OSIRIS User Guide

Document – OSR-UG-Rev04
Prototype Project Agreement (PPA) No. 01/IWRP Base Agreement No. 2021-562
Project Title - IWRP-21-PAC-0163-008
Submitted – 31 Jan 2025

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Table of Contents

List of Figures

List of Tables

Document Change History

Rev	Date	Change Author	Change Summary
Rev 01	29 Jun 2023	Vedha Ramanujam	Initial Release
Rev 02	25 Jul 2024	Bryan Windsor	Updated for Phase 2 – Draft
Rev 03	20 Jan 2025	Bryan Windsor	Updated for Phase 3
Rev 04	31 Jan 2025	Bryan Windsor	Updated for Phase 3 and addressed customer comments

1 INTRODUCTION

1.1 OVERVIEW

This document provides user guidance and information needed to operate the OSIRIS (Open Systems Interoperable & Reconfigurable Infrastructure Solution) 5G platform, specifically the Nomadic Tower (NT) and Mobile Relay (MR). The OSIRIS platform integrates commercial O-RAN components, such as 5G-NR software defined radios (SDR), Multi-access edge computing (MEC), and virtualized network functions (VNF) enabling high performance and enhanced 5G coverage. The 5G NR solution supports the control and data plane functionalities of the 3GPP 5G Radio Access Network (RAN) and 5G Core.

1.1.1 About this Guide

This document is the governing document to all associated user guides for the OSIRIS 5G Nomadic Tower (NT) and Mobile Relay (MR). Guidance in this document is intended to supplement, not replace documentation provided by or available from the Original Equipment Manufacturers (OEM). This document also describes the OSIRIS Configuration Items, and provides references for hardware components, and setup procedures for the OSIRIS system. (Refer to Table 1.2-1 for a list of all connecting documentation)

1.1.2 Approach

This guide will provide a high level discussion of system operation. Specific operation and features of HW and SW can be found in the OEM vendor manuals. Maintenance information can be found in OSIRIS Maintenance Guide (OSR-MG) latest revision.

1.1.3 Disclaimer

The material in this publication is for information only and is subject to change without notice. In the event of a conflict, OEM manuals and documentation take precedence. It is the responsibility of user personnel to understand and follow all safety precautions and warnings defined in this guide and the OEM documentation.

1.1.4 Audience

This guide is intended for the following audience.

- Equipment operators and their supervisors
- Trained maintenance personnel

1.2 ADDITIONAL DOCUMENT REFERENCES

Table 1.2-1: Additional User Guide Document References

Document ID	Document Title
OSR_SUG_Rev03_Software_User_Guide	OSIRIS – Software User's Guide
OSR_MG_Rev01_Maintenance_Guide	OSIRIS –Maintenance Guide
OSR-HERF-HERO-Rev03	OSIRIS – Hazards of Electromagnetic Radiation to Fuel (HERF) & Ordinance (HERO) Analysis
OSR-HERP-Rev03	OSIRIS – Hazards of Electromagnetic Radiation to Personnel (HERP) Analysis

2 SAFETY AND REGULATORY INFORMATION

2.1 IMPORTANT SAFETY PRECAUTIONS

Be sure to observe safe operation and to read and follow the instructions provided in vendor documentation. Take note of warning indicators present on the system and described in the vendor manuals, they are there to assist the user on proper operation of the system and to advise of risks. An example of these warnings is shown in **Error! Reference source not found.** below.

Figure 2-1: Safety First Breakdown

The OSIRIS OEM equipment manuals provide detailed safety guidance. Additionally, OSIRIS operators and system users shall be cognizant of the following:

1. Read and carefully understand all operator manuals and equipment labels before attempting to operate any hardware.
2. Ensure appropriate clothing is worn. Do not wear loose, torn, or bulky clothing that may catch on controls or moving parts in the mast assemblies.
3. Keep surroundings clean to avoid obstructions.
4. Electrical Grounding Safety Note- The Nomadic Tower and Mobile Relay are equipped with grounding wires that must be attached to an earth ground. The specific method of grounding to earth is terrain, location, and soil dependent. A single rod placed 6’ into the ground or multiple 3’ rods can be used depending on local soil conditions. For system use near structures the platforms may be connected to the building ground bus.

5. GPS/GNSS Antenna Electrical Safety Note – The MR and NT GPS/GNSS antennas contain an active amplifier. The rated voltage is 3-5VDC, rated current- 25mA maximum. The power for these antennas is supplied by the PCIe NIC expansion cards in the baseband server equipment and is overcurrent protection limited to 1A maximum. If the GPS/GNSS service is reconfigured, care must be taken to ensure current for the antenna is limited to 1A.
6. RF Safety Note – Ensure HERO, HERP, and HERF limits are understood. Safe distances for personnel, ordnance, and fuel are achieved when masts are fully deployed.
7. Cable and Equipment Safety Note – Ensure all equipment and cables are unencumbered before raising or lowering masts. Ensure equipment is properly tied down before moving the MR or NT.
8. Laser Light Radiation Hazard Note- Optical fiber cables used in the baseband OSIRIS electronics carry laser light energy that may or may not be visible. Do not look directly into the connector ends of fiber optic cables. Fiber optic cable integrity can be verified using fiber optic cable test equipment.
9. The NT LED task lights are bright. Do not look directly into lights when they are illuminated. Temporary impairment or permanent vision damage could occur.

Reference the following documentation for additional information:

- Antenna documentation
- HERF/HERP/HERO documentation

3 PRODUCT OVERVIEW AND ARCHITECTURE

3.1 PRODUCT OVERVIEW

This section provides overview of the product and services associated with the OSIRIS program. The testbed 5G infrastructure should be seen as a modular architecture (notionally depicted in Figure 3-1).

Figure 3-1: OSIRIS Testbed – 5G Platforms for Experimentation

3.2 ARCHITECTURE

This 5G network will connect a variety of 5G-ready user devices, sensors, vehicles, and endpoints through a family of nomadic towers and core infrastructure along with platform-based 5G relays, in coverage areas with frequencies and throughputs appropriate to the use cases.

