HIPOINTER MANUAL

HIPOINTER 100 RADAR

REVISION LOG

Revision	Date	Description	Author
F	8/2/2023	Update Uncontrolled Exposure limits from 3.37 m to 3.38 m	EEA
E	4/18/2023	Admin Change	EEA
D	4/13/2023	Update to include RF exposure training notices	EEA
C	1/17/2023	Updated maximum permissible exposure levels in accordance with OET Bulletin 65	EEA
B	11/22/2022	Added information on deployment options and updated documentation to Aerostar.	EEA
A	07/30/2021	Block 10 updates	EAC
Initial	03/30/2020	Initial Release	EAC

Table of Contents

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TABLE OF FIGURES

1   INTRODUCTION

The HiPointer Manual provides a detailed description of how to install, operate, and maintain the HiPointer radar. The HiPointer Manual provides the operator with a system overview, standard operating instructions and troubleshooting help.

1.1   TECHNICAL SUPPORT

Standard service and support are available, Monday through Friday from 8am to 5pm Central time, excluding holidays. If your organization has purchased 24x7 support, please contact your Account or Program Manager for the 24x7 product support phone number.

If problems are encountered during the installation or operation of this system, please contact Aerostar technical support using the following contact information:

Telephone number:	1-855-429-2376
E-mail address:	RadarSupport@Aerostar.com

In the event the equipment requires service, a Return Merchandise Authorization (RMA) number will be assigned by an Aerostar technical support representative along with shipping instructions.

1.2   WARNINGS, CAUTIONS, NOTES

This manual uses the following cautionary messages:

WARNING
Warnings call attention to things which could cause serious or fatal injury to personnel. Follow all warning messages to prevent serious or fatal injury.

CAUTION
Cautions call attention to things which could damage equipment. Follow all caution messages to prevent damage to equipment.

NOTE
Notes contain specific information for a detailed procedure or step.

1.3   SAFETY AND TRAINING

For personal safety, refer to the warnings below throughout the manual. When the radar is transmitting, follow the safe distance guidelines listed below.

All personnel that may be exposed to RF transmitted by this device through the course of their employment must be trained on RF exposure and be fully aware of the actions that they can take to control their exposure. Occupational/controlled exposure values outline the minimum distance that meets the allowed radiation exposure for persons who are exposed as consequence of their employment (based on six minute time averaged limit). Uncontrolled exposure outlines the minimum distance that meets the radiation exposure permissible for an unlimited amount of time for the general public.

To ensure compliance with RF maximum exposure limits, access to the radar must be restricted at the distance specified in the chart below when the radar is transmitting.   Installation of the radar on ship masts or towers should be at a height sufficiently high to exceed the uncontrolled exposure distance or other means must taken to prevent personnel access to the radar closer than then uncontrolled distance when transmitting.

All installation and or maintenance work performed on the radar or within the vicinity of the radar at a distance closer than the uncontrolled exposure distance shall be performed when the radar is in the standby state (not transmitting) and ideally unpowered. The customer is responsible for implementing the access restrictions and operational procedures to ensure personnel safety.

WARNING

The following exposure limits are based on far field calculations which over predict the power density in the near field of the antenna and are therefore a worst-case conservative prediction. Exposure limits are based on 47 CFR 1.1310 and OET Bulletin 65 Edition 97-01 for limits of Maximum Permissible Exposure (MPE) using far field calculation, a 100W peak power output for the HiPointer 100 and a maximum duty cycle of transmission of 5%. The duty cycle used is based on measurements of system performance of software defined operational modes and cannot be modified by the end-user.

RADAR MODEL	CONTROLLED EXPOSURE[1]	UNCONTROLLED EXPOSURE[2]
HiPointer 100	>1.51m	>3.38m

[1]Controlled exposure distance is based on 50W/m^2
[2]Uncontrolled exposure distance is based on 10W/m^2

CAUTION

To prevent serious injury to personnel near the radar and prevent damage to equipment, ensure the following before setting the radar to "Activate":

Setup and mounting have been completed.

Personnel are a safe distance from the radar

All safety measures are complete.

Opening the radar enclosure may result in personal injury and/or may result in damage to the radar. This radar contains no user serviceable parts and should only be opened by Aerostar personnel. Any damage to the radar occurring as a result of opening the radar by someone other than an Aerostar team member will *not* be covered under warranty.

NOTE

Certain types of installations may require additional installation-specific components necessary for proper operation (e.g., GPS units for position and heading). For additional support contact Aerostar technical support

1.4   GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ACRONYM/ABBREVIATION	DESCRIPTION
ADS-B	Automatic Dependent Surveillance-Broadcast
AIS	Automatic Identification System
GGA	NMEA String Containing Global Positioning System Fix Data
GPS	Global Positioning System
HP100	HiPointer 100 Radar
HP150	HiPointer 150 Radar
MPE	Maximum Permissible Exposure
NMEA	National Marine Electronics Association
NTP	Network Time Protocol
RF	Radio Frequency
RMC	NMEA String Recommended Minimum Sentence C
SHM	Shared Memory
SMA-M	Subminiature A Connector (Male)
ZDA	Zero Delay Adjustment

2   RADAR SYSTEM OVERVIEW

The HiPointer radar is a portable, high-performance, low-power, multi-purpose doppler based radar for land, air and maritime applications requiring acquisition and tracking of thousands of targets.

2.1   SYSTEM COMPONENTS

Description	Qty	Part Number
HiPointer 100, Radar	1	215321/217158 (GPS Sync)
Power Cable	1	212120/215086
Ethernet Cable	1	212122
Installation Kit (Screws, washers, spacers, GPS antenna, cold shrink, tape)	1	212703

2.2 SYSTEM BLOCK DIAGRAM

The HiPointer radar requires power and ethernet to operate. There are two ethernet connections (ETH0 and ETH1), both connections are connected to the same internal switch and are identical. Ethernet connections are used to control the radar, obtain track outputs from the radar, configure the radar, and get navigation information to the radar. The HiPointer radar requires a DC source between 24 - 28 VDC and 10-12 amps. If possible, run a separate power supply line to the HiPointer to minimize the amount of noise on the data lines going to the radar.

Figure 1: System Block Diagram
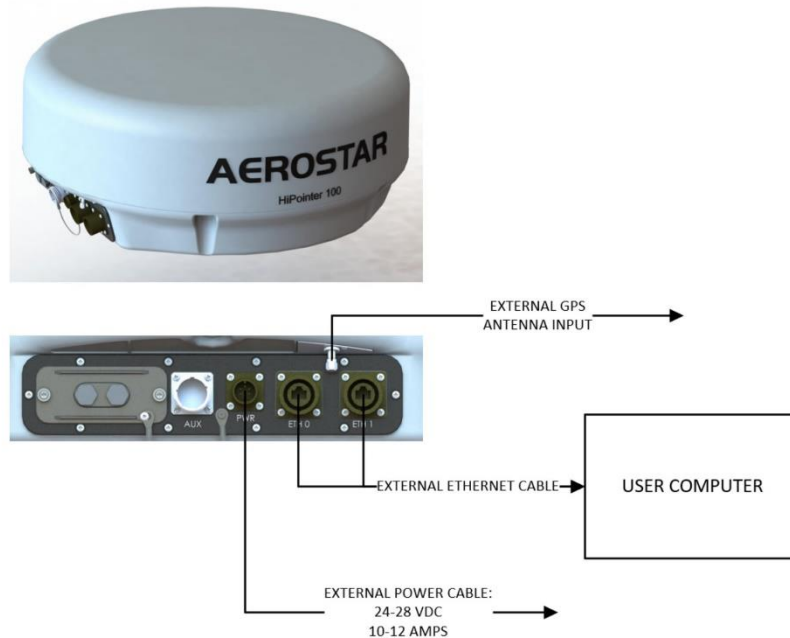
An external SMA connection is available for an external GPS antenna. This connection is not required for normal operation but is highly recommended. This connection allows the radar to use GPS time for the radar's internal timeserver. Using this antenna will reduce latency from navigation sources, increasing accuracy of detections and tracks. The GPS antenna is required in applications where multiple radars are co-located and used in a pulse synchronization mode (option).

2.3 SYSTEM COMPONENT DESCRIPTIONS

ITEM	SPECIFICATION
GENERAL	
Radar Type	Pulse-Doppler
Frequency	9.41GHz ± 30MHz
Radiated Power	HP100 Peak: 100W
Voltage	24-28 VDC
Antenna Beamwidth	Vertical: 20° / Horizontal: 5°
RPM	0 To 40
Minimum Range	85m (0.045NM)
Current	10-12 A (MAX)
MECHANICAL	
Dimensions	622mm Diameter x 255mm H (24.5in x 10in)
Weight	15kg (33lbs)
Housing Material	Luran (ABS-like Material)
ENVIRONMENTAL	
Temperature	Operating: -32 to 50° C; Storage: -33 to 71 °C
Operating Humidity	95% Relative, Non-Condensing
Cooling	Forced Air, Natural Cooling
Enclosure Rating	IP66
INTERFACES	
Network	Ethernet, RJ45 (T568B) Mating Connector: RJFTV6MG
Power	Mating Connector: MS3106F14S-6S

2.4   DIMENSIONS

HiPointer external dimensions are outlined in the following figure.

