



sigma S6 WaMoS® II
Operators Manual

E-SP-02486, Issue 009

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sigma S6 WaMoS® II Operators Manual

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Amendment Record

The details of any amendment made to this documentation should be recorded in the table below.

Issue	Description of changes	Date
001	Release of <i>WaMoS® II Operators Manual</i> for Version 8.0.0	18-Jul-14
002	Release of <i>WaMoS® II Operators Manual</i> for Version 8.1.0	28-Nov-14
003	Release of <i>WaMoS® II Operators Manual</i> for Version 8.2.0	13-Mar-15
004	Release of <i>WaMoS® II Operators Manual</i> for Version 9.0.0	07-Aug-15
005	Release of <i>WaMoS® II Operators Manual</i> for Version 9.0.1	08-Oct-15
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Conventions Used in This Manual

The following table lists the conventions that are used throughout the *sigma S6 WaMoS® II Operators Manual*.

Convention	Description	Example
Key name	Press a keyboard key	Ctrl
Italics	Identifies a window, tab, menu item, or field.	<i>Sector Blanking</i> window
Key+Key	Type the appropriate consecutive keystroke sequence	CTRL+G
Key–Key	Type the appropriate simultaneous keystroke sequence	CTRL–G
—	An em dash in a table cell indicates there is no information.	—
→	Indicates a cascading menu item	Window→InfoPanel

Procedures with Options or Substeps

When there are options in a procedure, they are identified by letters. When there are substeps in a procedure, they are identified by roman numerals.

Example of options in a procedure

At step 1, you can choose option a or b. At step 2, you must do what the step indicates.

1. This step offers two options. You must choose one of the following:
 - a. This is one option.
 - b. This is another option.
2. You must perform this step.

Example of substeps in a procedure

At step 1, you must perform a series of sub-steps within a step. At step 2, you must do what the step indicates.

1. This step has a series of sub-steps that you must perform to complete the step. You must perform the following substeps:
 - i. This is the first substep.
 - ii. This is the second substep.
 - iii. This is the third substep.
2. You must perform this step.

Important Information

The following conventions are used to indicate important information.



Note – A note provides information that is, or may be, of special interest.



Caution – A caution indicates that the described activity or situation may, or will cause interruptions to system functionality or equipment damage.

Abbreviations

A	Amperes
AFC	Automatic Frequency Control
ALRM	Alarm
ARP	Azimuth Reset Pulse
BIST	Built-in System Test
CFAR	Constant False Alarm Rate
COG	Course Over Ground
CRS	Course
Dec	Decimal Degrees
DM	Degrees, Minutes
DMS	Degrees, Minutes, Seconds
EBL	Electronic Bearing Line
ESRI	Environmental Systems Research Institute
GDAL	Geospatial Data Abstraction Library
GIS	Geospatial Information System
GML	Geography Markup Language
GSHHG	Global Self-Consistent Hierarchical High-Resolution Geography Database
GUI	Graphical User Interface

HRC	High Resolution Current
LAN	Local Area Network
mil	Thousandths of an inch
Mins.	Minutes
Nm	Nautical Mile(s)
NMEA	National Marine Electronics Association
PERFMON	Performance Monitor
PLEN	Pulse Length
PRF	Pulse Repetition Frequency
Rge/Brg	Range/Bearing
RSi	Radar Signal Interface
Rx	Receive
S	Second
SOG	Speed Over Ground
SPD	Speed
STAT	Status
STBL	Stabilized
STBYTX	Standby Transmit
STC	Sensitivity Time Control

TRIG	Trigger
Tx	Transmit
TXRX	Transmit/Receive
UTC	Coordinated Universal Time
V	Volts
VRM	Variable Range Marker
WaMoS	Wave and Surface Monitoring System

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1 *sigma* S6 WaMoS® II System

The *sigma* S6 WaMoS® II System provides real time measurement of directional ocean wave spectra, providing continuous availability of wave data in rough seas, under harsh weather conditions with limited visibility, and at night.

The *sigma* S6 WaMoS® II System uses the unfiltered output from marine X-Band radar to determine wave and surface current parameters in near real-time. The measurements are based on the backscatter of radar energy from the ocean surface (sea clutter). The backscatter, which is visible on the marine radar, shows the wave patterns. The *sigma* S6 WaMoS® II measures and displays all the essential wave field parameters such as significant wave height, peak wave period and peak wave direction.