1. Nomadic Tower (NT)
2. Mobile Relay (MR)

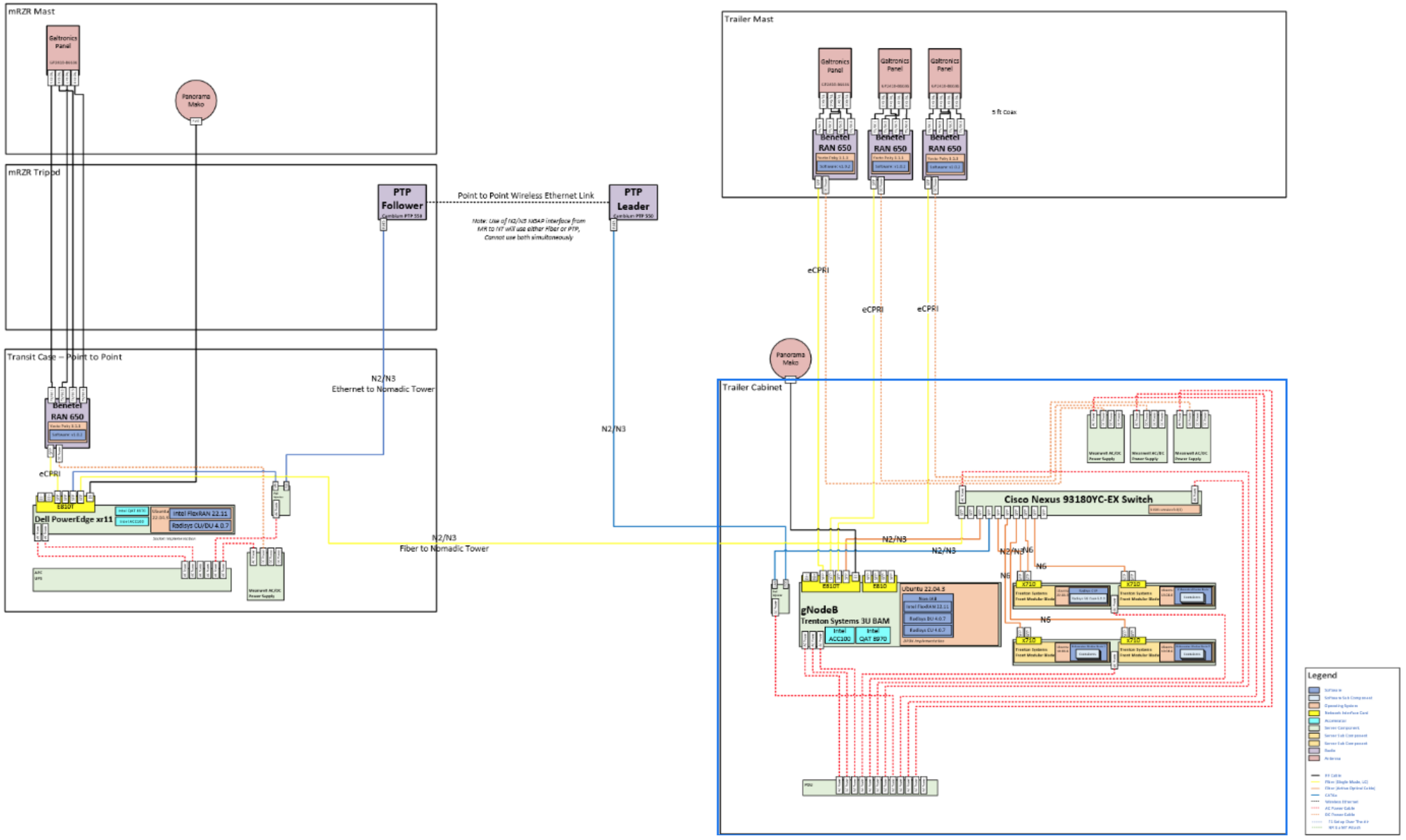

Figure 3-2: System Connection Diagram

3.3 CONFIGURATION ITEM DESCRIPTION

3.3.1 Nomadic Tower (NT)

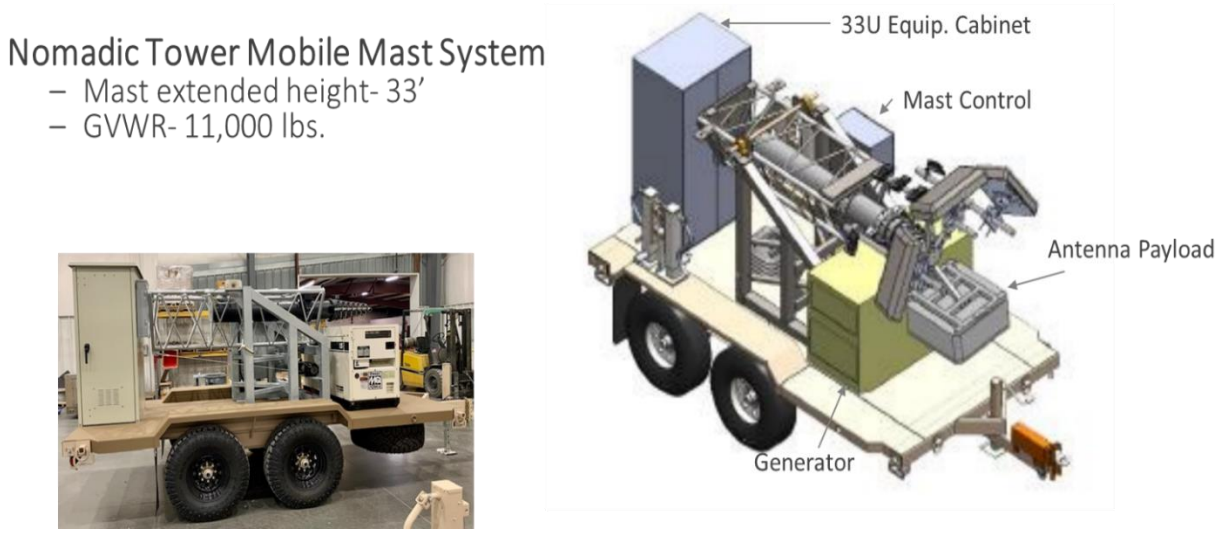

Figure 3-3: Nomadic Tower Trailer Diagram

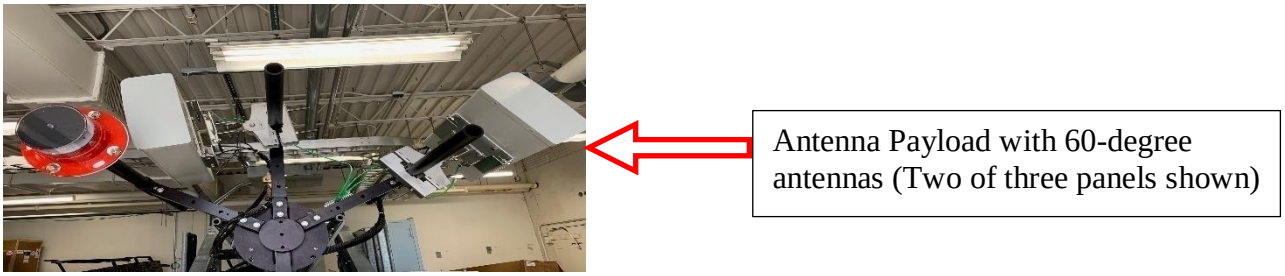

Figure 3-4: Nomadic Tower Trailer Mast Payload

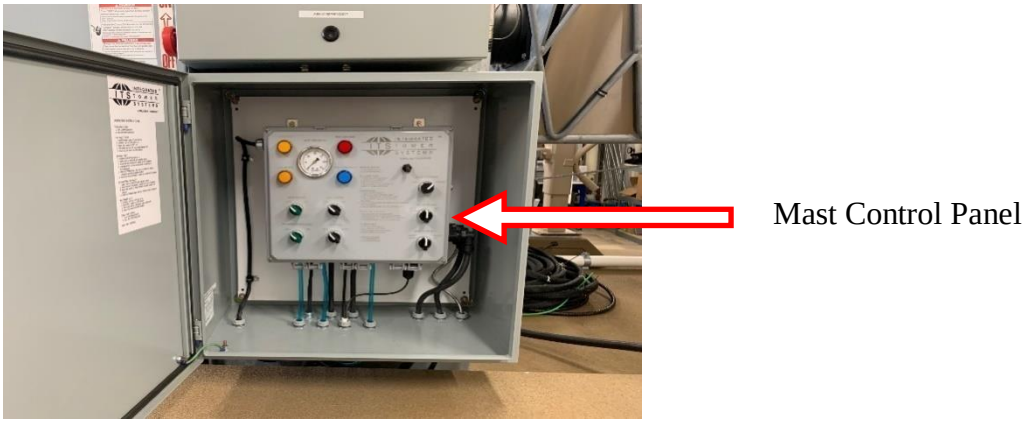

Figure 3-5: Nomadic Tower Trailer Mast Controller

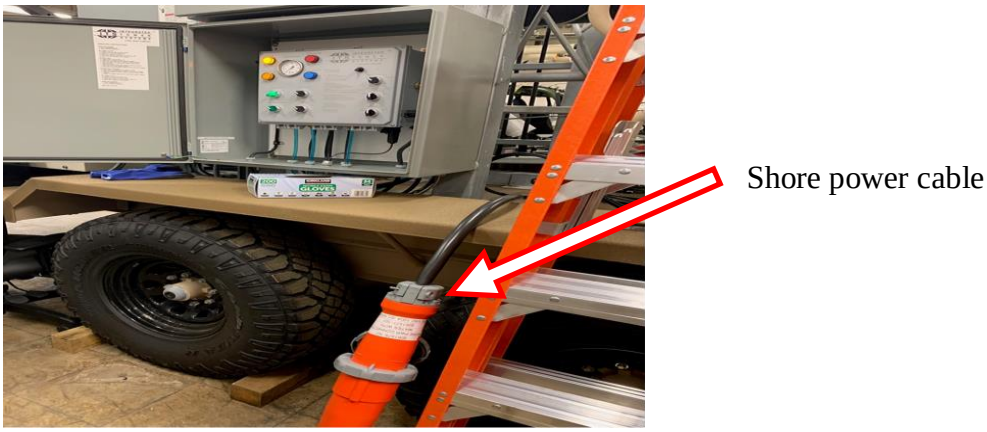

Figure 3-6: Nomadic Tower Trailer - Shore Power Cable

Figure 3-7 shows the NT mast fully extended with two of three 60-degree MIMO panels. Cabling includes RF, power, ground, and lightning protection. A solar powered obstruction light is installed at the top of the mast payload. The right side image shows mast guy wires installed to the mast but not tensioned.