Figure 2: System Dimensions

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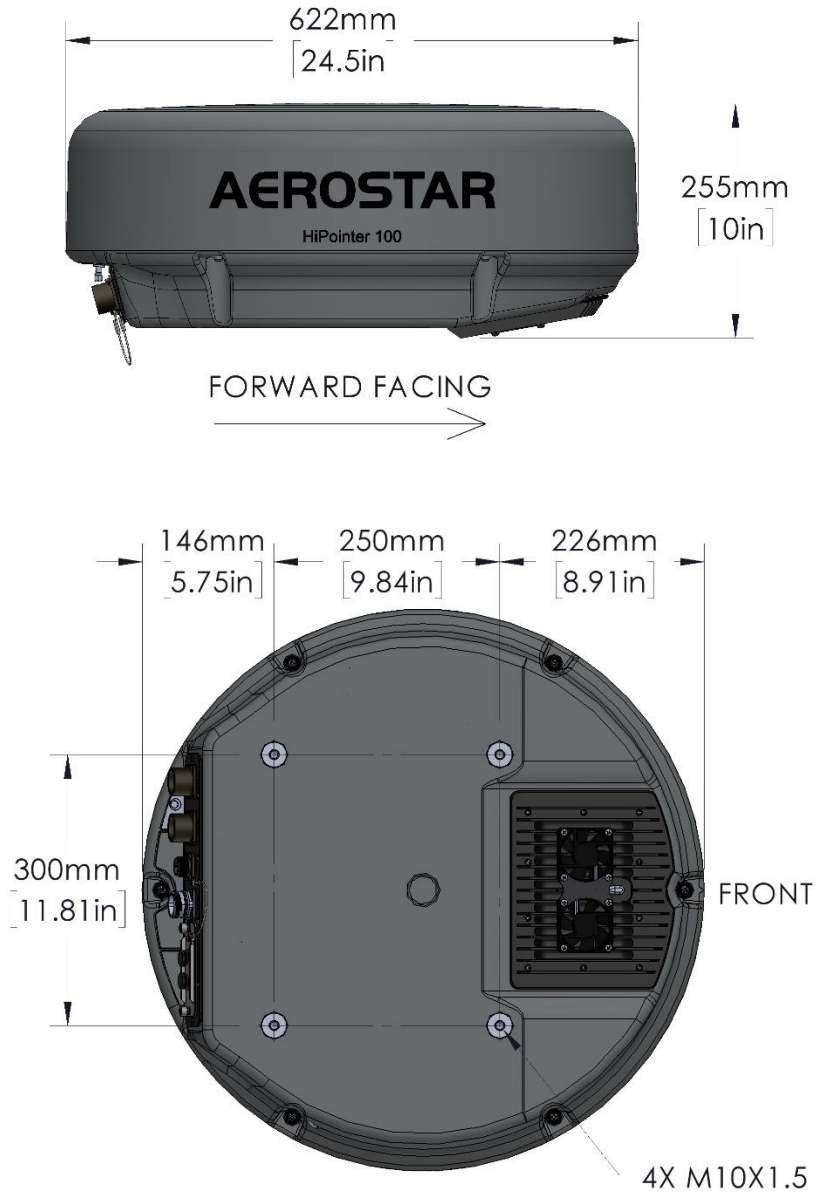
3 INSTALLING AND MOUNTING THE RADAR

3.1 MOUNTING PREFERENCES

To complete the installation, utilize the provided hardware and tooling for mounting the radar.

The radar should be mounted with minimal blockage between the vessel (if applicable) and the radar beam. Obstructions may cause blind sectors. In general, the higher the radar is mounted, the further the radar can detect targets. Please contact an Aerostar Field Service Representative with any questions regarding target detection vs platform height.
The radar's 3 dB vertical beamwidth is 20°. The antenna center of the radar is 145.5mm (5.73in) above the mounting surface. The vertical beamwidth spreads 10° above and below the antenna's center. Care should be taken to avoid any metal obstructions around the radar which can cause multi-path RF interference and could generate false tracks. Please contact an Aerostar application engineer for radar installation questions.

Figure 3: Radar Beamwidth

The radar should be mounted on a flat surface or a platform parallel to the vessel's water line (if applicable) or level with respect to the ground and of sufficient strength to support the radar's weight. The weight of the radar is 15kg (33lbs). Other electronics, cable, and emission sources (other radars, etc.) should be clear of the beam path.
GPS and ADS-B antennas should be either above or below the radar beam path.
True north from the perspective of the radar is indicated by the arrow notch placed on the upper radome underneath one of the Aerostar decals. The arrow notch coincides with a 0-degree offset as seen in the picture below.

Figure 4: Alignment Notch

It is recommended in maritime applications; the notched arrow should face the same way as the bow of the ship.

3.2 CABLE PREFERENCES

Observe the following precautions when installing the power, network, and serial cables:

To ensure safety, appropriate cable ties, fasteners, sealant, and tape should be used to secure the cable along the route and through any enclosures or metal plates.
Cables should not be run near moving objects, high-heat sources, or through doorways.
The power cable should be installed as close to the power source as possible.
The standard power cable length is 25ft, contact technical support if extended lengths are required.

3.3 MOUNTING THE HIPOINTER

Before the radar is mounted, review the mounting pattern, and select a mounting location.

Hardware is supplied with the HiPointer system that will cover multiple mounting plate thicknesses. The screw length used should be guided by the thickness of the mounting plate as listed in the following table:

QTY	DESCRIPTION	PART NUMBER	MOUNTING THICKNESS
4	Screw, M10 X 1.5, 70mm, SHC, 18-8 SS	112-01-690	6.35 mm (0.25in)
4	Screw, M10 X 1.5, 75mm, SHC, 18-8 SS	112-01-691	12.7mm (0.50in)
4	Screw, M10 X 1.5, 80mm, SHC, 18-8 SS	112-01-692	19.05mm (0.75in)

The installation procedure for mounting the HiPointer to the mounting surface is illustrated in Figure 6 and outlined here:
1) Use the included template to drill holes in the mounting surface.
    a. If the mounting surface is electrically isolated the standard mounting holes size is 12mm (15/32in).
    b. If the mounting surface is not electrically isolated from system ground, the recommended mounting hole size should be 13.5mm (17/32-in) to accommodate the use of isolation washers.
2) Place isolation washers in mounting holes if required for electrical isolation.
3) Place the spacers over the mounting holes.
4) Position the radar on the mounting surface over the spacers with the connection panel facing the rear of the vessel (if applicable).
5) Fasten the radar and spacer to the mounting surface using the appropriate length screws, flat washers, and split lock washers.

6) Torque all fasteners to 33N-m (25lbf-in.).

Figure 5: Mounting Hardware
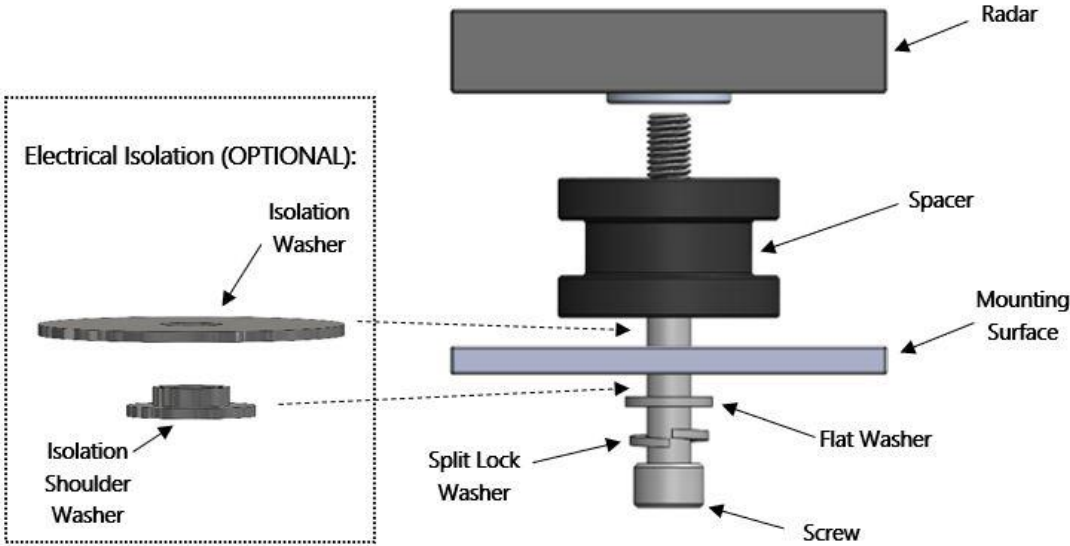
3.4 POWER CABLE CONNECTION

<div style="background:red;color:white">**WARNING**</div>

For the safety of personnel, ensure the power source is de-energized before connecting to the radar.

Route the power cable from the radar to the power supply/conditioner. See appendix A for wire diagram and recommendations for how to ground the power cable. Connect the power cable to the radar rear panel (PWR).

Figure 6: Power Connection

3.5 ETHERNET CABLE CONNECTION

Connect a radar ethernet connection directly to a computer or to a network switch for access to the control interface.

Route the ethernet cable from the radar to a computer or network switch. Connect the ethernet cable to a computer or network switch. Connect the ethernet cable to the radar rear panel (ETH0 or ETH1).

Figure 7: Ethernet Connections

3.6   GPS CONNECTION

If using an external GPS antenna, connect to the radar directly using a compatible SMA-M connector. Active GPS antennas are preferred; however, passive antennas are acceptable.

Figure 8: GPS Connection

3.7   CABLE WEATHERPROOFING

To ensure all connections are weathertight, cold shrink tubing shall be installed on all mated electrical connections as instructed below Alternate weatherproofing procedures shall follow NAVSEA SE000-00-EIM-110 or similar approved Mil-Std methods and procedures. All non-used connector locations shall have weatherproof dust caps installed (included).

Cold Shrink Tubing Application:

1) For ETH0 and ETH1 connections only, apply 8-10 wraps of self-fusing tape (PN 112-24-218) over the cable within 1/8 to 1/4-inch of connector back shell.

Figure 9: Self-Fusing Tape Application

2) Disconnect each connector from the radar. Prior to the application of Cold Shrink tubing, ensure all connections are clean and dry. For ethernet and power, use PN 112-21-188. For GPS connections use PN 112-21-191. Slide cold shrink sleeve over connector & cable with loose end of plastic spiral on the bottom end of the cable.

Figure 10: Cold Shrink Sleeve Application

3) Reinstall connector to the radar rear panel, ensure the connection is secure.
4) Slide Cold Shrink sleeve over connection until the plastic spiral contacts the rear panel bulkhead.

Figure 11: Cold Shrink Bulkhead Placement

5) Pull loose end of plastic spiral (on outboard bottom side) while maintaining *light* compression force between spiral and rear panel bulkhead until Cold Shrink boot collapses over receptacle-bulkhead panel interface.

Figure 12: Collapsing Cold Shrink

6) Once boot collapses on receptacle, maintain a *light* tension force on Cold Shrink pulling it *away* from receptacle while continuing to pull plastic spiral.
7) Continue pulling plastic spiral on bottom side until plastic spiral is removed from Cold Shrink.

Figure 13: Cold Shrink Application

8) Inspect applied area to ensure Cold Shrink covers the receptacle, mating connector and a minimum of 1-inch coverage over associated cable.
9) Repeat process for all remaining connections.
10) Ensure weatherproof dust caps are securely installed at all unused connector locations.

