

Installation and Operation Manual

QSight™ Boresight System



Quasonix, Inc.
6025 Schumacher Park Dr.
West Chester, OH 45069
22 August, 2023

***** Revision 1.0 *****



Specifications subject to change without notice.

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1 Introduction

1.1 Description

The QSight™ Boresight System is a multi-band, high-powered, boresight RF test source that allows an operator to verify that the receive range telemetry system is properly configured and operating as expected prior to a mission.

The outdoor portion of the unit consists of a high-performance RF telemetry transmitter with a multi-band antenna packaged in a single radome enclosure. A companion two-axis positioner as well as a camera can be added to allow for convenient testing of multiple receive sites. The indoor portion of the system is a 2U, 19" rackmount unit that is controlled via an external web browser based GUI. A single cable connects the transmit assembly with the controller, ensuring easy setup and robust operation.

QSight™ supports a wide variety of IRIG-106 modulations and coding options. It can source either internally generated PN test patterns at a user specified data rate or externally supplied customer data via traditional RS-422. The power level is calibrated with a maximum output of 10 Watts EIRP and is controllable over an 80 dB range. This range of adjustment provides appropriate power levels for both short and long-distance test links.

In addition to flexible telemetry signal generation, the QSight™ system can also precisely control its output polarization to verify the RF operation of receive antenna systems. Polarization options include vertical, horizontal, or fixed-linear at any arbitrary angle, right-hand or left-hand circular, as well as a rotating linear polarization mode. These modes allow the operator to easily measure and verify the cross-polarization and axial ratio performance of the receive antenna system prior to live operation.

This document describes the installation and operation of the Quasonix QSight™ Boresight System.

The QSight™ Boresight System is manufactured by:

Quasonix, Inc.
6025 Schumacher Park Drive
West Chester, OH 45069
CAGE code: 3CJA9

1.2 Nomenclature

The QSight™ Boresight System is available in a number of variations, depending on the options specified at the time of order. The features and modes installed in each unit are identified in the model number, as depicted in Figure 1.

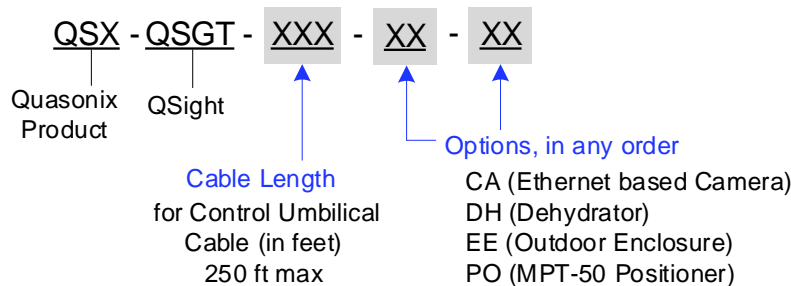


Figure 1: QSight™ Boresight System Part Number Construction

For example, model number QSX-QSGT-050-CA-DH defines a unit configured as shown in Table 1.

Table 1: Model Configuration Example

Identifiers	Description
QSX	Quasonix product
QSGT	QSight Boresight System
050	Cable length for control umbilical cable, in feet (250 ft maximum)
CA	Ethernet based Camera
DH	Dehydrator

Specifications are subject to change. Contact Quasonix for questions regarding your specific system.

1.2.1 Options and Accessories

The available options and accessories are listed below. Refer to section 1.2.2 for detailed descriptions of each option. Please contact Quasonix for assistance ordering QSight™ options.

- CA Ethernet based Camera
- DH Dehydrator
- EE Outdoor Enclosure
- PO MPT-50 Positioner with Ethernet interface

1.2.2 Detailed Option Descriptions

1.2.2.1 Ethernet based Camera – CA

The Ethernet Camera option includes a 1080p, 30 fps, Power-Over-Ethernet coaxial camera. It has 30X optical zoom, 4.3 to 128 mm focal length, auto-focus, and auto-exposure. An h.264 to HDMI hardware decoder is included.

1.2.2.2 Dehydrator – DH

The DH option provides a pressurizing dehydrator in an outdoor-rated enclosure.

1.2.2.3 Outdoor Enclosure – EE

The EE option includes a DDB 7U environmentally-controlled rack enclosure.

1.2.2.4 MPT-50 Positioner – PO

The PO option adds a Quickset MPT-50 positioner. It has a -90° to +90° elevation range and unlimited azimuth range.

1.2.3 Standard Package Contents

The contents of the shipment include the following:

- Transmit Assembly (including antenna)
- 2U rack mount Antenna Control Unit
- (1) 160288 (without PO option) or 160289 (with PO option) Umbilical (length defined by part number)
- USB Hand Wheels
- USB to Serial Adapter

2 Specifications

Boresight Antenna Specifications	
Operating Frequency	1435.5-1534.5 MHz 1755.5-1849.5 MHz 2200.5-2394.5 MHz 4400.5-4939.5 MHz 5091.5-5149.5 MHz
Polarization	Any angle linear, Rotating linear, LHCP, RHCP
Axial Ratio	1 dB typical, 3 dB max (primarily in L band)
Antenna Type	Electronic amplitude an phase control
Array Size (Diameter)	13.25 inches nominal
Weight	< 15 lbs (7 kg)
Radiated EIRP Level	-40 to +40 dBm +1 dB -40 to –80 dBm uncalibrated
Antenna Beamwidth (3 dB) (nominal)	40°
<i>Environmental</i>	
Temperature	Operating -30°C to +55°C Storage -40°C to +71°C
Relative Humidity	Up to 100%, including condensation (radome protected)

Pedestal Specifications (Optional)

Type	Elevation/Azimuth
Backlash	≤ 0.2 degrees
Travel Azimuth	Continuous
Elevation	-90° to +90° (Software, Electrical, and Mechanical limited provided)
Weight	25 lbs nominal
Power Requirements	115 VAC, 60 Hz, 1Ø
<i>Environmental</i>	
Operating Temperature	-30°C to +55°C
Storage Temperature	-40°C to +71°C
Relative Humidity	Up to 100%, including condensation (radome protected)
Rain	Up to 4 inches per hour
Ice	1/2 inch, Radial
Wind	Operating 50 MPH (80 Km/Hr), Gusting to 65 MPH (105 Km/Hr), Survival at 120 MPH (193 Km/Hr)

3 Theory of Operation

The QSight™ Boresight System is a multi-band, high-powered, boresight RF test source. It supports L, S, and C frequency bands using a dual-output transmitter along with a dual polarization (Horizontal and Vertical) antenna. A variety of IRIG-106 modulation and coding options can be selected over a wide range of data rates and output power levels. In addition to controlling its frequency and power, the QSight™ Boresight System is also capable of synthesizing any type of linear as well as Left Hand (LH) or Right Hand (RH) circular polarization. A block diagram of the system is shown in Figure 2.

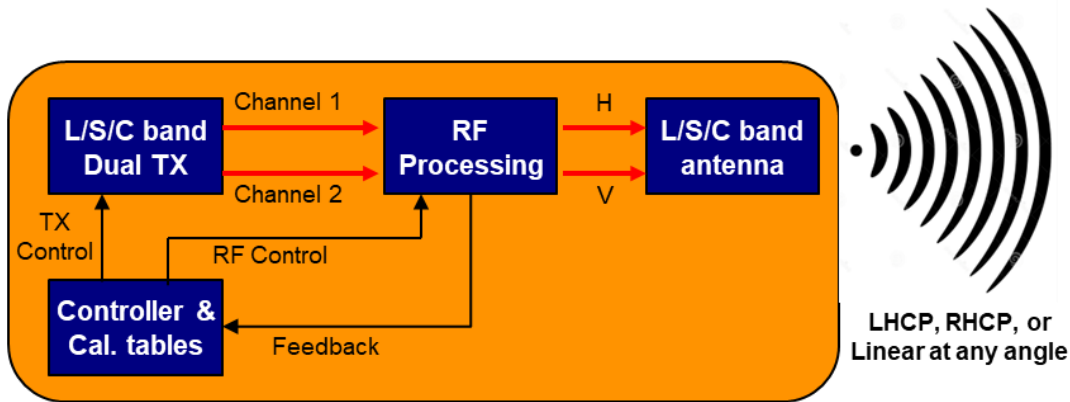


Figure 2: Block Diagram of the QSight™ Boresight System

The signal generation and transmission portion of the system consists of a high-performance RF telemetry transmitter, RF Processor, and a multi-band antenna. The dual transmitter is responsible for the modulation, frequency upconversion, and power amplification. The outputs are appropriately adjusted by an RF processor to create the separate Horizontal and Vertical components that drive the multi-band antenna. This flexible architecture enables efficient and accurate generation of boresight waveforms ranging from the very simple to the most advanced.