The *sigma* S6 WaMoS® II System is most often interfaced to traditional analog radars (outputting analog radar signals), requiring that a *sigma* S6 RSi-5000 PCI card and an RSi-5000 Interface Module be installed to the *sigma* S6 Server PC to allow connection to the analog radar outputs. Alternatively, the *sigma* S6 WaMoS® II System may also be interfaced to specific digital radars (outputting digitized and encoded radar signals over a LAN). When interfaced to a digital radar, the *sigma* S6 RSi-5000 PCI card and the RSi-5000 Interface Module is not required, as the *sigma* S6 Server PC connects directly to a LAN to obtain the already digitized radar signals.

The components of the system include:

- *sigma* S6 Server PC
- *sigma* S6 RSi-5000 PCI card and RSi-5000 Interface Module (analog radar only)
- *sigma* S6 SeaView GUI application (referred to as SeaView in this document)
- *sigma* S6 Server application
- *sigma* S6 WaMoS® II Sea-State Analysis application
- *sigma* S6 WaMoS® II High Resolution Current (HRC) application (Optional; required when Sea-State Analysis and HRC features are purchased and installed)

The *sigma* S6 components listed above are developed and supplied by Rutter Inc. OceanWaveS GmbH is a wholly-owned subsidiary of Rutter Inc. The *sigma* S6 WaMoS® II System is designed to operate on Windows® 7 Professional 64-bit platforms.



Note— For proper operation of the *sigma* S6 WaMoS® II System, the radar must be maintained in its shortest pulse length. Moving the radar to medium or long pulse length will return inaccurate results or no result at all.

1.1 Overview

The *sigma* S6 WaMoS® II System is typically interfaced to an analog output Rutter Radar-100S6 antenna and transceiver in a controlling configuration. The *sigma* S6 WaMoS® II System can also be interfaced to a SAM NACOS Platinum Digital Radar in a controlling configuration.

Alternatively, the system may be passively interfaced to one of many supported standard commercial marine navigation radars in a slaved, non-controlling configuration. When in the slaved configuration, the connection of the *sigma* S6 WaMoS® II System does not impact the operation of the navigation radar.

The physical interface between the *sigma* S6 WaMoS® II System and analog radars is via the RSi-5000 Interface Module. The RSi-5000 Interface Module is mounted directly to the top of *sigma* S6 Server PC utilizing a supplied mounting bracket, or as an independent unit in a 1u rack mount configuration. The RSi-5000 Interface Module provides:

- Connection points for termination of the ACP, ARP, Trigger and Video radar signals
- Jumpers to select the correct polarity of the terminated radar signals
- RS-422 input and output ports for Rutter Radar-100S6 control

The RSi-5000 Interface Module is connected to the RSi-5000 PCI card using a supplied mini-BNC cable and a supplied custom cable. The RSi-5000 PCI card is always installed into the *sigma* S6 Server PC, and performs the capture and digitization of the raw analog radar data.

The *sigma* S6 Server PC runs the *sigma* S6 Server application which communicates directly with the installed *sigma* S6 RSi-5000 PCI card. The *sigma* S6 Server application retrieves the digitized radar data directly from the *sigma* S6 RSi-5000 PCI card, processes the retrieved data, and then forwards the processed data to the SeaView application. SeaView displays the processed digital radar data and is the main operator interface.

SeaView is typically installed directly onto the *sigma* S6 Server PC. However, SeaView may also be installed to a remote client PC connected to the *sigma* S6 Server PC by a LAN or over the internet.

Multiple networked *sigma* S6 Server PCs, each connected to different radars via installed RSi-5000 PCI cards and RSi-5000 Interface Modules (or via a LAN for digital radars), can also be commissioned. In this configuration, each *sigma* S6 Server PC can distribute radar data to the remote client PC on the same network.

1.2 Radar Display

The *Radar Display* in the SeaView application window displays radar data in 256 intensity levels. It can be shown with or without any or all of the following overlays:

- Range rings
- Heading mark
- Marker
- Cursor Annotations
- Electronic bearing line
- Variable range marker
- Compass rose

The *sigma* S6 WaMoS® II System displays radar data in real time from a radar source. If the optional Raw Data Recording Module is enabled, the *sigma* S6 WaMoS® II System can also play back raw, previously recorded data.

The operator can easily view the WaMoS® II data by toggling the display mode from *Radar* to *WaMoS® II*. Alternatively, if a second display is available, the *WaMoS® II* display mode can be undocked and moved to the second display, allowing simultaneous viewing of both modes of operation.

When the optional Camera Integration Module is purchased, SeaView also allows control of FLIR Voyager III, M400 or M-Series cameras (contact Rutter for details of supported models and minimum hardware and software requirements).

To support GIS requirements, the *sigma* S6 System can be configured with an optional module that will allow the output of georeferenced radar imagery and associated GML formatted vector data files.