4   RADAR SETUP

4.1   SYSTEM STARTUP PROCEDURES

WARNING
For the safety of personnel, ensure the power source is de-energized before connecting to the radar.

Before turning on the radar for the first time, confirm the following:

- The radar has been properly mounted.
- All cables are properly connected between components.
- The power cable has been properly grounded.

After the above tasks are confirmed, the radar can be powered on. To power on the radar simply energize the power source. It may take up to five (5) minutes for the system to fully initialize.

For instructions on how to reboot and shutdown the radar, please refer to 5.3 System Shutdown and Reboot Procedures.

4.2   USER ROLES

There are two user roles which define the access level to the system. These two roles are user or admin.

Persons with the user role have the following abilities:

- Activate/deactivate the radar and select pulse settings
- Add and edit data feeds (ADS-B, AIS, GPS)
- Stop and restart services
- Create additional accounts with user level access
- Create and download diagnostic logs
- Monitor tracks in vStorm

Persons with the admin role additionally have the ability to:

- Edit the deployment type for the radar
- Edit the network configuration for the radar
- Edit the time server configuration for the radar
- Set position and offset values
- Configure output data settings Create additional users with user or admin level access

On a new installation the default usernames and passwords are:

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Username	Password	Roles
admin	rad@dmin_pass#1	admin
ssp	ssp_radar_access	user

4.3   INITIAL RADAR CONFIGURATION

If an Aerostar Field Service Representative did not set up the radar, the radar will need to be configured before transmitting for the first time. Configuration items include:

- Deployment configuration
- IP addresses configuration
- Data feeds configuration (AIS, ADS-B and GPS sources)
- Radar position and offsets
- Time Server configuration
- Output data configuration

Radar configuration can be performed by logging into the status and control webpage as an admin and configuring each of items listed. The following sections provide details on first time login and configuration instructions.

4.4   ACCESSING THE STATUS AND CONTROL WEBPAGE

The Status and Control Webpage is where the operator will configure and control the radar.

To log into the radar for the first time, the ETH0 or ETH1 connections must be connected directly to a computer and accessed using the maintenance IP address of the radar (10.10.10.2) until the user desired network configuration is saved. When using the maintenance address to connect to the HiPointer, the connection should be direct to the radar to prevent multiple radars from responding at the 10.10.10.2 address.

- Configure a computer to the default subnet of the maintenance address for the radar (10.10.10.X).
- Connect the computer to the Eth1 or Eth0 ethernet connections on the radar.
- Launch a web browser and navigate to the HiPointer default IP address (10.10.10.2).

NOTE: Instructions in Section 4.6 will guide the user on how to change the radar network configuration to the user desired values. If the IP address of the HiPointer has been set to the user desired network configuration, the HiPointer can be accessed at the user defined IP address.

These actions will launch the login page for the *Status and Control* web page used to control the system. To access the configuration features the user must be logged in as an admin (see Section 4.2 for login information). After a successful login, the *Status and Control* webpage will display.

Figure 14: HiPointer Login Screen
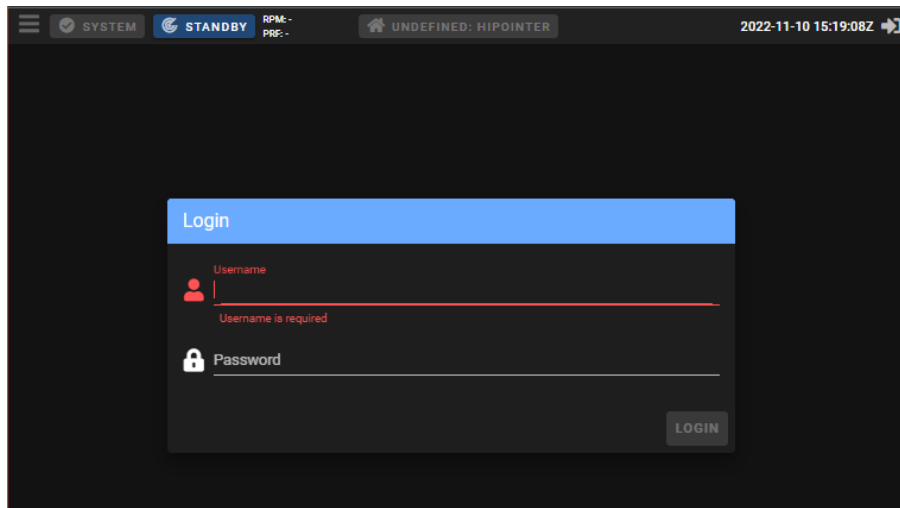
The navigation panel in the Status and Control Webpage is accessed by clicking on the three lines in the top left corner of the screen. A tab will open with various options to select from for system configuration as displayed in the following images.

Figure 15: Status and Control Interface Navigation

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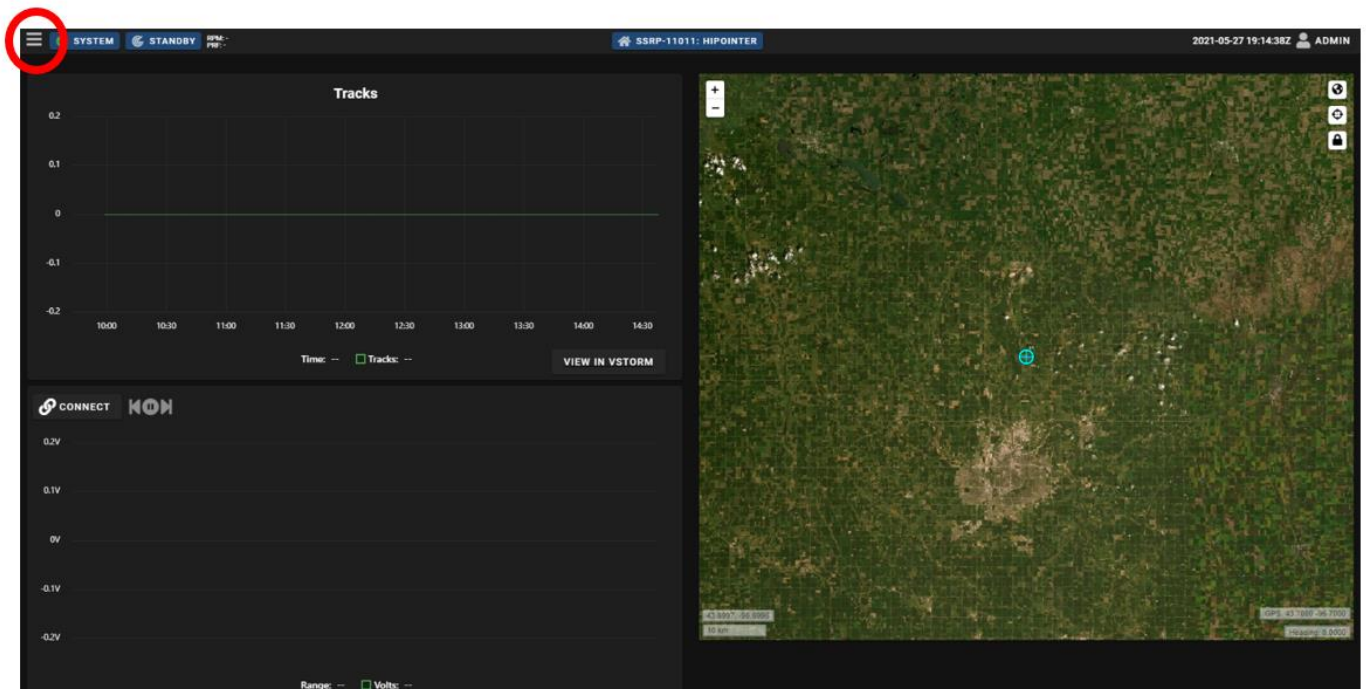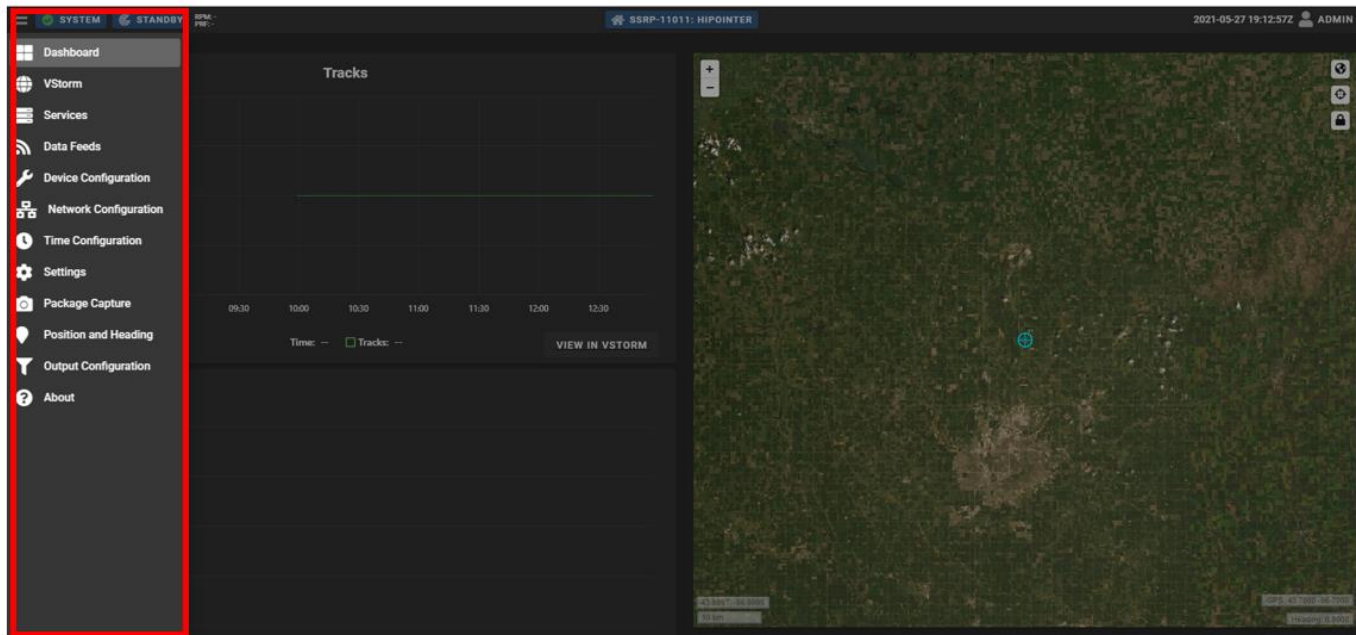www.aerostar.com

Figure 16: Status and Control Expanded Navigation Options

4.5   DEVICE CONFIGURATION

Device configuration can be performed by an admin user and defines how the radar will process sensor information. Configuration settings are defined below but selectable options will be limited based on system configuration that was ordered from Aerostar.