Figure 3-7: Nomadic Tower Mast Extended with Three, 60° MIMO panels

3.3.1.1 Trailer Electronics Cabinet

The NT trailer carries a 33U rack mount cabinet containing up to 60A 120V AC power and four exhaust fans. Maximum rack depth for electronic equipment is 24”.

3.3.1.2 Generator

The NT trailer has a 15KW diesel generator that can supply 120 or 220V 60Hz AC power. The generator powers the mast system and trailer cabinet.

Power from the generator enters an electrical load center which provides a power cut off for the trailer electrical system and the electronics cabinet. The load center provides the ability to switch between generator power and shore power using the shore power cable.

Approved fuels are diesel and biodiesel up to B20. The generator can run up to 22 hours on a single tank of fuel at 75% generator rating (16 gal).

The use of biodiesel fuel in the Nomadic Tower 15KW generator is subject to additional precautions that are described in Kubota Engineering Information bulletin KEI-197. The bulletin is reproduced on the following pages. The end user may elect to forgo the use of biodiesel fuel at their discretion.

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Lincolnshire, IL 60069
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ENGINEERING INFORMATION

NUMBER: KEI – 197 ISSUE DATE: 12/06/2018
DISTRIBUTION: OEM's, Distributors, RSM's, KCL
SUBJECT: Kubota B20 Biodiesel Fuel Policy
WRITTEN BY: Nam Nguyen
TOTAL PAGES: 3

TITLE: Kubota B20 Biodiesel Fuel Policy for North America

Information: Kubota mechanical and common-rail diesel engines are approved to use up to 20% bio-diesel blends in North America. Final blended B20 solution must conform to ASTM D7467 Standard. This bulletin is the current revision to KEI-162 and will be effective immediately. Please follow the instructions below for proper preparation, warranty, handling, maintenance, and storage procedures when using up to B20 fuel:

◆ Definition of Allowable Biodiesel Fuels:

1. Blended diesel fuels B1 up to B5 (0-5% bio-diesel) that comply with ASTM D975 are acceptable to use with Kubota engines.

2. Blended diesel fuels B6 up to B20 (6-20% bio-diesel) that comply with ASTM D7467 are acceptable to use with Kubota engines.

3. Any mineral oil diesel fuel used must conform to the ASTM D975 Standard.
   Pure bio-diesel fuel (B100), which acts as a solute to make blended diesel fuel solution, must meet ASTM D6751 Standard. The final blended B20 solution must conform to ASTM D7467 Standard. Pure vegetable oil is NOT allowed as a solute for any blended bio-diesel fuel solution.

4. The maximum volume ratio of the blended solution of fuel must be 20% or less of B100. The B100 biodiesel must be supplied from an accredited BQ-9000 manufacturer or equivalent.
   More information about qualified marketer(s) and producer(s) can be found at http://www.bq-9000.org.

◆ Preparation:

1. It is advisable to replace the fuel filter before using B6 thru B20 Biodiesel fuel as the service interval will be reduced due to Bio-diesel usage. Please refer to the Operator's Manual or contact your local Kubota Dealer for replacement procedures and identification of correct parts for the machine.
2. When using B6 thru B20 Biodiesel fuel products, please replace the mechanical fuel feed

pump with a B20 compliant pump according to the KEI-162.

- Product Warranty, Emission and Other Precautions:
  1. Your Kubota engine emission control system is certified according to applicable emissions regulations based on the use of Federal Diesel Fuel Standard, which is ULSD (Ultra Low Sulfur Diesel) fuel. When using biodiesel fuel, we request the owner to comply with the Kubota requirements as stated in the operator's manual. We also encourage user to check applicable local and Federal emission regulations and comply with them as required.
  2. Biodiesel fuel may cause restricted or clogged fuel filters during cold weather conditions resulting in improper engine operation.
  3. Biodiesel fuel encourages the growth of micro-organisms which may cause degradation of the fuel, fuel line corrosion, or reduce fuel filter flow sooner than standard diesel fuel.
  4. Biodiesel fuel inherently absorbs moisture which may cause degradation of the fuel sooner than standard diesel fuel. In order to avoid field issues, drain the water separator and fuel filter port frequently.
  5. Do not use biodiesel fuel, which blends biodiesel higher than 20% (i.e. greater than B20). Using biodiesel greater than B20 will affect the engine performance, fuel consumption, and cause the degradation of the fuel system.
  6. Do not re-adjust the engine fuel control system as this action violates emission regulations.
  7. Palm oil-based feedstock has higher viscosity at lower temperatures than soybean-based and rapeseed-based feedstock. Consequently, higher viscosity fuel may reduce the life of fuel filters particularly in cold weather operation, which will require more frequent service and attention.
  8. The KUBOTA Limited Warranty only covers defects in product materials and workmanship for KUBOTA approved engines. Therefore, the KUBOTA Limited Warranty will not cover any problems that may arise due to the use of poor quality fuels that fail to meet the above requirements, whether biodiesel or mineral oil based.

- Routing handing:
  1. Avoid spilling Biodiesel fuel onto engine surfaces as it may cause corrosion. If fuel is spilled, immediately wipe up and clean with soapy water to avoid any permanent damage.
  2. Maintain a full fuel tank level, especially overnight and during short-term storage, to reduce condensation inside of the tank. Tighten the fuel cap after refueling to prevent moisture build up inside of the tank. Water in the biodiesel mixture will damage fuel filters and engine components.

- Maintenance Requirements when using Biodiesel fuel B1 thru B5:
  - Refer to the "Periodic Service" section in Operator's Manual.
    1. When using Bio-diesel for the first time in your Kubota engine, replace the engine oil per the specifications in the Operator's Manual and replace the oil filter with a new Kubota approved filter.
    2. The engine oil level must be checked daily. Follow the oil change intervals recommended service instructions by referring to the "Periodic Service" section in Operator's Manual.

Extended oil change intervals may result in premature wear or engine damage.

- Maintenance Requirements when using Biodiesel fuel B6 thru B20:
  - Refer to the "Periodic Service" section in Operator's Manual.
  1. The engine oil level must be checked daily. Follow the oil change intervals recommended by referring to the "Periodic Service" section in Operator's Manual. Extended oil change intervals may result in premature wear or engine damage.

  2. The maintenance interval for fuel related parts changed. Follow the applicable Kubota or OEM workshop manual when servicing these components:
     - Replace the fuel filters at one half (1/2) of the suggested replacement interval as listed on the Operator's Manual.

       For example: If the suggested interval is 100 hours to replace fuel filters, then replace at 50 hours.

     - Replace the fuel hoses at one half (1/2) of the suggested replacement intervals as listed in the Operator's Manual.

       For example: If the suggested interval is 2 years to replace fuel hoses, then replace at 1 year.

  3. There is a possible reduction of service interval of fuel filter by condition of use.

- Long Term Storage:
  1. Biodiesel fuel easily deteriorates due to oxygen, water, heat and foreign substances. Do not store B6 thru B20 longer than one (1) month and B1 thru B5 no longer than three (3) months.

  2. When using B6 thru B20 and storing the machine longer than one (1) month, drain the fuel from the tanks and replace with light mineral oil diesel fuel. Subsequently, run the engine at least thirty (30) minutes to remove all of the biodiesel from the fuel lines and filter.

  3. When using B1 thru B5 fuel and storing the machine longer than three (3) months, drain the fuel from the tanks and replace with light mineral oil diesel fuel. Subsequently, run the engine at least thirty (30) minutes to remove all of the biodiesel from the fuel lines and filter.

3.3.1.3 Mast

The NT trailer mast consists of a set of nested tubes that are stowed horizontally when in transit. The tubes are placed in the horizonal position by an electric winch and extended by using compressed air provided by an onboard compressor. Maximum mast payload capacity is 430 lbs., including RF, power, and ground cables. Mast height is 10m (32.8 ft) above the trailer bed when extended. Due to the nature of the mast tube interlock system, the mast must be completely deployed to design height.

3.3.1.4 Mast Controller

The mast controller is an electro-mechanical panel that provides status and control for deploying and stowing the mast. The controller manages the electric winch for horizontal to vertical movement and an air compressor for raising and lowering the mast. The controller has built in logic that prevents the mast from being rotated, raised, or lowered unless it is in the proper position.