1.3 Recording and Playback

1.3.1 Raw Data Recording

An optional Raw Data Recording Module is available for the *sigma* S6 WaMoS® II System, allowing you to capture live raw radar data onto any recording device to which the *sigma* S6 Server PC has access. All available NMEA data sources may also be simultaneously recorded.

Recording raw radar data provides the following advantages:

- Fidelity is fully retained in the recording
- The recording is independent of the display and filter settings set at the time of recording
- During playback, different processing options and parameters can be applied to recorded data as if it were live radar data



Note 1 — As the *sigma* S6 WaMoS® II System generates large amounts of data at a high data rate, ensure the recording device has sufficient speed/capacity.

Note 2 — The *sigma* S6 WaMoS® II System must be configured by a Rutter technician to unlock the optional recording and playback of radar data.

Note 3 — The maximum file size for recorded raw data is limited by the quantity of free disk space on the recording device. When the device is full, recording will automatically stop.

Note 4— When operating in Playback mode, the system does not capture new data from the radar. During this time, raw data recording is not possible.

The *sigma* S6 WaMoS® II System is installed with an external USB hard disk drive. This drive is used by the *sigma* S6 WaMoS® II processing software to store long term data, which is later retrieved for *sigma* S6 WaMoS® II calibration purposes. This *sigma* S6 WaMoS® II long-term data recording process is separate from the optional Raw Data Recording Module that is part of the

core *sigma* S6 Server application. If required, this drive may also be used for optional Raw Data Recording Module by the *sigma* S6 Server.

The Raw Data Recording Module supports multiple storage locations. This allows for the system to write to another location once a drive is full or removed.

Additionally, the Raw Data Recording Module maintains a reserved 10 GB failover location on the operating system drive to allow recording to continue should the active recording location become unavailable and there is no alternate recording location specified and available.

1.3.2 Radar Data Playback

Radar data playback is available to all versions of the *sigma* S6 system, allowing users to playback data recorded on another *sigma* S6 system. When playing back data there are two options to choose from:

- Playback from the Internal Archive. This is the dataset recorded to the storage locations configured in the recording panel. This option is unavailable without the optional Raw Data Recording Module.
- Playback from a selected file. This can be a dataset recorded from another PC

1.3.3 WaMoS® II Recording

The *sigma* S6 WaMoS® II System is installed with an external USB hard disk drive. This drive is used by the WaMoS® II processing software to store long term data, which is later retrieved for WaMoS® II calibration purposes. This WaMoS® II long-term data recording process is separate from the optional Raw Data Recording Module that is part of the core *sigma* S6 Server application.

1.4 System Configuration

All the operational and user-specific configuration settings can be set in SeaView or in the *sigma* S6 Server application.

1.5 Product Manuals

You can access the *sigma* S6 WaMoS® II System documents from the Windows® start directory by selecting:

Start → *All Programs* → *Rutter* → *sigma S6* → *Manuals*

The *sigma* S6 WaMoS® II System documents are installed in the following default directory:
C:\Program Files (x86)\Rutter\Manuals\

2 *sigma* S6 Server

2.1 Overview

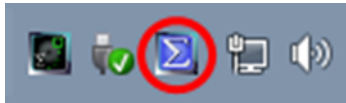
The *sigma* S6 Server application is a Windows® system tray application (located on the right side of the Windows® task bar at the bottom of the screen). The *sigma* S6 Server typically receives the raw radar data from the *sigma* S6 RSi-5000 card (unless connected to a digital radar), filters and processes the data, and forwards it to the SeaView application.

The *sigma* S6 Server sends raw, unprocessed radar data to the *sigma* S6 WaMoS® II application, where the raw data is further processed into Sea-State Analysis and High Resolution Current results. The Sea-State Analysis and High Resolution Current results are then provided to the SeaView application for display when viewing in the *WaMoS® II* display mode.

2.2 Starting *sigma* S6 Server

To start the *sigma* S6 Server application, double-click on the *sigma* S6 Server icon on the Windows® Desktop or in the Windows® Start Menu. Figure 2-1 displays the *sigma* S6 Server system tray icon that appears when the application is running.

Figure 2-1: *sigma* S6 system tray icon



2.3 *sigma* S6 Server System Tray Controls

Right-click the *sigma* S6 Server icon in the Windows® system tray to provide the following options:

- View the *sigma* S6 Server event log
- Select a source to play back data recordings
- Configure the recording system (optional)
- Information about *sigma* S6 Server application
- Shut down the *sigma* S6 Server application.

Figure 2-2 displays the *sigma* S6 Server pop-up menu.

