Document ID: SS-TRI-MANUAL-001
Document Title: Trident-S Installation & Maintenance Manual
Version: 1.0
Status: Released
Date: 13 August 2025

1. Introduction

1.1 Purpose

This manual provides qualified technical personnel with detailed instructions for the installation, preventative maintenance, and basic corrective actions for the Trident-S Antenna Array. Adherence to these procedures is essential for ensuring system safety, performance, and reliability.

1.2 Scope

This manual covers the above-deck equipment (ADE) of the Trident-S system. It is intended for use by trained technicians responsible for shipboard hardware installation and maintenance. This document does not cover the operation of the antenna control unit or software interfaces.

1.3 Safety Summary

Personnel must read and understand all safety warnings before commencing any work.

- **Electrical Hazard:** The system operates on high voltage. Ensure all power is isolated and locked-out/tagged-out before performing installation or maintenance.
- **Heavy Lift:** The Trident-S ADE weighs up to 200 kg. Use appropriate lifting equipment and a minimum of two personnel for all handling operations.
- **RF Radiation Hazard:** Do not approach the antenna when it is transmitting. Ensure the system is powered down before performing any work on the antenna or radome.

2. Applicable Documents

- **SS-TRI-SPEC-001:** Trident-S Mechanical & RF Specification
- **SS-QM-PLAN-001:** Quality Management Plan
- **SS-VISITOR-PROC-001:** Visitor Management and Escort Procedures

3. Installation Procedure

3.1 Site Preparation

1. Verify that the installation location on the ship's mast or deck is structurally sound

and prepared with the correct mounting hole pattern.
2. Ensure the location provides a clear 360-degree view of the sky, with no obstructions within the antenna's travel range.
3. Confirm that ship's power (208 VAC, 3-Phase, 60 Hz) and data cabling have been run to the installation site.

3.2 Mechanical Installation

1. **Lifting:** Using a certified crane and lifting sling, carefully hoist the Trident-S ADE from the transport cradle to the installation location. Use the designated lifting points on the pedestal base.
2. **Mounting:**
    - Carefully align the pedestal base with the mounting holes on the ship's structure.
    - Install the eight (8) M20 stainless steel mounting bolts and washers.
    - Tighten the bolts in a star pattern to ensure even pressure.
    - Using a calibrated torque wrench, tighten each bolt to a final torque specification of **250 Nm (184 ft-lbs)**.
3. **Grounding:** Attach a 6 AWG or larger grounding cable from the designated grounding point on the pedestal base to the ship's main ground bus.

3.3 Electrical and Data Connection

1. Ensure power is locked out.
2. Connect the ship's power cable to the main power interface on the pedestal.
3. Connect the ship's data cable to the Ethernet data port on the pedestal.
4. Connect the RF waveguide cables from the below-deck equipment to the corresponding WR-75 (Ku-Band) and WR-28 (Ka-Band) flanges on the pedestal.

4. Preventative Maintenance Schedule

Regular preventative maintenance is critical to ensure the operational availability and lifespan of the Trident-S system. These checks should be performed by a qualified technician.

Interval	Task	Procedure
6 Months	**Visual Inspection & Cleaning**	1. Visually inspect the radome for cracks, punctures, or signs of damage. 2. Clean the radome surface with fresh water and a soft cloth to remove salt and grime

		buildup. 3. Inspect all external fasteners for tightness and signs of corrosion.
12 Months	**Seal Integrity Check**	1. Carefully inspect the integrity of the main seal between the radome and the pedestal base. 2. Check all connector seals for signs of cracking, brittleness, or degradation.
12 Months	**Corrosion Inspection**	1. Inspect the pedestal housing and mounting hardware for any signs of paint blistering, flaking, or underlying corrosion. 2. Pay close attention to joints and interfaces between different materials.
24 Months	**Lubrication**	1. Check and replenish the lubricant in the azimuth and elevation drive gearboxes as per the detailed service manual.

5. Basic Troubleshooting

This guide covers basic fault finding. For complex issues, contact Synthetic Systems support.

Symptom	Possible Cause	Corrective Action
System will not power on	No power from ship / Tripped circuit breaker	1. Verify ship's power is available at the source. 2. Check and reset the main circuit breaker for the antenna system.
"Pedestal Fault" on control unit	Obstruction in movement path / Motor issue	1. Power down the system. 2. Visually inspect for any physical obstructions blocking the antenna's movement.

		3. If no obstruction is found, do not attempt to force movement. Raise a fault report.
No satellite signal	Blockage (e.g., ship's superstructure) / RF cable fault	1. Check the antenna's pointing direction and ensure it has a clear line of sight. 2. Inspect RF cable connections at the pedestal for tightness and damage.
Water ingress inside radome	Damaged radome / Failed seal	1. Immediately power down the system. 2. Do not attempt to power on again. 3. Raise an urgent fault report.

6. Fault Reporting and Support

6.1 Non-Conformance Reporting

For any fault or issue that cannot be resolved using the basic troubleshooting steps in Section 5, the user must raise a formal report. The process for reporting such issues is governed by the Synthetic Systems quality system.

Action: For all unresolved faults, the user shall submit a **Non-Conformance Report (NCR)** in accordance with the process defined in **SS-QM-PLAN-001: Quality Management Plan**. This ensures the issue is formally tracked, investigated, and resolved by the appropriate engineering team.

6.2 Field Service Support

On-site support can be requested through your designated support channel. Please note that any visit to a Synthetic Systems facility by non-company personnel for joint investigation or repair will be subject to the procedures outlined in **SS-VISITOR-PROC-001: Visitor Management and Escort Procedures**.