Drop. [T-0620] A[T].C, L[T].C/G

(U) The transportation shock test SHALL be similar in scope and process to ASTM D5414 Horizontal Impact. [T-0621] A[T].C, L[T].C/G

(U) The transportation shock test SHALL be similar in scope and process to ASTM D880 Incline Impact. [T-0622] A[T].C, L[T].C/G

(U) The transportation shock test SHALL be similar in scope and process to ASTM D642 Superimposed Load. [T-0623] A[T].C, L[T].C/G

(U) The transportation shock requirements SHALL apply to all EOSS equipment after such components are packed and packaged for transportation and storage IAW this specification. [T-0624] A[T].C, L[T].C/G

(U) Upon unpacking and assembly, all EOSS equipment SHALL satisfy all performance requirements without repair after being subjected to the following tests: [T-0625] A[T].C, L[T].C/G

3.26.26 (U) Fungus

(U) The effect of fungus on the EOSS SHOULD be known through testing. [O-0626] A[T].C, M[O].C, L[T].C/G

(U) The test SHOULD be developed by the contractor and approved by the government. [O-0627] A[T].C, L[T].C/G

(U) The test SHOULD be similar in scope and process to MIL-STD-810H CHANGE 1 Method 508.8. [O-0628] A[T].C, L[T].C/G

3.26.27 (U) Ice ADE

(U) The ADE SHALL transition from the power off state to the operate state and SHALL satisfy all performance requirements within sixty minutes (60min) after exposure to ice accumulation of an average thickness of forty-one millimeters (41mm). [T-0629] A[T].C, M[T].C, L[T].C/G

(U) ADE ice accumulation compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0630] A[T].C, L[T].C/G

(U) The ADE ice accumulation test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 521.4, Procedure I with the following tailoring and clarifications. [T-0631] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 521.4, Procedure I Step 1 the EOSS SHALL be in the power off state. [T-0632] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 521.4, Procedure I Step 3 ice thickness SHALL be forty-one millimeters (41mm). [T-0633] A[T].C, L[T].C/G

(U) In the case where the EOSS incorporates and integral "anti-icing" ability that is consistent with all performance requirements, "anti-icing" may be enabled during ice build-up procedure and MIL-STD-810H CHANGE 1, Method 521.4, Procedure I Step 3 ice thickness SHALL be forty-one millimeters (41mm) on all surfaces not protected or affected by integral anti icing features. [T-0634] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 521.4, Procedure I Step 4 temperature SHALL be negative thirty degrees Celsius (-30°C). [T-0635] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 521.4, Procedure I Step 4 time SHALL be six hours (6hrs). [T-0636] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 521.4, Procedure I Step 4 the time requirement of UID T-0629 SHALL start after the time requirement of UID T-0636. [T-0637] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 521.4, Procedure I Step 4 ice removal SHALL be by integral features ONLY. [T-0638] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 521.4, Procedure I Step 5 ice removal SHALL be by integral features ONLY. [T-0639] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 521.4, Procedure I Step 6 SHALL not be required. [T-0640] A[T].C, L[T].C/G

(U) MIL-STD-810H CHANGE 1, Method 521.4, Procedure I Step 7 SHALL not be required. [T-0641] A[T].C, L[T].C/G

3.26.28 (U) Freeze / Thaw ADE

(U) The EOSS ADE SHALL satisfy all performance requirements after exposure to freezing conditions. [T-0642] A[T].C, M[T].C, L[T].C/G

(U) ADE freeze and thaw compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0643] A[T].C, L[T].C/G

(U) The ADE freeze and thaw test SHALL be similar in scope and process to MIL-STD-810H CHANGE 1, Method 524.1, Procedure I with the following tailoring and clarifications. [T-0644] A[T].C, L[T].C/G

(U) The ADE SHALL transition from the power off state to the operate state and SHALL satisfy all performance requirements within sixty minutes (60min) after ADE freeze and thaw testing. [T-0645] A[T].C, L[T].C/G

3.26.29 (U) Electromagnetic Environment ADE

(U) The ADE SHALL satisfy all performance requirements during and after exposure to an electromagnetic environment. [T-0646] A[T].C, M[T].C, L[T].C/G

(U) ADE electromagnetic environmental compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0647] A[T].C, L[T].C/G

(U) The ADE electromagnetic environmental test SHALL be similar in scope and process to MIL-STD-461G and MIL-STD-464D with the following tailoring and clarifications. [T-0648] A[T].C, L[T].C/G

(U) The ADE SHALL conform to the requirements of Paragraph 5.2 and Table V of MIL-STD-461G tailored as follows. [T-0649] A[T].C, L[T].C/G

(U) MIL-STD-461G per Paragraph 5.2 and Table V; requirements CE106, CS103, CS104, CS105, CS109, CS115, CS117, CS118, and RE103 SHOULD not be applicable. [O-0650] A[T].C, L[T].C/G

(U) MIL-STD-461G Table V requirement RE101 frequency range SHALL be thirty hertz (30Hz) to fifty kilohertz (50kHz). [T-0651] A[T].C, L[T].C/G

(U) MIL-STD-461G Table V requirement RE102 frequency range SHALL be ten kilohertz (10kHz) to eighteen gigahertz (18GHz). [T-0652] A[T].C, L[T].C/G

(U) MIL-STD-461G Table V requirement RS101 frequency range SHALL be thirty hertz (30Hz) to fifty kilohertz (50kHz). [T-0653] A[T].C, L[T].C/G

(U) MIL-STD-461G Table V requirement RE103 Limit Level SHALL be two hundred Volts per meter (200V/m). [T-0654] A[T].C, L[T].C/G

(U) The ADE SHALL conform to the external electromagnetic environment requirements of Table 2 of MIL-STD-464D for shipboard operations in the beam of transmitters with the following tailoring and clarifications. [T-0655] A[T].C, L[T].C/G

(U) In the eight thousand five hundred megahertz (8,500MHz) to eleven thousand megahertz (11,000MHz) range the peak electric field SHALL be nine hundred Volts per meter (900V/m) RMS. [T-0656] A[T].C, L[T].C/G

(U) In the eight thousand five hundred megahertz (8,500MHz) to eleven thousand megahertz (11,000MHz) range the average electric field SHALL be eight hundred Volts per meter (800V/m) RMS. [T-0657] A[T].C, L[T].C/G

(U) In the five thousand four hundred megahertz (5,480MHz) to eight thousand four hundred megahertz (8,400MHz) range the average electric field SHALL be three hundred fifty Volts per meter (350V/m) RMS. [T-0658] A[T].C, L[T].C/G

(U) Note: Any failures found during Government conducted Electromagnetic Vulnerability (EMV) tests, as part of the electromagnetic environment testing, SHALL be considered Classified. Classified results will require extra processes and agreements between the Contractor and Government in order to mitigate these failures. [T-0659] A[T].C, L[T].C/G

3.26.30 (U) Electromagnetic Environment BDE

(U) The BDE SHALL satisfy all performance requirements during and after exposure to an electromagnetic environment. [T-0660] A[T].C, M[T].C, L[T].C/G

(U) BDE electromagnetic environmental compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0661] A[T].C, L[T].C/G

(U) The BDE electromagnetic environmental test SHALL be similar in scope and process to MIL-STD-461G and MIL-STD-464D with the following tailoring and clarifications. [T-0662] A[T].C, L[T].C/G

(U) The BDE SHALL conform to the requirements of Paragraph 5.2 and Table V of MIL-STD-461G tailored as follows. [T-0663] A[T].C, L[T].C/G

(U) MIL-STD-461G per Paragraph 5.2 and Table V; requirements CE106, CS103, CS104, CS105, CS109, CS115, CS117, CS118, and RE103 SHOULD not be applicable. [O-0664] A[T].C, L[T].C/G

(U) MIL-STD-461G Table V requirement RE101 frequency range SHALL be thirty hertz (30Hz) to fifty kilohertz (50kHz). [T-0665] A[T].C, L[T].C/G

(U) MIL-STD-461G Table V requirement RE102 frequency range SHALL be ten kilohertz (10kHz) to eighteen gigahertz (18GHz). [T-0666] A[T].C, L[T].C/G

(U) MIL-STD-461G Table V requirement RS101 frequency range SHALL be thirty hertz (30Hz) to fifty kilohertz (50kHz). [T-0667] A[T].C, L[T].C/G

(U) MIL-STD-461G Table V requirement RE103 Limit Level SHALL be ten Volts per meter (10V/m). [T-0668] A[T].C, L[T].C/G

3.26.31 (U) DC Magnetic Field

(U) The EOSS SHALL satisfy all performance requirements during and after exposure to DC magnetic fields. [T-0669] A[T].C, M[T].C, L[T].C/G

(U) DC magnetic field compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0670] A[T].C, L[T].C/G

(U) The DC magnetic field test SHALL be similar in scope and process to MIL-STD-1399 Section 407. [T-0671] A[T].C, L[T].C/G

3.26.32 (U) Lightning And Stray Electrical Charges ADE

(U) The ADE SHALL satisfy all performance requirements during and after exposure for lightning and stray electrical charges. [T-0672] A[T].C, M[T].C, L[T].C/G

(U) ADE Lightning and stray electrical charge compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0673] A[T].C, L[T].C/G

(U) The ADE lightning and stray electrical charge test SHALL be similar in scope and process to MIL-STD-1310. [T-0674] A[T].C, L[T].C/G

(U) The ADE lightning and stray electrical charge test SHALL survive and operate without degradation immediately after exposure to all levels, from 2 to 200 ±10% kilo amps, direct and indirect lightning strikes defined in Figure 2 and Table 7 (Lightning direct and indirect effects waveform parameters) and Figure 1 (Lightning direct effects environment) of MIL-STD-464C. [T-0675] A[T].C, L[T].C/G

3.26.33 (U) Lightning And Stray Electrical Charges BDE

(U) The BDE SHOULD satisfy all performance requirements during and after exposure for lightning and stray electrical charges. [O-0676] A[T].C, M[T].C, L[T].C/G

(U) BDE Lightning and stray electrical charge compliance SHOULD be verified by a test developed by the contractor and approved by the government. [O-0677] A[T].C, L[T].C/G

(U) The BDE lightning and stray electrical charge test SHOULD be similar in scope and process to MIL-STD-1310. [O-0678] A[T].C, L[T].C/G

3.26.34 (U) Wind Loading ADE 38 M/S

(U) The ADE SHALL satisfy all performance requirements during and after exposure to thirty-eight meters per second (38m/s) wind. [T-0679] A[T].C, M[O].C, L[T].C/G

(U) ADE wind loading thirty-eight meters per second (38m/s) compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0680] A[T].C, L[T].C/G

(U) The ADE SHALL satisfy the performance requirements during and after exposure to winds having a relative velocity of thirty-eight meters per second (38m/s). [T-0681] A[T].C, L[T].C/G

3.26.35 (U) Wind Loading ADE 51 M/S

(U) The ADE SHALL satisfy all performance requirements after exposure to fifty-one meter per second (51m/s) wind. [T-0682] A[T].C, M[O].C, L[T].C/G

(U) ADE wind loading fifty-one meter per second (51m/s) compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0683] A[T].C, L[T].C/G

(U) The ADE SHALL satisfy the performance requirements after exposure to winds having a relative velocity of fifty-one meter per second (51m/s). [T-0684] A[T].C, L[T].C/G

(U) The EOSS SHALL withstand, without subsequent damage or degradation, exposure to winds having a relative velocity of fifty-one meter per second (51m/s). [T-0685] A[T].C, L[T].C/G

(U) The EOSS SHALL be in the stow position with the power off brake engaged during exposure to this environment. [T-0686] A[T].C, L[T].C/G

3.26.36 (U) Gun Blast Overpressure

(U) The ADE SHALL satisfy all performance requirements during and after exposure to gun blast overpressure. [T-0687] A[T].CG, L[T].C/G

(U) ADE gun blast overpressure compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0688] A[T].CG, L[T].C/G

(U) The ADE gun blast overpressure test SHALL be similar in scope and process to MIL-STD-1399A Section 072.2 with the following tailoring and clarifications. [T-0689] A[T].CG, M[T].C, L[T].C/G

(U) Gun blast environment characterized by a peak free-air overpressure (PS) of forty-eight kilopascals (48kPa) with a positive duration (to) of seven milliseconds (7ms) IAW MIL-STD-1399A Section 072.2. [T-0690] A[T].CG, L[T].C/G

3.26.37 (U) Gun Blast Residue

(U) The EOSS ADE SHALL satisfy all performance requirements after long term exposure to the residue left from the standard gun family; MK45 (5"), MK38 (25mm), AGS, or MK 110 (57mm), SeaRAM CIWS, Phalanx CIWS, MK44 Bushmaster, 7.62mm machine guns, M242 Bushmaster, 50 caliber machine gun. [T-0691] A[T].CG, L[T].C/G

(U) ADE gun blast residue compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0692] A[T].CG, L[T].C/G

3.26.38 (U) Wave Loading

(U) The ADE SHALL meet all requirements after wave impingement and greenwater loading of forty-two kilopascals (42kPa). [T-0693] A[T].CG, M[O].C, L[T].C/G

(U) ADE wave loading compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0694] A[T].CG, L[T].C/G

(U) The ADE wave loading test SHALL be similar in scope and process to guidance provided in MIL-HDBK-2036 with the following tailoring and clarifications. [T-0695] A[T].CG, L[T].C/G

(U) Note: Values for the wave loading are installation dependent and may need to be derived in lower-level specifications. Any evidence of damage or water intrusion will be considered a failure.

3.26.39 (U) Missile Exhaust Residue

(U) The ADE SHALL not experience degradation after long term exposure to the residue left from the standard missile family; Tomahawk, Harpoon, Rolling Airframe Missile (RAM), Enhanced SeaSparrow Missile (ESSM), Standard Missile 2 (SM-2), Standard Missile 3 (SM-3), Standard Missile 6 (SM-6), Hellfire missile, Naval Strike Missile (NSM), and Vertical Launch Anti-Submarine (VLA) missiles IAW MIL-STD-1399. [T-0696] A[T].CG, M[O].C, L[T].C/G

(U) ADE missile exhaust residue exposure compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0697] A[T].CG, L[T].C/G

3.26.40 (U) Missile Exhaust Temperature

(U) The ADE SHALL operate after exposure to reflected missile exhaust from standard missile family; Tomahawk, Harpoon, Rolling Airframe Missile (RAM), Enhanced SeaSparrow Missile (ESSM), Standard Missile 2 (SM-2), Standard Missile 3 (SM-3), Standard Missile 6 (SM-6), Hellfire missile, Naval Strike Missile (NSM), and Vertical Launch Anti-Submarine (VLA) missiles IAW MIL-STD-1399. [T-0698] A[T].CG, M[O].C, L[T].C/G

(U) ADE missile exhaust temperature exposure compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0699] A[T].CG, L[T].C/G

3.26.41 (U) Stack Gasses

(U) The ADE SHALL withstand continuous exposure to stack gas in the presence of moisture, with resultant residual sulfuric acids in concentration of five percent (5%). [T-0700] A[T].CG, M[O].C, L[T].C/G

(U) ADE stack gases exposure SHALL be verified by a test developed by the contractor and approved by the government. [T-0701] A[T].CG, L[T].C/G

3.26.42 (U) Aircraft Exhaust

(U) The ADE SHALL withstand continuous exposure to rotary aircraft exhaust in the presence of moisture. [T-0702] A[T].CG, M[O].C, L[T].C/G

(U) Rotary Aircraft SHALL include: MH-60, MH-60R, MH-60S, SH-60B, and MH-65 Helicopters. [T-0703] A[T].CG, L[T].C/G

(U) ADE rotary aircraft exhaust exposure compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0704] A[T].CG, L[T].C/G

3.26.43 (U) Ship Motion

(U) The EOSS SHALL meet all performance requirements across the entire FOV and at all pointing angles with any ship mounting configuration during and after exposure to the ship pitch motion angles from negative five and eight tenths degrees (-5.8°) to positive five and eight tenths degrees (5.8°) at a rate of five and five tenths degrees per second (1.7°/s). [T-0705] A[T].C/G, M[T].C, L[T].C/G

(U) The EOSS SHALL meet all performance requirements across the entire FOV and at all pointing angles with any ship mounting configuration during and after exposure to the ship yaw motion angles from negative five and eight tenths degrees (-5.8°) to positive five and eight tenths degrees (5.8°) at a rate of one and seven tenths degrees per second (1.7°/s). [T-0706] A[T].C/G, M[T].C, L[T].C/G