Deployment Options:

Land SS: This radar deployment mode will reject clutter and all objects that are not moving. This mode should be used when detecting moving objects over land, such as walkers and vehicles

Land SS with archiving enabled (raw on SBC3): This radar deployment mode is the same as Land SS but allows for the recording of track information. This mode should only be selected if working with Aerostar Service team members to troubleshoot or capture tracks.

Maritime SS: This radar deployment mode detects all objects in a maritime environment, whether moving or stationary. When in maritime mode the radar will automatically adjust the detection thresholds based on the operating clutter.

Maritime SS with archiving enabled (raw on SBC3): This radar deployment mode is the same as Maritime SS but allow for recording of track information. This mode should only be selected if working with Aerostar Service team members to troubleshoot or capture tracks.

Aggregator: This radar deployment mode should be used if the system aggregates the streams of multiple sensors into one export stream.

Platform options:

> Tower mode: Tower mode is used when the radar is mounted to a stationary platform and not moving. It can also be used on a moving platform such as a scope truck if the radar is not in motion while operating. The radars should have inputs that inform it to what the correct GPS position is, and the bearing offset to true north. With those 2 pieces of information, the radar will report the correct latitude and longitude for tracking outputs.

> Vessel mode is used when the radar is on the move with the position and heading of the radar changing. Applications for this mode include ships, aerostats, and other moving platforms such as UAVs. For accurate tracking, the radar requires heading information along with position information. Both the heading and position sensors should be as low-latency as possible. Heading update rate should be no slower than 10Hz and position information should be updated no slower than 5Hz.

Radar option is not user selectable and is set to F10 SS.

Antenna option is not user selectable and is set to 2' antenna.

Inverted mount option should be set to yes when the radar is mounted hanging upside down from the mounting plate (e.g., aerostat configuration) and set to no when the radar is mounted above the mounting plate.

Correct for Ground Range should be set to yes when the radar position is significantly above the elevation of the detected targets (e.g., aerostat installation).

Default Target Elevation should be used when correct for ground range is enabled and defines the default elevation of targets that will be used when the ground range correction is calculated.

The Device Configuration tab in the Navigation Panel is shown below. Any changes made to the device configuration settings will be saved by selecting "submit."

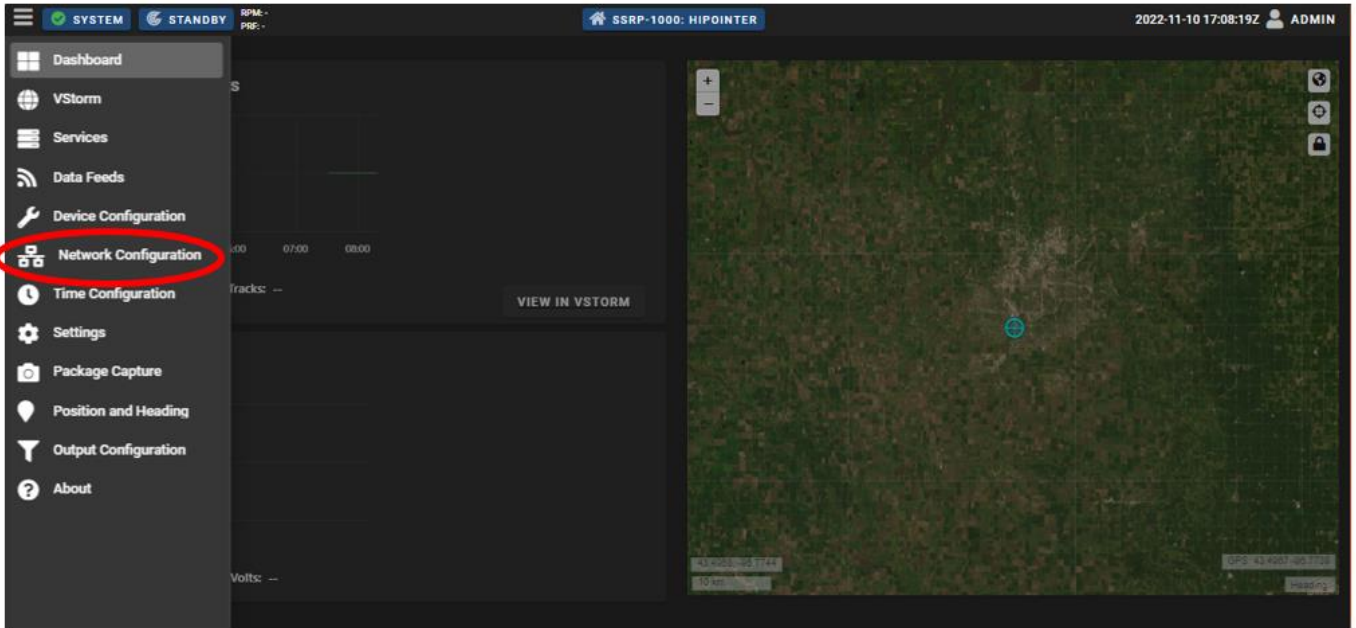*Figure 17: Deployment Configuration Panel*

4.6   NETWORK CONFIGURATION

The Network Configuration page can be accessed through the navigation panel and is used to configure the radar to communicate on the desired network.

Figure 18: Status and Control Navigation to Network Configuration

The network configuration page will display the current IP addresses for EXT1 and EXT2 (connection to either ETH0 or ETH1 on the HiPointer connector panel). Both external ports are the same and are connected to an internal switch. Normal operation will require setting only one of the two network configurations. NOTE: Only one of the two network configurations should have a gateway value defined as the two external ports are connected to the same internal switch. If the user requires configuring a second address for redundancy please contact Aerostar technical support for network configuration guidance.

The network configuration can be edited by clicking on the Pencil Icon, which will open the ethernet configuration page.

Figure 14: Network Configuration-Status Page and Network Configuration-Settings Page
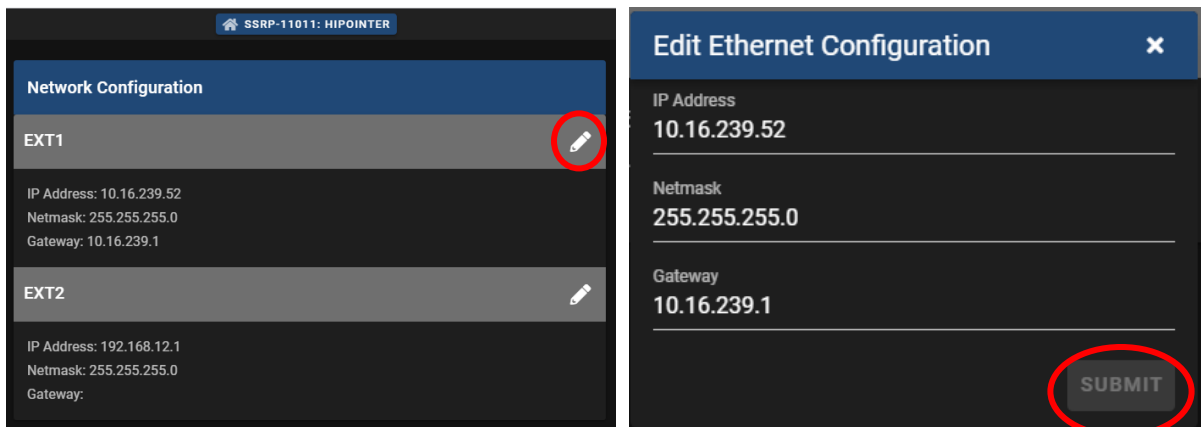
When editing the ethernet configuration the user can enter IP address, netmask, and gateway in the appropriate fields. Gateway, if applicable, should only be entered for one of the two configurations. If a netmask is not provided for the radar network, use 255.255.255.0 (default). All new settings will be saved after selecting Submit. The radar will need to be

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rebooted after changing the IP address configuration. For instructions on how to reboot the radar, please refer to 5.3 System Shutdown and Reboot Procedures.

Once the radar has rebooted, the radar will be reachable at the newly configured ethernet settings.

There are some IP addresses that will not work for the HiPointer radar. These IP addresses include 10.10.10.X and 10.11.11.X. The default IP addresses, of 192.167.12.1 and 192.168.11.1, should also not be used to avoid system confusion with other HiPointer radar systems.

4.7   NETWORK PROVIDED GPS AND DATA FEED CONFIGURATION

Data feeds can be defined to provide position and track information from external sources. The data feed types include AIS, ADS-B and GPS.
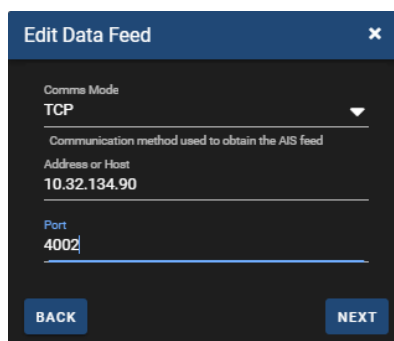
AIS SOURCE

To configure the AIS settings, select the Data Feed page in the Navigation Panel. Select the pencil icon for the AIS source to configure the settings.

Figure 19: AIS Configuration
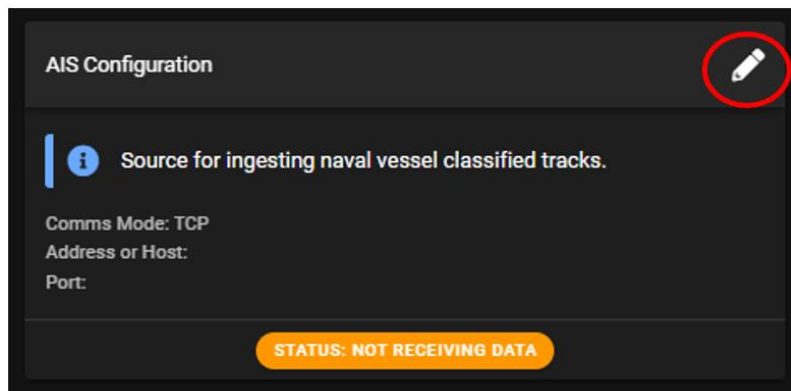
Once in edit mode the user can set the appropriate address and port settings for TCP or UDP. Populate the required fields and then click Next.