3.3.1.5 Compressor

The air compressor provides the motive power to raise the mast and lift the mast off the physical locks to stow.

3.3.1.6 Antenna Panels

FR1 frequencies are supported by 4T4R panel antennas that provide 60 degrees of RF coverage.

3.3.1.7 External Power cable

A 100A 240V AC split phase IEC approved power cable and connector is provided for connection to shore power. The cable is terminated at the load center.

3.3.1.8 Load Center

Electrical power for the Nomadic Tower can be provided by the onboard diesel generator or the external shore power cable. Power selection is made at the load center. The load center functions as a mechanical switch and does not provide the ability to seamlessly shift the load or parallel one power source to the other. Moving from one power source to the other will result in a momentary loss of power to the mast controller and NT electronics cabinet.

3.3.2 Mobile Relay (MR) M-RZR Alpha

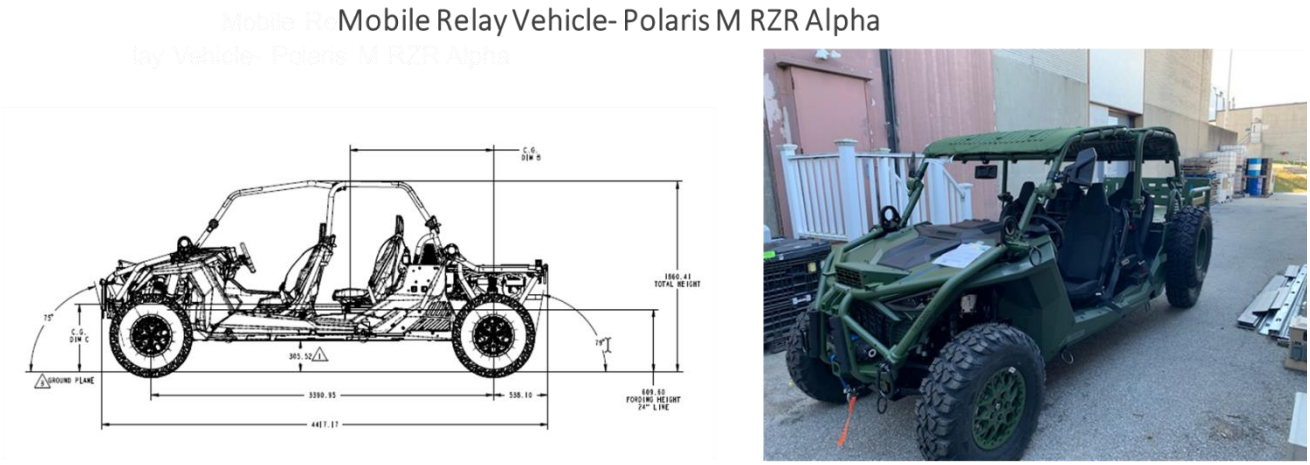


Figure 3-8: Mobile Relay Vehicle: M-RZR Alpha

Figure 3-9: Mobile Relay with Mast and one 4x4 MIMO Antenna Panel

Figure 3-10: Mobile Relay

Figure 3-11: Mobile Relay: Mast Extended

3.3.2.1 M-RZR Alpha

The crew capacity was reduced by removing the rear seats to keep the vehicle below the manufacturer recommended maximum payload weight which is 2000 lbs. The payload weight includes personnel, personnel equipment, mast, MR electronics, and liquid fuels.

3.3.2.2 Mast

The Mobile Relay uses a manually operated belt driven mast to deploy 4T4R MIMO antenna panels. The mast height is 4m (13.1 ft.) when deployed.

3.3.2.3 Electronics

The Mobile Relay electronics consist of computing equipment, O-RU assemblies, power supplies, and networking equipment housed in a 14U transit case with an UPS for power conditioning.

3.3.2.4 Antenna

The Mobile Relay uses 4T4R MIMO antenna panels to support 5G FR1 frequencies.

3.3.2.5 Power

The Mobile Relay may be powered using an onboard generator or using a 125V 30A L5-30P locking plug extension cord to connect to a locking shore power outlet.

3.3.2.6 Generator

The Mobile Relay has an onboard 8 kW 120V/240V AC generator. The generator will run at least 8 hours on a single tank of fuel (6 gal).

3.4 HARDWARE DESCRIPTION

Hardware for OSIRIS includes Nomadic Tower and Mobile Relay.

3.4.1 Baseband Device Description

The software components/electronics includes the servers, switches, Radios, and UE's towards hosting the software to support gNodeB (RAN), 5G Core, and user devices.

The following figures provide the snapshot of the baseband devices used for Phase 3:

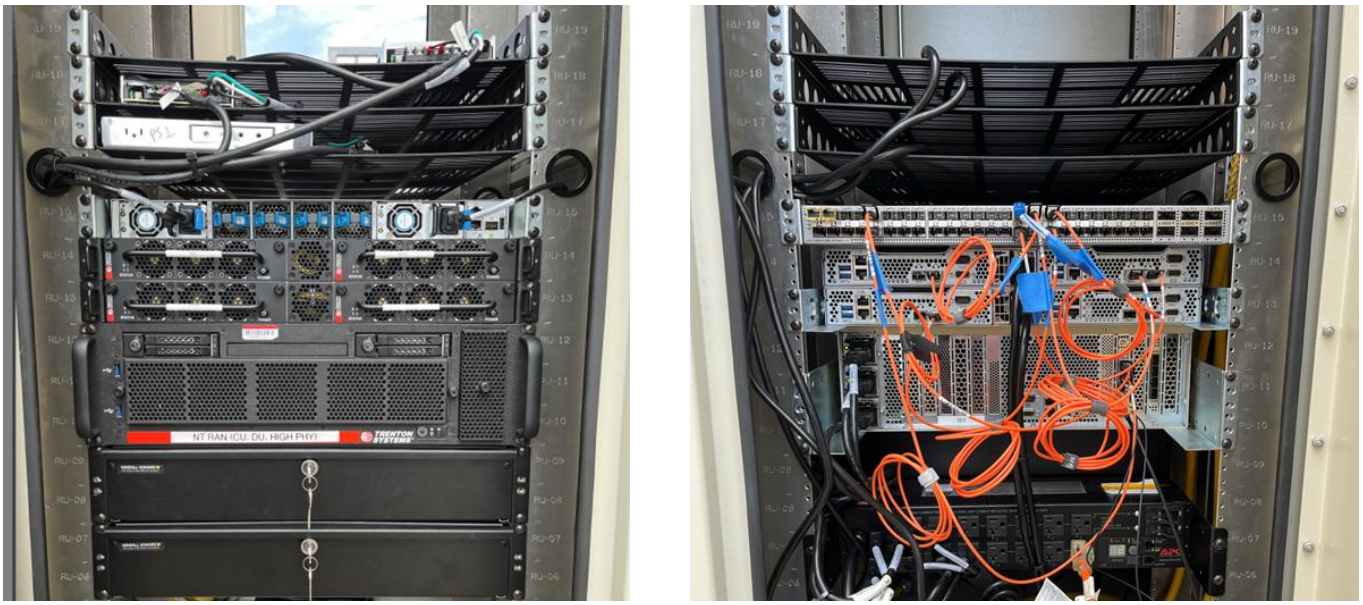


Figure 3-12: NT Cabinet Electronics - Front (Left) and Rear View (Right)

3.4.2 Nomadic Tower

The Nomadic Tower form factor consists of a truck and trailer. The truck solely transports the trailer to different sites. The trailer infrastructure includes an integrated mast & trailer, a trailer mounted generator, and a trailer mounted electronics enclosure.

3.4.3 Mobile Relay

The OSIRIS Mobile Relay consists of a vehicle with integrated mast, vehicle mounted electronics, and a portable generator. The Mobile Relay platform is the USMC ULTV variant of the Polaris MRZR Alpha 4 vehicle.

3.5 SOFTWARE DESCRIPTION

This section provides description and guidelines on servers and software. The software includes the L1, L2, L3, and the FlexRan.

Please reference OSR-SUG-Rev02_SoftwareUserGuide for a complete description of the system software.

4 HARDWARE OPERATIONS

The following sub-sections provide instructions on how to use the various functions or features of the system hardware components. These functions are to be performed by trained equipment operators and their supervisors.

See Section 2 for safety information.

Follow the recommendations from the vendor manuals (Refer to Appendix 1: Table A.1-1).