QSight™ supports a wide variety of IRIG-106 modulations and coding options. It can source either internally generated PN test patterns at a user specified data rate or externally supplied customer data via traditional RS-422. The power level is calibrated with a maximum output of 10 Watts EIRP and is controllable over an 80 dB range. This range of adjustment provides appropriate power levels for both short and long-distance test links.

In addition to flexible telemetry signal generation, the QSight™ system can also precisely control its output polarization to verify the RF operation of receive antenna systems. Polarization options include vertical, horizontal, or fixed-linear at any arbitrary angle, right-hand or left-hand circular, as well as a rotating linear polarization mode. These modes allow the operator to easily measure and verify the cross-polarization and axial ratio performance of the receive antenna system prior to live operation.

3.1 Linear Polarizations – Drive Both Ports in Phase

The precision phase and timing control of the dual TX outputs allows for generation of arbitrary linear polarizations. For Horizontal polarization channel 1 is active while channel 2 is disabled. Similarly, for Vertical polarization channel 2 is used while channel 1 is disabled. Other linear polarizations can be synthesized by driving both channels simultaneously with different H/V ratios. Continuously varying the H/V ratio can yield a rotating linearly polarized signal ideal for showing the axial ratio performance of a receive system under test.

Figure 3 illustrates how the boresight can synthesize a linear polarization at 45 degrees. By driving both the H and V outputs simultaneously and in phase, a polarization output of 45 degrees is created. This can be directly observed by measuring the response of a linear receive reference horn as it is physically rotated 360 degrees as shown in Figure 4. Note that the measured response is maximized when the receive horn aligns with the transmit polarization and is minimized when it the alignment is at ± 90 degrees.

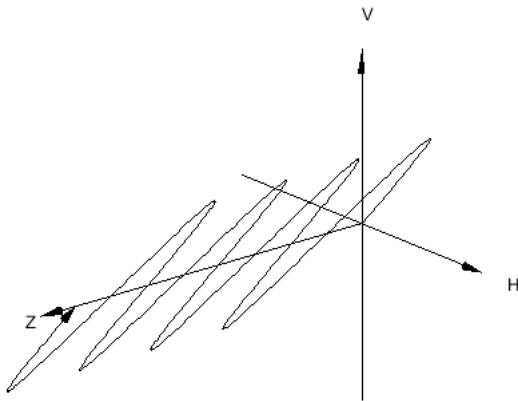


Figure 3: Linear Output

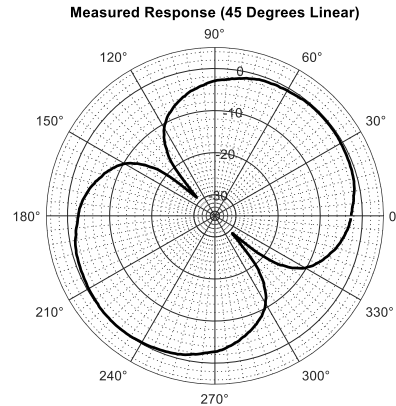


Figure 4: Response of Linear Receive Antenna

3.2 Circular Polarizations – Drive Both Ports 90 Degree Shifted

The precision phase and timing control of the dual TX outputs also allows for generation of right-hand or left-hand circular polarizations. By driving the H and V outputs simultaneously and out of phase by either ± 90 degrees, right and left-handed polarization can be produced, as shown in Figure 5 and Figure 7. The phase offset between the outputs causes the electric field vector to continuously rotate either clockwise or counter clockwise as it propagates outward from the antenna. Again, this can be directly observed by measuring the response of a linear receive reference horn as it is physically rotated 360 degrees, as shown in Figure 6 and Figure 8. Note that the received level is always constant since the circular to linear transmission does not favor any particular angular alignment.

Having a boresight with flexible polarization options allows for more thorough testing of each channel of the antenna under test. For example, the LHCP and RHCP receive processing paths can be isolated and verified independently. In addition, the cross-polarization performance between the channels can also be easily evaluated. This level of testing can uncover issues that may be unnoticed with traditional test sources and methods.

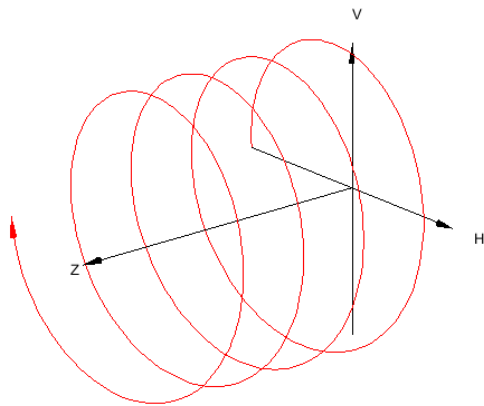


Figure 5: LHCP Output

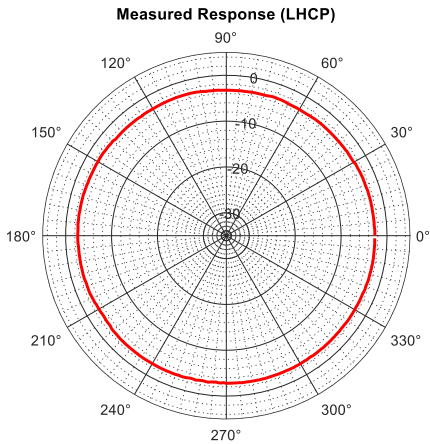


Figure 6: Response of Linear Receive Antenna

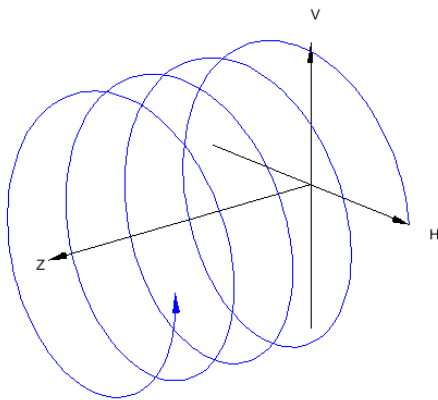


Figure 7: RHCP Output

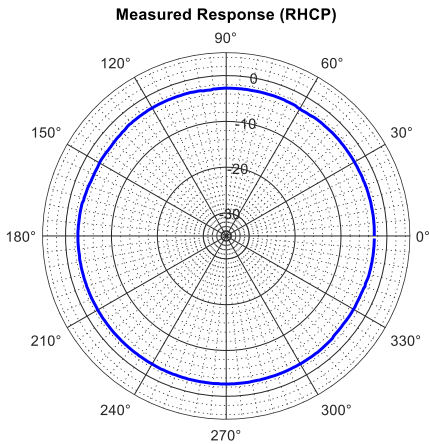


Figure 8: Response of Linear Receive Antenna

4 System Components

4.1 Antenna Control Unit

The QSight Antenna Control Unit is a 2U rack-mount chassis that resides on user's network and provides a browser-based user interface via embedded web server. A single cable connects to Transmit Assembly.

Controller Interfaces

- 110 VAC power
- Ethernet (RJ-45)
- BNC for TTL user data
- MDM-25 for RS-422 user data
- DB-9 serial port for setting IP address
- Feed cable connects to Transmit Assembly



Figure 9: QSight Antenna Control Unit, Front



Figure 10: QSight Antenna Control Unit, Rear

4.2 Transmit Assembly (TA)

The QSight TA consists of a Quasonix dual output transmitter with up to 10 watts per output, internal or external clock and data, and all ARTM modulations. A dual-linear polarization (H & V) L/S/C band antenna with RF cables are part of the calibrated configuration.

- An RF processing module enables gain and phase control.
- A controller module provides calibration tables and Ethernet access to the Antenna Control Unit.