(U) The EOSS SHALL meet all performance requirements across the entire FOV and at all pointing angles with any ship mounting configuration during and after exposure to the ship roll motion angles from negative seventeen degrees (-17°) to positive seventeen degrees (17°) at a rate of three and one tenth degrees per second (3.1°/s). [T-0707] A[T].C/G, M[T].C, L[T].C/G

(U) The EOSS SHALL operate in a degraded capacity during and after exposure to the ship roll motion angles from negative thirty-five degrees (-35°) to positive thirty-five degrees (35°) at a rate of six and four tenths degrees per second (6.4°/s). [T-0708] A[T].C/G, M[T].C, L[T].C/G

(U) The EOSS SHOULD meet the performance requirements across the entire FOV and at all pointing angles with any ship mounting configuration during and after exposure to the ship roll motion angles from negative thirty-five degrees (-35°) to positive thirty-five degrees (35°) at a rate of six and four tenths degrees per second (6.4°/s). [O-0709] A[T].C/G, M[T].C, L[T].C/G

(U) The EOSS SHALL survive without damage during and after exposure to the ship roll motion angles from negative forty-five degrees (-45°) to positive forty-five degrees (45°) at a rate of eight and two tenths degrees per second (8.2°/s). [T-0710] A[T].C/G, M[T].C, L[T].C/G

(U) The EOSS SHOULD meet the performance requirements across the entire FOV and at all pointing angles with any ship mounting configuration during and after exposure to the ship roll motion angles from negative forty-five degrees (-45°) to positive forty-five degrees (45°) at a rate of eight and two tenths degrees per second (8.2°/s). [O-0711] A[T].C/G, M[T].C, L[T].C/G

(U) Ship motion compliance SHALL be verified by a test developed by the contractor and approved by the government. [T-0712] A[T].C/G, L[T].C/G

3.26.44 (U) Audible Noise

(U) The EOSS SHALL comply with the noise requirements of SECNAV memo titled Compliance with Hearing Policies Consistent with Naval Audit Service Hazardous Noise Recommendations. [T-0713] A[T].C, M[T].C, L[T].C/G

(U) The EOSS SHALL comply with the noise requirements of MIL-STD-1474 while operating. [T-0714] A[T].C, M[T].C, L[T].C/G

(U) The EOSS SHOULD not generate noise in excess of 38 dBA. [O-0715] A[T].C, L[T].C/G

(U) Audible noise compliance SHALL be verified by test developed by the contractor and approved by the government. [T-0716] A[T].C, L[T].C/G

3.26.45 (U) Bright Lights

(U) The EOSS and/or sensors SHALL have sufficient dynamic range, auto gain / level / brightness / contrast, and Signal Transfer Function (SiTF) to continue to fully operate in the presence of intense illumination by spotlight within nine hundred fifteen meters (915m). [T-0717] A[T].CG, M[T].C, L[T].C/G

(U) Bright light compliance SHALL be verified by test developed by the contractor and approved by the government. [T-0718] A[T].CG, L[T].C/G

3.26.46 (U) Flares

(U) The EOSS / sensors SHALL not be adversely affected by flares. {redacted, available in CUI version} [T-0719] A[T].CG, M[T].C, L[T].C/G

(U) Flare compliance SHALL be verified by test developed by the contractor and approved by the government. [T-0720] A[T].CG, L[T].C/G

3.26.47 (U) Muzzle Flash

(U) The EOSS and/or sensors SHALL have sufficient dynamic range, auto gain / level / brightness / contrast, and SiTF to continue to fully operate in the presence of muzzle flash from the standard gun family. MK45 (5"), MK38 (25mm), AGS, or MK 110 (57mm). [T-0721] A[T].CG, L[T].C/G

(U) Muzzle Flash compliance SHALL be verified by test developed by the contractor and approved by the government. [T-0722] A[T].CG, L[T].C/G

3.26.48 (U) Sensor Counter-Counter Measures (CCMs)

(U) The EOSS SHOULD provide a method or methods to provide protection {redacted, available in CUI version}. [O-0723] A[T].C, M[O].C, L[T].C/G, L[O].G, R[O].G

(U) The EOSS SHOULD be protected from an adversarial use of {redacted, available in CUI version} countermeasures. [O-0724] A[T].C, L[T].C/G, L[O].G, R[O].G

(U) CCM compliance SHOULD be verified by test developed by the contractor and approved by the government. [O-0725] A[T].C, L[T].C/G, L[O].G, R[O].G

3.26.49 (U) Structure Borne Noise

(U) The EOSS SHALL comply with the structure borne noise requirements of MIL-STD-740-2, Type III, Figure 2. [T-0726] A[T].CG, M[T].C, L[T].C/G

(U) Structure borne noise compliance SHALL be verified by test developed by the contractor and approved by the government. [T-0727] A[T].CG, L[T].C/G

3.26.50 (U) Chemical, Biological, Radiological and Nuclear

(U) The ADE SHALL be designed to prevent Chemical, Biological, Radiological and Nuclear (CBRN) contamination of the internal spaces of the system and ship IAW MIL-STD-3056. [T-0728] A[T].C, M[O].C, L[T].C/G

(U) To support post CBRN operations, the EOSS SHALL be designed to avoid contamination of internal system components and migration into ship spaces if open interfaces across the boundary exist. [T-0729] A[T].C, M[O].C, L[T].C/G

(U) The EOSS SHOULD be maintainable and repairable by personnel wearing the full complement of individual protective equipment in compliance with MIL-STD-3056 paragraph 5.3.3. [O-0730] A[T].C, M[O].C, L[T].C/G

(U) The EOSS SHOULD be maintainable and repairable without significant degradation to repair time by personnel wearing the full complement of individual protective equipment in compliance with MIL-STD-3056 paragraph 5.3.3. [O-0731] A[T].C, M[O].C, L[T].C/G

(U) CBRN Decontaminability Design: The ADE SHALL be designed to support decontaminability to negligible risk levels upon completion of mission IAW MIL-STD-3056. [T-0732] A[T].C, M[O].C, L[T].C/G

(U) To support post CBRN operations, the EOSS must be designed to support mitigation of the safety hazards through decontamination activities. [T-0733] A[T].C, M[O].C, L[T].C/G

(U) CBRN Decontaminability Survivability: The ADE SHALL survive immediate and operational decontamination procedures designed to remove and neutralize contaminates. [T-0734] A[T].C, M[O].C, L[T].C/G

(U) To support post CBRN operations, the EOSS SHALL be designed using materials that can handle exposure to decontamination substances and procedures to remove contaminants from system components to limit the spread of contaminates into work areas. [T-0735] A[T].C, M[O].C, L[T].C/G

3.27 (U) Marking And Labeling

(U) Shipping and storage containers SHALL be marked IAW MIL-STD-129 w/Change 3. [T-0736] A[T].CG, I[T].C

(U) ID plates on equipment packaged in reusable shipping containers SHALL be located in such a position that are readily visible without removal of the item from the shipping container. [T-0737] A[T].CG, I[T].C

(U) EOSS components SHALL be marked and may be tailored by the government IAW MIL-STD-130. [T-0738] A[T].CG, I[T].C

(U) All cables and cable assemblies SHALL be clearly marked with product information and include jacket/plug information to interface to the sensor set components and the markings SHALL remain legible for the usable life of the cable per MIL-STD-130. [T-0739] A[T].CG, I[T].C

Cables (internal and external) between LRUs SHALL have cable tags for the purpose of identification in accordance with MIL-STD-1472. [T-0740]

Cable tags SHALL be installed in accordance with the applicable ship specifications. [T-0741]

3.28 (U) Shipping Containers

(U) Containers SHALL be designed IAW MIL-STD-2073-1 Method-54 Preservation and Level-A Packaging. [T-0742] A[T].C

(U) The exterior container shell SHOULD be rotomolded polyethylene PE223 IAW ASTM D4976, which has material properties known to be suitable for military transport cases. [O-0743] A[T].C

(U) All containers of a common configuration SHOULD be the same color; permitted colors are Gray, Tan, Green, Olive Drab, Black, and White. [O-0744] A[T].CG, I[T].C

(U) Containers for items over eleven kilograms (11kg) SHOULD have a suspension system consisting of a mounting frame and resilient mounts designed to carriage and protect the item with consideration of the item's mass properties and fragility. [O-0745] A[T].C, L[T].C/G

(U) Resilient mounts SHOULD be designed to suppress resonant frequencies that contribute to the fragility of the item being protected. [O-0746] A[T].C, M[T].C, L[T].C/G

(U) Containers SHOULD incorporate a relative humidity indicator plug conforming to SAE-AS26860 or SAE-AS5362. [O-0747] A[T].CG, I[T].C

(U) If applicable, humidity indicator plugs SHALL be selected to show an affirmative reading when the interior air volume is below forty percent (40%) relative humidity and to show a negative reading with the interior air volume is above forty percent (40%) relative humidity. [T-0748] A[T].CG, I[T].C

(U) Packaging SHOULD be subjected to test standards described in MIL-STD-3010. [O-0749] A[T].C, M[O].C, L[T].C/G

(U) All transit cases and sealed shipping containers SHALL not leak when immersed under one meter (1m) of water for two hours (2hrs). A leak is defined as a steady stream (one (1) bubble every ten seconds (10s) minimum) or recurring stream of bubbles emanating from the same place. [T-0750] A[T].CG, M[O].C, L[T].C/G

(U) A transit case leakage test procedure SHALL be developed by the contractor and approved by the government. [T-0751] A[T].CG, L[T].C/G

(U) Any loaded container weighing more than forty-five kilograms (45kg) SHALL include provisions for standard material handling equipment. [T-0752] A[T].CG

3.29 (U) Director

(U) Directors SHALL provide three hundred sixty degrees (360°) of continuous Az range of motion. [T-0753] A[T].C, M[T].C, L[T].C/G, P[T].G

(U) The director angular range of motion for El SHALL be from negative thirty degrees (-30°) to positive eighty-five degrees (+85°). [T-0754] A[T].C, M[T].C, L[T].C/G, P[T].G

(U) The director angular range of motion for El SHOULD be from negative ninety degrees (-90°) to positive ninety degrees (90°). [O-0755] A[T].C, M[T].C, L[T].C/G, P[T].G

(U) If the El travel is limited, the director design SHALL provide both electrical and mechanical limit stops. [T-0756] A[T].CG, M[T].C, D[O].C

(U) The director design SHALL be such that reaching the mechanical stops SHALL not cause damage to any components. [T-0757] A[T].CG, M[O].C, D[O].C, L[T].C/G, P[T].G

(U) The minimum director Az angular velocity SHALL be ninety degrees per second (90°/s). [T-0758] A[T].C, M[O].C, L[T].C/G, L[O].G

(U) The minimum director El angular velocity SHALL be sixty degrees per second (60°/s). [T-0759] A[T].C, M[O].C, L[T].C/G, L[O].G

(U) The minimum director Az and El angular acceleration SHALL be sixty degrees per second per second (60°/s2). [T-0760] A[T].C, M[O].C, L[T].C/G, L[O].G

(U) The minimum director Az angular velocity SHOULD be one hundred eighty degrees per second (180°/s). [O-0761] A[T].C, M[O].C, L[T].C/G, L[O].G

(U) The minimum director El angular velocity SHOULD be one hundred eighty degrees per second (180°/s). [O-0762] A[T].C, M[O].C, L[T].C/G, L[O].G

(U) The minimum director Az and El angular acceleration SHOULD be two hundred seventy degrees per second per second (270°/s2). [O-0763] A[T].C, M[O].C, L[T].C/G, L[O].G

(U) The director SHALL meet operational and survivability requirements and provide at least two (2) axes of LOS stabilization, to include Az and El (relative to the LOS director reference frame), for all pointing angles. [T-0764] A[T].C, M[T].C, L[T].C/G, L[O].G, P[O].G

(U) A lower level of stabilization performance at El angles exceeding 85° may be acceptable and SHOULD be defined in the system documentation IAW T9070-BY-DPC-010/457-1. [O-0765] A[T].C, M[T].C, L[T].C/G, L[O].G, P[O].G

(U) The EOSS video SHALL not be inverted as the EOSS approaches its El FOR upper limit. [T-0766] A[T].C, M[T].C, L[T].C/G, L[O].G, P[O].G

(U) The director SHOULD meet operational and survivability requirements and provide at least three (3) axes of LOS stabilization, to include Az, El, and roll (relative to the LOS director reference frame), for all pointing angles. [O-0767] A[T].CG, M[T].C, D[O].C, L[T].C/G, P[T].G

(U) The director SHALL provide LOS stabilization from jitter in all stabilized axes across the entire sensor FOV to an RMS error less than the Instantaneous Field Of View (IFOV) of the Narrowest Field Of View (NFOV) under static conditions as measured over a period of twenty second (20s). [T-0768] A[T].C, M[T].C, L[T].C/G, L[O].G, P[O].G

(U) The director SHOULD provide LOS stabilization from jitter in all stabilized axes across the entire sensor FOV to an RMS error less than fifty percent (50%) of the IFOV of the NFOV and if the system is diffraction limited, an RMS error less than fifty percent (50%) of the radius of the Airy disk, under static conditions as measured over a period of twenty second (20s). [O-0769] A[T].C, M[T].C, L[T].C/G, L[O].G, P[O].G

(U) The director SHALL provide LOS stabilization in all stabilized axes across the entire sensor FOV to an RMS error less than the IFOV of the NFOV for the operational ship motion profile defined by UIDs T-0705, T-0706, T-0707, T-0708, O-0709, T-0710, and O-0711 as measured over a period of twenty second (20s). [T-0770] A[T].C, M[T].C, L[T].C/G, L[O].G, P[O].G

(U) The director SHOULD provide LOS stabilization in all stabilized axes across the entire sensor FOV to an RMS error less than fifty percent (50%) of the IFOV of the NFOV and if the system is diffraction limited, an RMS error less than fifty percent (50%) of the radius of the Airy disk, for the operational ship motion profile defined by UIDs T-0705, T-0706, T-0707, T-0708, O-0709, T-0710, and O-0711 as measured over a period of twenty second (20s). [O-0771] A[T].C, M[T].C, L[T].C/G, L[O].G, P[O].G

(U) The director SHALL provide LOS stabilization in all stabilized axes across the entire sensor FOV to an RMS error less than the IFOV of the NFOV during exposure to high frequency vibration of the ship environment. [T-0772] A[T].C, M[T].C, L[T].C/G, L[O].G, P[O].G

(U) The director SHOULD provide LOS stabilization in all stabilized axes across the entire sensor FOV to an RMS error less than fifty percent (50%) of the IFOV of the NFOV and if the system is diffraction limited, an RMS error less than fifty percent (50%) of the radius of the Airy disk, during exposure to high frequency vibration of the ship environment. [O-0773] A[T].C, M[T].C, L[T].C/G, L[O].G, R[O].G, P[O].G

(U) The director SHALL provide LOS stabilization while the system is tracking a target while complying with all the higher-level requirements for pointing, tracking, and rangefinding a target. [T-0774] A[T].CG, M[T].C, L[T].C/G, R[O].G, P[T].G

(U) The director SHOULD provide LOS stabilization while the system is tracking a target that is equal to the LOS Jitter, High Frequency, and Low Frequency LOS stabilization requirements over a period of twenty second (20s) across the entire sensor FOV. [O-0775] A[T].CG, M[T].C, L[T].C/G, R[O].G, P[T].G

(U) The director SHALL maintain a LOS pointing accuracy {redacted, available in CUI version} across the entire FOR. [T-0776] A[T].C, M[T].C, L[T].C/G, R[T].G, P[T].G

(U) Upon receipt of a position command, the director SHALL slew to, settle, and synchronize to the currently designated position within one second (1s) of the system's calculated slew time. [T-0777] A[T].CG, M[T].C, D[O].C, L[T].C/G, P[T].G

(U) Upon receipt of a position command, the director SHALL slew to, settle, and synchronize to the currently designated position, if the position command points to a position that is within ten degrees (10°) of mechanical stops, this SHALL be accomplished within three seconds (3s) of the system's calculated slew time. [T-0778] A[T].CG, M[T].C, D[O].C, L[T].C/G, P[T].G

(U) The director SHALL have the ability to allow the installation and maintenance personnel to electronically set the zero degrees (0°) relative position, as the installation of the system will not always be a perfect zero degrees (0°) relative to a reference point located on the vessel. [T-0779] A[T].C, D[T].C, P[O].G

(U) The director SHOULD have the capability to automatically sense and set the zero degrees (0°) relative position using ship information, inertial reference, and Az/El information from the system, as the installation of the system will not always be a perfect zero degrees (0°) relative to a reference point located on the vessel. [O-0780] A[T].C, M[T].C, D[O].C, L[T].C/G, P[T].G