4.1 NOMADIC TOWER SETUP

4.1.1 NT Trailer Setup

The following high-level steps are provided as guidance:

- Ensure grounds are connected and secure

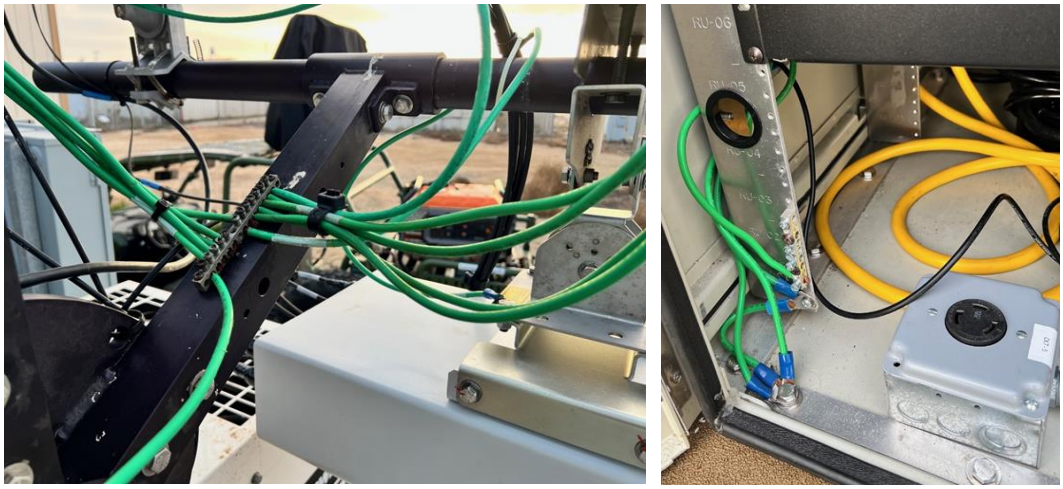


Figure 4-1: NT Mast and Electronics Cabinet Ground Points

- Secure NT Trailer with supplied wheel chocks as shown below:

Figure 4-2: NT Trailer Chocked Wheels and Jacks

- Unlock outriggers by pulling out and twisting the lock pins under the trailer 180°

Figure 4-3: Outrigger Lock Pins

- Extend and lock the outriggers (audible click of the pin inserting when extended) and attach jacks
- Level NT Trailer using jacks and a level, taking care not to raise trailer off the ground

Figure 4-4: NT Trailer Leveling with Outriggers and Jacks Deployed

- Ensure that the antennas are stabilized and azimuth is adjusted prior to mast inclination and extension

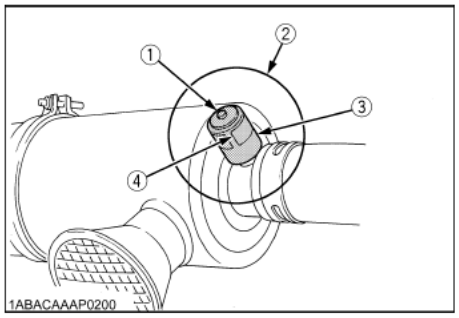
Figure 4-5: NT Antenna Orientation

- Deploy/Install tension guy wires
- Deploy antenna ground and lightning protection. See Section 2 for safety information.
- The trailer may be powered using shore or generator power:
    - If using shore power, connect the external power cable to prime power outlet.
    - If using generator power, follow the instructions in this section that follow.
- Figure 4-6 shows the power load center. Leave switch in the OFF position until power is ready to be applied.

Figure 4-6: NT Trailer Power Box and Switch

- Ensure the air filter is not clogged. The air filter has a visual dust indicator where the filter meets the air intake. If the indicator is red then the filter must be serviced. See the OSIRIS Maintenance Guide and the generator engine manual for details.

If the red signal on the dust indicator attached to the air cleaner is visible, the air cleaner has reached the service level.
Clean the element immediately, and reset the signal with the "RESET" button.



(1) "RESET" button
(2) Dust indicator
(3) Service level
(4) Signal

- Start generator – Follow Instructions on the door. See Manual for details.

Figure 4-7: NT Generator and Generator Control Panel

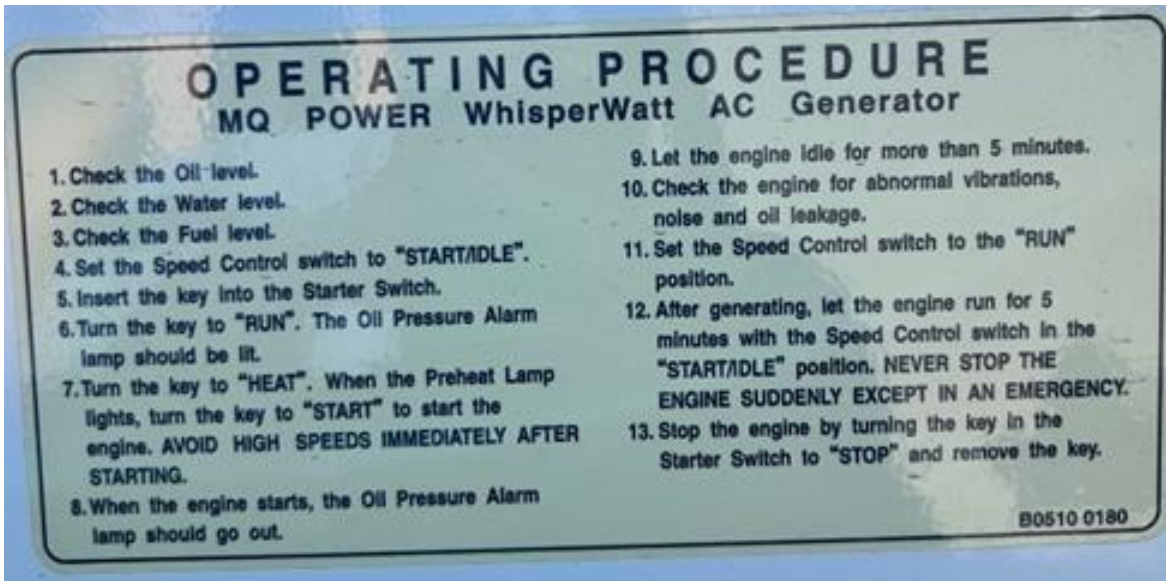


Figure 4-8: NT Generator Instructions

- Note: After engine idle "warmup", it is imperative to flip the Engine Speed Switch (5) from Start/Idle to RUN.
- Observe voltage, adjust if needed
- Flip 70A breaker to ON