Figure 11: Transmit Assembly, Front

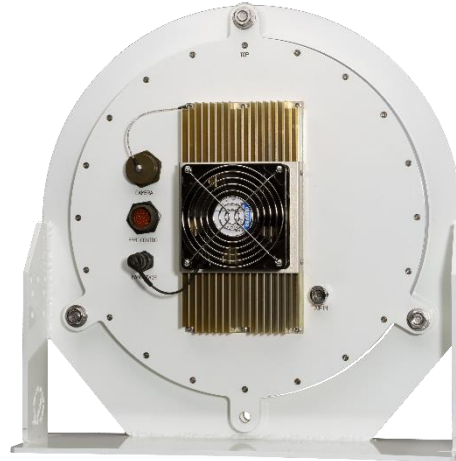


Figure 12: Transmit Assembly—Camera, Feed Control, Fan Power

4.2.1 Features

- Contains All RF Hardware
RF cables are part of the calibrated configuration; Dual polarization (H&V) L/S/C band antenna; RF modules for gain and polarization control; mounts outdoors, up high
- Single Connection to the Antenna Control Unit
Supports user interface via an embedded web server and the user's browser; provides power to the Transmit Assembly—Ethernet, Power, and RS-422 data with just one cable. Mounts indoors in a 19-inch rack
- Sealed to IP67 and NEMA-4x
- PoE Injector
Supports optional camera
- Quick Disconnect for dehydrated air

5 Installation Instructions

5.1 Mechanical

5.1.1 System Configuration

The overall QSight Assembly includes four packages. The packages contain the Positioner, Transmit Assembly, Camera, and Cables. The red box in the image below indicates the Transmit Assembly, the yellow box indicates the Camera, and the green box indicates the Positioner. The cables are shown attached in the figures below. In the figure on the right side, there are two points of cable management.

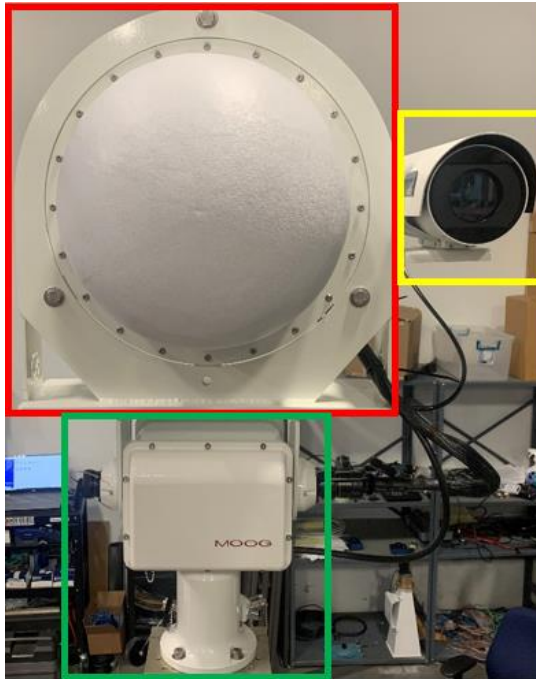


Figure 13: QSight Assembly, Front



Figure 14: QSight Assembly, Right

The Transmit Assembly should be placed on the Positioner facing towards the front. The front of the Positioner can be recognized by the “FRONT” sticker. To connect the Transmit Assembly to the Positioner, four ¼-20 x 1.00” hex screws are needed.



Figure 15: Positioner



Figure 16: Transmit Assembly and Positioner

The Camera attaches to the Transmit Assembly with three 1/4-20 x 0.625" captive socket head screws.



Figure 17: Camera and Transmit Assembly

5.2 Thermal

The storage temperature of the QSight™ Boresight System is rated for -40°C to +71°C, while the operating temperature is rated for -30°C to +55°C. It is recommended that the Antenna Control Unit be kept in a temperature controlled environment to minimize the risk of operating (or storing) outside the ranges specified.

The Antenna Control Unit features cooling vents on the sides of its aluminum chassis. These vents must be kept entirely unobstructed in order to allow for maximum airflow through the system. Whenever feasible, it is helpful to leave an open rack space above and below the Antenna Control Unit for additional heat dissipation.

5.3 Electrical

Rear panel connectors are the same for all Antenna Control Units. Connectors are present whether the feature is ordered or not.

Functional descriptions and electrical characteristics for each connector located on the rear panel are described in Table 2.

Table 2: Antenna Control Unit Rear Panel Connectors

Name	Description
TTL Data	BNC, 75 Ohm TTL
RS-422 Data	MDM-25
COM Port	Male DB-9, RS-232 comm port
Ethernet	RJ-45, Enables network access
To Feed	D38999/20WJ43SN multi-pin connector for control umbilical to Transmit Assembly
Power (far right side)	IEC-320-C14, Supplies AC power to the unit, 100 to 240 VAC, 50/60 Hz

5.4 IP Address Initialization

1. With the QSight Antenna Control Unit front Power switch set to '0' (Off), ensure that a complete Boresight unit, including Transmit Assembly, is connected via the TO FEED port (rear of Antenna Control Unit), and that AC power is connected.
2. Connect the USB-to-Serial cable to the COM PORT (rear of Antenna Control Unit).



Figure 18: QSight Antenna Control Unit, Rear Connectors

3. With the USB-to-Serial adapter, connect a PC and open a Terminal program, such as Tera Term VT, or Windows 10.

- Configure Tera Term VT or equivalent terminal program to the settings shown in Figure 19 and Figure 20.

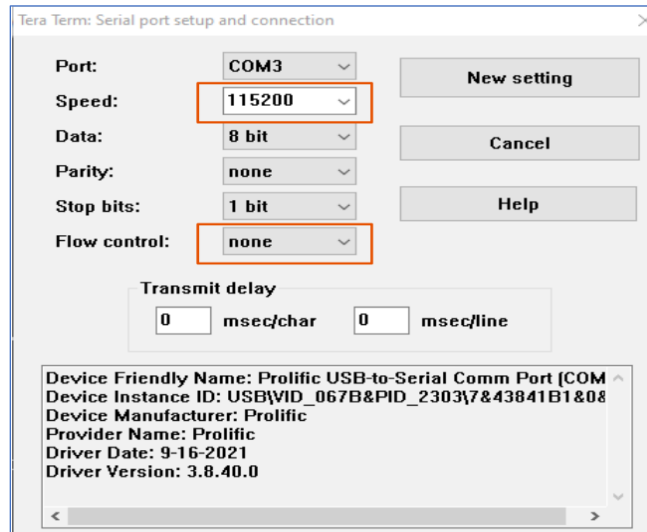


Figure 19: Terminal Program Settings, Part 1

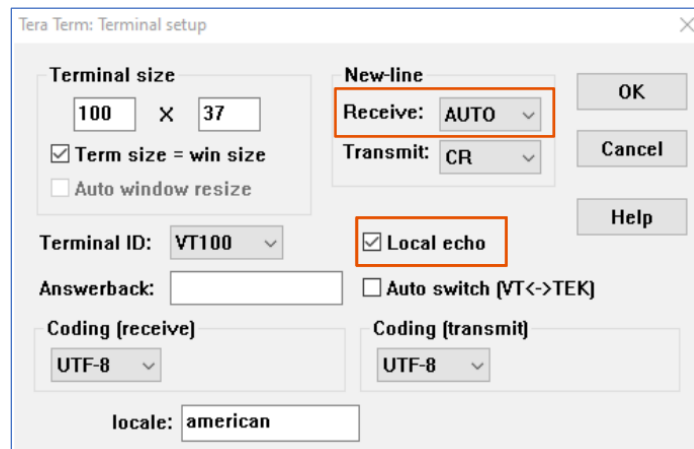


Figure 20: Terminal Program Settings, Part 2

- Turn the Antenna Control Unit front panel Power to '1' (On), then wait approximately 2 minutes for the power up sequence to complete.

```

COM3 - Tera Term VT
File Edit Setup Control Window Help

QSight Terminal v0.01
QS>
=== QS APP INIT: Init Loop ===
=== QS APP INIT: Failed: Calibration Files Load From BoreSight ===

=== QS APP INIT: Init Loop ===
=== QS APP INIT: Failed: Calibration Files Load From BoreSight ===

=== QS APP INIT: Init Loop ===
=== QS APP INIT: Calibration Files Loaded From BoreSight ===
=== QS APP INIT: Calibration Files Processed ===
=== QS APP INIT: Transmitter Connected ===
=== QS APP INIT: Start Configuring Transmitter ===
=== QS APP INIT: Done Configuring Transmitter ===
=== QS APP INIT: Remote Command Interface Open ===
=== QS APP INIT: SUCCESS ===
>
  