(U) The EOSS system SHALL be capable of assigning a programmable home position that can be set by the Operator which will return the director to this preset Az and El position upon command. [T-0781] A[T].C, D[T].C, P[O].G

(U) The Maintenance Preset SHALL return the EOSS to an Az and El that allows the maintenance crew to easily remove and replace an LRU and perform any cleaning procedures. [T-0782] A[T].C, D[T].C, P[O].G

(U) The EOSS system SHOULD be capable of assigning three (3) or more presets, excluding home, maintenance, and stow AZ and EL setting for each director which will return the director to this preset AZ and EL upon command. [O-0783] A[T].C, D[T].C, P[O].G

(U) The director SHALL incorporate Az and El mechanism control for error correction in position sensing. [T-0784] A[T].C, L[T].C, P[T].G

(U) EOSS sensors SHALL be mounted in an orientation that enables EL Field of Regard (FOR) from negative fifteen degrees (-15°) to positive ninety five degrees (95°) with respect to the horizon including operational ship motion profile defined by UIDs T-0705, T-0706, T-0707, T-0708, O-0709, T-0710, and O-0711 [T-0785] A[T].C, M[T].C, D[O].C, L[T].C/G, P[O].G

(U) The director SHALL include power off brakes that fix the director in place in Az and El when power is lost or when powering down the system. [T-0786] A[T].CG, M[T].C, D[O].C, L[T].C

(U) A power off brake bypass SHALL be included in the design in order to manually position the director for maintenance while power is off. [T-0787] A[T].CG, M[T].C, D[O].C, L[T].C

(U) The director SHALL incorporate a secured Stow Position. [T-0788] A[T].CG, D[T].C

(U) The director SHALL be secured in the Stow Position when the system is not in use. [T-0789] A[T].CG, D[T].C

(U) The Stow Position SHALL be the optimum position for protecting the optical windows. [T-0790] A[T].CG, M[T].C, D[T].C

(U) When in the Stow Position and EOSS is powered off, the system is secured in place such that normal activity (e.g. ship motion, wind, etc.) SHALL not cause it to move in both Az and El. [T-0791] A[T].CG, D[T].C

(U) The director SHALL position the selected sensor LOS in response to static or dynamic designated position commands from the GCS and when moving to or from stow. [T-0792] A[T].CG, D[T].C

(U) The director SHALL travel to the Stow preset upon Operator command and system shutdown. [T-0793] A[T].CG, D[T].C

(U) As a minimum, gyro drift correction SHALL be by means of an automated measurement and correction process. [T-0794] A[T].C, L[T].C, R[T].G, P[T].G

(U) Any gyro drift not automatically corrected by the system stabilization SHALL be correctable by manual operator commands separately from the automatic drift calibration from the GCS console conveyed via the GWS LAN. [T-0795] A[T].C, L[T].C, R[T].G, P[T].G

(U) The EOSS SHALL have a manual null function to remove or reduce the LOS drift not automatically corrected by the system stabilization due to the dynamic environment on the maritime crafts. [T-0796] A[T].C, L[T].C, R[T].G, P[T].G

(U) The EOSS SHOULD have an automatic null function to remove the LOS drift not automatically corrected by the system stabilization due to the dynamic environment on the maritime crafts, that can be used while the platform is underway in all operational platform dynamics. [O-0797] A[T].C, L[T].C, R[T].G, P[T].G

(U) The EOSS element(s) SHALL have a drift rate less than or equal to one degree per hour (1°/hr) after a Null has been performed. [T-0798] A[T].C, M[T].C, L[T].C, R[T].G, P[T].G

(U) The EOSS element(s) SHOULD have a drift rate less than or equal to three thousandths degrees per hour (0.003°/hr) after a Null has been performed. [O-0799] A[T].C, M[T].C, L[T].C, R[T].G, P[T].G

3.30 (U) VIS

The VIS SHALL meet the following requirements over the full El FOR (T-0782) and Az range of motion (T-0750). [T-0800] A[T].C, M[T].CG, L[T].C, L[O].G, R[O].G, P[O].G

The VIS SHALL be capable of resolving an illuminated theodolite at all distances between ten meters (10m) and fifty meters (50m) for system alignment purposes. [T-0801] A[T].C, M[T].CG, L[T].C, L[O].G, R[O].G, P[O].G

(U) The VIS at its NFOV and without image alteration SHALL be designed and manufactured to achieve a N50 of ten (10) or greater for an object with a target critical dimension of twelve and seventy two hundredths meters (12.72m) at a range of eleven thousand meters (11,000m) and less given a visual contrast of five tenths (0.5) and an extinction coefficient of one hundred eighty seven thousandths per kilometer (0.187/km). [T-0802] A[T].C, M[T].CG, L[T].C, L[O].G, R[O].G, P[O].G

(U) Note: Target Critical Dimension is defined for this section as the square root of the exposed target area.

(U) Note: Visual Contrast is defined for this section as the target-to-background contrast in the visual region, which is seen as the difference between the visual radiance of the target and the visual radiance of the background divided by the visual radiance of the background.

(U) Note: Atmospheric transmission for this section SHALL be calculated using Beer's law as $T = e^{-\alpha R}$, where R is the range from the target to the sensor in kilometers and α is the atmospheric extinction coefficient.

(U) Note: Image alteration is defined for this section to be Edge Enhancement (EE), e-zoom, contrast enhancement, etc.

(U) The VIS SHALL perform color imaging over the entire visible spectral range from four hundred nanometers (400nm) to seven hundred nanometers (700nm). [T-0803] A[T].C, M[T].CG, R[T].G, P[T].G, V[T].CG

(U) The VIS color imaging capability SHALL utilize a NIR cut filter. [T-0804] A[T].C/G, M[T].C, L[T].C, L[O].G, R[O].G

(U) The color imaging capability of the VIS sensor SHOULD have a delta-E value of less than or equal to two (2) measured at the display IAW CIEDE2000 Color-Difference-Formula IAW ISO/CIE 11664-6:2014. [O-0805] A[T].C/G, M[T].C, L[T].C, L[O].G, R[O].G

(U) The color imaging capability of the VIS sensor SHALL be capable of being manually white balanced. [T-0806] A[T].C/G, L[T].C, L[O].G, R[O].G

(U) The color imaging capability of the VIS sensor SHOULD be capable of being automatically white balanced. [O-0807] A[T].C/G, L[T].C, L[O].G, R[O].G

(U) The VIS SHOULD have the capability to perform monochromatic imaging within the four hundred nanometers (400nm) to seven hundred nanometers (700nm) spectral range. [O-0808] A[T].C/G, L[T].C, L[O].G, R[O].G

(U) The VIS sensor(s) SHALL be capable of directly imaging the sun in any FOV for continuous thirty minutes (30min) without damage (image saturation is acceptable). [T-0809] A[T].C, M[T].C, L[T].C/G, R[T].G, P[T].G

(U) The VIS sensor(s) SHOULD be capable of directly imaging the sun in any FOV for any length of time without damage (image saturation is acceptable). [O-0810] A[T].C, M[T].C, L[T].C/G, R[T].G, P[T].G

(U) The VIS SHALL utilize a Full High Definition (FHD) Focal Plane Array (FPA) with one thousand nine hundred twenty horizontal by one thousand eighty vertical (1920 (H) x 1080(V)) or greater array size. [T-0811] A[T].C, D[O].C, L[T].C, L[O].G

(U) The VIS SHOULD utilize a 4K FPA with four thousand ninety-six horizontal by two thousand one hundred sixty vertical (4096(H) x 2160(V)) or greater array size. [O-0812] A[T].C, D[O].C, L[T].C, L[O].G

(U) The VIS SHALL have a dynamic Range of greater than sixty decibels (60dB). [T-0813] A[T].C/G, D[T].C, L[T].C

(U) The VIS SHOULD have a dynamic Range of greater than eighty decibels (80dB). [O-0814] A[T].C/G, D[T].C, L[T].C

(U) The VIS sensor SHALL have a bit depth of no less than eight (8) bit (per channel if utilizing more than one (1) sensor within the VIS sensor), all of which SHALL be utilized at the display. [T-0815] A[T].C/G, D[T].C, L[T].C

(U) The VIS sensor SHOULD have a bit depth of greater than eight (8) bit. [O-0816] A[T].C/G, D[T].C, L[T].C

(U) The VIS SHALL include at least one (1) Charge Coupled Device (CCD) or Complimentary Metal-Oxide Semiconductor (CMOS) FPA for imaging. [T-0817] A[T].C/G, D[T].C

(U) The VIS SHOULD include three (3) CCDs or CMOS FPAs with one (1) FPA dedicated to red, one (1) FPA to green, and one (1) FPA to blue. [O-0818] A[T].C/G, D[T].C

(U) The VIS SHALL have a continuous zoom from Widest Field Of View (WFOV) to NFOV. [T-0819] A[T].CG, M[T].C, D[O].C, R[T].G, P[T].G

(U) The EOSS SHALL provide a capability to automatically select and command the VIS zoom position, or positions if in a slaved zoom mode, when receiving a slew to cue command from an external source and the accuracy of the sensor pointing angle will be such that the operator is able to perform a manual cued detection of the target of interest [T-0820] A[T].C, P[T].G

(U) The EOSS system SHOULD provide a capability to automatically select and command the VIS zoom position when receiving a slew to cue command from an external source and the accuracy of the sensor pointing angle will be such that the operator is able to perform a manual cued recognition of the target of interest. [O-0821] A[T].C, P[T].G

(U) The VIS SHALL be capable of zooming from WFOV to NFOV as well as from NFOV to WFOV in less than four seconds (4s). [T-0822] A[T].CG, M[T].C, D[O].C, L[T].C

(U) The VIS SHOULD be capable of zooming from the widest optical zoom position to the narrowest optical zoom position in less than two seconds (2s). [O-0823] A[T].CG, M[T].C, D[O].C, L[T].C

(U) The VIS SHALL have the capability of setting a minimum of three (3) preset FOV preset positions. [T-0824] A[T].C, D[T].C, P[O].G

(U) The VIS WFOV SHALL be greater than or equal to fifteen angular degrees (15°) in the vertical and greater than or equal to twenty-six angular degrees (26°) in the horizontal. [T-0825] A[T].CG, M[T].C, D[O].C

(U) The VIS SHALL have the capability and user interface to configure the integration time of each sensor independently in real time, and each sensor have a range of Operator selected integration time to allow adaptation to the scene and the environment. [T-0826] A[T].CG, D[O].C

(U) The VIS SHOULD have the capability to automatically and independently adjust the integration time to the scene and the environment. [O-0827] A[T].CG, D[O].C

(U) The EOSS aiming reticle(s) SHALL not move more than ten percent (10%) (measured in horizontal and Vertical directions) while changing from the VIS NFOV to WFOV. [T-0828] A[T].CG, M[O].C, D[O].C, R[O].G, P[T].G

(U) The VIS SHALL have a minimum focus range of fifty meters (50m) or less at its narrowest FOV. [T-0829] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The VIS SHALL have a maximum focus range of infinity at its narrowest FOV. [T-0830] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) This VIS SHALL be able to be focused continuously from its minimum to maximum focus at its narrowest FOV. [T-0831] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The VIS SHALL have a minimum focus range of ten meters (10m) or less at its widest FOV. [T-0832] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The VIS SHALL have a maximum focus range of infinity at its widest FOV. [T-0833] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) This VIS SHALL be able to be focused continuously from its minimum to maximum focus at its widest FOV. [T-0834] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The VIS SHALL have a continuous autofocus capability that allows for optimum adjustment of system focus at the center of the FOV without any outside source of information from the system. [T-0835] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The EOSS SHALL provide a capability to automatically select and command the sensor's focus positions when receiving a slew to cue command from an external source. [T-0836] A[T].C, D[O].C, P[T].G

(U) The VIS SHALL have an autofocus capability that allows for optimum adjustment of system focus via Operator initiated (button press) function. [T-0837] A[T].C, D[T].C, R[O].G, P[T].G

(U) The VIS SHALL have a one hundred percent (100%) Manual focus control mode that provides no amount of automatic adjustments and initializes to the most recent settings from the automatic mode. [T-0838] A[T].C, D[T].C, R[O].G, P[T].G

(U) VIS focus SHALL be retained as the VIS FOV is changed. [T-0839] A[T].CG, M[T].C

(U) The optical axis of the VIS fixed optics SHOULD maintain a temporal pointing accuracy of better than fifty percent (50%) of the VIS NFOV. [O-0840] A[T].C, D[T].C, R[O].G, P[T].G

(U) The VIS SHALL be capable of full operational performance within two minutes (2 min.) for the full operational temperature range. [T-0841] A[T].C, M[T].C, L[T].C, R[T].G, P[T].G

3.31 (U) TIS

The TIS SHALL meet the following requirements over the full El FOR (T-0782) and Az range of motion (T-0750). [T-0842] A[T].C, M[T].CG, L[T].C, L[O].G, R[O].G, P[O].G

(U) The TIS at its NFOV and without image alteration SHALL be designed and manufactured to achieve a N50 of four (4) or greater for an object with a target critical dimension of seven and seven hundredths meters (7.07m) at a range of twelve thousand meters (12,000m) and less given a thermal contrast of one Kelvin (1 K) and an extinction coefficient of two hundred thirty three thousandths per kilometer (0.233/km). [T-0843] A[T].C, M[T].CG, L[T].C, L[O].G, R[O].G, P[O].G

(U) The TIS at its NFOV and without image alteration SHALL be designed and manufactured to achieve a N50 of ten (10) or greater for an object with a target critical dimension of twelve and seventy two hundredths meters (12.72m) at a range of eleven thousand five hundred (11,500m) and less given a thermal contrast of four Kelvin (4 K) and an extinction coefficient of two hundred thirty three thousandths per kilometer (0.233/km). [T-0844] A[T].C, M[T].CG, L[T].C, L[O].G, R[O].G, P[O].G

(U) Note: Target Critical Dimension is defined for this section as the square root of the exposed target area.

(U) Note: Thermal Contrast is defined for this section as the area-weighted difference between the average temperature of the target and the average temperature of the background.

(U) Note: Atmospheric transmission for this section SHALL be calculated using Beer's law as $T = e^{-\alpha R}$, where R is the range from the target to the sensor in kilometers and α is the atmospheric extinction coefficient.

(U) Note: Image alteration is defined for this section to be EE, e-zoom, contrast enhancement, etc.

(U) The TIS SHALL provide thermal imaging in the entire spectral range between three micrometers and five micrometers (3µm-5µm). [T-0845] A[T].C, M[T].CG, L[T].C, L[O].G, R[O].G, P[O].G

(U) The TIS SHALL utilize a CO2 notch filter that operates in the TIS spectral region. [T-0846] A[T].CG, M[T].C, D[O].C, L[T].C

(U) The TIS SHALL utilize a HD FPA with one thousand two hundred eighty horizontal by seven hundred twenty vertical (1280(H) x 720(V)) or greater array size. [T-0847] A[T].C, L[T].C, L[O].G

(U) The TIS SHOULD utilize an HD FPA with one thousand nine hundred twenty horizontal by one thousand eighty vertical (1920(H) x 1080(V)) or greater array size. [O-0848] A[T].C, L[T].C, L[O].G

(U) The TIS SHALL have a spatial Noise Equivalent Temperature Difference (NETD) of less than twenty-five millikelvin (25mK) at an ambient testing temperature of three hundred Kelvin (300K). [T-0849] A[T].CG, M[T].C, D[O].C, L[T].C

(U) The TIS SHALL have a dynamic range of greater than seventy-five decibels (75dB). [T-0850] A[T].C/G, D[T].C

(U) The TIS SHOULD utilize a FPA / Digital-pixel Focal Plane Array (DFPA) / ReadOut Integrated Circuit (ROIC) / Digital ReadOut Integrated Circuit (DROIC) / for High Dynamic Range (HDR) of greater than ninety-six decibels (96 dB). [O-0851] A[T].C/G, D[T].C

(U) The TIS SHALL have a bit depth of fourteen (14) bits across the TIS dynamic range. [T-0852] A[T].C/G, D[T].C

(U) The TIS SHOULD have a bit depth of sixteen (16) bits across the TIS dynamic range. [O-0853] A[T].C/G, D[T].C

(U) The TIS FPA SHALL have a greater than ninety nine percent (99%) pixel operability prior to any pixel killing or masking. [T-0854] A[T].C/G, D[T].C

(U) The TIS FPA SHOULD have a greater than ninety-nine and a half percent (99.5%) pixel operability prior to any pixel killing or masking. [O-0855] A[T].C/G, D[T].C

(U) Note: A dead pixel is defined for this section as a pixel that exceeds twenty five percent (25%) of the average value across the array while looking at a uniform black body with a specific temperature.