Figure 20: AIS Data Feed Configuration

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Double check the populated fields, then click Submit to update the configuration. Wait a few moments for confirmation that the configuration has updated. Confirm the updated information by reviewing the information in the Data Feeds page.

ADS-B SOURCE

To configure the ADS-B settings, select the Data Feed page in the Navigation Panel. Select the Pencil Icon for the ADS-B source to edit the ADS-B settings.

Figure 21: ADSB Configuration
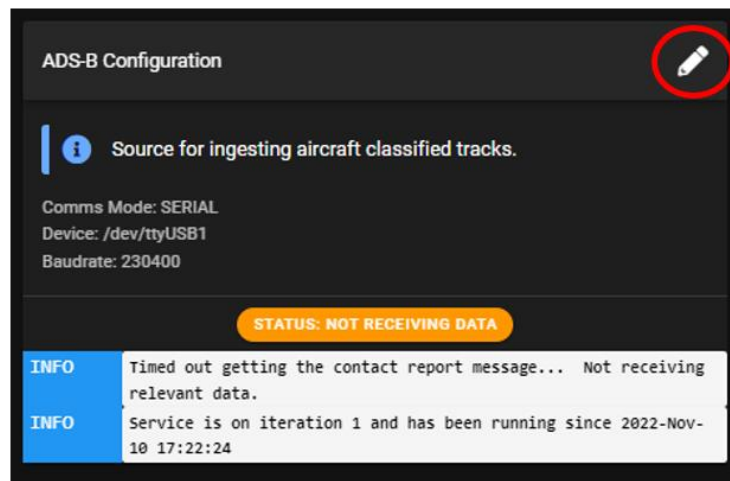
Once in edit mode the user can set the appropriate address and port settings for TCP. Populate the required fields and then click Next.

Figure 22: ADSB Data Feed Configuration
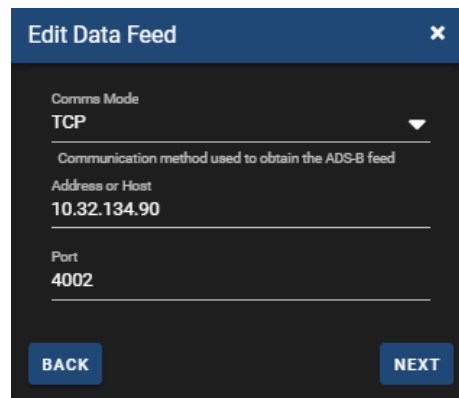
Confirm the populated configuration is correct, then click Submit. Wait a few moments until the configuration has been updated. Confirm the updated information by reviewing the information in the Data Feeds page.

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GPS SOURCE

An external GPS source can be added for any system but is strictly required in a moving platform configuration (platform selection of vessel) to provide position and heading information. The accuracy of the navigation source will directly impact the quality of the radar detections and tracks.

To configure the external GPS settings, select the Data Feed page in the Navigation Panel. Select the Pencil Icon to edit an existing GPS source and the ADD button to add a new source.

Figure 23: GPS Configuration
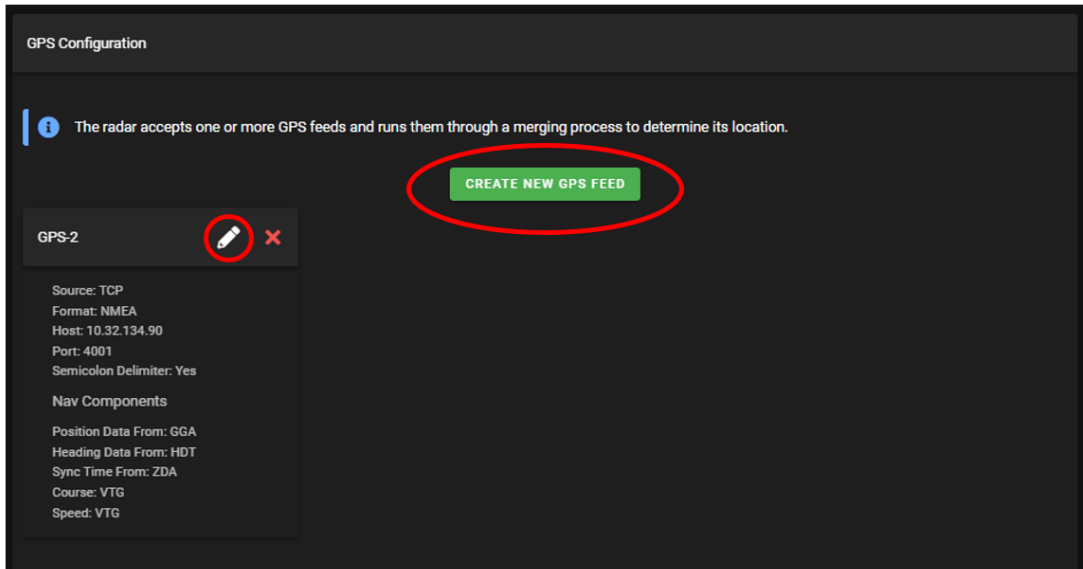
Populate the fields with the connections appropriate for the GPS source and data format. Click Next when all fields are populated.

Figure 24: GPS Data Feed Configuration
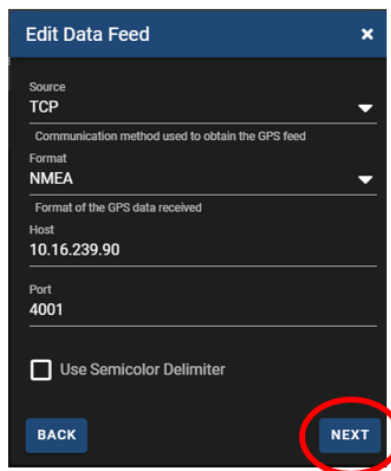
Finish populating the remaining fields regarding position, heading, sync time, course, and speed. Then click Next again.

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Figure 25: GPS Data Feeds Navigation Components

Review the populated fields once more before clicking Submit. Wait a few moments for confirmation of the configuration update. Confirm the updated information by reviewing the information in the Data Feeds page.

In many configurations, there will be multiple sources providing the radar with heading and position. If there is more than one source, use the Create New GPS Feed button and repeat the process.

4.8   RADAR POSITION AND OFFSETS

A fixed GPS position can be entered for stationary systems such as radars configured for land deployments on tower platforms. An offset may also need to be entered for any system where the radar zero-degree direction does not align with true north for fixed position systems or align with the forward direction of the moving platform.

To enter fixed position and/or offset information, select the Position and Heading page in the Navigation Panel.

Fixed GPS coordinates can be entered under the Radar Defaults section. The known altitude, latitude and longitude of the radar position can be entered in the units indicated. NOTE: These values will only be used if the platform type is tower. If the radar is on a tower configuration, include the total altitude of the tower and the ground elevation.

If an external GPS device is configured, X and Y GPS Offset values should be used to indicate the GPS device position relative to the radar position.

If the notched arrow on the radome of the radar is not aligned with true north or the bow of a vessel, the heading offset will need to be adjusted to match the incoming track data. The heading offset can be entered under the GPS Offsets section in the range from -360 to 360 degrees. A value of 90 indicates the notch is aligned east, 180 indicates the notch is aligned south, 270 indicates the notch is aligned west, and zero indicates the notch is aligned north.

Click Submit when done and wait a few moments for the configuration to update. The map should show an updated location based on entered values.

Figure 26: Position and Heading Configuration
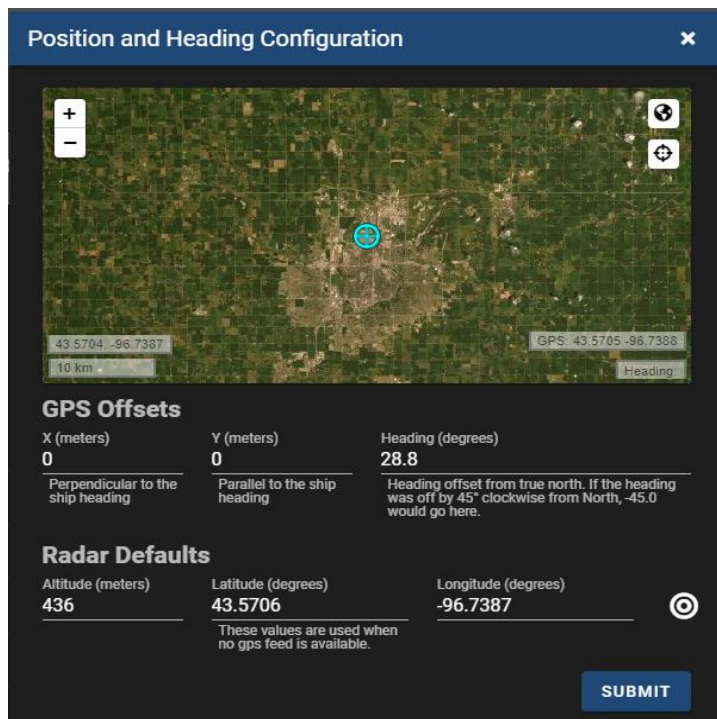
4.9   CONFIGURING THE TIME SERVER

Accurate time tracking is critical to the HiPointer radar's performance. It is important that the system time matches the time from external sources that the radar needs to operate so the radar returns can be properly aligned. These sources include GPS, Gyro sensors, AIS, ADSB, and other sensor information. When setting up a radar, ensuring the radar has accurate time is a key step to making sure the radar functions properly and there is minimal latency between the Navigation sources and the radar returns.

The preferred time source for the HiPointer is the external GPS input. If this input is connected, the system will be controlled by a high accuracy hardware clock. If this is not an option, the radar can be synchronized to external time messages from the external GPS feeds. This method does add additional latency when compared to using the internal GPS.

Three devices can be used for the time server that are listed by default with the ability of the user to add in external sources. The default sources are:

LOCAL – This is the internal real time clock from the system. This is always available and should be marked as preferred when not using the NMEA or SHM source.
NMEA – This source corresponds to time derived from the internal GPS. This should be marked as prefer when an external GPS antenna is not connected. This should be disabled if there is no antenna connected.
SHM – This source corresponds to when the system is using a GPS Data Feed to provide messages such as ZDA, RMC, and GGA messages to derive GPS time.