```

Figure 21: Power Up Completed

6. Type '?' to show command line interface commands, as shown in Figure 22, and verify connection.

```

>?
Commands:
AA <antenna angle>          - Set Antenna Angle (Fixed Linear Mode)
AD <deg/step>               - Set Antenna Deg / Step
AN <antenna setting>        - Select Antenna Setting
AP <start angle>            - Set Antenna Start Angle (Fixed/Rotating Linear Modes)
BP <power>                  - Set Boresight Power
CC <setting>                - Camera Power On/Off Control
DP <pattern>                - Select Transmit Data Pattern
DS <source>                 - Select Transmit Data Source
DR <rate>                   - Select Transmit Data Rate
FC <frequency>              - Set Transmitter Frequency
LD <setting>                - Set Transmitter LDPC Setting
MO <mode>                   - Set Transmitter Modulation Mode
RF <state>                  - RF Power Control
TE                           - Display Device Temperature Info
TP <state>                  - Transmitter External Power On/Off Control
VS                           - Display System Information Info
H or ?                     - Display This Help

Advanced Commands:
AS <step time>              - Set Rotating Linear Step Time
CD <frequency> <power>      - Show Calibration Data
CF <frequency>              - Show Calibration Data For Frequency
CL <option>                 - Load Calibration Files
CP <power>                  - Show Calibration Data For Power
DT <channel>                - Read Power Detector Temp Voltage
PD <channel>                - Read Power Detector Value
QI                           - Set QSight Transmitter to known state for Test
RN <command>                - Reset Network Addresses
SN                           - Set User Network Addresses
UP <freq> <eirp_dbm> <ant_angle> <ant_type> - Update settings command
TV                           - Transmitter Verification

Super User Commands:
DX <chan> <transmitter command> - Send Dual Channel Transmitter a Command with Specified Channel
RR                           - Reset Router And Set To QSight Default Addresses
TX <transmitter command>      - Send Transmitter a Command
ZQ <subnet 201 ... 205>      - Set Network Addresses in ACU For QLAB Settings
  
```

Figure 22: Command Line Interface Help Menu

7. Type SN to show current IP settings. Copy this line with the current settings to a text editor.
8. Edit the SN command line in a text editor to the desired settings.

In Figure 23, the external network was changed to 192.168.203.0/16 network from a 192.168.201.0/16 network for the Antenna Control Unit, Camera, and Positioner, and changes were made to the individual device addresses.

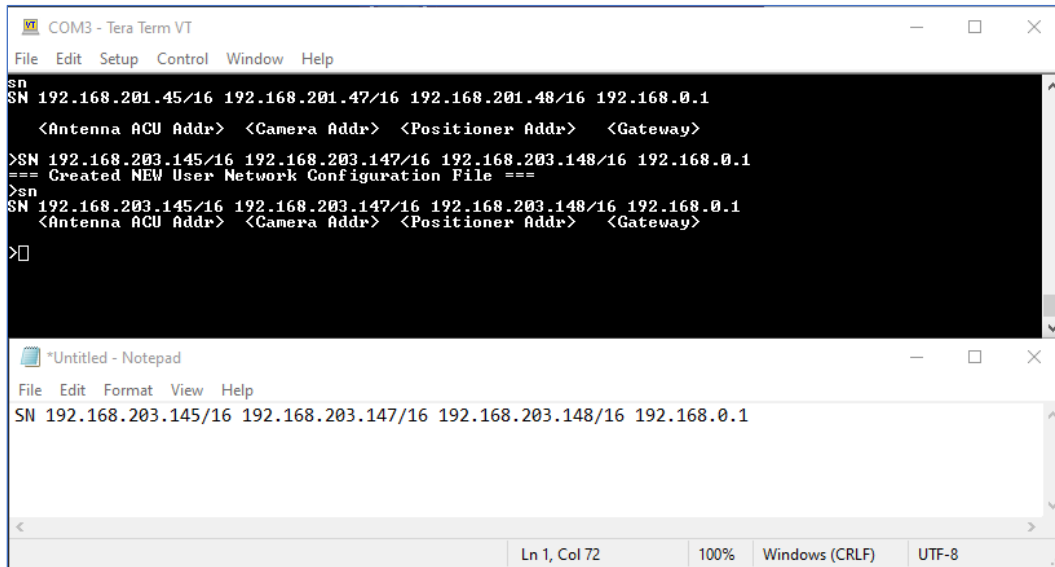


Figure 23: Example of IP Address Change

9. Change the addresses via the SN command using the following syntax:
SN <Antenna Control Unit Address/network prefix> <Camera Address/network prefix> <Positioner Address/network prefix> <Gateway>.
10. Type SN and verify the addresses are as desired.

Note: The Antenna Control Unit Address is used to access the QSight Browser Interface.

Note: It is advised to NOT have the ETHERNET cable (rear of Antenna Control Unit) connected during the following step.

11. If the addresses displayed in the SN command are as desired, type 'RN 1' then press Enter for the new settings to take effect.

Note: No response is shown until the Reset Completed message displays, as shown in Figure 24. This process takes about 2 minutes.

```

COM3 - Tera Term VT
File Edit Setup Control Window Help
rn ?
Command Format: Reset Network Routes To - RN 1: User Configuration, RN 9: Default Fixed Configuratio
n
NOTE: Use SN Command To Define User Configuration First
Takes upto 2 minutes to complete>
>sn
SN 192.168.203.145/16 192.168.203.147/16 192.168.203.148/16 192.168.0.1
    <Antenna ACU Addr> <Camera Addr> <Positioner Addr> <Gateway>
>rn 1
=== Network User Reset Completed ===
>

```

Figure 24: IP Address Reset Complete

12. Type VS, then press Enter to show the new IP configuration.

```

>VS
ACU IP Address (Browser Interface) : 192.168.202.45/16
Camera IP Address                  : 192.168.202.47/16
Positioner IP Address              : 192.168.202.48/16
Gateway IP Address                 : 192.168.0.1

```

Figure 25: IP Address Change Verification

Note: System accessories, such as a Camera and Positioner, have been set with specific “internal” IP address schemes at the factory. These “internal” system IP addresses must not be altered. Any IP address changes for any elements in the system must be made at the Antenna Control Unit as described above.

6 Operating Instructions

6.1 Browser Interface

The QSight Antenna Control Unit contains a built-in web server which provides a Browser Interface enabling configuration and monitoring. The Browser Interface provides easy-to-read, real-time status information with all primary control and monitoring functionality on a single page, as shown in Figure 26. While the Browser Interface works with most modern browsers, the latest version of Firefox, Chrome, or Edge is recommended.

The QSight system has an IP address assigned to it. Connecting to the assigned address initially opens the Configuration page (.../config). All operational controls and status are located on this page.

Note: The browser control interfaces for optional accessories, Camera and Positioner, are accessed via specific IP Addresses noted on the About page (.../about), and are discussed in a separate section.

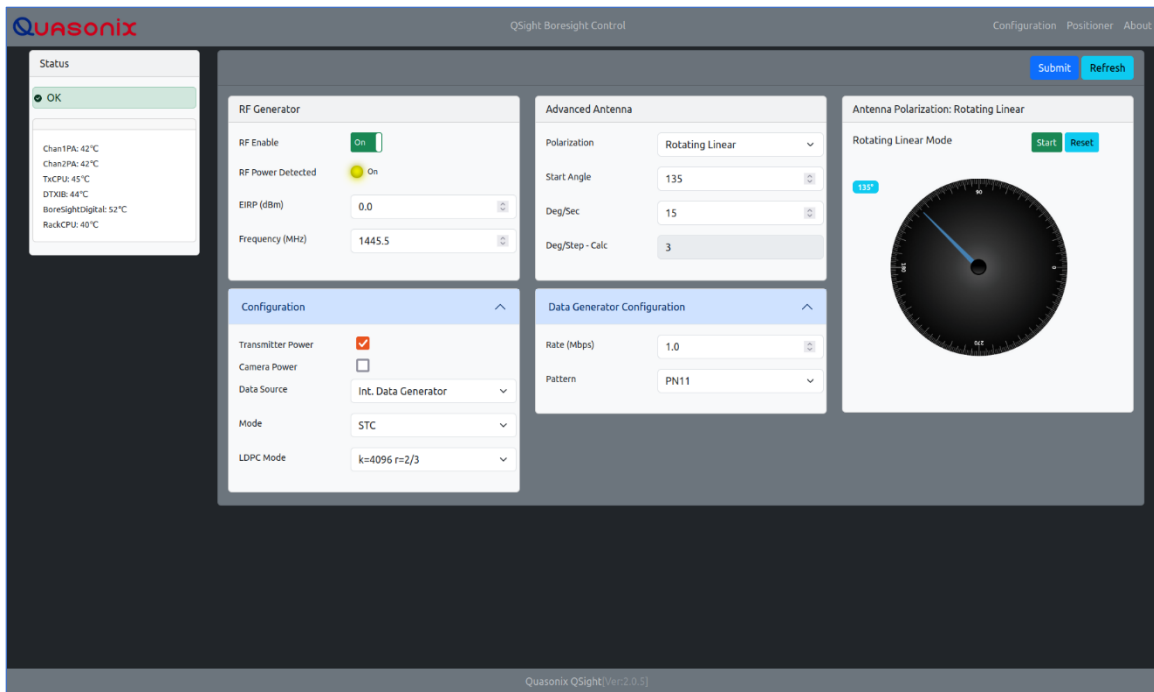


Figure 26: QSight Boresight Browser Interface

6.1.1 Basic Operation

Settings are changed, then manually submitted.