(U) The TIS SHALL have a total of zero (0) dead, bad pixels, or blinking pixels in the center twenty five percent (25%) (measure in horizontal and vertical directions) of the FPA after masking / killing dead, bad, or blinking pixels. [T-0856] A[T].C/G, D[T].C

(U) The TIS SHALL have a total of less than or equal to two (2) dead, bad pixels, or blinking pixels in the center seventy five percent (75%) (measure in horizontal and vertical directions) of the FPA after masking / killing dead pixels. [T-0857] A[T].C/G, D[T].C

(U) The TIS SHALL have a total of less than or equal to six (6) dead, bad pixels, or blinking pixels in the entire FPA after masking / killing dead pixels. [T-0858] A[T].C/G, D[T].C

(U) The TIS SHALL be initialized by separate and specific operator action from the GCS console. [T-0859] A[T].CG, M[T].C, D[O].C

(U) The TIS SHALL reach operational temperature and performance within ten minutes (10min) after system startup with normal configuration settings from maximum required ambient temperature and solar loading. [T-0860] A[T].CG, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) The TIS cooler SHOULD be configurable so that cool down settings can be adjusted for increased reliability while taking no longer than thirty minutes (30min) to cool down. [O-0861] A[T].C, M[T].C, D[O].C, L[T].C, P[T].G

(U) TIS cooler (if applicable) SHALL be able to be put into battle short mode while still meeting reliability metrics [T-0862] A[T].CG, M[T].C, D[O].C

(U) The TIS SHALL have a continuous zoom from WFOV to NFOV. [T-0863] A[T].CG, M[T].C, D[O].C

(U) The TIS SHALL provide a capability to automatically select and command the sensor's zoom position, or positions if in a slaved zoom mode, when receiving a slew to cue command from an external source and the accuracy of the sensor pointing angle will be such that the Operator is able to perform a manual cued detection of the target of interest [T-0864] A[T].C, D[O].C, P[T].G

(U) The TIS SHOULD provide a capability to automatically select and command the sensor's zoom position when receiving a slew to cue command from an external source and the accuracy of the sensor pointing angle will be such that the Operator is able to perform a manual cued recognition of the target of interest. [O-0865] A[T].C, D[O].C, P[T].G

(U) The TIS SHALL be capable of zooming from the widest optical zoom position to the narrowest optical zoom position as well as from the narrowest optical zoom position to the widest optical zoom position in less than four seconds (4s). [T-0866] A[T].CG, M[T].C, D[O].C

(U) The TIS SHOULD be capable of zooming from the widest optical zoom position to the narrowest optical zoom position in less than two seconds (2s). [O-0867] A[T].CG, M[T].C, D[O].C

(U) The TIS SHALL have the capability of setting a minimum of three (3) preset FOV preset positions. [T-0868] A[T].C, M[T].C, D[T].C, P[O].G

(U) The TIS NFOV SHALL satisfy the imager performance requirement UIDs T-0843, and T-0844 [T-0869] A[T].C, M[T].CG, D[O].C, L[T].C, L[O].G, R[O].G, P[O].G

(U) The TIS WFOV SHALL be greater than or equal to eleven angular degrees (11°) in the vertical and greater than or equal to twenty angular degrees (20°) in the horizontal. [T-0870] A[T].CG, M[T].C, D[O].C

(U) The EOSS aiming reticle(s) SHALL not move more than ten percent (10%) (measured in horizontal and Vertical directions) while changing from the TIS NFOV to WFOV. [T-0871] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

(U) The TIS SHALL have a continuous autofocus capability that allows for optimum adjustment of system focus at the center of the FOV without any outside source of information from the system. [T-0872] A[T].C, M[T].C, D[T].C

(U) The EOSS system SHALL provide a capability to automatically select and command the TIS focus positions when receiving a slew to cue command from an external source. [T-0873] A[T].C, D[O].C, P[T].G

(U) The TIS SHALL have a minimum focus range of fifty meters (50m) or less at its narrowest FOV. [T-0874] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The TIS SHALL have a maximum focus range of infinity at its narrowest FOV. [T-0875] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) This TIS SHALL be able to be focused continuously from its minimum to maximum focus at its narrowest FOV. [T-0876] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The TIS SHALL have a minimum focus range of ten meters (10m) or less at its widest FOV. [T-0877] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The TIS SHALL have a maximum focus range of infinity at its widest FOV. [T-0878] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) This TIS SHALL be able to be focused continuously from its minimum to maximum focus at its widest FOV. [T-0879] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The TIS SHALL have an autofocus capability that allows for optimum adjustment of system focus via Operator initiated (button press) function. [T-0880] A[T].C, D[T].C, R[O].G, P[T].G

(U) The TIS SHALL have a one hundred percent (100%) Manual focus control mode that provides no amount of automatic adjustments and initializes to the most recent settings from the automatic mode. [T-0881] A[T].C, D[T].C, P[T].G

(U) TIS focus SHALL be retained as the FOV is changed. [T-0882] A[T].CG, M[T].C, D[O].C, P[T].G

(U) The TIS SHOULD have the capability to automatically and independently adjust the integration time to the scene and the environment. [O-0883] A[T].CG, D[O].C, P[T].G

(U) The optical axis of the TIS fixed optics SHOULD maintain a temporal pointing accuracy of better than fifty percent (50%) of the TIS NFOV. [O-0884] A[T].C, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

3.32 (U) VIS TIS Matching

(U) The VIS and TIS on a single director SHALL be capable of being set by the Operator to zoom in and out together given a single zoom command. [T-0885] A[T].C, D[O].C, L[T].C, L[O].G, P[T].G

(U) The VIS and TIS zoom controls SHALL be capable of being set by the Operator to zoom each imaging sensor in and out independently given a single zoom command. [T-0886] A[T].C, D[O].C, L[T].C, L[O].G, P[T].G

(U) The VIS and TIS SHALL provide matching FOV's when slaved zoom is the selected mode of operation to within five percent (5%). [T-0887] A[T].C, D[O].C, L[T].C, L[O].G

(U) The VIS and TIS SHALL have a capability for focus matching that would apply to autofocus or manual focus and would focus all the imaging sensor given a single focus or autofocus command. [T-0888] A[T].C, D[T].C, L[T].C, P[T].G

3.33 (U) ELRF

The ELRF SHALL meet the following requirements over the full El FOR (T-0782) and Az range of motion (T-0750). [T-0889] A[T].CG, M[T].CG, D[O].C, L[T].C, R[T].G, P[T].G

(U) The ELRF SHALL be designed and manufactured to return the range greater than, ninety nine and a half percent (99.5%) of the time, of a target that is six percent (6%) or greater reflective, is six meters by seven meters (6m x 7m) or larger, is perpendicular to the ELRF optical axis, and is between one hundred meters (100m) and fifteen thousand meters (15,000m), given an atmospheric extinction coefficient of ninety nine thousandths (0.099). [T-0890] A[T].CG, M[T].CG, D[O].C, L[T].C, R[T].G, P[T].G

(U) The ELRF SHALL emit a wavelength in the one and a half micrometer to one and sixty-five hundredths micrometer (1.5 µm-1.65µm) band and that allows for EOSS to meet the operational requirements. [T-0891] A[T].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The ELRF SHALL have a manual and continuous firing mode pulse repetition rate of greater than or equal to {redacted, available in CUI version}. [T-0892] A[T].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The ELRF SHALL have a continuous firing mode pulse repetition rate of greater than or equal to {redacted, available in CUI version}. [T-0893] A[T].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The ELRF SHALL have a duty cycle of {redacted, available in CUI version} at all operating pulse rates. [T-0894] A[T].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The ELRF SHALL have a duty cycle of {redacted, available in CUI version} at all operating pulse rates throughout the full operating temperature range of the EOSS. [T-0895] A[T].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The ELRF SHALL have a time out duration that is set by maintenance, safety, or depot personnel that includes a battle override function. [T-0896] A[T].CG, D[O].C, P[T].G

(U) The Beam Jitter of the ELRF SHALL be less than or equal to twenty five percent (25%) of the divergence. [T-0897] A[T].C, M[T].C, L[T].C, R[O].G

(U) The ELRF Divergence SHALL be less than or equal to one milliradian (1mrad). [T-0898] A[T].CG, M[T].C, D[O].C, P[T].G

(U) The ELRF divergence SHOULD be reduced as much as practical to reduce overspill, underspill, and clipping, while still meeting performance and safety requirements. [O-0899] A[T].C, M[T].C, D[O].C, L[T].C, P[T].G

(U) The ELRF SHALL have a life cycle of greater than or equal to one million (1,000,000) ELRF shots before failure. [T-0900] A[T].C, D[O].C

(U) The ELRF SHOULD have a life cycle of greater than or equal to ten million (10,000,000) ELRF shots before failure. [O-0901] A[T].CG, D[O].C

(U) The ELRF Receiver SHALL not be damaged by its own ELRF transmitter return at {redacted, available in CUI version}. [T-0902] A[T].C, M[T].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The ELRF SHALL have an accuracy of less than or equal to {redacted, available in CUI version} at all ranges required for performance-based metrics. [T-0903] A[T].C, M[T].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The ELRF SHOULD have an accuracy of less than or equal to {redacted, available in CUI version} at all ranges required for performance-based metrics. [O-0904] A[T].C, M[T].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The ELRF SHALL update track range data at {redacted, available in CUI version}. [T-0905] A[T].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The EOSS systems SHALL be capable of displaying operator selected range units to include nautical miles (nMi), meters, yards, and feet. [T-0906] A[T].CG, D[T].C, P[T].G

(U) The EOSS SHALL be capable of converting the units of the last range taken to any of the range settings or converting datums for a geolocated object without having to re-range the object. [T-0907] A[T].CG, D[T].C, P[T].G

(U) The EOSS SHALL allow the Operator to select the ELRF return settings including first / last, best or first, second, third return. [T-0908] A[T].CG, D[O].C

(U) The ELRFs range SHALL display at a higher precision than the range error of the ELRF so that the error is not compounded (i.e. a plus or minus five meter (5m) accuracy ELRF might show range in one meter (1m) increments). [T-0909] A[T].C, M[O].C, D[T].C

(U) The ELRF displays SHALL support as many digits as the range counter (i.e. internal electronics that count time) can support, even if it is expected to never encounter max range. [T-0910] A[T].C, D[T].C

(U) The ELRF SHALL meet operational requirements and have a laser range time tag accuracy of one thousandths seconds (0.001s) or less. [T-0911] A[T].C, M[O].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The ELRF SHOULD meet operational requirements and have a laser range time tag accuracy of one ten-thousandths seconds (0.0001s) or less. [O-0912] A[T].C, M[O].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The ELRF FAR for all targets and required ranges SHALL be less than a half percent (0.5%). [T-0913] A[T].C/G, M[T].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) Lasers SHALL not have a beam waist external to the ELRF. [T-0914] A[T].C, M[T].C, L[T].C

(U) The ELRF SHALL output a single beam for ranging. [T-0915] A[T].C, M[T].C, L[T].C

(U) Lasers SHALL only output the designed wavelength in any environment and across all angles. [T-0916] A[T].C, M[T].C, L[T].C

(U) The EOSS SHOULD provide a {redacted, available in CUI version}. [O-0917] A[T].C, M[O].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) Any pump wavelength SHALL be filtered below detectable levels. [T-0918] A[T].C, M[T].C, L[T].C

(U) Detectability SHALL be determined based on the pump laser wavelength. [T-0919] A[T].C, M[T].C, L[T].C

(U) The ELRF SHALL measure and report true range to the GCS at a minimum distance of less than or equal to fifty meters (50m). [T-0920] A[T].C, M[T].C, L[T].C, R[O].G, P[O].G

(U) Beam jitter SHALL be designed to move within no more than twenty five percent (25%) of the divergence. [T-0921] A[T].C, M[T].C, L[T].C, R[O].G

(U) When the ELRF is fired and a range is not returned, the EOSS SHALL send an indication of "No Return" to the GCS. [T-0922] A[T].C/G, D[T].C, R[T].G, P[T].G

(U) When the ELRF is fired and multiple ranges are returned, a multiple range indication and all ranges up to the first five (5) returns SHALL be reported to the GCS. [T-0923] A[T].CG, D[T].C, R[T].G, P[T].G

(U) The ELRF SHALL incorporate a range gating function in which only those range values returned from within a preset range band SHALL be transmitted to the GCS. The range band SHALL be designated from the GCS and conveyed via the GWS LAN. [T-0924] A[T].C, M[O].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The range band function SHALL support either fixed upper and lower range limits or a floating band around a dynamic range value(s) received from the GCS. [T-0925] A[T].C, M[O].C, D[O].C, L[T].C, R[O].G, P[O].G

(U) The EOSS SHALL report range of each valid ELRF range measurement to the GCS, tagged with the common time of the range, and at a latency not to exceed one hundred milliseconds (100ms) from time of range measurement to time of output onto the GWS LAN. [T-0926] A[T].CG, M[T].C, D[O].C, L[T].C, R[O].G, P[T].G

3.34 (U) Alignment

(U) Each EOSS topside element SHALL contain an embedded Inertial Measurement Unit (IMU) to automatically align to true north, east, and nadir (down) with a director heading accuracy less than one milliradian (1.0 mrad) RMS, heading stability less than two tenths milliradian per hour (0.2 mrad/hr), pitch and roll accuracy of less than half a milliradian (0.5mrad) RMS, and alignment time less than fifteen minutes (15min) in static conditions and less than sixteen minutes (16min) in dynamic conditions. [T-0927] A[T].C, M[O].C, D[O].C, L[T].C/G, P[T].G

(U) Without the support from ship's forces, technical representatives, or outside systems, the EOSS SHALL have the ability to self-align, measure, calculate, display, and report (e.g., MD) Az (relative to sensor mount). [T-0928] A[T].C, M[O].C, D[T].C, P[T].G

(U) Without the support from ship's forces, technical representatives, or outside systems, the EOSS SHALL have the ability to self-align, measure, calculate, display, and report (e.g., MD) Range (slant distance to target). [T-0929] A[T].C, M[O].C, D[T].C, P[T].G

(U) Without the support from ship's forces, technical representatives, or outside systems, the EOSS SHALL have the ability to self-align, measure, calculate, display, and report (e.g., MD) Relative Bearing (relative to ship's centerline plane). [T-0930] A[T].CG, M[O].C, D[T].C, P[T].G

(U) Without the support from ship's forces, technical representatives, or outside systems, the EOSS SHALL have the ability to self-align, measure, calculate, display, and report (e.g., MD) Relative El (relative to ship's combat system master reference plane). [T-0931] A[T].CG, M[O].C, D[T].C, P[T].G

(U) Without the support from ship's forces, technical representatives, or outside systems, the EOSS SHALL have the ability to self-align, measure, calculate, display, and report (e.g., MD) True Bearing (relative to true north). [T-0932] A[T].CG, M[O].C, D[T].C, P[T].G

(U) Without the support from ship's forces, technical representatives, or outside systems, the EOSS SHALL have the ability to self-align, measure, calculate, display, and report (e.g., MD) True El (relative to tangential horizon plane that is orthogonal to Up/Down vector). [T-0933] A[T].CG, M[O].C, D[T].C, P[T].G

(U) Without alignment support from ship's forces or technical representatives, the EOSS SHALL have the ability to calculate, display, and report (e.g., MD) sensor and track positions in the East-North-Up reference frame (relative to Own Ship Reference Point (OSRP) or another EOSS defined origin (e.g., sensor position)). [T-0934] A[T].CG, M[O].C, D[T].C, P[T].G

(U) Without alignment support from ship's forces or technical representatives, the EOSS SHALL have the ability to calculate, display, and report (e.g., MD) sensor and track positions in the Earth-Centered Earth-Fixed (ECEF) reference frame (referenced to the center of the earth in true coordinates (i.e., East, North, Up (ENU))). [T-0935] A[T].CG, M[O].C, D[T].C, P[T].G

(U) Without alignment support from ship's forces or technical representatives, the EOSS SHALL have the ability to calculate, display, and report (e.g., MD) sensor and track positions in the Range, True Bearing, Altitude reference frame (Height Above WGS-84 Ellipsoid) (relative to OSRP or another defined origin (e.g., sensor position)). [T-0936] A[T].CG, M[O].C, D[T].C, P[T].G

(U) Without alignment support from ship's forces or technical representatives, the EOSS SHALL have the ability to calculate, display, and report (e.g., MD) sensor and track positions in the Range, True Bearing, True El reference frame (relative to OSRP or another defined origin (e.g., sensor position)). [T-0937] A[T].CG, M[O].C, D[T].C, P[T].G