Additional time server sources can be added by selecting the green plus button in the upper right-hand corner of the Time Servers screen. These servers will be displayed as EXT sources.
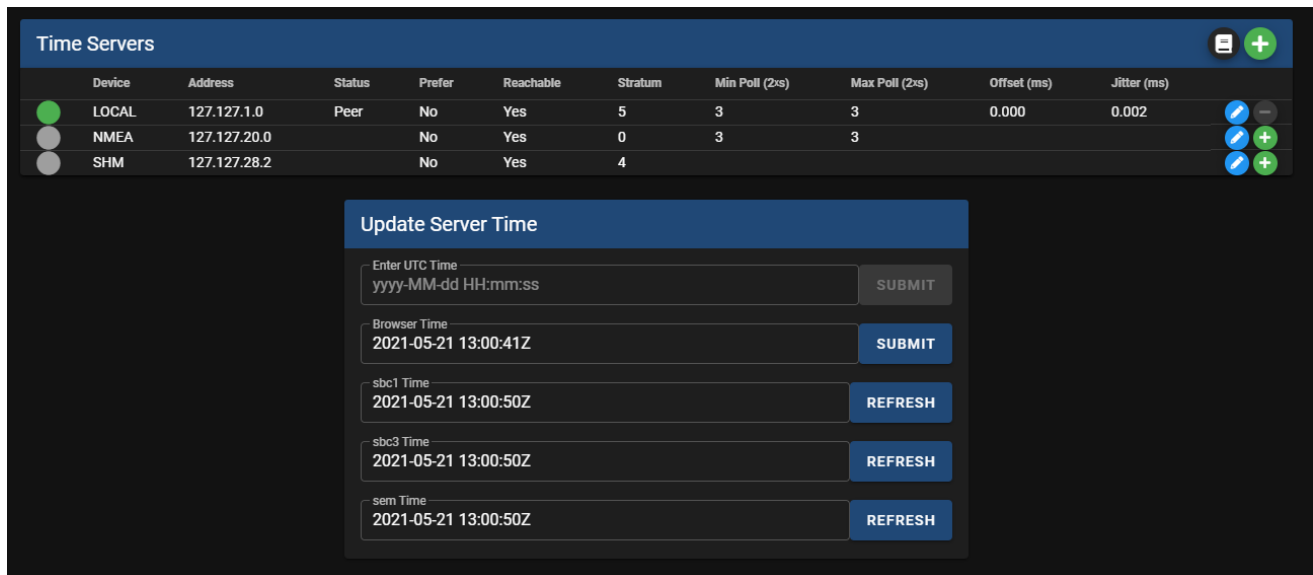
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Each device has a status associated with it. Green indicates the time source is functioning and being used to drive time. Gray indicates a time source not in use. Red indicates the time source is having problems and is not being used.

The stratum refers to the expected accuracy of the time source, where lower numbers indicate better accuracy.

The Offset is the amount of time the source is off from the internal NTP source, and the Jitter refers to the accuracy of the external source. The jitter and offset values will be non-zero but offset should tend towards zero as time synchronization converges.

The blue pencil allows you to edit the source settings. The button to the right of the pencil icon will either be a green plus, a red minus sign, a red trash or grayed out minus sign. A green plus sign indicates you may enable the time source, where a red minus sign indicates the time source is disabled. A red trash sign enables you to delete external sources, and a grayed out minus indicates the source may not be disabled as it is a local source only.

Figure 27: Time Servers

Device	Address	Status	Prefer	Reachable	Stratum	Min Poll (2ᵡs)	Max Poll (2ᵡs)	Offset (ms)	Jitter (ms)		
LOCAL	127.127.1.0	Peer	No	Yes	5	3	3	0.000	0.002	✎	−
NMEA	127.127.20.0		No	Yes	0	3	3			✎	+
SHM	127.127.28.2		No	Yes	4					✎	+

Update Server Time

Enter UTC Time
yyyy-MM-dd HH:mm:ss   SUBMIT

Browser Time
2021-05-21 13:00:41Z   SUBMIT

sbc1 Time
2021-05-21 13:00:50Z   REFRESH

sbc3 Time
2021-05-21 13:00:50Z   REFRESH

sem Time
2021-05-21 13:00:50Z   REFRESH

After the time server is configured or changed, the radar will need to be rebooted. The radar will gradually synchronize time sources after being rebooted. If the time change is greater than 1 month upon initial configuration, it is recommended that the radar be rebooted as that will take less time than waiting for the gradual synchronization.

To force an update to the current time the user has the option from this page to submit a fixed UTC time or submit the current browser time.

4.10   CHECKING STATUS INDICATORS

After configuring the radar, the system should be in a good state as would be indicated by the overall status icon at the top of the screen.

Figure 28: Overall System State Indicators

SYSTEM   STANDBY   RPM: -
PRF: -

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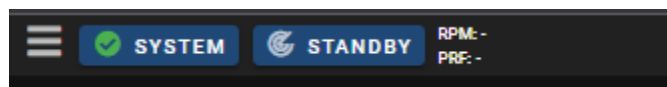
Details on the system state can be reviewed by navigating to the Services tab in the Navigation Panel. The left-hand side of the screen shows a list of services running.

Green status indicators show the service is running appropriately. Blue status indicators show the service is idle and not processing, but there are no errors associated with the idle state. All green and blue status indicators mean it is appropriate to operate the radar. Orange status indicators mean the services are not operating normally and may need a restart. Red status indicators mean the service has an issue and needs to be restarted.

To obtain more information on any of the services, click on the desired service and messages will show on the right side of the screen. Warning descriptions will also be shown on the right side of the screen. If a red status indicator shows before activating the radar, do NOT activate the radar until the red status is resolved, waiting for a few moments after startup will often resolve the red status. For red statuses lasting longer than 5 minutes, please refer to 6 System Maintenance and Troubleshooting for additional troubleshooting help or contact an Aerostar field services representative. See an example picture of the services page below.

*Figure 29: Services Status Page*

4.11   OUTPUT CONFIGURATION

To establish the output settings, go to the Output Configuration tab in the Navigation Panel. Select the Export Formats tab, and then configure the appropriate settings depending on export data requirements. Message options and filter criteria can be specified in this section.
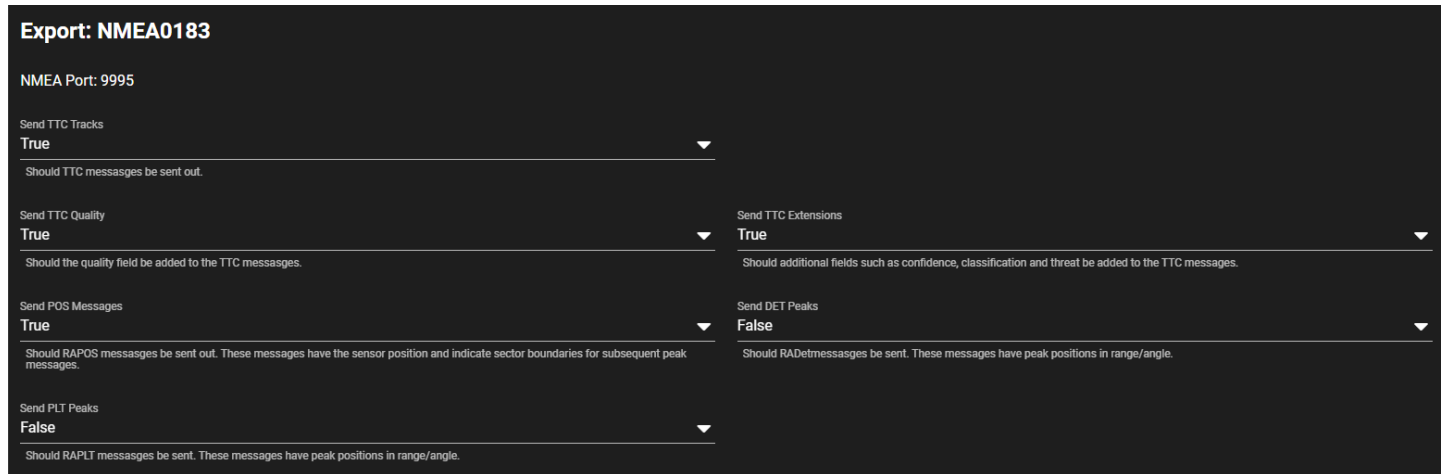
Figure 30: Output Configuration Status Page
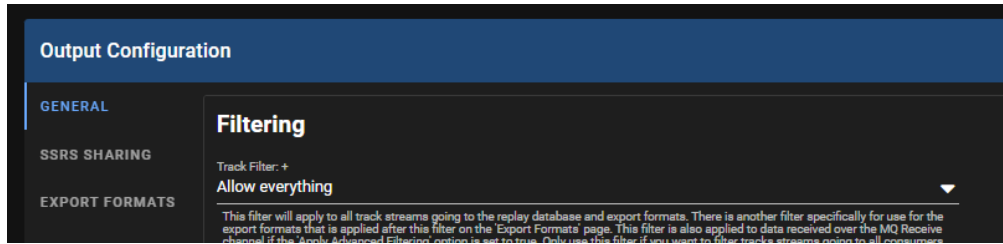
The 10001 SEIWG XML Port is the unfiltered version of the SEIWG 101B export data. The 10002 Alt SEIWG XML Port is the filtered version of the SEIWG 101B export data.

Figure 31: SEIWG 101B Export
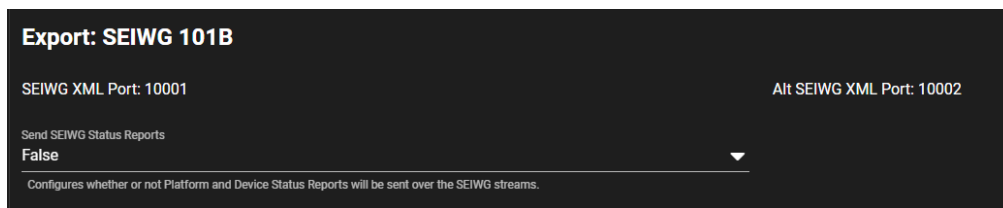
A configured NMEA0183 export data source is shown below.

Figure 32: NMEA0183 Export

For additional information on how to configure the output configuration settings for a specific situation, please contact an Aerostar service representative.