- Submit button – Updates the QSight system with all changed settings.
Alternatively, the Enter key may be used to immediately submit settings.
Note: The RF Enable On/Off switch instantaneously takes effect without the need to submit.
- Refresh button – Clears any unsubmitted settings, then returns the Browser Interface to the current state of the Boresight controller.

Note: If the state of the controller has changed, for example via the command line interface, the Reset button changes to alert the user.

Status and Linear Mode polarization angle feedback updates automatically.

The Toolbar on the top right of the desktop contains three options:

- Configuration and Status (.../config)
- Positioner (optional) (.../config-positioner)
- About (.../about)

6.1.2 Configuration

The Configuration page is subdivided into sections:

- Status
- RF Generator
- Advanced Antenna
- Antenna Polarization
- Configuration (Advanced)
- Data Generator Configuration

6.1.2.1 Status

The Status panel, shown in Figure 27, provides continuous system status updates including connectivity, component temperature (Chan1PA, Chan2PA, TxCPU, DTXIB, BoreSightDigital, RackCPU), and data rate for external data sources (ExtDataRate), if available.

After submitting a settings change, feedback is provided: *Saved* or *Not Saved* with a description of the issue.

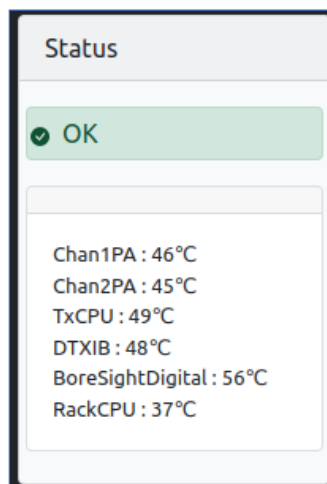


Figure 27: System Status Panel

6.1.2.2 RF Generator

The RF Generator control panel, shown in Figure 28, sets the primary controls and provides operational status for the internal RF generator. As mentioned above, the RF Enable On/Off switch, shown in Figure 29, instantaneously takes effect without the need to submit.

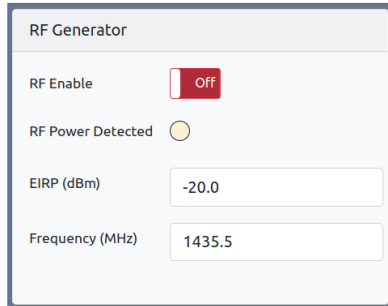


Figure 28: RF Generator Controls

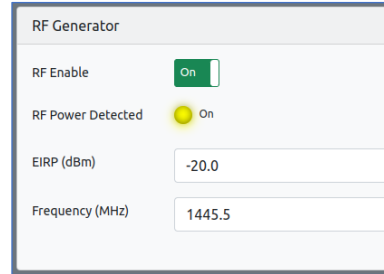


Figure 29: RF Power Detected, Indicator On

- RF Power Detected - Alerts the operator that the RF output is enabled and active
- EIRP (dBm) – Range is -80 to 40 dBm. Output less than -40 dBm is uncalibrated.

In STC mode, modulation output is limited to 34 dBm maximum.

- Frequency (MHz) – Frequency parameter

Available Frequency bands:

- L band: 1435.5 to 1534.5 MHz
- U band: 1750.0 to 1855.0 MHz
- S band: 2200.5 to 2394.5 MHz
- C band: 4400.0 to 4950.0 MHz
- Mid C band: 5091.0 to 5250.0 MHz

6.1.2.3 Advanced Antenna Controls

The Advanced Antenna control panel, shown in Figure 30, selects polarization and associated parameters for each specific polarization mode. Available polarization modes are:

- Horizontal
- Vertical
- Right-hand Circular (RHCP)
- Left-hand Circular (LHCP)
- Fixed Linear
- Rotating Linear

Figure 30: Advanced Antenna Polarization Parameter

Linear polarization modes have additional settings including:

- Fixed Linear – Start Angle and Degrees per Step (Deg/Step), as shown in Figure 31
- Rotating Linear – Start Angle and Degrees per Second (Deg/Sec). A calculated Degrees per Step (Deg/Step) displays, as shown in Figure 32.

Figure 31: Fixed Linear Selection Settings

Figure 32: Rotating Linear Selection Settings

6.1.2.4 Antenna Polarization Display

Based on the Polarization selection in the previous section, the Antenna Polarization display, shown in Figure 33, provides a variety of views. Current polarization angle is displayed for Horizontal, Vertical, Fixed Linear, and Rotating Linear modes. RHCP and LHCP display arrows in the direction as viewed into the antenna, as shown in Figure 34 and Figure 35.

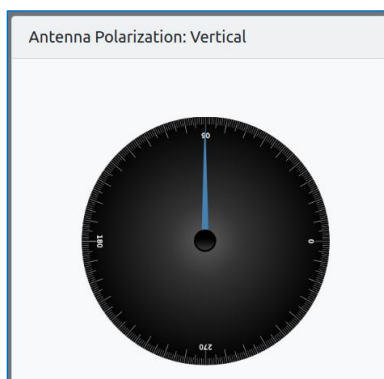


Figure 33: Antenna Polarization, Vertical Mode



Figure 34: Antenna Polarization, RHCP Mode



Figure 35: Antenna Polarization, LHCP Mode

Linear Mode polarization angle feedback updates automatically. Linear polarization modes have additional control buttons:

- Fixed Linear – Step and Reset, as shown in Figure 36
- Rotating Linear – Start/Stop and Reset, as shown in Figure 37

Submitting a new setting automatically stops Rotating Linear operation.

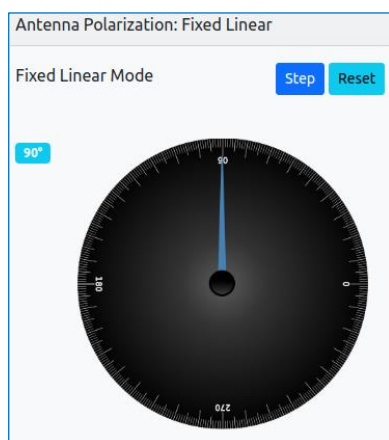


Figure 36: Antenna Polarization, Fixed Linear Mode

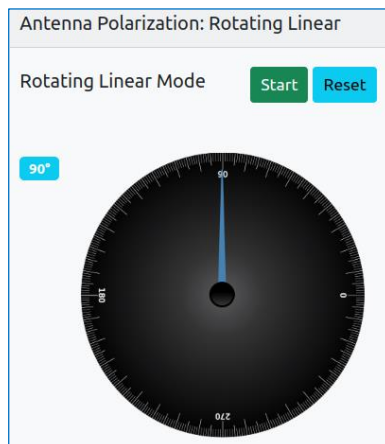


Figure 37: Antenna Polarization, Rotating Linear Mode

6.1.2.5 Configuration (Advanced) Settings

A Configuration panel, shown in Figure 38, provides access to advanced control settings that are intended to be set during initialization of the boresight systems. After these settings are saved, the panel may be hidden if desired.