(U) Without alignment support from ship's forces or technical representatives, the EOSS SHALL have the ability to calculate, display, and report (e.g., MD) sensor and track positions in the geodetic position reference frame (i.e., latitude, longitude, altitude (Height Above Ellipsoid)). [T-0938] A[T].CG, M[O].C, D[T].C, P[T].G

(U) The EOSS SHALL perform startup and Operator initiated automatic alignments for the TIS-to-VIS boresight at the O-level pier side and at-sea during operational conditions to the EOSS track accuracy, boresight alignment and error requirements. [T-0939] A[T].CG, M[O].C, D[T].C, P[T].G

(U) The EOSS SHALL perform startup and Operator initiated automatic alignments for the ELRF-to-VIS boresight at the O-level pier side and at-sea during operational conditions to the EOSS track accuracy, boresight alignment and error requirements. [T-0940] A[T].CG, M[O].C, D[T].C, P[T].G

(U) The EOSS SHALL perform startup and Operator initiated automatic alignments for the VIS-to-Director at the O-level pier side and at-sea during operational conditions to the EOSS track accuracy, boresight alignment and error requirements. [T-0941] A[T].CG, M[O].C, D[T].C, P[T].G

(U) The EOSS SHALL perform startup and Operator initiated automatic alignments for the Director-to-mount at the O-level pier side and at-sea during operational conditions to the EOSS track accuracy, boresight alignment and error requirements. [T-0942] A[T].CG, M[O].C, D[T].C, P[T].G

(U) The EOSS SHALL perform startup and Operator initiated automatic alignments for the Mount-to-ship reference frame at the O-level pier side and at-sea during operational conditions to the EOSS track accuracy, boresight alignment and error requirements. [T-0943] A[T].CG, M[O].C, D[T].C, P[T].G

(U) The EOSS SHALL perform startup and Operator initiated automatic alignments for the Mount-to-earth reference frame at the O-level pier side and at-sea during operational conditions to the EOSS track accuracy, boresight alignment and error requirements. [T-0944] A[T].CG, M[O].C, D[T].C, P[T].G

(U) The spatial pointing accuracy between the director and optical axis of the VIS fixed optics SHOULD be less than fifty percent (50%) of the VIS NFOV. [O-0945] A[T].C, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) The ELRF SHALL maintain a radial boresight error including jitter with VIS aiming reticle across the entire zoom range and centroid of the beam of less than fifty percent (50%) of the ELRF's beam's divergence in all operating conditions. [T-0946] A[T].C, M[T].C, D[O].C, L[T].C

(U) The ELRF SHALL be designed so that the ELRF optical axis can be boresight aligned to the VIS optical axis to within one hundred microradians (100µrad). [T-0947] A[T].CG, M[T].C, D[T].C, L[T].C, P[O].G

(U) The ELRF SHOULD be capable of maintaining {redacted, available in CUI version} boresight accuracy between the laser centroid and system aiming reticle of the VIS NFOV within a {redacted, available in CUI version} temperature change from the last system boresight. [O-0948] A[T].CG, M[T].C, D[T].C, L[T].C, P[O].G

(U) The spatial pointing accuracy between the TIS and VIS SHOULD be better than fifty percent (50%) of the VIS NFOV. [O-0949] A[T].C, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) The TIS SHALL be designed so that the TIS optical axis can be boresight aligned to VIS optical axis to within one hundred microradians (100µrad). [T-0950] A[T].C, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) The EOSS SHOULD provide the user with a boresight error alert for any condition that prevents maintaining the required boresight accuracy. [O-0951] A[T].C, M[O].C, D[T].C, P[T].G

(U) The EOSS SHALL have provisions to correct its measured LOS position for both pointing alignment error and roller path inclination error relative to the ship references. [T-0952] A[T].CG, M[O].C, D[O].C, P[T].G

(U) Position errors due to system pointing error misalignment, director-mounting base tilt and sensor boresight or collimation SHALL be corrected by the EOSS control processor prior to reporting the EOSS LOS position to the GCS. [T-0953] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHALL have the capability for the ELRF, VIS, and TIS to allow the installation and maintenance personnel to electronically offset the zero degrees (0°) relative position to align to a reference point located on the vessel. [T-0954] A[T].C, M[O].C, D[T].C, P[O].G

(U) The EOSS SHOULD have the capability for the ELRF, VIS, and TIS to automatically sense and set the zero degrees (0°) relative position using ship information, inertial reference, and Az/El information from the system, as the installation of the system will not always be a perfect zero degrees (0°) relative to a reference point located on the vessel. [O-0955] A[T].C, M[O].C, D[O].C, L[T].C, P[T].G

(U) The Relative Zero setting accuracy SHALL support the threshold LOS pointing accuracy. [T-0956] A[T].CG, M[O].C, D[O].C, P[T].G

3.35 (U) Image Processing

(U) The Image Processing Suite SHALL be physically located in the BDE. [T-0957] A[T].CG

(U) The Image Processing Suite SHALL have at least one (1) automatic gain and level control mode for all applicable imaging sensors. [T-0958] A[T].CG, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) The Image Processing Suite SHOULD have more than one (1) automatic gain and level control modes that use different optimization approaches. [O-0959] A[T].CG, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) The Image Processing Suite SHALL have one (1) automatic contrast and brightness control mode. [T-0960] A[T].CG, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) The Image Processing Suite SHOULD have more than one (1) automatic contrast and brightness control modes that use different optimization approaches. [O-0961] A[T].CG, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) The Image Processing Suite SHALL have a one hundred percent (100%) manual gain and level, brightness, contrast, local area contract enhancement, and white balance control mode that provides no amount of automatic adjustments, initializes to the most recent settings from the automatic mode, and can be set per imager independently. [T-0962] A[T].CG, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) The Image Processing Suite SHALL have an operator-initiated capability to change between white hot polarity mode and black hot polarity mode independently for each imaging sensor. [T-0963] A[T].CG, M[T].C, D[O].C, R[T].G, P[T].G

(U) The Image Processing Suite SHALL have a NUC capability that produces a non-uniformity of less than three percent (3%) for all infrared imaging sensors that can be initiated for each sensor independently. [T-0964] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The Image Processing Suite SHOULD have a NUC capability that produces a non-uniformity of less than one percent (1%) for all infrared imaging sensors that can be initiated for each sensor independently. [O-0965] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The NUC SHALL accommodate ambient temperature drifts and other sources of spatial noise. [T-0966] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) A NUC SHALL be performed automatically once the applicable camera has reached its optimal FPA temperature following the camera's power up. [T-0967] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The Operator SHALL be capable of initiating a NUC for each sensor independently. [T-0968] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The Image Processing Suite SHALL include Local Area Processing/Contrast Enhancement (LAP/LACE) that can be applied globally or independently to the VIS and TIS MI. [T-0969] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) Note: LAP/LACE is defined as an automatic method of image enhancement that redistributes information such as color and light levels based on the range of information present in the current scene and allows mitigation of the low contrast conditions to improve object definition.

(U) The Image Processing Suite SHALL include EE that can be applied globally or independently to the VIS and TIS MI. [T-0970] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) Note: EE is defined as a function to increase the sharpness of the edges within a scene.

(U) The Image Processing Suite SHALL include image stitching that can be applied globally or independently to the VIS and TIS MI. [T-0971] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The Image Processing Suite SHALL include turbulence mitigation (TM) that can be applied globally or independently to the VIS and TIS MI. [T-0972] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) Note: TM is defined as a functionality in order to enhance images to correct for the degradation caused by atmospheric turbulence.

(U) The Image Processing Suite SHALL include image fusion that can be applied globally or independently to the VIS and TIS MI. [T-0973] A[T].CG, M[T].C, D[O].C, R[T].G, P[T].G

(U) Note: Image fusion is defined as the capability to blend imagery from VIS and TIS and control the contribution from each source.

(U) The Image Processing Suite SHOULD include Scintillation Mitigation (SM) that can be applied globally or independently to the VIS and TIS MI. [O-0974] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) Note: SM is defined as the ability to compensate for unwanted light flashes or speckles.

(U) The Image Processing Suite SHOULD include Super-Resolution (SR) that can be applied globally or independently to the VIS and TIS MI. [O-0975] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) Note: SR is defined as the ability to apply a function that increases the resolution beyond the diffraction limit.

(U) The Image Processing Suite SHOULD include de-aliasing that can be applied globally or independently to the VIS and TIS MI. [O-0976] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The Image Processing Suite SHOULD include de-blurring that can be applied globally or independently to the VIS and TIS MI. [O-0977] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The Image Processing Suite SHOULD include de-noising that can be applied globally or independently to the VIS and TIS MI. [O-0978] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The Image Processing Suite SHOULD include electronic image stabilization that can be applied globally or independently to the VIS and TIS MI. [O-0979] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The Image Processing Suite SHOULD enable running algorithms from third party sources in a common user operating environment that are decoupled from the sensor manufacturer. [O-0980] A[T].CG, M[T].C, D[T].C

(U) The Image Processing Suite SHOULD have haze penetration image processing for VIS imagery. [O-0981] A[T].C, M[T].C, D[O].C, L[T].C, R[O].G, P[T].G

(U) The Image Processing Suite SHOULD provide both two dimensional (2D) and when ELRF or passive ranging data is available three dimensional (3D) geo-registration of each pixel in the entire image for accurate correlation of geodetic inputs to imagery content positions across the FOV. [O-0982] A[T].C, M[T].C, D[O].C, L[T].C, R[O].G, P[T].G

(U) Any image processing feature which relies on multi-frame convolution, hysteresis, or other non-real-time processing SHALL be enabled/disabled by operator action and SHALL provide the operator an indication of the increased latency when enabled. [T-0983] A[T].CG, D[O].C, L[T].C, R[T].G, P[T].G

(U) Image Processing Suite SHALL have the ability to correct spatial noise in the image created by manufacturing non-uniformities, imaging system changes, environmental changes, self-heating, etc. [T-0984] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

(U) The Image Processing Suite SHALL provide both two-dimensional (2D) and when ELRF or passive ranging data is available three-dimensional (3D) geo-registration of each pixel in the entire image for accurate correlation of geodetic inputs to imagery content positions across the FOV. [T-0985] A[T].C, M[T].C, D[O].C, L[T].C, R[O].G, P[T].G

(U) The Image Processing Suite SHALL employ techniques to provide clutter mitigation for the purpose of improved target detection and tracking in clutter. [T-0986] A[T].C, M[T].C, L[T].C, R[O].G, P[T].G

(U) Image latency from the entrance aperture to BDE output SHALL be less than one hundred milliseconds (100ms). [T-0987] A[T].C, M[T].C, L[T].C, R[O].G, P[T].G

(U) The EOSS SHALL be capable of compensating for parallax issues caused by ranging small target at the systems minimum range. [T-0988] A[T].C, M[T].C, D[T].C, R[O].G, P[T]

3.36 (U) EOSS Controller

(U) The EOSS controller SHALL serve as the sole inter-system computer link with the GCS (via the GWS LAN). [T-0989] A[T].CG

(U) The EOSS controller SHALL initiate and process all EOSS unique Computer Software Configuration Items (CSCI). [T-0990] A[T].CG

(U) The EOSS controller SHALL initiate and process all EOSS operating commands received from the GCS via the GWS LAN (e.g., system initialization commands, EOSS commands, sensor control commands). [T-0991] A[T].CG, D[O].C, R[O].G, P[T].G

(U) The EOSS controller SHALL accept any EOSS data (e.g., combat system alignment data; operator entered alignments) and distribute to required LRU for storage and application. [T-0992] A[T].CG, M[O].C, P[T].G

(U) The EOSS controller SHALL initiate and process all BIT functions. [T-0993] A[T].CG, M[O].C, P[T].G

(U) The EOSS controller SHALL incorporate an “EOSS reset” function [T-0994] A[T].CG, M[O].C, D[O].C, P[T].G

3.37 (U) Communication

(U) Each EOSS SHALL interface to the GWS LAN and SHALL be the single EOSS point of connection to the GWS LAN. The GWS LAN Interface Component used SHALL be a 1-GB LX Single Mode Fiber-Optic cable no greater than seventy-six meters (76m). [T-0995] A[T].CG, L[T].C

(U) ALL communications between the GCS and EOSS SHALL take place over the GWS LAN. [T-0996] A[T].CG, L[T].CG

(U) The sensor command and control SHALL interface using Ethernet Internet Protocol version 4 (IPv4) from the BDE to the GCS. [T-0997] A[T].CG, M[O].C, L[T].C, L[O].G

(U) Communications among the GCSC, EOSS, and GWS console applications SHALL be exchanged over a Fast Ethernet 1000Base LX SM fiber-optic Ethernet IAW IEEE 802.3-2004, using IP multicast IAW IETF RFC 1112. [T-0998] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) The EOSS SHALL use Direct X-Windows X11R6 protocol to initiate displays at the GWS console that is in control of the EOSS, and to read operator-control actions from that console. These exchanges are governed by the X11R6 protocol with no additional handshake requirements at the application level. [T-0999] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) PTP SHALL be used by the EOSS to synchronize time with the AEGIS Combat System over AEGIS LAN Interconnect System (ALIS) to within two milliseconds (2ms). [T-1000] A[T].CG, M[O].C, P[T].G

(U) EOSS system SHALL be a Follower per PTP defined by IEEE Standard 1588. [T-1001] A[T].CG, M[O].C

(U) Messages and commands between the GCS and BDE SHOULD comply with {redacted, available in CUI version}. [O-1002] A[T].CG, M[O].C, D[O].C, L[T].CG, P[T].G

3.38 (U) CSCI

(U) Except for specific changes affecting the interfaces to the GCS, the primary EOSS operating CSCI(s) SHALL be maintainable independently of the GCS software. [T-1003] A[T].CG, M[O].C, D[O].C, L[T].CG, P[T].G

(U) The EOSS SHALL incorporate a feature to reload or re-initialize the EOSS CSCI(s) from the GCS console by commands conveyed via the GWS LAN. [T-1004] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) The primary EOSS operating CSCI(s) SHALL be capable of being remote loaded. This requirement does not apply to embedded sub-system processors. [T-1005] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) Modification of any EOSS CSCI(s) as a result of any maintenance action SHALL be limited to defining ship or system unique parameters [T-1006] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) Modification of any EOSS CSCI(s) as a result of any maintenance action SHALL not affect the primary operational CSCI functionality. [T-1007] A[T].CG, M[O].C, D[O].C, P[T].G

3.39 (U) Video Distribution

(U) The EOSS SHALL support the simultaneous transmission of VIS and TIS video from the BDE to each GCS console via a dedicated point-to-point fiber optic distribution network. [T-1008] A[T].CG, M[O].C, D[O].C, L[T].C, R[O].G, P[T].G

(U) The number of video signals from an EOSS to each GCS console SHALL not exceed a total of four (4). [T-1009] A[T].CG, M[O].C

(U) The EOSS SHALL transmit digital video directly to GCS Consoles via fiber optic, Ethernet network connection using the H.264 Real-Time Streaming Protocol. [T-1010] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHALL output VIS and TIS video from the below-deck ancillary equipment suite to an external video distribution system. [T-1011] A[T].CG, M[O].C, P[T].G

(U) The sensor video output to the external video distribution system SHALL be as selected from the controlling GCS console. [T-1012] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) External video distribution SHALL not degrade video to the GCS consoles. [T-1013] A[T].CG, M[O].C, L[T].CG, P[T].G

(U) The EOSS SHALL transmit video to the DiVDS for distribution through the ship. [T-1014] A[T].CG, M[O].C, P[T].G

(U) EOSS SHALL transmit annotation signals in the form of MD packets to DiVDS IAW WS-35435, where the annotation is added by the DiVDS. [T-1015] A[T].CG, M[O].C, P[T].G

(U) The EOSS annotation SHALL be performed IAW the Distributed Video System/Common Display System Interface Design Specification, WS-35435. [T-1016] A[T].CG, M[O].C, P[T].G

(U) The EOSS SHALL transmit annotated signals in the form of MD packets to the external video distribution system IAW WS-35435 where the annotation is added by DiVDS. [T-1017] A[T].CG, M[O].C, P[T].G