5   STANDARD OPERATIONS

The daily operations of the HiPointer are included in this section. When activating the radar, ensure the radar is securely mounted, and personnel are at an appropriate distance. vStorm is the primary operator interface for tracking targets, with more details relating to setup on vStorm in 5.2 vStorm Common Operational Picture (COP). For additional questions on content not covered in daily radar operations, please reach out to an Aerostar field service representative.

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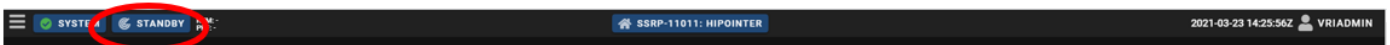
5.1 ACTIVATING THE RADAR

Verify it is safe to radiate, i.e., the tower and safe operating zone are clear of people and obstructions.

| WARNING |
|---|
| To prevent injury to people, only transmit a radar signal when there are no persons within the safe operating area of the radar. |

When deemed safe to radiate, click the Standby button at the top of the Status and Control Webpage.

Figure 33: Standby Button

A pop-up window will appear. Verify the selected settings and select Update if changes were made then click Activate to begin transmitting the radar.

Figure 34: Radar Control
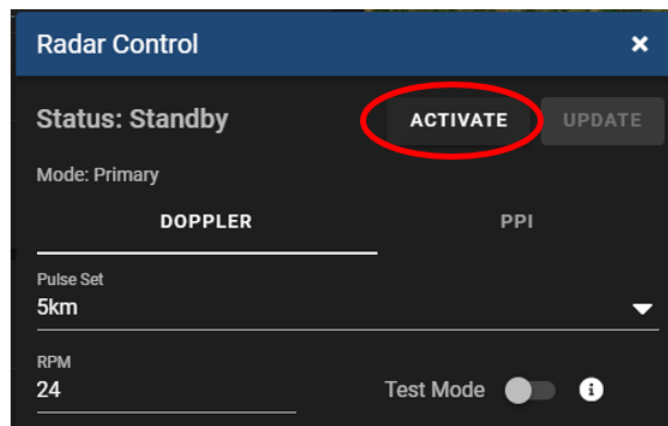
The Standby button at the top of the screen will change to Active and the icon will spin. The RPMs will also show at what rate the radar is rotating.

Figure 35: Active Radar

If present, tracks will begin appearing on the dashboard and vStorm. To launch and access vStorm, go to the Navigation Panel and select the vStorm screen. The screen will change to a view of the radar location and will begin populating with tracks and targets if the radar is Activated. Additionally, you can also access vStorm directly from the Dashboard, from the View in vStorm button located in the center of the page.
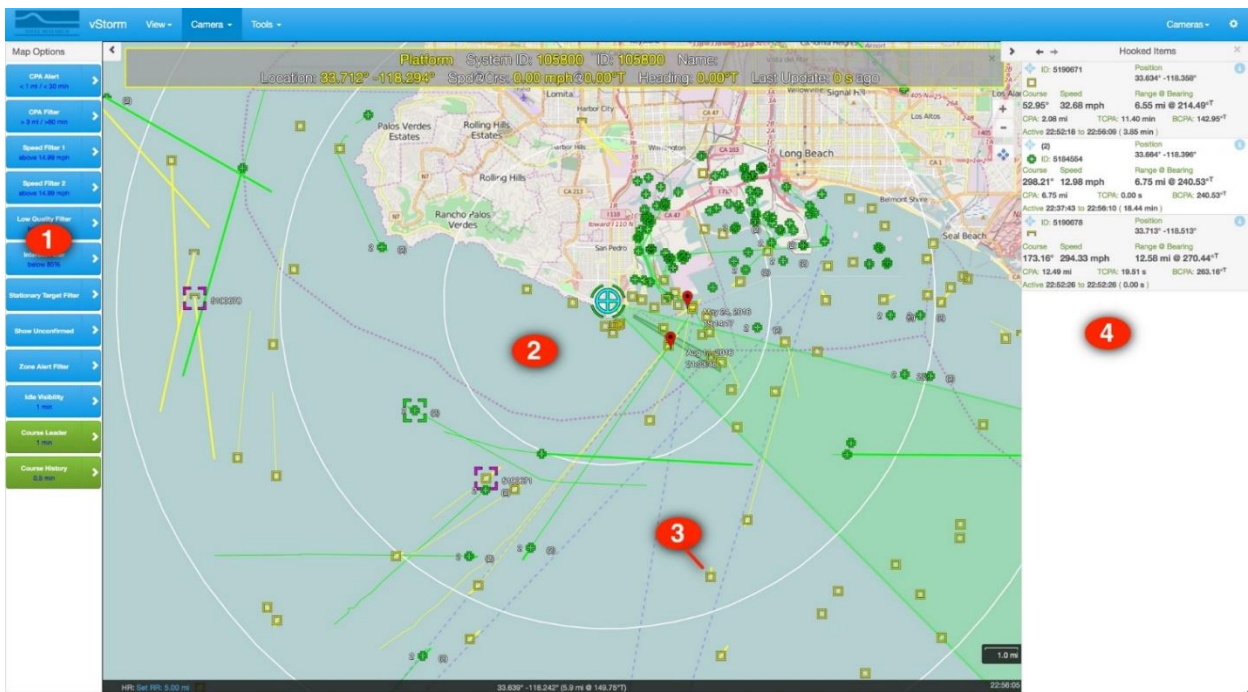
Figure 36: Navigation to vStorm
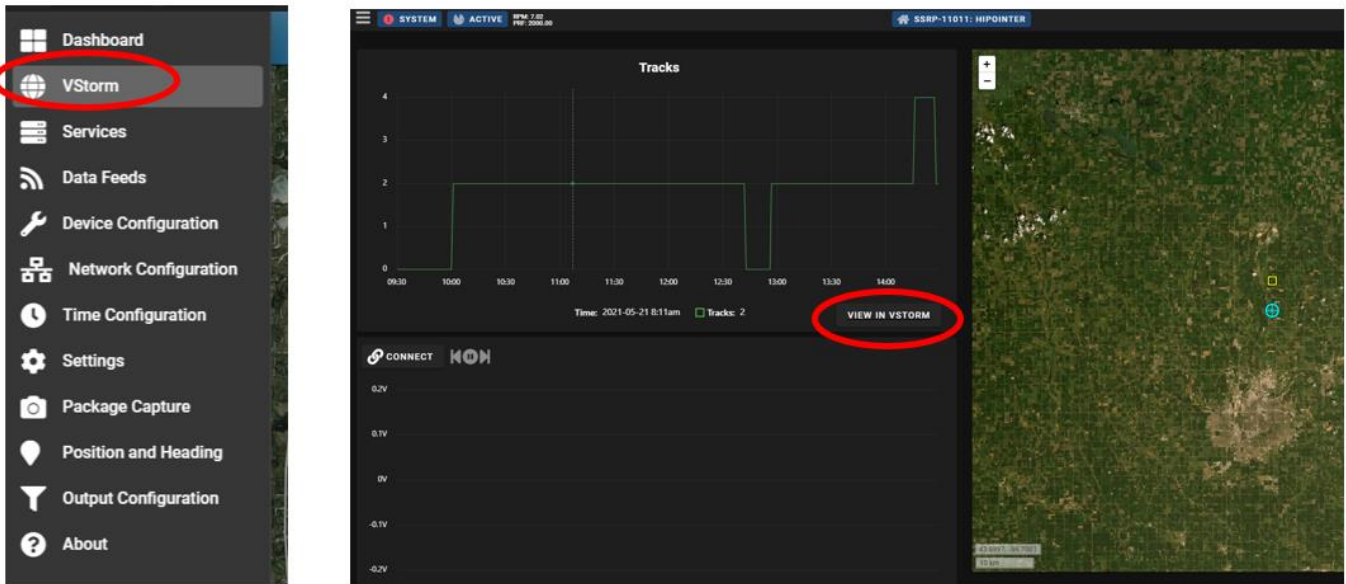
5.2   VSTORM COMMON OPERATIONAL PICTURE (COP)

The picture below is an example of tracks detected by the radar.

Figure 37: vStorm Common Operational Picture (COP)

The functions of the noted features are explained further in the table below.

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ITEM	DESCRIPTION	FUNCTION
1	Map Display Filters	Always visible in Map view at left side of window Filters and other functions readily available Arrow icons open dialog boxes for additional functions
2	Map Area	Left click and drag for typical map panning Scroll for map zooming Right-click opens contextual menu to enter ruler mode, add place marks, and slew the camera to location
3	Displayed Symbols	Right-click on symbol to open menu to set threat, classification, enable a home reference, create Variable Range Marker–Electronic Bearing Line, hook tracks, slew camera
4	Sidebar	Shows various sets of information like hooked tracks, track summary, track detail, selected track details

In addition, the Key for determining Threat Level and Type of track is outlined in the table below.

THREAT LEVEL	SURFACE	DISMOUNT	AIRCRAFT
Friend	⬤	⊗	⌒
Assumed Friend	⬤	⊗	⌒
Neutral	✚	✚	⊓
Unknown	▢	⊠	⊓
Civilian	▢	⊠	⊓
Suspect	✦	✦	⌃
Hostile	◆	◆	⌃

Unknown and neutral tracks are the default tracks, and the radar will detect different threat levels based on the contributions from the external data feed sources. An AIS external data feed source will identify maritime traffic. An ADS-B external data feed source will identify air traffic.

TYPE	BUOY
Green Conical	◺
Green Can	▱

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Danger Buoy	
Buoy – General	
Beacon - General	
Red Conical	
Red Can	

## 5.3   SYSTEM SHUTDOWN AND REBOOT PROCEDURES

To shut down or restart the radar, first deactivate the radar. To deactivate the radar, click the Active button at the top of the screen.

Figure 39: Shutdown via Activate Button
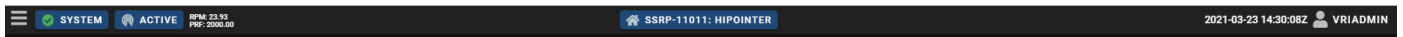
A pop-up window will appear. Select Deactivate and wait a few moments for the command to send. The radar should be in Standby mode now.