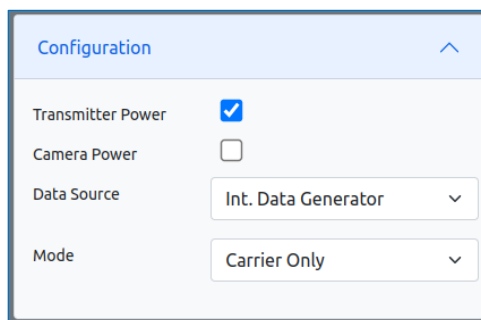


Figure 38: Advanced Configuration

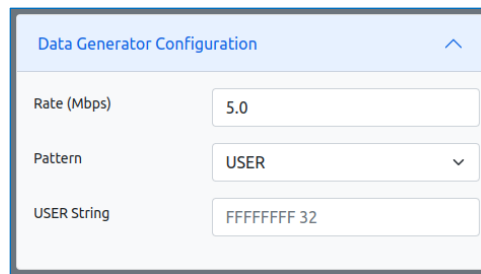
- Transmitter Power check box – Checked indicates On/Enabled; required for operation of the boresight system.
- Camera Power check box – Checked indicates On/Enabled; required for use of the optional camera.
- Data Source parameter has three selections available from the drop down menu:
 - Internal Data Generator – When selected, additional parameters are set in the Data Generator Configuration panel
 - External RS-422 Data – Input is via the back of the QSight; MDM-25 connection
 - External TTL Data – Input via the back of the QSight; BNC connection
- Mode – Drop down menu enables selection of the Mode parameter; available modes are:

- Carrier Only
- PCMFm, ARTM Tier 0
- SOQPSK-TG, ARTM Tier I, with LDPC error correction
- Multi-h CPM (MHCPM), ARTM Tier II
- STC with LDPC error correction

6.1.2.6 Data Generator Configuration

As mention previously, if Internal Data Generator is selected, additional parameters are set in the Data Generator Configuration panel, as shown in Figure 39.

- Rate – Valid range is 1-46 Mbps
- Pattern – PN Pattern may be selected from the drop down menu of options, or may be User defined with a string. The string pattern is XXXXXXXX [bitlen] where XXXXXXXX is a hex number (0-FFFFFFFF) and bitlen is the number of bits to use (1-32).



The screenshot shows a web interface titled "Data Generator Configuration". It contains three input fields: "Rate (Mbps)" with a value of "5.0", "Pattern" with a dropdown menu showing "USER", and "USER String" with a value of "FFFFFFFF 32".

Figure 39: Data Generator User Defined Pattern

6.2 Camera Control

Type: CostarHD (formerly CohuHD) 3430HD

Product information: <https://costarhd.com/Product/octima-3430hd-series>

To use the Camera, ensure that the Camera Power setting is enabled in the Browser Interface Configuration panel.

Note: According to the manufacturer, the Camera user interface must use an Internet Explorer (not Chrome, Edge, or Firefox) browser, or Edge in IE compatibility mode. Alternatively, a video stream using software such as VLC may be established using a method described by the camera vendor.

Note: System accessories, such as Camera and Positioner, are set with specific IP address schemes at the factory. These “internal” system IP addresses must not be altered. Any IP address changes for any elements in the systems must be made at the Antenna Control Unit.

To set an Edge browser to Internet Explorer compatibility mode:

1. Open Microsoft Edge.

2. Click on the Settings and More (ellipsis) button on the top-right corner.
3. Select the Settings option.
4. Click on Default browser.

Under the “Internet Explorer compatibility” section, turn on the “Allow sites to be reloaded in Internet Explorer mode” toggle switch. If this is not available, search for the setting.

5. Click on the Restart button.

Using the IE compatible browser, go to the camera’s IP address listed on the system’s About page.

Reload the camera’s interface in IE Mode using the “Reload in Internet Explorer Mode” option in the Settings and More (ellipsis) button on the top-right corner, as shown in Figure 40.

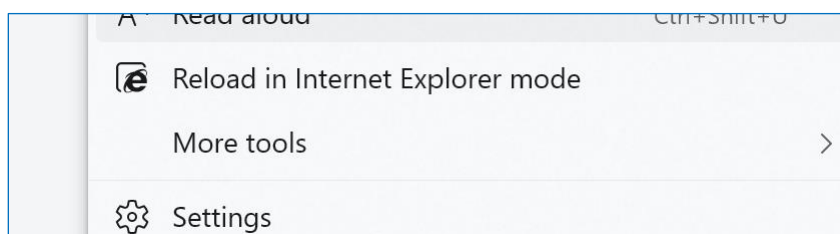


Figure 40: Edge Browser, Reload in Internet Explorer Mode

The Camera’s UI may also request the following for full compatibility.

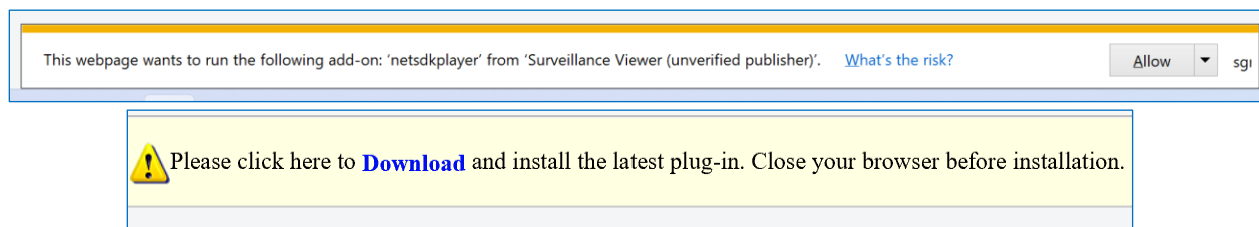


Figure 41: Camera UI Compatibility Issues

Camera Interface Login

When the Costar HD camera interface login screen, shown in Figure 42, displays, type the Username and Password as follows:

- User Name: admin
- Password: Sysadmin1!

- User Name: common
- Password: Commonuser1#

Figure 42: Camera Interface Login

After logging in, the Camera Device Settings may be viewed via the Network tab, as shown in Figure 43.

Figure 43: Camera Device Settings (Factory Settings—Do Not Alter)

6.3 Positioner Control

Type: Quickset (Moog) MPT-50

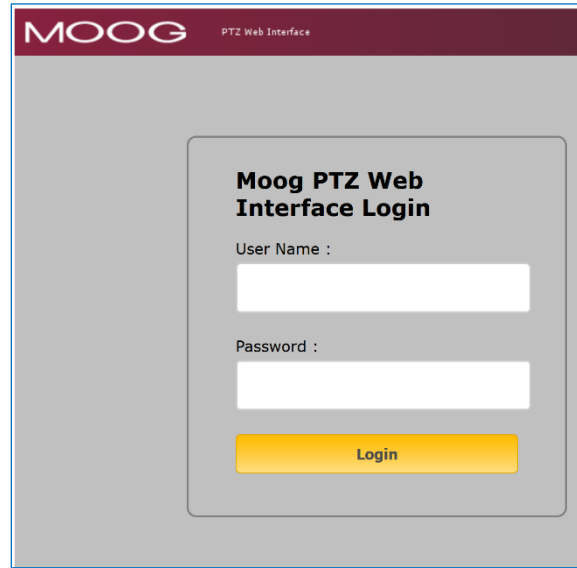
Product information: <https://www.quickset.com/products/pan-tilt/mpt-50/>

The Positioner interface may be accessed directly via the IP Address listed on the About page, or by using the link in the header of the QSight Browser Interface.

Note: System accessories, such as the Camera and Positioner, have been set with specific IP address schemes at the factory. These “internal” system IP addresses must not be altered. Any IP address changes for any elements in the systems must be made at the Antenna Control Unit.

Type the User Name and Password into the Moog PTZ Interface Login screen, shown in Figure 44.