(U) The EOSS SHALL insert and display a graduated reticle in each sensor FOV video display which can be used to determine the relative angular separation (in Az and El) between objects in the displayed video to within one milliradians (1mR). [T-1018] A[T].CG, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) The reticle SHALL be centered in the displayed video. [T-1019] A[T].CG, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) The scaling of the reticle graduations SHALL be consistent between the sensor FOVs. [T-1020] A[T].CG, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) The EOSS SHALL insert and display any additional graphical indicators or icons inherent to the basic system. [T-1021] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) The EOSS SHALL insert and display any annotation necessary for system alignments or adjustments and situational awareness indicators. [T-1022] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) The EOSS annotation to be displayed SHALL be selected from the controlling GCS console via commands and data conveyed across the GWS LAN. [T-1023] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) All EOSS annotation, graphics or textual data fields, SHALL be individually selectable as displayed or not displayed. [T-1024] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) The EOSS SHALL support the ability to have separate annotation configurations – one for the GCS console video distribution and one for the external video distribution. [T-1025] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) The EOSS SHALL support the ability to display textual annotation associated with the EOSS BIT, operator prompts and alerts, situational awareness data, etc. either on the sensor video or in dedicated X-windows at the GCS consoles. [T-1026] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

3.40 (U) EOSS States

3.40.1 (U) Power-Off State

(U) The EOSS SHALL enter the power-off state by switch action at the below-deck ancillary equipment suite. [T-1027] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) In the power-off state there SHALL be no power applied to any element of the EOSS with the exception of primary power applied to the below-deck ancillary equipment suite. [T-1028] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) In the power-off state the director SHALL be at the stow position with the power off brakes engaged. [T-1029] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

3.40.2 (U) Pre-Standby State

(U) The EOSS SHALL enter the pre-standby state from the power off state by switch action at the below-deck ancillary equipment suite. [T-1030] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) The EOSS SHALL enter pre-standby state from the standby or operate state by operator commands conveyed from the GCS console via the GWS LAN. [T-1031] A[T].CG, M[O].C, R[T].G, P[T].G

(U) Pre-standby state SHALL be reported to the operator as the “Off” or “Ready” state. [T-1032] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) In the pre-standby state the EOSS SHALL be preconditioned to be transitioned into standby state by operator commands conveyed from the GCS console via the GWS LAN. [T-1033] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) In the pre-standby state maintenance power SHALL be applied only to components necessary to enable subsequent system initialization from the GCS console and thermostatically controlled environmental heaters. [T-1034] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) In the pre-standby state the director SHALL remain at the stow position with the power off brakes engaged. [T-1035] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) In the pre-standby state the EOSS SHALL be capable of not less than ninety (90) days continuous service in this state without self-damage. [T-1036] A[T].CG, M[O].C, L[T].C, P[T].G

3.40.3 (U) Standby State

(U) The EOSS SHALL enter the standby state, from either pre-standby state or operate state by operator commands conveyed from the GCS console via the GWS LAN. [T-1037] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) The transition time from the selection of standby state to a condition where operate state selection is available SHALL not exceed two minutes (2min). [T-1038] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) In the standby state the EOSS operating software SHALL be initialized. [T-1039] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) In the standby state system power SHALL be distributed to all EOSS subsystems except components and subsystems requiring separate operator initialization. [T-1040] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) In the standby state inherent EOSS start up tests SHALL be initiated. [T-1041] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) In the standby state, the operator SHALL be able to initiate self-tests from the GCS console. [T-1042] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) In the standby state any operator initiated self-test status and results of such tests SHALL be reported to the GCS console via the GWS LAN. [T-1043] A[T].CG, M[O].C, R[T].G, P[T].G

(U) In the standby state the director SHALL remain at the stow position and the power off brake SHALL remain engaged. [T-1044] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) In the standby state the EOSS SHALL be ready to transition into the operate state or be returned to the pre-standby state. [T-1045] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

3.40.4 (U) Operate State

(U) The EOSS SHALL enter the operate state from the standby state by GCS operator action. [T-1046] A[T].CG, M[O].C, D[O].C, R[T].G, P[T].G

(U) At ambient conditions of twenty-five degrees Celsius (25°C) plus or minus five and five tenths degrees Celsius (5.5°C) the transition time from standby state to operate state SHALL not exceed five seconds (5s). [T-1047] A[T].CG, M[T].C, L[T].CG

(U) Transition to the operate state SHALL not exceed fifteen minutes (15min) under any operating temperature conditions cited in this specification. [T-1048] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) In the operate state the power off brake SHALL be released, the director SHALL be stabilized against ship's motion and the designated aligned Line of Sight (LOS) positioned at zero degrees relative Az and El in manual operating mode. [T-1049] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) In the operate state all EOSS components and subsystems except those requiring separate operator initialization SHALL be functional. [T-1050] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In the operate state all EOSS operating controls SHALL be available to the GCS operator. [T-1051] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In the operate state the EOSS SHALL be ready for full system operation in any operating mode or sub-mode or to be returned to the standby or pre-standby state. [T-1052] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHALL be capable of operation in any of the operating modes or sub modes, once transitioned to the operate state. [T-1053] A[T].CG, M[O].C, D[O].C, P[T].G

(U) Settings used in the operate state, including zoom, sensor, focus and any other selected settings, SHALL be retained when transitioning from operate state to standby unless the actions required in standby state force an alteration to the prior operate state settings. [T-1054] A[T].CG, M[O].C, D[O].C, P[T].G

3.41 (U) Operational modes

(U) The EOSS SHALL meet the following operational mode requirements. [T-1055] A[T].CG, M[O].C, D[O].C, P[T].G

(U) With the exception of automatically initiated AVT mode transitions (i.e., auto track to coast to auto track) the transitions between operating modes SHALL be initiated by operator commands from the (controlling) GCS console. [T-1056] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHALL report satisfactory execution of the command to the GCS via the GWS LAN. [T-1057] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHALL automatically transmit the system status to the GCS every one second (1s) plus or minus one tenth second (0.1s) for combat system readiness assessment. [T-1058] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) The EOSS SHALL automatically transmit the currently occupied operating mode or sub-mode to the GCS at a data rate of not less than sixteen Hertz (16Hz). [T-1059] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) The operating modes Manual Mode, Follower Mode and Auto Track Mode SHALL be reported to the console. [T-1060] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) The only sub-mode to be reported SHALL be Coast Sub-Mode. [T-1061] A[T].CG, M[O].C, D[O].C, P[T].G

3.41.1 (U) Manual Mode

(U) Manual Mode SHALL be the default mode of operation [T-1062] A[T].CG, M[O].C, D[O].C, P[T].G

(U) Manual Mode SHALL be active when the system is not in follower mode, auto track mode, or coast sub-mode. [T-1063] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHALL enter Manual Mode by operator de- selection of the current operating mode. [T-1064] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Manual Mode, the operator SHALL position the EOSS LOS in both axes using the manual control devices at the GCS console. [T-1065] A[T].CG, M[O].C, D[O].C, P[T].G

(U) When in Manual Mode, the following features of operation SHALL be available for operator selection. [T-1066] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The Rate Assist feature SHALL apply only to LOS control via the thumb transducer of the handgrip controller when the system is in (full) manual mode. [T-1067] A[T].C, M[O].C, D[T].C, P[T].G

(U) Upon enabling the Rate Assist feature, the output of the thumb transducer of the handgrip controller SHALL be applied as an angular velocity input command to the stabilized pedestal. [T-1068] A[T].C, M[O].C, D[T].C, P[T].G

(U) While using the Rate Assist feature, the last input velocity SHALL be held constant until modified by an additional input from the thumb transducer. [T-1069] A[T].C, M[O].C, D[T].C, P[T].G

(U) The Automatic Stabilization feature SHALL use automated stabilization to compensate for ship motion in all stabilized axes. [T-1070] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The True Bearing Hold feature SHALL lock true bearing angle and stabilize El. [T-1071] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The Horizon Hold feature SHALL lock El to the horizon while allowing the operator to manually control Az. [T-1072] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The Az Hold feature SHALL lock Az to a relative bearing and stabilize El. [T-1073] A[T].C, M[O].C, D[T].C, P[O].G

(U) The Az and El Hold feature SHALL lock Az and El to an operator selected relative bearing and relative El without Az/El ship motion compensation. [T-1074] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Manual Mode, the EOSS SHALL convey the angular position of the LOS to the GCS at a data rate of thirty-two Hertz (32Hz). [T-1075] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

(U) In Manual Mode, all angular position data SHALL be reported to GCS in deck coordinates accurate to within twenty five hundredths milliradians (0.25mrad) RMS. [T-1076] A[T].C, M[O].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) In Manual Mode, all angular position data SHALL be reported to GCS in true coordinates accurate to within one milliradians (1mrad) RMS corrected for any external and internal system alignments, and corrected for own ship roll, pitch and heading. [T-1077] A[T].C, M[O].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) In Manual Mode, data latency SHALL not exceed ten milliseconds (10ms) from time of measurement to time of output onto the GWS LAN. [T-1078] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

3.41.1.1 (U) Deck Sub Mode

(U) When in Manual Mode, the Deck Sub-Mode of operation SHALL be available for operator selection. [T-1079] A[T].CG, M[O].C, D[O].C, P[T].G

(U) Upon selection of Deck Sub-Mode at the GCS console, the EOSS LOS SHALL be fixed to deck coordinates. [T-1080] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Deck Sub-Mode, the operator SHALL position the EOSS LOS in both axes using the manual control devices at the GCS console. [T-1081] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Manual Mode and Deck Sub-Mode, the EOSS SHALL be capable of being positioned by all manual operating devices within one milliradians (1mrad) RMS of the true geometric position of a fixed angular reference under all environmental disturbances identified in this specification. [T-1082] A[T].C, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) In Manual Mode and Deck Sub-Mode, the EOSS SHALL continually report the LOS position to the GCS. [T-1083] A[T].CG, M[O].C, D[O].C, P[T].G

3.41.2 (U) Follower Mode

(U) The EOSS SHALL enter and exit Follower Mode by operator action at the GCS console. [T-1084] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Follower Mode, the EOSS LOS SHALL be positioned in response to static or dynamic position commands conveyed from the GCS. [T-1085] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Follower Mode, the EOSS SHALL automatically drive the LOS to minimize the difference between the EOSS LOS position and the Az and El angle position conveyed from the GCS. [T-1086] A[T].CG, M[O].C, D[O].C, L[T].C, P[T].G

(U) In Follower Mode and upon loss of the GCS position command, the EOSS LOS SHALL remain at the last commanded position. [T-1087] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Follower Mode and after initial synchronization to the GCS position order(s), the EOSS control processor SHALL generate pedestal commands to maintain the EOSS LOS within one milliradians (1mrad) RMS of the currently commanded position. [T-1088] A[T].C, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) In Follower Mode, the EOSS SHALL be capable of maintaining the 1 milliradian (1mrad) RMS accuracy under all environmental disturbances identified in this specification. [T-1089] A[T].CG, M[O].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) In Follower Mode, the EOSS SHALL continually report the LOS position to the GCS. [T-1090] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Follower Mode, the EOSS SHALL convey the angular position of the LOS to the GCS at a data rate of thirty-two Hertz (32Hz). [T-1091] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

(U) In Follower Mode, all angular position data SHALL be reported to GCS in deck coordinates accurate to within twenty five hundredths milliradians (0.25mrad) RMS. [T-1092] A[T].C, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) In Follower Mode, all angular position data SHALL be reported to GCS in true coordinates accurate to within one milliradians (1mrad) RMS corrected for any external and internal system alignments, and corrected for own ship roll, pitch and heading. [T-1093] A[T].C, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

(U) In Follower Mode, data latency SHALL not exceed ten milliseconds (10ms) from time of measurement to time of output onto the GWS LAN. [T-1094] A[T].CG, M[T].C, D[O].C, L[T].C, R[T].G, P[T].G

3.41.2.1 (U) Manual Aided Sub Mode

(U) Follower Mode SHALL have a Manual Aided Sub-Mode. [T-1095] A[T].CG, M[O].C, D[O].C, P[T].G

(U) Manual Aided Sub-Mode SHALL allow the GCS operator to manually override the GCS position order and assume full manual control of the EOSS LOS by the manual control devices while in Follower Mode. [T-1096] A[T].CG, M[O].C, D[O].C, P[T].G

(U) While in Manual Aided Sub-Mode, upon removal of the overriding manual position order, the EOSS LOS SHALL be positioned at the position currently ordered by the GCS. [T-1097] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Manual Aided Sub-Mode, the EOSS SHALL provide an indication to the operator console as to the mode of operation. [T-1098] A[T].CG, M[O].C, D[O].C, P[T].G

3.41.2.2 (U) Split Follower Sub-Mode

(U) Follower Mode SHALL have a Split Follower Sub-Mode. [T-1099] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Split Follower Sub-Mode, the EOSS SHALL allow the operator to select manual control of either axis (Az or El) while the other axis remains follower to the GCS ordered position. [T-1100] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Split Follower Sub-Mode, operator control of the selected axis SHALL be by the manual control devices. [T-1101] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Split Follower Sub-Mode, upon loss of GCS orders, the position of the follower axis SHALL remain at the last ordered position. [T-1102] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Split Follower Sub-Mode, the EOSS SHALL provide an indication to the operator console as to the mode of operation (i.e., follower or manual) of each axis. [T-1103] A[T].CG, M[O].C, D[O].C, P[T].G

3.41.3 (U) Auto Track Mode

(U) The EOSS SHALL enter the Auto Track Mode from either the follower or manual mode by operator action at the GCS console. [T-1104] A[T].CG, M[O].C, D[O].C, P[T].G

(U) If conditions exist to enter Auto Track Mode, upon initiation by the operator, the AVT SHALL automatically drive the EOSS LOS to minimize the difference between the angular position of the target centroid and the present EOSS LOS position. [T-1105] A[T].CG, M[O].C, D[O].C, P[T].G

(U) After entering auto track mode, the EOSS control processor SHALL generate pedestal commands to maintain the auto track condition. [T-1106] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Auto Track Mode, the EOSS SHALL report the LOS position to the GCS. [T-1107] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Auto Track Mode, the EOSS control processor SHALL convey the angular position of the EOSS LOS plus the AVT measured angle between the EOSS LOS and the target centroid to the GCS at a data rate of thirty-two Hertz (32Hz). [T-1108] A[T].CG, M[T].C, D[O].C, L[T].CG, P[T].G

(U) In Auto Track Mode, all angular position data SHALL be corrected for any external and internal system alignments, be corrected for own ship roll, pitch, and heading, and be conveyed in both true and relative coordinates. [T-1109] A[T].CG, M[O].C, D[O].C, R[O].G, P[T].G

(U) In Auto Track Mode, the reported LOS position SHALL be within one milliradians (1mrad) of the instant true geometric position of the target centroid and SHALL be time tagged. [T-1110] A[T].C, M[T].C, D[O].C, L[T].CG, R[T].G, P[T].G

(U) In Auto Track Mode, data latency SHALL not exceed ten milliseconds (10ms) from time of measurement to time of output onto the GWS LAN. [T-1111] A[T].CG, M[T].C, D[O].C, L[T].CG, R[T].G, P[T].G

(U) When the EOSS is in the Auto Track Mode, a loss of track SHALL cause the EOSS to automatically enter the Coast Sub-Mode. [T-1112] A[T].CG, M[O].C, D[O].C, P[T].G

3.41.3.1 (U) Coast Sub-Mode

(U) In Coast Sub-Mode, the EOSS SHALL generate commands to drive the EOSS LOS to a predicted angular position to facilitate automatic reacquisition of the original target. [T-1113] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Coast Sub-Mode, the EOSS SHALL be capable of using GCS position commands to optimize and facilitate reacquisition. [T-1114] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Coast Sub-Mode, if conditions return that allow the AVT to continue tracking the originally acquired target, the EOSS SHALL automatically return to the auto track mode. [T-1115] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Coast Sub-Mode, if the EOSS cannot reacquire the original operator designated target after eight seconds (8s) the coast position orders SHALL be terminated, the AVT SHALL remain initialized (i.e., ready to enter auto track mode) and the EOSS SHALL automatically re-enter the previous operating mode (follower or manual). [T-1116] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

3.41.3.2 (U) Forced Coast Sub-Mode

(U) The Forced Coast Sub-Mode SHALL be operator selectable when the EOSS is in auto track mode. [T-1117] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Forced Coast Sub-Mode, the EOSS generated coast sub-mode LOS position commands SHALL be replaced by operator-initiated LOS commands from the manual control devices on the GCS console. [T-1118] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Forced Coast Sub-Mode, the AVT target reacquisition signal processing SHALL continue as in coast sub-mode and the AVT status SHALL be reported as "Coast Mode". [T-1119] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Forced Coast Sub-Mode, if the AVT can re-establish auto track on the original target, a prompt or indication SHALL be presented to the operator who SHALL have the capability to release LOS control to the AVT. [T-1120] A[T].CG, M[O].C, D[O].C, P[T].G

3.41.4 (U) Battle Short Mode

(U) When in Battle Short Mode, all IR cameras SHALL {redacted, available in CUI version} [T-1121] A[T].CG, M[O].C, D[O].C, P[T].G