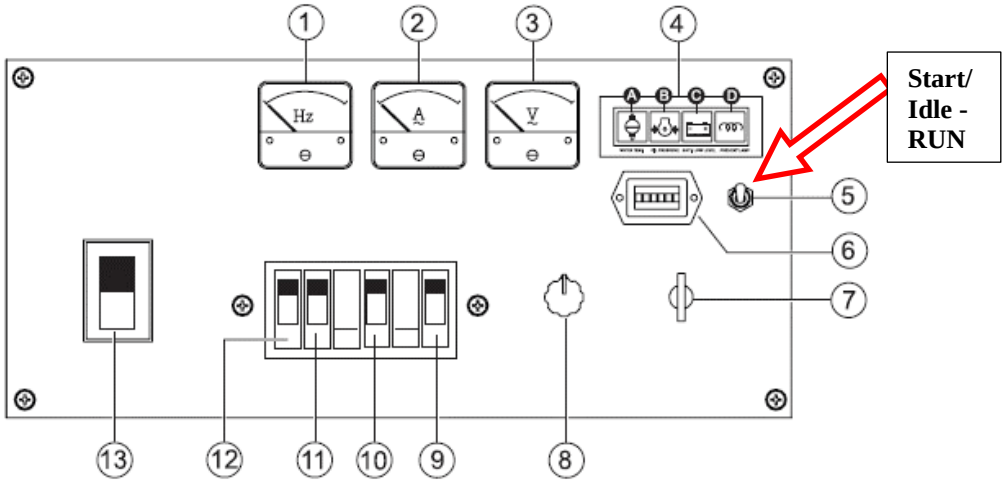


Figure 4-9: NT Generator Control Panel Start/Idle – RUN Switch

- Open Electronics Cabinet and turn on PDU
- Verify the PDU display is ON

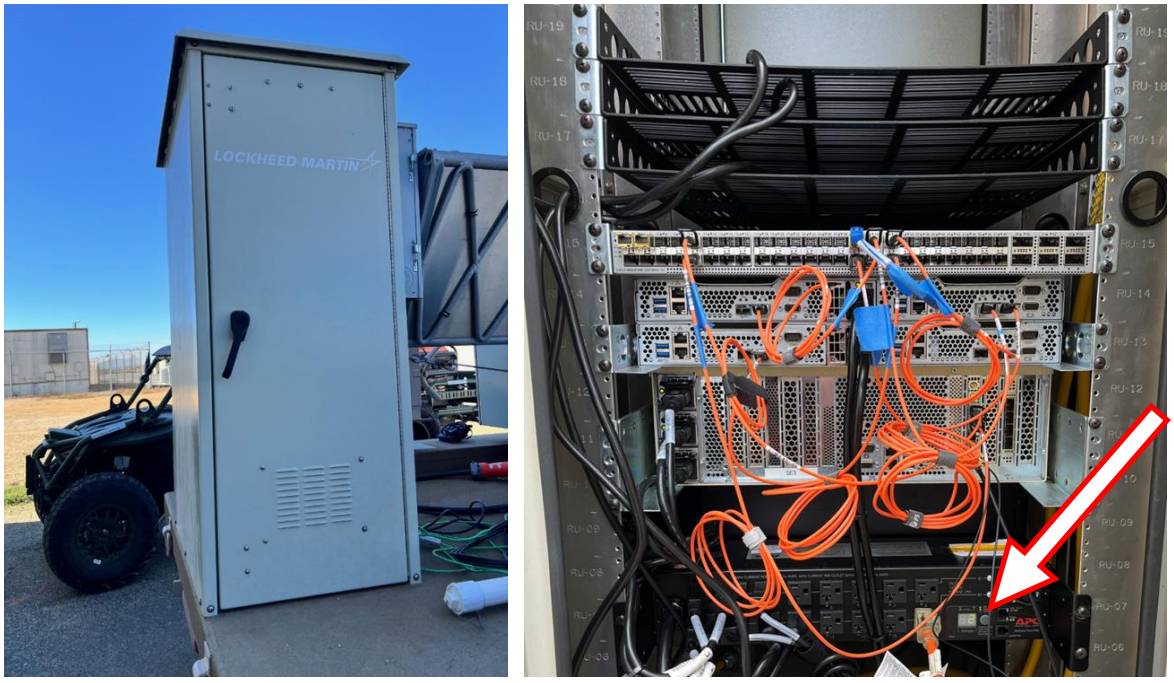


Figure 4-10: NT Electronics Cabinet and PDU

Vendor Manual References:

- Refer to Mobile Mast System Operating Manual Rev 12-2022a for complete instructions on proper towing and staging the trailer.
- Instructions for the operation and maintenance of the diesel generator can be found in the 15kW Diesel Generator Manual (DCA15SPXU4F_rev_3_ops_manual.pdf).

4.1.2 Mast Deployment

The following high-level steps are provided as guidance:

- Remove the Mast Transport Tiedown cables (x2) from the mast structure and mast top