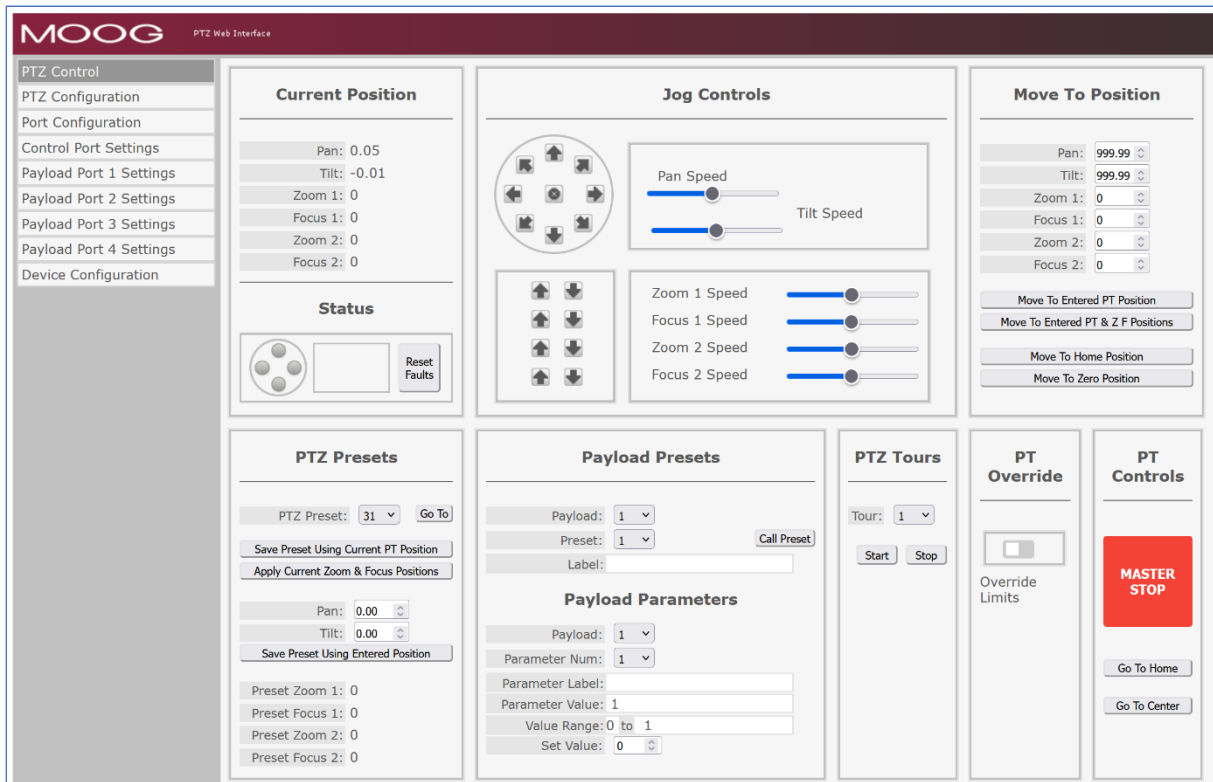
- User Name: admin
- Password: admin



The login screen features a dark red header with the 'MOOG' logo and 'PTZ Web Interface' text. The main content area is light gray and contains a central white box with the title 'Moog PTZ Web Interface Login'. Below the title are two input fields: 'User Name :' and 'Password :'. A yellow 'Login' button is positioned at the bottom of the white box.

Figure 44: Positioner Interface Login

After login, the Moog Positioner Interface screen displays, as shown in Figure 45. Within the Positioner user interface, PTZ Presets may be set to specific pan/tilt values for quick recall.



The PTZ Control interface is a complex dashboard with a dark red header. On the left is a vertical sidebar menu with options: PTZ Control, PTZ Configuration, Port Configuration, Control Port Settings, Payload Port 1 Settings, Payload Port 2 Settings, Payload Port 3 Settings, Payload Port 4 Settings, and Device Configuration. The main area is divided into several panels:

- Current Position:** Displays Pan (0.05), Tilt (-0.01), Zoom 1 (0), Focus 1 (0), Zoom 2 (0), and Focus 2 (0).
- Status:** Includes a joystick icon and a 'Reset Faults' button.
- Jog Controls:** Features a directional pad, 'Pan Speed' and 'Tilt Speed' sliders, and 'Zoom 1 Speed', 'Focus 1 Speed', 'Zoom 2 Speed', and 'Focus 2 Speed' sliders.
- Move To Position:** Allows setting target values for Pan (999.99), Tilt (999.99), Zoom 1 (0), Focus 1 (0), Zoom 2 (0), and Focus 2 (0). It includes buttons for 'Move To Entered PT Position', 'Move To Entered PT & Z F Positions', 'Move To Home Position', and 'Move To Zero Position'.
- PTZ Presets:** Includes a 'PTZ Preset' dropdown (set to 31), a 'Go To' button, and buttons to 'Save Preset Using Current PT Position' and 'Apply Current Zoom & Focus Positions'. It also shows preset values for Pan, Tilt, Zoom, and Focus.
- Payload Presets:** Includes 'Payload' and 'Preset' dropdowns, a 'Call Preset' button, and a section for 'Payload Parameters' with fields for Parameter Num, Label, Value, and Range.
- PTZ Tours:** Includes a 'Tour' dropdown (set to 1) and 'Start'/'Stop' buttons.
- PT Override:** Includes an 'Override Limits' checkbox.
- PT Controls:** Features a large red 'MASTER STOP' button and 'Go To Home'/'Go To Center' buttons.

Figure 45: Positioner Interface, PTZ Control

Positioner Ramp Parameters and Device Configuration are set at the factory and should not be changed.

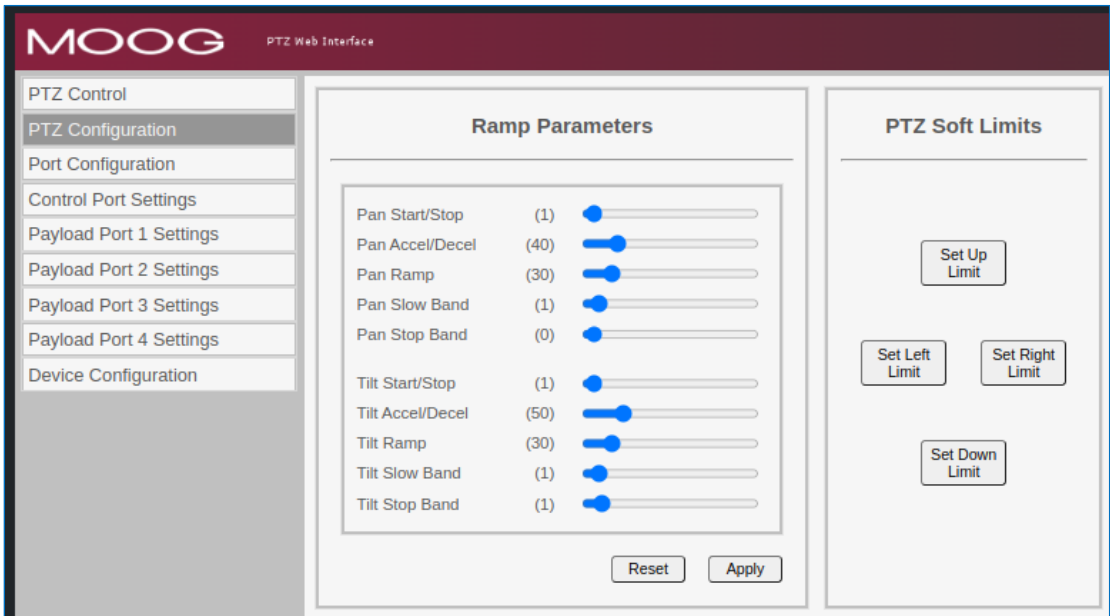


Figure 46: Positioner Ramp Parameters (Factory Settings—Do Not Alter)

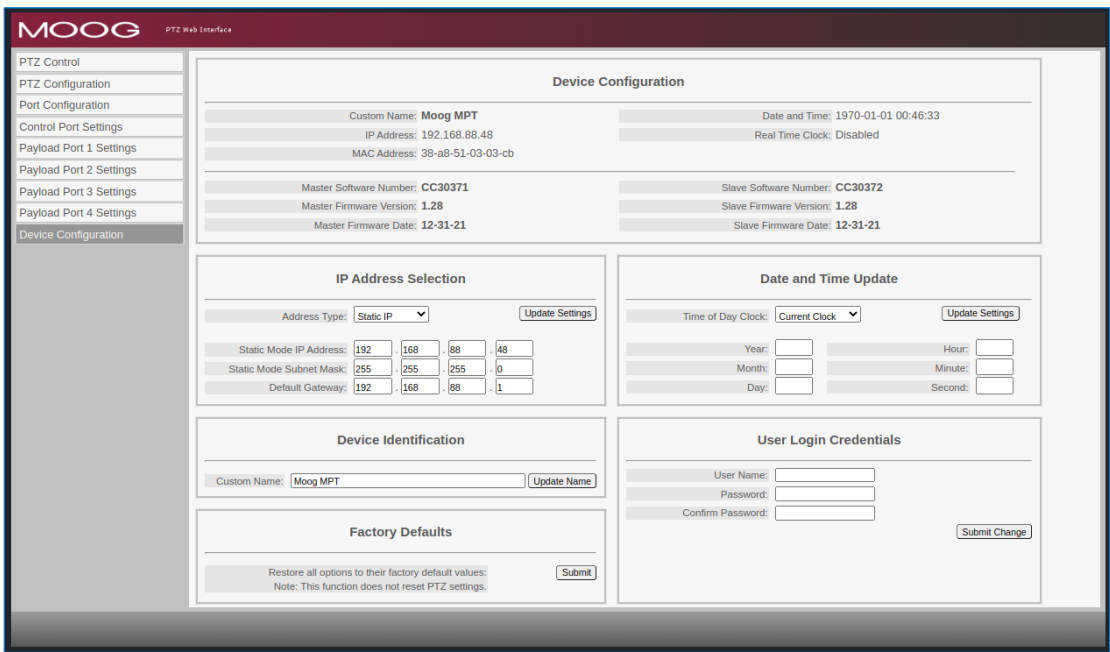


Figure 47: Positioner Device Settings (Factory Settings—Do Not Alter)

7 Maintenance Instructions

The QSight™ Boresight System requires no regular maintenance, and there are no user-serviceable parts inside.