(U) When in Battle Short Mode, the LRF SHALL {redacted, available in CUI version} [T-1122] A[T].CG, M[O].C, D[O].C, P[T].G

3.41.5 (U) Test Mode

(U) After Test Mode authorization by the GCS, the EOSS SHALL allow the operator to select test mode and initiate EOSS BIT functions. [T-1123] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Test Mode video test patterns SHALL be selectable by the operator to test video circuitry and display. [T-1124] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Test Mode, tests SHALL be initiated by operator commands from the (controlling) GCS console via the GWS LAN. [T-1125] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In Test Mode, operational prompts and test results SHALL be conveyed for display at the (controlling) GCS console. [T-1126] A[T].CG, M[O].C, D[O].C, P[T].G

(U) After Test Mode is de-authorized by the GCS, the EOSS SHALL exit the test mode within thirty seconds (30s). [T-1127] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

(U) After Test Mode is de-authorized by the GCS, the EOSS SHALL purge all test and training track-related data. [T-1128] A[T].CG, M[O].C, D[O].C, P[T].G

3.42 (U) Automatic Video Tracking (AVT)

(U) The AVT SHALL use video imagery from either sensor to automatically maintain the sensor LOS on an operator-designated target. [T-1129] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The AVT SHALL be initialized (i.e., placed in an operating condition where the system can be transitioned to auto track mode) by operator action at the GCS console. [T-1130] A[T].CG, M[O].C, D[O].C, P[T].G

(U) Upon initialization of the AVT, all AVT controls supporting AVT operation SHALL be available at the (controlling) GCS console. [T-1131] A[T].CG, M[O].C, D[O].C, P[T].G

(U) All AVT controls supporting the target acquisition process SHALL be executed from the (controlling) GCS console. [T-1132] A[T].CG, M[O].C, D[O].C, P[T].G

(U) Upon initialization of the AVT the EOSS SHALL insert graphics on the sensor video selected at the (controlling) GCS console to assist the GCS operator in decisions regarding the acquisition of targets for automatic video tracking. [T-1133] A[T].CG, M[O].C, D[O].C, P[T].G

(U) AVT graphics SHALL include an indication of the AVT position in the sensor FOV that is being tracked. [T-1134] A[T].CG, M[O].C, D[O].C, P[T].G

(U) AVT graphics SHALL include an indication that a stable track can be achieved (i.e., EOSS LOS control can be transitioned into auto track mode). [T-1135] A[T].CG, M[O].C, D[O].C, P[T].G

(U) AVT graphics SHALL include an indication that a loss of auto track on the initially designated target has occurred. [T-1136] A[T].CG, M[O].C, D[O].C, P[T].G

(U) AVT graphics SHALL automatically include an indication of such items as, but not limited to, the track-able targets available for tracking when objects are detected in the FOV as part of multi-tracking. [T-1137] A[T].CG, M[O].C, D[O].C, P[T].G

(U) AVT automatically generated graphics used during multi-tracking SHOULD work in conjunction with sector scanning. [O-1138] A[T].CG, M[O].C, D[O].C, P[T].G

(U) AVT features SHOULD include subframe selection. [O-1139] A[T].C, M[O].C, D[T].C, R[O].G, P[T].G

(U) AVT features SHOULD include target of interest selection. [O-1140] A[T].C, M[O].C, D[T].C, R[O].G, P[T].G

(U) AVT features SHOULD include Moving Target Indication. [O-1141] A[T].C, M[O].C, D[T].C, R[O].G, P[T].G

(U) AVT features SHOULD include track prediction. [O-1142] A[T].C, M[O].C, D[T].C, R[O].G, P[T].G

(U) AVT SHALL have both automatic and manual control of the target being tracked. [T-1143] A[T].C, M[O].C, D[T].C, R[O].G, P[T].G

(U) While in auto-track mode, the AVT SHALL not require any operator adjustments to maintain track on the designated target. [T-1144] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In auto track mode, the AVT SHALL accommodate changes in target contrast, scene background, sensor gain and sensor level. [T-1145] A[T].CG, M[O].C, D[O].C, P[T].G

(U) In auto track mode, the AVT SHOULD accommodate partial target image occlusion or total temporary target occlusion conditions unique to gunnery including gun smoke, stack gas, projectile detonation smoke, heat and debris, water pluming, wave swells, and cloudy conditions. [O-1146] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHALL be able to track in two dimensions (2D), in Az and El, the targets in the defined environments listed in this document. [T-1147] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHALL output the track and LOS pointing for a two-dimensional (2D) track at {redacted, available in CUI version}and the BDE SHALL output it to the track server/CS at {redacted, available in CUI version}. [T-1148] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

(U) The EOSS SHOULD report out the track and LOS pointing for a two dimensional (2D) track at a rate of greater than or equal to {redacted, available in CUI version} to the track server / CS. [O-1149] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

(U) The EOSS SHALL be able to track in three dimensions (3D), in Az and El and range, the targets in the defined environments listed in the system performance requirements. [T-1150] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

(U) The EOSS SHALL report out the track and LOS pointing and range for a three-dimensional (3D) track at a rate of greater than or equal to {redacted, available in CUI version} for LOS and range at the ELRF reporting rate. [T-1151] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

(U) The EOSS SHOULD report out the track and LOS pointing and range for a three dimensions (3D) track at a rate of greater than or equal to {redacted, available in CUI version} for LOS and range at the ELRF reporting rate. [O-1152] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

(U) The EOSS SHALL be capable of tracking multiple targets through the use of a re-visit rate and Operator initiated auto-slewing to targets to update tracking information and be capable of completing this with the track capacity requirements listed below. [T-1153] A[T].C, M[T].C, D[O].C, L[T].C, P[T].G

(U) The EOSS SHALL be capable of differentiating multiple tracks that are separated by at least four times (4X) the IFOV of the sensor. [T-1154] A[T].C, M[T].C, D[O].C, L[T].C, P[T].G

(U) The EOSS SHALL include provisions to allow the Operator to determine the priority target in a multi-target track environment where multiple tracks are available on a sensor. [T-1155] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHOULD include provisions to allow the Operator or system processing to determine the priority target in a multi-target track environment where multiple tracks are available on a sensor. [O-1156] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHALL maintain the bound box to the center of the FOV equal to or greater than eighty percent (80%) of time while an object is tracked. [T-1157] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

(U) The EOSS system SHALL have a tracker SNR threshold sufficient enough to maintain video track. [T-1158] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHALL have a track update latency of no greater than seven hundredths seconds (0.07s) for video track data. [T-1159] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

(U) The EOSS SHALL compute all target and tracks geoposition using WGS84 geodetic reference frame IAW MIL-STD-2401. [T-1160] A[T].C, M[O].C, D[O].C, L[T].C, R[O].G, P[T].G

(U) The AVT integration to the EOSS SHALL support AVT operation in the modes and sub-modes. [T-1161] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The AVT, in conjunction with the EOSS control processor, SHALL develop director commands to automatically maintain the EOSS LOS on operator designated targets in the video scene produced from either VIS or TIS. [T-1162] A[T].CG, D[O].C, P[T].G

(U) The AVT SHALL provide two (2) modes of operation (one (1) for stationary targets and one (1) for moving targets). [T-1163] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The AVT SHOULD provide one (1) mode of operation that will function for any given target. [O-1164] A[T].CG, M[O].C, D[O].C, P[T].G

(U) AVT SHALL maintain tracking capabilities when switching sensors and FOV positions. [T-1165] A[T].C, M[O].C, D[T].C, R[O].G, P[T].G

(U) Subject to limitations resulting from target size within the sensor FOV, the AVT SHALL acquire and maintain track of operator designated targets throughout the dynamic range of each sensor and in the presence of all allowable video artifacts produced by the sensors. [T-1166] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHOULD possess the capability of running and correlating the results of multiple tracker software simultaneously within real time constraints. [O-1167] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHOULD provide an interface that permits the reconfiguration, update, and exchange of tracker software without the need to recompile system software. [O-1168] A[T].CG, M[O].C, D[O].C, P[T].G

(U) The EOSS SHOULD provide software and user interface access to tracker integration time. [O-1169] A[T].CG, D[O].C, P[T].G

(U) The EOSS SHOULD provide software and user interface access to tracker track band. [O-1170] A[T].CG, D[O].C, P[T].G

(U) The EOSS SHOULD provide software and user interface access to tracker FOV. [O-1171] A[T].CG, D[O].C, P[T].G

(U) The EOSS SHOULD provide software and user interface access to tracker director orientation. [O-1172] A[T].CG, D[O].C, P[T].G

(U) The EOSS SHOULD provide software and user interface access to tracker track point. [O-1173] A[T].CG, D[O].C, P[T].G

(U) The EOSS SHOULD provide software and user interface access to tracker track point intensity. [O-1174] A[T].CG, D[O].C, P[T].G

(U) The EOSS SHOULD provide software and user interface access to tracker track point trajectory. [O-1175] A[T].CG, D[O].C, P[T].G

(U) The EOSS SHOULD provide software and user interface access to tracker track point trajectory prediction. [O-1176] A[T].CG, D[O].C, P[T].G

(U) The EOSS SHOULD provide software and user interface access to tracker mask data. [O-1177] A[T].CG, D[O].C, P[T].G

(U) The EOSS SHOULD provide software and user interface access to tracker bounding box location. [O-1178] A[T].CG, D[O].C, P[T].G

(U) The EOSS SHOULD provide software and user interface access to tracker bounding box size. [O-1179] A[T].CG, D[O].C, P[T].G

(U) The AVT SHALL have a Probability of Track Maintenance (PTM) of at least 95% at ranges while within the recognition range of the target. [T-1180] A[T].CG

(U) Note: PTM is the percentage of time that a track is supported by valid sensor inputs (i.e., locked onto the target), calculated as the time the target is tracked divided by the duration of the target presentation. This MOP requires that a start and end time be defined for each test segment.

(U) The Auto-Tracker SHALL have a PTM on a target of 85% or greater at ranges outside of the target recognition ranges. [T-1181] A[T].CG

(U) The Auto-Tracker SHOULD have a PTM on a target of 95% or greater at ranges outside of the target recognition ranges. [O-1182] A[T].CG

(U) The AVT SHALL have a Probability of Track Continuity (PTC) of at least 90% at ranges while within the recognition range of the target. [T-1183] A[T].CG

(U) The AVT SHALL have a PTC of at least 85% at ranges while outside of the recognition range of the target. [T-1184] A[T].CG

3.43 3.43 (U) HMI

(U) The EOSS aiming reticle(s) SHALL be within the center 10% of the FOV (measured in horizontal and Vertical directions) after O-level alignment. [T-1185] A[T].CG, M[T].C, D[O].C, L[T].C, P[T].G

(U) All command-and-control symbology and modifiers SHOULD be implemented according to MIL-STD-2525E and in the symbology of Naval Tactical Data System (NTDS) for Aegis platforms. [O-1186] A[T].C, M[O].C, D[T].C, R[O].G, P[T].G

(U) The EOSS system SHALL have the capability to arbitrate user control and sensor management from each EOSS operator station in order to provide assured access and deconfliction. [T-1187] A[T].C, M[O].C, D[O].C, L[T].C, P[T].G

(U) All user EOSS operator station video displays SHALL receive MI from the VIS and TIS with common text and symbology that include the parameters outlined herein. [T-1188] A[T].C, M[O].C, D[O].C, L[T].C, P[T].G

(U) Display presets supporting operational requirements SHOULD be developed using the guidance in Naval Surface Warfare Center (NSWC) CRANE STD/17/JXQ/102. [O-1189] A[T].C, M[O].C, D[T].C, R[O].G, P[T].G

(U) Standard components identified in DPC paragraph 3-6.3 SHOULD be utilized to build display presets compatible with display screen size. [O-1190] A[T].C, M[O].C, D[T].C, P[T].G

(U) Standard components identified in DPC paragraph 3-6.3 SHOULD be utilized to build display presets compatible with display resolution. [O-1191] A[T].C, M[O].C, D[T].C, P[T].G

(U) Standard components identified in DPC paragraph 3-6.3 SHOULD be utilized to build display presets compatible with number of displays available. [O-1192] A[T].C, M[O].C, D[T].C, P[T].G

(U) In addition to mission-oriented presets, layouts or menus SHOULD support EOSS system maintenance. [O-1193] A[T].C, M[O].C, D[T].C, P[T].G

(U) In addition to mission-oriented presets, layouts or menus SHOULD support EOSS HUM. [O-1194] A[T].C, M[O].C, D[T].C, P[T].G

(U) In addition to mission-oriented presets, layouts or menus SHOULD support EOSS installation. [O-1195] A[T].C, M[O].C, D[T].C, P[T].G

(U) In addition to mission-oriented presets, layouts or menus SHOULD support EOSS T&E. [O-1196] A[T].C, M[O].C, D[T].C, R[O].G, P[T].G

(U) In addition to mission-oriented presets, layouts or menus SHOULD support EOSS product-specific use. [O-1197] A[T].C, M[O].C, D[T].C, R[T].G

(U) Installation, test, and maintenance layouts or menus SHOULD have accessible menu information at each operator station necessary to install system hardware and software components. [O-1198] A[T].C, M[O].C, D[T].C, R[T].G, P[T].G

(U) Installation, test, and maintenance layouts or menus SHOULD have accessible menu information at each operator station necessary to maintain and calibrate the system. [O-1199] A[T].C, M[O].C, D[T].C, R[T].G, P[T].G

(U) Installation, test, and maintenance layouts or menus SHOULD have accessible menu information at each operator station necessary to capture technical information into files for sharing with EA personnel. [O-1200] A[T].C, M[O].C, D[T].C, R[T].G, P[T].G

(U) Installation, test, and maintenance layouts or menus SHOULD have accessible menu information at each operator station necessary to link error messages to corresponding troubleshooting and repair instructions. [O-1201] A[T].C, M[O].C, D[T].C, R[T].G, P[T].G

(U) Own-ship information such as date, Greenwich Mean Time (GMT), course, speed, latitude, and longitude SHOULD be displayable at a minimum. [O-1202] A[T].CG, M[O].C, D[O].C, P[T].G

(U) Track information such as track number (link or local), identity, Az (true and relative), tag, El, range, course, speed, and altitude, at a minimum. [O-1203] A[T].CG, D[O].C, P[T].G

(U) Own-ship information SHALL be clearly differentiated from target information with the ability to override simultaneous display. [T-1204] A[T].C, D[T].C, P[T].G

(U) EOSS Sensor FOV/FOR reference symbol information SHOULD include compass rose, true north indicator, ship heading indicator, center of reticle LOS indicator, and FOV wedge indicator scaled based on FOV size, at a minimum. [O-1205] A[T].C, M[O].C, D[T].C, P[T].G

(U) As an objective, the EOSS Sensor FOV/FOR Reference symbol SHOULD include an indication of the blind/blocked area(s) (cutouts) for the applicable sensor(s). [O-1206] A[T].C, M[O].C, D[T].C, P[T].G

(U) The EOSS Sensor FOV/FOR Reference SHOULD have corresponding user options to select the top orientation based on Ship's Heading or True North. [O-1207] A[T].C, D[T].C, P[T].G

(U) True Az, Relative Az, and El scales SHOULD aid the operator with determining sensor, imagery, and target LOS. [O-1208] A[T].C, M[O].C, D[T].C, P[T].G

(U) Standard reticle(s) for Targeting SHOULD aid the operator in determining the sensor LOS and laser aim point. [O-1209] A[T].C, M[O].C, D[T].C, P[T].G

(U) A standard reticle for Targeting support SHOULD aid the operator in estimating distance to the target, target size, distance between objects, and splash spot offset distance. [O-1210] A[T].C, M[O].C, D[T].C, P[T].G

(U) An imaging system with integrated laser SHALL display a point of impact reticle for that laser to aid the operator with firing on target. [T-1211] A[T].C, M[O].C, D[T].C, P[T].G

(U) A standard Track box SHOULD aid the operator with observing tracked target(s), track centroid, track box size, and tracking status (e.g., locked, coast, etc.). [O-1212] A[T].C, M[O].C, D[T].C, P[T].G

(U) The Menu Tab SHOULD provide access to functions such as display preset selection, sensor selection, mode selection, sensor fusion selection, sensor optimization, track information, BIT and system messages, automated function selection, user options, maintenance menus, etc. [O-1213] A[T].C, D[T].C, P[T].G

(U) Menu information SHOULD minimize display real estate, imagery obscuration, and SHOULD not reduce the size of imagery windows. [O-1214] A[T].C, M[O].C, D[T].C, P[T].G

(U) Standardized labels, data field formats, required significant digits, and standard units SHOULD be utilized for all EOSS preset layouts utilizing the component. [O-1215] A[T].C, M[O].C, D[T].C, P[T].G