Figure 4-11: NT Mast Transport Tiedown Locations

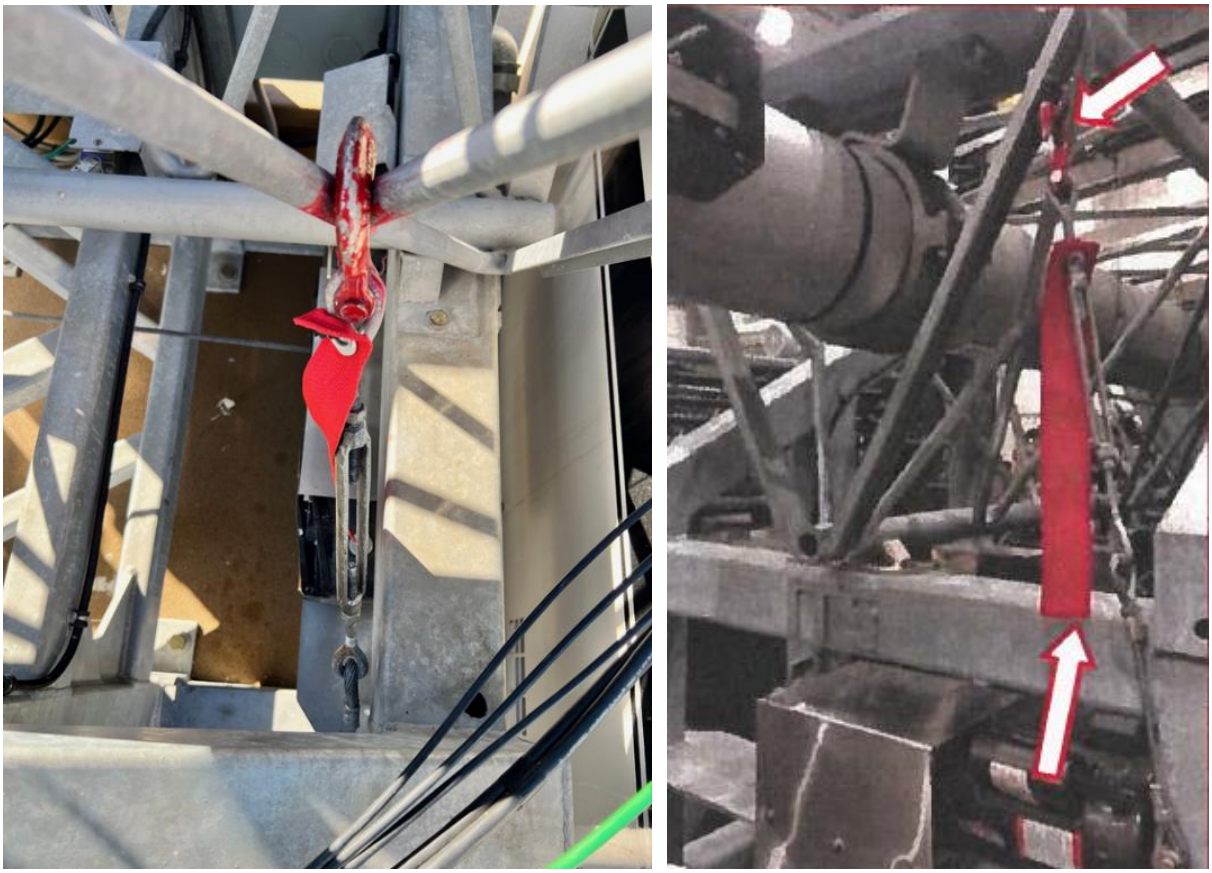


Figure 4-12: NT Mast Transport Tiedown Closeup

Figure 4-13: NT Mast Control Panel Location

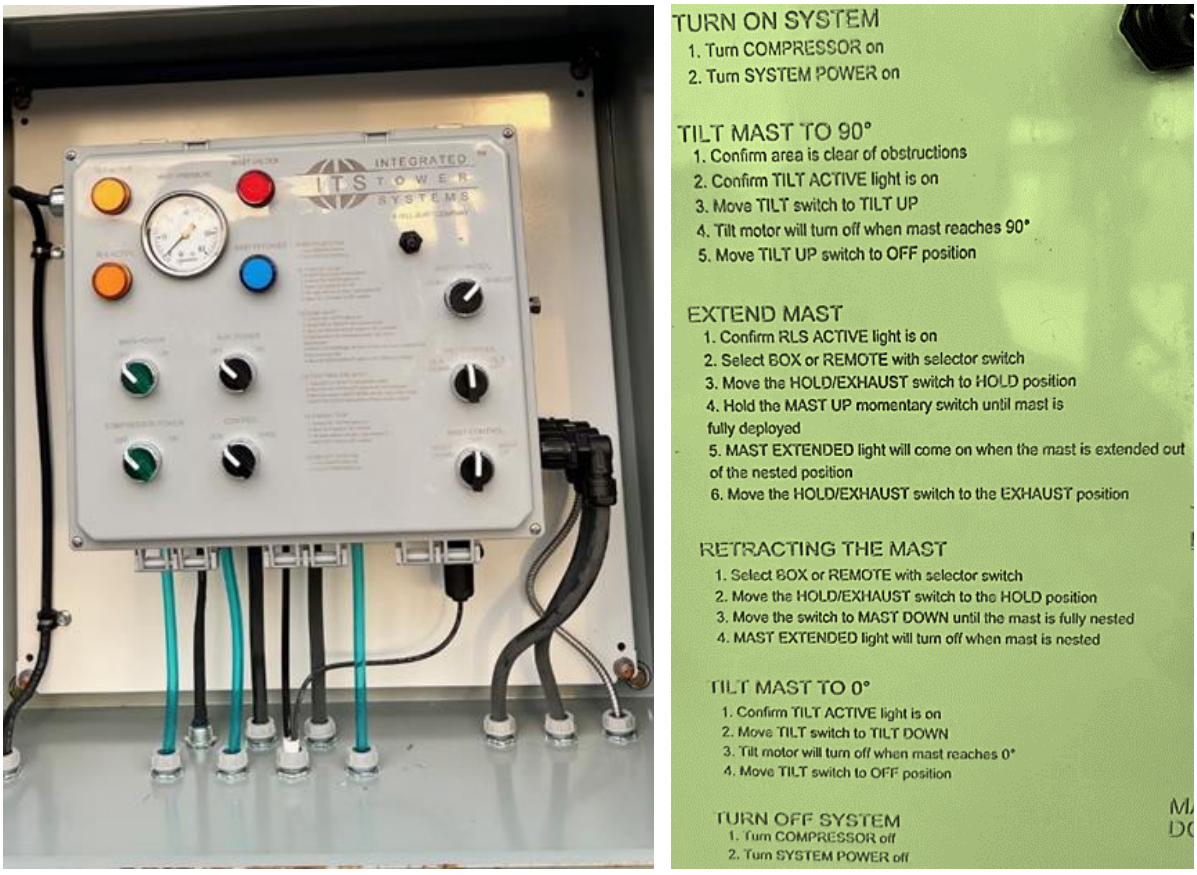


Figure 4-14: NT Mast Control Panel and Operating Instructions

Figure 4-15: NT Mast Tilted to Upright Position

- Use the Tilt control switch tilt mast to 90° vertical from its stowed, horizontal position
- Note: "System Power" refers to the Main Power knob, the 'Box/Remote" positions are on the Control knob, and the "Hold/Exhaust" positions are on the Mast Control knob. "Remote" refers to an optional control pendant.
- When the compressor is in operation typical mast pressure ranges from 20 psi to 35 psi
- Use a level to confirm the mast is plumb
- Remove the Servant Bolts from the holder and insert them into the Mast base assembly

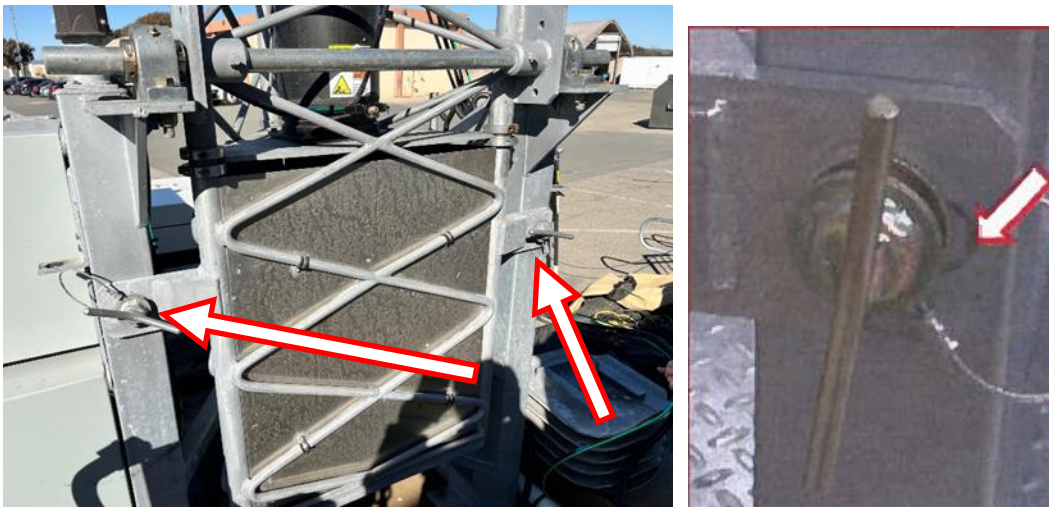


Figure 4-16: NT Mast Servant Bolts

- Raise the mast using the Mast Control Panel Instructions
    - The mast collars lock automatically with an audible click
    - Ensure six clicks are heard which corresponds to a fully extended mast

- Verify collars lock and hold after compressor is turned OF

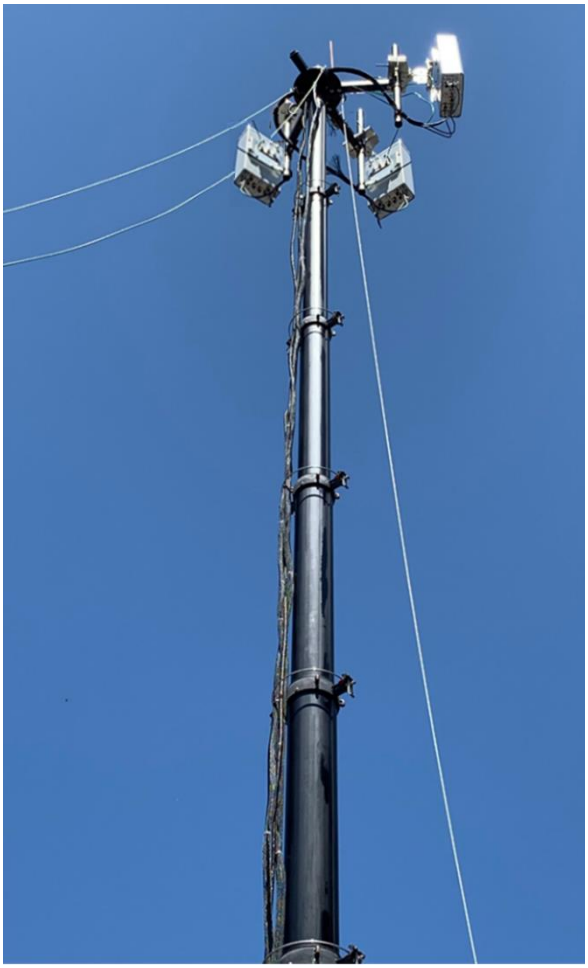


Figure 4-17: NT Mast Fully Deployed

Vendor Manual References:

- Refer to Mobile Mast System Operating Manual Rev 12-2022a for instructions to deploy the mobile mast.
- Additional details can be found in the Standard-Duty-Heavy-Duty-and-Super-Heavy-Duty-Locking-Pneumatic-Mast-Operators-Manual-September-2021-Current.pdf.

4.2 MOBILE RELAY

4.2.1 MRZR Alpha Setup

The following high-level steps are provided as guidance:

- Prior to deployment, place vehicle in park, set vehicle parking brake
- Remove transit case covers
- Lay out cables
- Ensure that the antenna is stabilized, and antenna azimuth is adjusted prior to mast extension

Figure 4-13: MR Antenna Adjustment

Vendor Manual References:

- Operational instructions for the Polaris MRZR Alpha vehicle can be found here: Polaris MRZR Alpha Operator Manual (9940030r02_reduced MRZR Operator Manual.pdf).
- Instructions for starting the Mobile Relay portable generator can be found here: XT8500EFI Generator (xt8500efi-omnl_a0000306683.pdf).