8 Product Warranty

The QSight™ Boresight System carries a standard parts and labor warranty of one (1) year from the date of delivery.

8.1 Quasonix Limited Warranty Statement

This Limited Warranty Statement (this “Limited Warranty”) applies to all hardware and software products and internal components of such products (the “Products”) sold by Quasonix, or its representatives, authorized resellers, or country distributors (collectively referred to herein as “Quasonix”). EXCEPT AS EXPRESSLY SET FORTH IN THIS LIMITED WARRANTY, QUASONIX MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ANY PRODUCTS SOLD BY IT. Quasonix expressly disclaims all warranties and conditions not stated in this limited warranty. There are no warranties which extend beyond the description on the face hereof. Capitalized terms not otherwise defined herein shall have the meaning set forth in those certain General Terms and Conditions of Sale for Standard Product, as amended from time to time.

Quasonix warrants to customer that for one (1) year from the date of shipment of the Products by Quasonix (the “Warranty Period”), such Products purchased from Quasonix or its authorized affiliate will materially conform to the specifications set forth in the applicable Quasonix Specifications, if any, and are free from defects in materials and workmanship under normal use during the Warranty Period. As used herein, “normal use” means the intended use of the Products for which it was designed by Quasonix.

This Limited Warranty extends only to the original purchaser of the Products and is not transferable to anyone who obtains ownership of the Products from the original purchaser.

Quasonix’ software, whether incorporated into the Products or sold separately, is warranted solely to the extent that problems or “bugs” are found in the software and affect the functional operation of the Products. At no time shall requests for changes in the software architecture or visual esthetics be considered a warranty item.

The Products are manufactured using new materials only. Replacement parts may be new or equivalent to new. Replacement parts are warranted to be free from defects in material or workmanship for thirty (30) days or for the remainder of the Warranty Period of the Products in which they are installed, whichever is longer.

During the Warranty Period, Quasonix will repair or replace the defective Products. All components or hardware products removed from the Products under this Limited Warranty become the property of Quasonix. All warranties are limited to the repair or replacement of the Products.

In no event shall Quasonix be liable for any special, consequential, incidental or indirect damages of any kind, including, without limitation, loss of profits, loss of data, “down-time,” loss of use or damage to other equipment, or personal injury or death, whether or not Quasonix has been advised of the possibility of such loss.

Notwithstanding anything to the contrary herein, Quasonix’s entire liability hereunder from any cause whatsoever and regardless of the form of action shall be limited to the amount actually received by Quasonix.

Quasonix shall not be liable for a breach of the warranty set forth in this Limited Warranty unless: (i) the customer gives written notice of the defect, reasonably described, to Quasonix’s Contracts Administrator within thirty (30) days of the time when customer discovers or ought to have discovered the defect and obtains a Return Materials Authorizations (“RMA”) number; (ii) Quasonix is given a reasonable opportunity after receiving the notice to examine such Products and customer (if requested to do so by Quasonix) returns such Products to Quasonix’s facility in Moorpark, CA, unless otherwise approved by Quasonix; and (iii) Quasonix reasonably verifies customer’s claim that the Products are defective.

Subject to the foregoing, with respect to any such Products during the Warranty Period, Quasonix shall, in its sole discretion, either: (i) repair or replace such Products (or the defective part) or (ii) credit or refund the price of such

Products at the pro rata contract rate provided that, if Quasonix so requests, customer shall, at Quasonix's expense, return such Products to Quasonix.

The customer is responsible for all costs associated with packaging and shipping of the defective Products to Quasonix's facility and clearly marking or affixing the given RMA number on the shipping label. Quasonix is not responsible for any loss or damage during shipment to Quasonix's facility. Following repair or replacement of covered Products, Quasonix will assume responsibility for the costs associated with the return of the material to the customer to an address provided by the customer. Notwithstanding the foregoing, items returned to Quasonix's facility and found to be operational or otherwise not covered by this Limited Warranty shall be returned to the customer at the customer's expense.

This Limited Warranty does not apply to expendable parts, such as cables, lamps, fuses, connectors, etc. This Limited Warranty does not extend to any Products which have been damaged or rendered defective (a) as a result of accident, misuse, abuse, or external causes; (b) by operation outside the usage parameters stated in the user documentation that shipped with the Products; (c) as a result of a failure to follow the instructions in the Operations & Maintenance Manual (d) by the use of parts not manufactured or sold by Quasonix; or (e) by modification or service by anyone other than (i) Quasonix, (ii) an Quasonix authorized service provider, or (iii) your own installation of end-user replaceable Quasonix or Quasonix approved parts if available for the Products in the servicing country.

THE TERMS OF THE WARRANTIES CONTAINED HEREIN DO NOT IN ANY WAY EXTEND TO ANY PRODUCT OR PART THEREOF OR SOFTWARE MATERIALS WHICH WERE NOT MANUFACTURED BY SELLER OR PREPARED BY SELLER OR ANY OF ITS AFFILIATES.

These terms and conditions constitute the complete and exclusive warranty agreement between the customer and Quasonix regarding the Products purchased. This Limited Warranty is applicable in all countries and may be enforced in any country where Quasonix or its authorized affiliates offer warranty service subject to the terms and conditions set forth in this Limited Warranty.

These terms and conditions supersede any prior agreements or representations (including representations made in Quasonix sales literature or advice given to the customer by Quasonix or an agent or employee of Quasonix) that may have been made in connection with the purchase of the Products. No change to the conditions of this Limited Warranty is valid unless it is made in writing and signed by an authorized representative of Quasonix.

8.1.1 Extended Warranties

Extended warranties or extra coverage are available upon request. Please contact Quasonix for details and pricing.

THE REMEDIES SET FORTH IN THIS LIMITED WARRANTY STATEMENT SHALL BE THE BUYER'S SOLE AND EXCLUSIVE REMEDY AND SELLER'S ENTIRE LIABILITY FOR ANY BREACH OF THE LIMITED WARRANTY SET FORTH HEREIN.

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9 Technical Support and RMA Requests

In the event of a product issue, customers should contact Quasonix via phone (1-513-942-1287) or e-mail (support@quasonix.com) to seek technical support. If the Quasonix representative determines that the product issue must be addressed at Quasonix, a returned materials authorization (RMA) number will be provided for return shipment.

Authorized return shipments must be addressed in the following manner:

**Quasonix, Inc.
ATTN: Repair, RMA #
6025 Schumacher Park Drive
West Chester, OH 45069**

To ensure that your shipment is processed most efficiently, please include the following information with your product return:

- Ship To – Company name, address, zip code, and internal mail-drop, if applicable
- Attention/Contact person – Name, Title, Department, Phone number, email address
- Purchase Order Number – If applicable
- RMA Number – provided by the Quasonix representative

Please note that Quasonix reserves the right to refuse shipments that arrive without RMA numbers.

10 Appendix A – Acronym List

Acronym	Description
ARTM	Advanced Range Telemetry
AZ	Azimuth
BNC	Bayonet Neill-Concelman Connector (RF Connector)
CCW	Counterclockwise
CW	Clockwise
EL	Elevation
IP	Internet Protocol
kbps	Kilobits per second
KHz	Kilohertz
LDPC	Low Density Parity Check
LHCP	Left Hand Circularly Polarized
mbps	Megabits per second
MHCPM	multi-h Continuous Phase Modulation
MHz	Megahertz
PCMFM	Pulse Code Modulation/Frequency Modulation
RF	Radio Frequency
RHCP	Right Hand Circularly Polarized
RJ-45	Ethernet Connection Jack
SOQPSK-TG	Shaped Offset Quadrature Phase Shift Keying –Telemetry Group
STC	Space-Time Coding