Figure 38: Radar Control Active
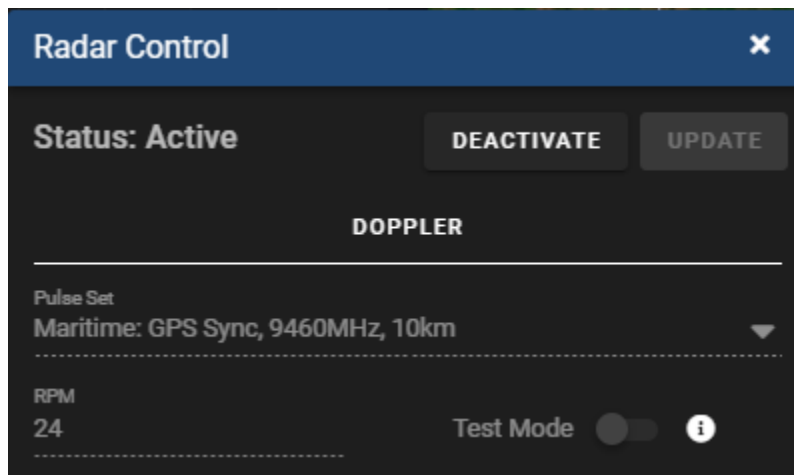
When in standby mode the radar can be safely shutdown or restarted from the user interface by selecting the username in the upper right-hand corner of the interface. When selected the options to sign out, restart or shutdown will be provided.

Figure 39: Sign Out, Restart, Shutdown
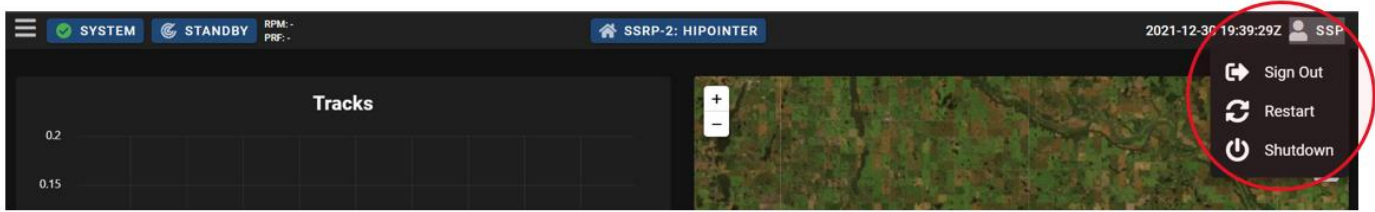
Selecting to restart the radar will cause all systems to reboot and immediately power back up again. The user will be required to sign in again to the system.

Selecting to shut down the radar will require a full power cycle to the system before the radar boots up again. To completely power off the radar following a commanded shutdown, de-energize the power source to the radar. To restart the radar, energize the power source, and log back into the Status and Control Webpage.

6   SYSTEM MAINTENANCE AND TROUBLESHOOTING

This section includes information on preventive maintenance for the radar, as well as some common ways to troubleshoot any issues on the Status and Control Webpage that may arise. The HiPointer is intended to be a maintenance free radar, and under no circumstances should the operator remove the top radome of the radar. The Status and Control Webpage may at times need to be refreshed or rebooted. The following section outlines more specific occurrences for how to troubleshoot the Status and Control Web page.

CAUTION
Opening the radar enclosure may result in personal injury and/or may result in damage to the radar. This radar contains no user serviceable parts and should only be opened by Aerostar Technical Solutions personnel. Any damage to the radar incurred when opening the radar by someone other than an Aerostar team member will not be covered under warranty.

6.1   STATUS AND CONTROL WEBPAGE—TROUBLESHOOTING GUIDANCE

WHERE TO START

After configuring the IP addresses, external data feeds, or the time server settings, the radar will require a reboot to operate normally. If errors persist once the radar has been rebooted, restart the individual services. It may take up to 10 minutes for the services to completely reset. The Status and Control webpage may also need to be refreshed, and can be accomplished by pressing F5, or logging out and then back into the webpage. If the radar services are still showing poor statuses after a system reboot and a service restart, check that the external power and ethernet connections are still tight and undamaged. Additionally, the radar has a maintenance port at 10.10.10.2, which can also be used to further troubleshoot poorly showing statuses.

For further assistance, please reach out to an Aerostar field service representative for more details on troubleshooting.

COMMON ISSUES

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Unable to connect to the Status and Control Page	Network cable unplugged.	Verify network cable is securely plugged into user's **vStorm** laptop and local switch and that cable from the switch is plugged in to the radar.
	Incorrect network settings.	Note that depending on the installation, **vStorm** from different locations may require different network settings and may not be interchangeable.
	Radar is de-energized.	Verify power is applied to the radar. If the radar was previously shutdown via software, it is necessary to power cycle the radar to restart the system.
User interface is unresponsive or showing stale information	Browser caching shows stale information.	Clear bowser cache and reload the page.
Warning condition from any other process	Indicates degraded or abnormal operating characteristics. Associated message under process with warning condition identifies the expected source of corrupted data that has generated the warning process. System tracking performance is generally unaffected.	Warning conditions should self-correct. If a process warning condition (other than from time synchronization) persists for over 15 minutes, restart the radar at a convenient time for re-establishing system communication.
vStorm interface is hung and unresponsive	Operating system crash or problem.	Reboot user (**vStorm**) computer. Rebooting the user computer does not affect radar operation and any track classifications, names, etc., will be restored after restarting **vStorm**.
vStorm issues	Browser resource	Most issues can be cleared by refreshing the vStorm page.
vStorm erratic behavior following update	Mismatched cached information	Click the gear in the upper right; select "Restore Initial States"

6.2   COLLECTING DATA FOR MAINTENANCE PERSONNEL

On occasion, when troubleshooting issues arise, an Aerostar field service representative may request diagnostic logs. To pull and download the diagnostic logs, access the Package Capture tab under the Navigation Panel. Select the Diagnostics Configuration choice if no vStorm information is needed else select the Diagnostics Configuration and Sample Data choice. Select Create Debug Package and then contact an Aerostar service representative with the data package.
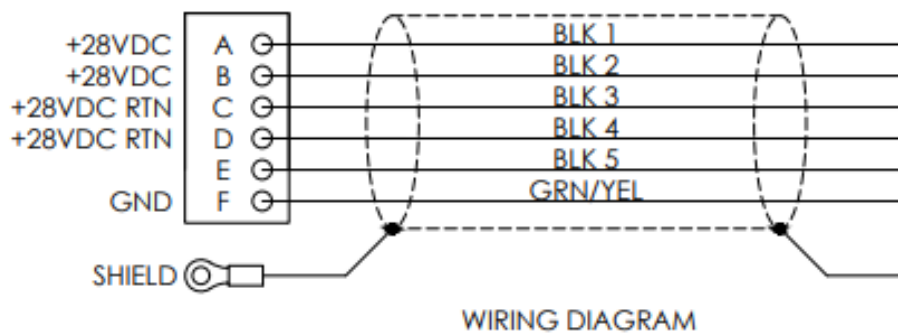
Figure 40: Diagnostic Package Capture

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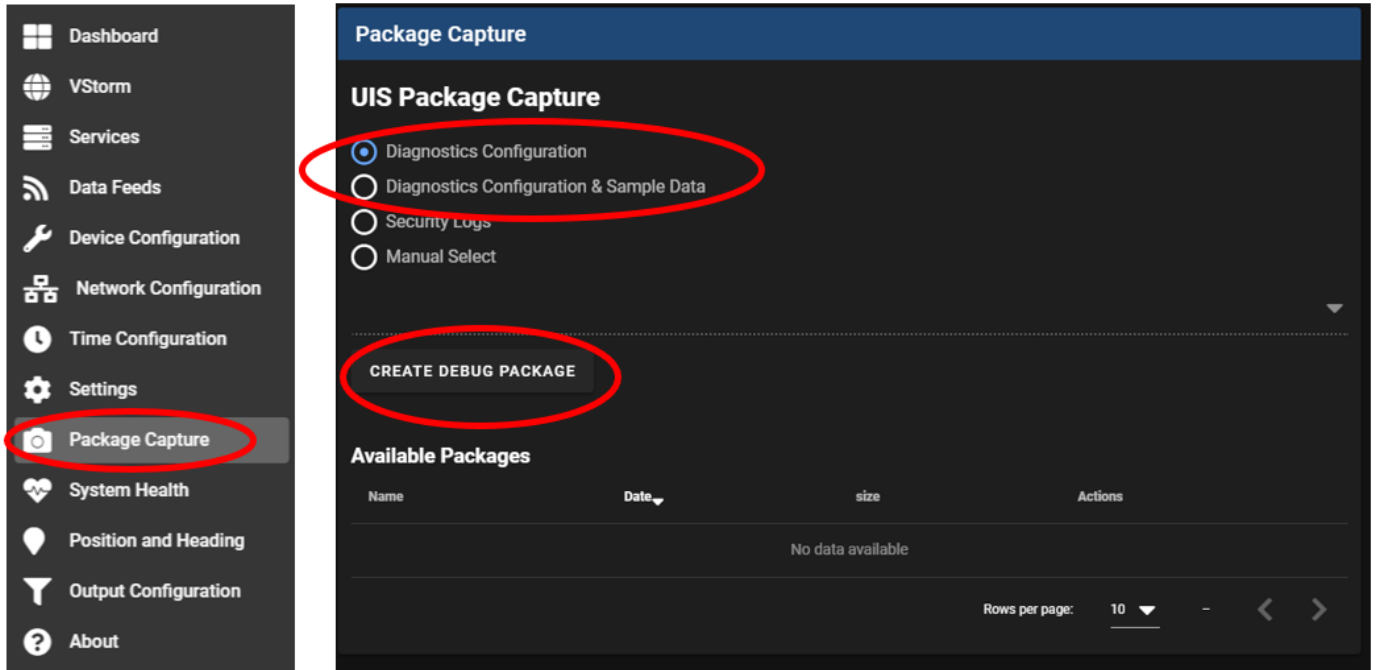
APPENDIX A: CABLING GUIDELINES

POWER CABLE DRAWING

The external cable drawing (drawing number 213705) showcases the pinout details for the Power cable for customer use. Power cable part numbers are 212120 for the straight connector version and 215086 for the right-angle connector version.

Note that the cable pinout is for the end of the connector that is attached to the PWR connector on the HiPointer. The other end of the cable can be customized. Aerostar recommends connecting wires A and B to the positive terminal, wires C and D to the negative terminal, wire E and the Shield to the shell of the customer cable connector and wire F as the grounding terminal.

Figure 41: Power Cable Pinout

WIRING DIAGRAM

END OF MANUAL