(U) User options SHOULD be available to turn off or declutter non-mission essential components. [O-1216] A[T].C, M[O].C, D[T].C, P[T].G

(U) Overlay symbology and textual backgrounds SHOULD be transparent, semi-transparent, or low-profile in order to minimize obscuration of imagery. [O-1217] A[T].C, M[O].C, D[T].C, P[T].G

(U) The EOSS SHALL have a password-protected maintenance menu, which SHALL allow for setting and changing certain parameters not accessible to operators. [T-1218] A[T].CG, D[O].C, P[T].G

(U) The menu SHALL have an option for changing its password. [T-1219] A[T].CG, D[O].C, P[T].G

3.44 (U) Controllers

(U) The EOSS SHALL use input from the controllers as prescribed in IDD. [T-1220] A[T].CG, M[T].C, D[O].C, P[T].G

4 (U) List of Acronyms

(U) Table 4 List of Acronyms

Acronym	Definition
4K	Horizontal display resolution of approximately 4,000 pixels
ABCL	As Built Configuration List
ADE	Above Deck Equipment
A_i	Inherent Availability
ALIS	AEGIS LAN Interconnect System
A_O	Operational Availability
APL	Approved Product List
ASPA	Aerial Surveillance and Photogrammetry Applications
AT	Anti-Tamper
AVC	Advanced Video Coding
AVT	Automatic Video Tracker
Az	Azimuth
BDE	Below Deck Equipment
BIT	Built In Test
BOM	Bill Of Materials
CA	Criticality Analysis
CCD	Charge Coupled Device
CCM	Counter-Counter Measure
CDRUSSTRATCOM	Commander, United States Strategic Command
CFR	Code of Federal Regulations
CG	Cruiser
CI	Configuration Item
CIA	Critical Item Analysis
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CM	Configuration Management
CMAF	Common Media Application Format
CMOS	Complimentary Metal-Oxide Semiconductor
CMS	COMSEC Management System
COMSEC	COMmunications SECurity
COTS	Commercial Off The Shelf
CPI	Critical Program Information
CPU	Central Processing Unit
CSCI	Computer Software Configuration Item
CSMA/CD	Carrier Sense Multiple Access with Collision Detection
CT	Critical Technology
CUI	Controlled Unclassified Information
DC	Direct Current

Acronym	Definition
DDG	Destroyer
DFIA	Defense-in-depth Functional Implementation Architecture
DFPA	Digital-pixel Focal Plane Array
DISA	Defense Information System Agency
DiVDS	Digital Video Distribution System
DMSMS	Diminishing Manufacturing Sources and Material Shortages
DoD	Department of Defense
DODI	Department Of Defense Instruction
DPC	Design Practices and Criteria
DROIC	Digital ReadOut Integrated Circuit
DSS	Deconfliction Safety System
ECEF	Earth-Centered Earth-Fixed
ECP	Engineering Change Proposal
EE	Edge Enhancement
El	Elevation
ELRF	Eye-Safe Laser Range Finder
EMC	Electromagnetic Compatibility
EMP	Electromagnetic Pulse
ENU	East, North, Up
EO/IR	Electro-Optic/InfraRed
EOSS	Electro-Optic/InfraRed Sight System
ESS	Environmental Stress Screening
FAR	False Alarm Rate
FHD	Full High Definition
FMEA	Failure Modes Effects and Analysis
FMECA	Failure Modes Effects and Criticality Analysis
FMS	Foreign Military Sales
FPA	Focal Plane Array
FOR	Field Of Regard
FOV	Field Of View
GCS	Gun Computer System
GMT	Greenwich Mean Time
GPS	Global Positioning System
GWS	Gun Weapon System
HD	High Definition
HDR	High Dynamic Range
HEVC	High Efficiency Video Coding
HMI	Human Machine Interface
HUM	Health and Usage Monitoring

Acronym	Definition
IA	Information Assurance
IAW	In Accordance With
ID	Identification
IDD	Interface Design Description
IFOV	Instantaneous Field Of View (FOV of a single sensor pixel)
IMU	Inertial Measurement Unit
IP	Internet Protocol
ISA	Integrated Sensor Architecture
IT	Information Technology
J-Box	Junction Box
JITC	Joint Interoperability Test Command
KLV	Key Length Value
LAN	Local Area Network
LAP/LACE	Local Area Processing/Contrast Enhancement
LCH	Laser Clearinghouse
LORA	Level Of Repair Analysis
LOS	Line Of Sight
LRU	Lowest Replaceable Unit
LSRB	Laser Safety Review Board
LX	Long Wavelength Long Run
MD	Metadata
MI	Motion Imagery
MISB	Motion Imagery Standards Board
MISB RP	Motion Imagery Standards Board Recommended Practices
MISB ST	Motion Imagery Standards Board STandards
MISB TRM	Motion Imagery Standards Board Technical Reference Material
MISP	Motion Imagery Standards Profile
MLDT	Mean Logistics Delay Time
MOSA	Modular Open Systems Approach
MTA	Maintenance Task Analysis
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
MXF	Material eXchange Format
NFOV	Narrowest Field Of View
NGA	National Geospatial-Intelligence Agency
NIAP	National Information Assurance Partnership
NSWC	Naval Surface Warfare Center
NTDS	Naval Tactical Data System
NUC	Non-Uniformity Correction

Acronym	Definition
O-level	Organizational Level
OCS	Optical Cross Section
OSRP	Own Ship Reference Point
OSS	Optical Sight System
P-BOM	Production Bill Of Materials
PM	Preventive Maintenance
PNT	Positioning, Navigation, and Timing
PTP	Precision Time Protocol
RCM	Reliability-Centered Maintenance
RCS	Radar Cross-Section
RDT&E	Research, Development, Test, and Evaluation
RF	Radio Frequency
RM&A	Reliability, Maintainability and Availability
RMF	Risk Management Framework
RMS	Root Mean Squared
ROIC	ReadOut Integrated Circuit
RPA	Risk Priority Analysis
SAR	Source Aspect Ratio
SiTF	Signal Transfer Function
SM	Scintillation Mitigation
SR	Super-Resolution
STIG	Security Technical Implementation Guide
T&E	Test and Evaluation
TA	Technical Authority
TAB	Technical Advisory Board
TDP	Technical Data Package
TEMPEST	Telecommunications Electronics Materials Protected from Emanating Spurious Transmissions
TIS	Thermal Imaging System
TM	Turbulence Mitigation
TWH	Technical Warrant Holder
U.S.	United States
U	Unclassified
UC	Unified Capabilities
UHD	Ultra High Definition
UID	Unique Identification
USCG	U.S. Coast Guard
VIS	Visible Imaging System
WFOV	Widest Field Of View
WGS	World Geodetic System

Acronym	Definition
WMSL	Maritime Security Cutter–Large (U.S. Coast Guard)
WMSM	Maritime Security Cutter–Medium (U.S. Coast Guard) (aka Offshore Patrol Cutter)

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(U) Modeling and Simulation Appendix

5 Modeling, Simulation, Test and Evaluation (MST&E)

5.1 (U) EOSS Sensor Modeling

(U) Modeling of VIS, TIS, and ELRF SHALL be performed IAW the requirements herein. [T-1221] A[T].CG, M[T].C, V[T].CG

5.2 5.2 (U) Baseline Scenarios

(U) The VIS, TIS, and ELRF SHALL be modeled using the baseline mission scenarios (i.e., all combinations of configurations, targets, and atmospherics) and output deliverables captured as described in DPC paragraphs 2-3.3.5 through 2-3.3.10. [T-1222] A[T].CG, M[T].C, V[T].CG

5.3 5.3 (U) Classified Scenarios

(U) The VIS, TIS, and ELRF SHOULD be modeled for the configurations, classified targets, and atmospherics as described in the Shipboard Passive/Augmented Detection and Evaluation Capabilities Based Assessment Report. This will enable performance to be compared with other EOSS sensors against a standard set of classified targets. [O-1223] A[T].CG, M[T].C, V[T].CG

5.4 5.4 (U) Unique Scenarios

(U) The VIS, TIS, and ELRF SHOULD be modeled using system configurations, mission scenarios, targets, environmental conditions, atmospherics, or other parameters which are unique to either the system's Capability Development Document/Capability Production Document CDD/CPD, Concept of Operations (CONOPS), performance specification, or a combination thereof. [O-1224] A[T].CG, M[T].C, V[T].CG

5.5 5.5 (U) FOV Modeling

(U) VIS, TIS, and ELRF SHALL be modeled at the narrowest and widest FOV, and any other focal lengths of significance, such as settings used for cued target acquisition. [T-1225] A[T].CG, M[T].C, V[T].CG

5.6 5.6 (U) Dedicated Display

(U) If an EOSS system utilizes a default, proprietary, or integrated display or direct view optic, then the system SHALL be modeled with that display configuration. [T-1226] A[T].CG, M[T].C, V[T].CG

5.7 5.7 (U) Viewing Distance

(U) The distance from the display to the viewer SHOULD be modeled per the intended configuration of the system installation; if this information is not available, an assumption of around ninety-one centimeter (91cm) is reasonable for a console-operated display. [O-1227] A[T].CG, M[T].C, V[T].CG

5.8 5.8 (U) Government Target Modeling

(U) Specific target/task V50 cycle criteria SHOULD be determined by the SME based on recent best practices, experiments, publications, etc.; as per the task descriptions, definitions, and considerations given in DPC. [O-1228] A[T].CG, V[T].CG

5.9 5.9 (U) Contractor Target Modeling

(U) The Government SHOULD specify or approve the target/task V50 cycle criteria used for contractor modeling. [O-1229] A[T].CG

5.10 5.10 (U) Baseline Atmospheric Conditions

(U) Baseline models SHALL be produced for the atmospheric conditions in DPC Table 2-6 with high, average (degraded), and poor visibility. [T-1230] A[T].CG, M[T].C, V[T].CG

5.11 5.11 (U) Turbulence

(U) The typical values of Cn2 (the turbulent refractive-index structure parameter) from DPC Table 2-6 SHALL be used in the baseline models. [T-1231] A[T].CG, M[T].C, V[T].CG

5.12 5.12 (U) Sensor Height

(U) The HOE for the sensor and look angle SHALL be included in the baseline models based on the target and the installation of the sensor. [T-1232] A[T].CG, M[T].C, V[T].CG

Note: When no other information is available, a height of eighteen meters (18m) above water level may be used.

5.13 5.13 (U) DRI Outputs

(U) A probability of task performance SHALL be produced for the DRI tasks, at minimum, as defined in DPC Table 2-2. [T-1233] A[T].CG, M[T].C, V[T].CG

5.14 5.14 (U) DRI Format

(U) The Probability of Task Performance SHALL be output as a two-dimensional (2D) Probability versus Range graph. [T-1234] A[T].CG, M[T].C, V[T].CG

5.15 5.15 (U) Baseline Probability

(U) The baseline range value SHALL be provided for seventy percent (70%) probability of task success as well as any other pertinent values specified in the requirements, performance specification, or other documentation. [T-1235] A[T].CG, M[T].C, V[T].CG

5.16 5.16 (U) DRI Data Set

(U) The corresponding range and probability values SHOULD be captured for the complete model output data set in order to support further analysis. [O-1236] A[T].C/G, M[T].C, V[T].CG

(U) Ranges SHOULD be specified along with probability, and vice versa. [O-1237] A[T].C/G, M[T].C, V[T].CG

5.17 5.17 (U) Tolerances And Conventions - Tolerances

(U) All laser parameters SHOULD have a tolerance. [O-1238] A[T].C/G, M[T].C, V[T].CG

5.18 5.18 (U) Divergence

(U) Divergence SHOULD be specified and measured based on a percentage of defined energy (e.g., 1/e of peak or ninety percent (90%) of total energy). [O-1239] A[T].C/G, L[T].C

5.19 5.19 (U) Specifications Over Temperature

(U) As a recommended practice, laser wavelengths, power, energy, and boresight alignment SHOULD be known and measured across expected maximum and minimum operating temperature. [O-1240] A[T].C/G, L[T].C, V[T].CG

5.20 5.20 (U) Target Acquisition

(U) As a recommended practice, the trade space between laser beam divergence, beam jitter, and total pointing error SHOULD be analyzed to meet target acquisition requirements. [O-1241] A[T].C/G

(U) Logistics Data Appendix

6 Logistics Data Deliverables

6.1 (U) Technical Data Package

(U) A Level II Development TDP SHALL be provided during the prototyping and testing phase with a Level III Product Level TDP required after design is baselined and approved supporting production of the system. [T-1242]

(U) TDP SHALL be updated as required due to Engineering Change Proposals (ECPs), or any deviation from the approved baseline design. [T-1243]

(U) The TDP SHALL consist of all Technical Data and Computer Software, including the models, product drawings and associated lists necessary for the re-engineering, manufacturing, in-service engineering, and logistics support of the system. These include, but are not limited to, models, engineering drawings, shop drawings, related data and lists, and descriptive specifications in accordance with MIL-STD-31000B. [T-1244]

6.2 Support Equipment –

(U) If support equipment is necessary, TDP information for support equipment SHALL be supplied. [T-1245]

6.3 Priced Bill of Material (P-BOM) –

(U) A P-BOM SHALL be provided including Commercial Off The Shelf (COTS), Modified COTS, Non-Developmental Items, and Development Items identifying information. [T-1246]

(U) The P-BOM SHALL be curated in an indentured list, down to the lowest line replaceable unit (LRU) to enable component level obsolescence tracking. [T-1247]

(U) Each system deliverable SHALL be accompanied by an As Built Configuration List. [T-1248]

6.4 COTS Supply Chain Risk Management Plan

(U) mission-critical functions or components SHALL be identified that may result in Level I or Level II protection failures due to operational, system information, or component integrity aspects. (U) (U) Utilize MIL-STD 882 System Safety Program definitions of criticality to identify mission criticality. [T-1249]

6.5 Diminishing Manufacturing Sources and Material Shortages (DMSMS) Plan and reports

(U) A robust DMSMS tracking and reporting system SHALL be created to identify, analyze, mitigate, and report obsolescence affecting the system and/or components using DODI 4245.15, DODM 4245.15, the SD-22 DMSMS Guidebook and the SD-26 DMSMS for guidance. [T-1250]

6.6 Logistics Product Data

(U) Complete Maintenance Task Analysis (MTA) SHALL be created to identify the logistics and systems engineering tasks that affect design of system hardware and software to meet mission support requirements and system RM&A, supportability, accessibility, and cost objectives, using MIL-HDBK-502 as guidance. [T-1251]

(U) The MTA SHALL include Modeling and Simulation data for system reliability, maintainability, and availability (RM&A). [T-1252]

6.7 Reliability and Maintainability Block Diagrams and Mathematical Models

(U) A reliability program SHALL be created that develops, collects, interprets, and analyzes reliability data using GEIA-STD-0009 and the DoD Reliability, Availability, Maintainability and Cost Rationale Report Manual, dated 1 JUNE 2009 as guidance, as well as guidance defined within MIL-HDBK-189C, 14 June 2011, and MIL-HDBK-781A, 01 April 1996. [T-1253]

6.8 Failure Modes, Effects, and Criticality Analysis (FMECA)

(U) A Failure Modes, Effects, and Criticality Analysis SHALL be provided comprising of Failure Mode and Effects Analysis (FMEA), the Criticality Analysis (CA) and Risk Priority Analysis (RPA), Critical Item Analysis (CIA) and Failure Compensation Analysis (FCA) [T-1254]

(U) The FMECA SHALL identify and analyze failures, identify root cause, rate severity, estimate system critical failure rates, and support mitigation of failure risks and identify alternatives. [T-1255]

6.9 Level of Repair Analysis (LORA)

(U) A Level of Repair Analysis SHALL be provided showing at what level the system and components of the system will be remove/replaced, repaired, and demilitarized using economic and non-economic models utilzing MIL-HDBK-1390 as guidance. [T-1256]

6.10 Configuration Management (CM) Plan and reports

(U) A Configuration management plan SHALL be provided using MIL-HDBK-502A and MIL-HDBK-61B as guidance. [T-1257]

(U) The CM Plan SHALL identify appropriate processes, tools, and resources to maintain system and component attribute consistency per the system requirements as well as identifying roles and responsibilities of the stakeholders to support and maintain the functional, allocated, and product baselines. [T-1258]

6.11 Technical Manuals and Training

(U) A system level technical manual SHALL be provided. If the system is a COTS item, a COTS technical manual is acceptable. [T-1259]

(U) Operator training SHALL be provided using the MIL-HDBK-29612 as guidance. [T-1260]

End.