4.2.2 MRZR Alpha MR Mast Deployment

The following high-level steps are provided as guidance:

- Ensure grounds are connected and secure

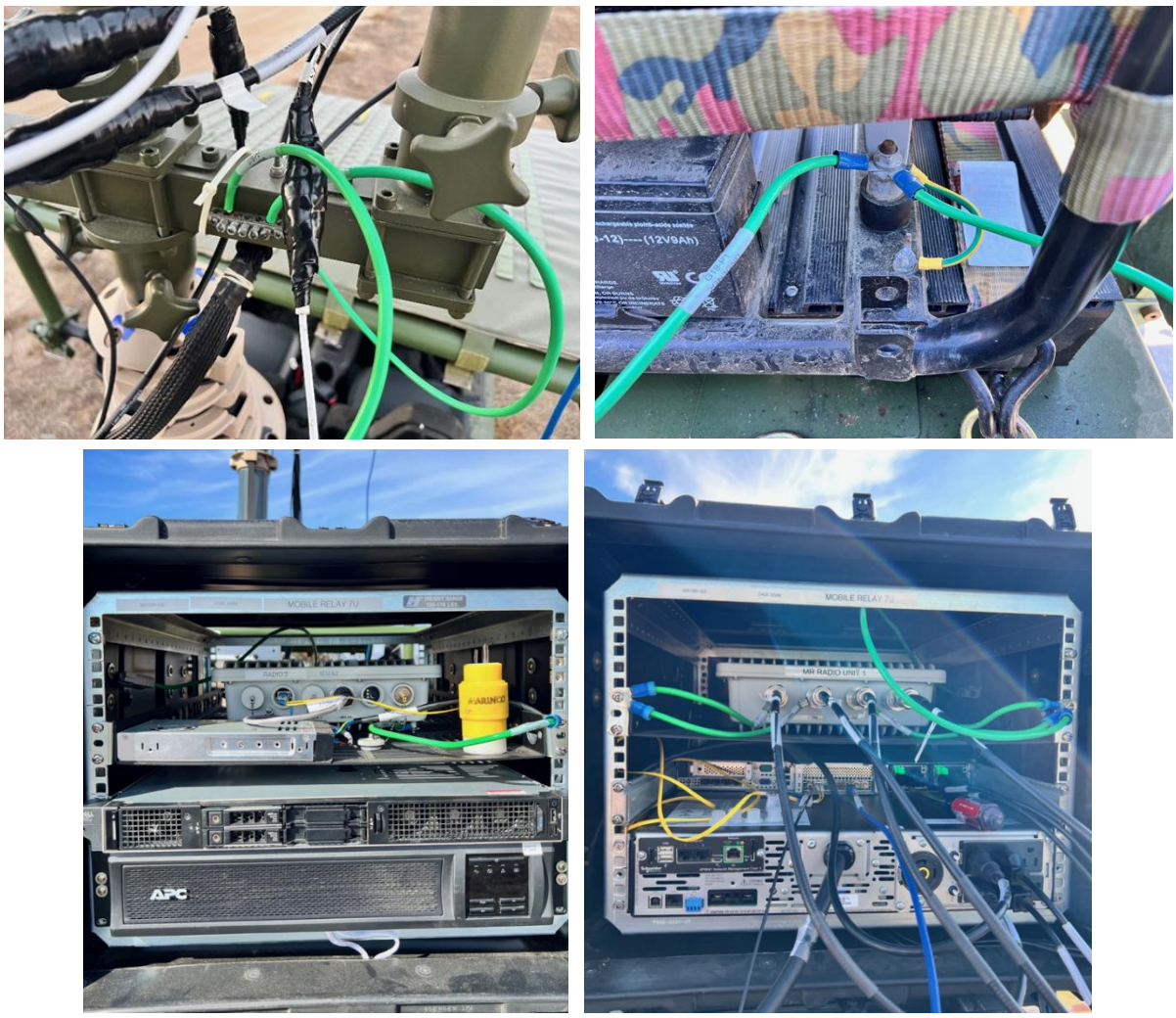


Figure 4-14: MR Ground Points on Mast, Generator, and Transit Case (clockwise)

- Ensure cables are free and there are no obstructions to the antenna belt drive

Figure 4-15: Nested MR Mast and Mast Crank

- Use the hand crank to raise the mast

Figure 4-16: MR Mast Deployed

- Ensure generator is level, fuel if necessary– See Manual for details

Figure 4-17: MR Generator Fuel Cap

- Connect the Mobile Relay to earth ground. See Section 5 safety note.
- Start generator

Figure 4-18: MR Generator Control Panel

- Connect power cable and turn circuit breaker ON

Figure 4-19: MR Generator Circuit Breaker

Vendor Manual References:

- 301139M EX-Mast User Manual.pdf

5 MAINTENANCE, ADMINISTRATION AND ADJUSTMENTS

See OSR_MG_Rev01_Maintenance_Guide for maintenance, troubleshooting, and repair.

ACRONYMS

The list of Acronyms is located at

- Baseline Data Library

APPENDIX A: HARDWARE VENDOR MANUALS AND VENDOR OPERATORS GUIDES

Table A.1-1 lists the Hardware Vendor Manuals available.

Table A.1-1: Hardware Vendor Manuals

Hardware		Description	OEM Manual
Location	Document ID		
3U BAM, XR11	Intel® Ethernet Network Adapter E810-XXVDA4T	Network interface card	Intel Ethernet Network Adapter E810-XXVDA4-006.pdf Intel Ethernet Network Adapter E810-XXVDA4T Product Brief_004.pdf
	Intel Quick Assist Adapter	Hardware accelerator	Intel Quick Assist Adapter_8960_8970_product brief.pdf Intel vRAN Accelerator ACC100 Adapter.pdf
Antennas	Galtronics GP2410-B6636	Single-sector 10-Port MIMO antenna for Small Cell, Stadium/ Venue and Outdoor DAS applications.	GP2410-B6636_Datasheet_R2_Panel_1695-5925.pdf
	Galtronics GP2708-07124	Directional 4 X 4 MIMO antenna	GP2708-07124-DataSheet-R3.pdf
	Panorama LGMQM4-6-60-24-58	GPS reception	Panorama SW3-931-L[G]M[X]M4[X]-6-60[-24-58].pdf
	PTP 550	Integrated 5GHz 1.36Gbs Radio for IAB simulation	Cambium_Networks_data_sheet_PTP_550.pdf
Mobile Relay	Mobile Relay Mast	Manually operated belt driven mast	301139M EX-Mast User Manual.pdf BHAA005.pdf BMAK044.pdf
	Polaris M RZR Alpha	Light tactical vehicle	9940030r02_reduced MRZR Operator Manual.pdf 9940302 MRZR Alpha Diag Service Manual.pdf
	Portable Generator	Portable Generator	xt8500efi-omnl_a0000306683.pdf
Mobile Relay Baseband	Dell XR11	Mobile Relay Baseband Server	pexr11-ism-pub-en-us.pdf
	UPS	Battery backup	APC_SmartUPS_SMX3000RMLV2UNC.pdf

Hardware		Description	OEM Manual
Location	Document ID		
NT & MR Baseband	Getac V110	Management laptop	V110G6 with TraCS English Manual_240510.pdf
	Benetel	5G radio	RAN650_Install_and_Bring_up_Guide_Rev2.7.pdf For the remaining software manuals, see the Software Vendor folder
NT Baseband	Cisco Nexus 9300-EX Series switches	Network switch .	b-cisco-nexus-9000-nx-os-fundamentals-configuration-guide-93x.pdf b-cisco-nexus-9000-nx-os-interfaces-configuration-guide-93x.pdf b-cisco-nexus-9000-nx-os-layer-2-switching-configuration-guide-93x.pdf Cisco Nexus 9300-EX Series Switches Data Sheet – Cisco.pdf
	Rack PDU	Rack power distribution	APC_NetShelter-Switched-Rack-PDUs_AP7902B.pdf
	Trenton Systems 3U BAM	Server	3U_BAM_DATA_SHEET.pdf 8270 3U BAM Manual Rev 2.pdf Enabling Root User and Creating New Users(Insyde).pdf
	Trenton Modular Blade Server Chassis	Server	MBS1001 Data Sheet MBS2000 Data Sheet
NT Trailer	Generator	15KW diesel generator	d1503me3.pdf DCA15SPXU4F-rev-3-ops-manual (3).pdf DCA15SPXU4F-rev-1-parts-manual.pdf DCA36SPXU4F-01-Generator-Data-Sheet.pdf DCA36SPXU4F-02-Engine-Emission-Data-Sheet.pdf

Hardware		Description	OEM Manual
Location	Document ID		
	Mast	Pneumatic trailer based mast	40598-B.pdf 7-32-HDL-Survival-Wind-Chart.pdf Guy Kit 55488-B.pdf Guy Kit 55126-00.pdf Mobile Mast System Operating & Maintenance Manual Rev 12-2022A.pdf Standard-Duty-Heavy-Duty-and-Super Heavy-Duty-Locking-PneumaticMast-Operators-Manual-September-2021-Current.pdf Weatherizing-Your-Pneumatic-Mast.pdf
	Trailer Body & Accessories	Trailer platform	Lockheed RD-T Trailer 2022Dec13.pdf
	Trailer Cabinet	Electronics cabinet	DDB-Fan-Kit-Installation-Instructions.pdf OD-Series-Manual-2-11-16.pdf