Figure 2-2: *sigma* S6 Server pop-up menu

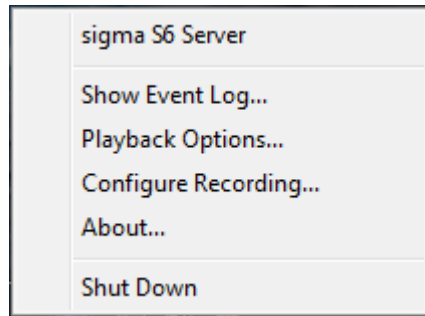


Table 2-1 describes the *sigma* S6 Server pop-up menu.

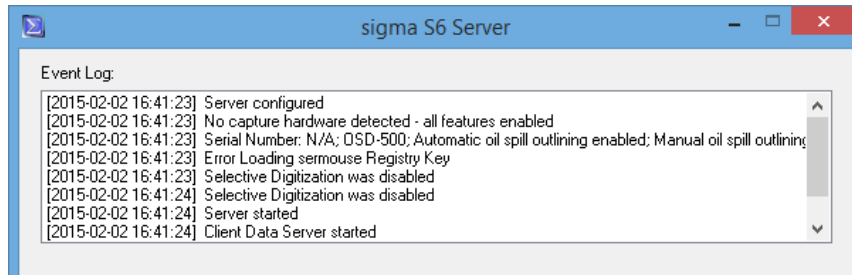
Table 2-1: *sigma* S6 Server pop-up menu

Control	Description
Show Event Log...	Opens the <i>sigma</i> S6 Server Event Log window. Use this menu item to display a window containing a real-time log of system status events and error messages.
Playback Options...	Opens the playback options dialog to specify the data file to be used for playback as well as enable playback looping.
Configure Recording...	Opens the recording options dialog where the recording system can be configured (optional).
About...	Opens the <i>About</i> window, displaying copyright, system information, and the <i>sigma</i> S6 Server software version.
Shut Down	Shuts down the <i>sigma</i> S6 Server application.

2.3.1 Show Event Log Window

The *Show Event Log...* menu item opens the *sigma* S6 Server Event Log window. This window displays a scrollable list of system status and error messages. Figure 2-3 displays the *sigma* S6 Server Event Log window.

Figure 2-3: *sigma* S6 Server Event Log window



Procedure 2-1 describes how to view the *sigma* S6 Server Event Log window.

Procedure 2-1: To view the *sigma* S6 Server Event Log window

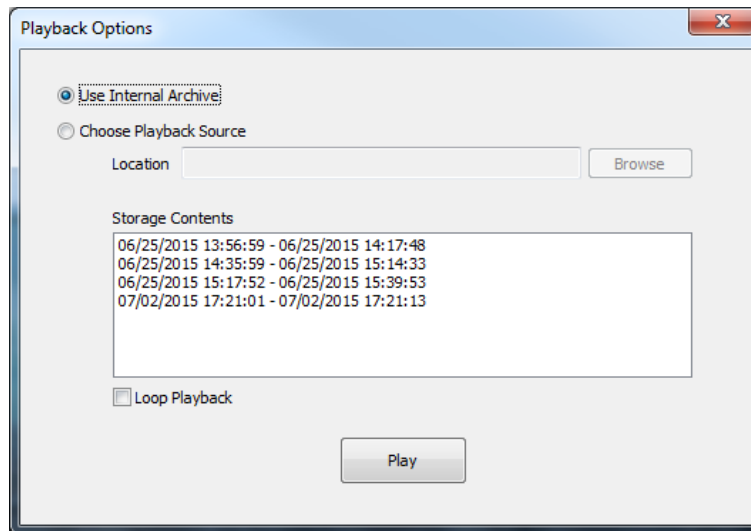
1. Right-click on the *sigma* S6 Server system tray icon.
2. Select *Show Event Log...* in the pop-up menu.

The *sigma* S6 Server Event Log window appears.

2.3.2 Playback Options

The *Playback Options...* menu item opens a *Playback Options* window. Here the user can select between using the Internal Archive or an external data file. Figure 2-4 displays the *Playback Options* window.

Figure 2-4: Playback Options window



If "Internal Archive" is selected, the system will play back data recorded to the storage locations configured on the *Recording Options* window.

If “Choose Playback Source” is selected, the user must use the browse button to navigate to data recording.

Once selected, the “Storage Contents” window will display the recording segments of the selected dataset.

Checking “Loop Playback” will allow the system to start over from the beginning of the selected segment once it has reached the end.

Procedure 2-2 describes how to view the *sigma S6 Server Select Data File* window.

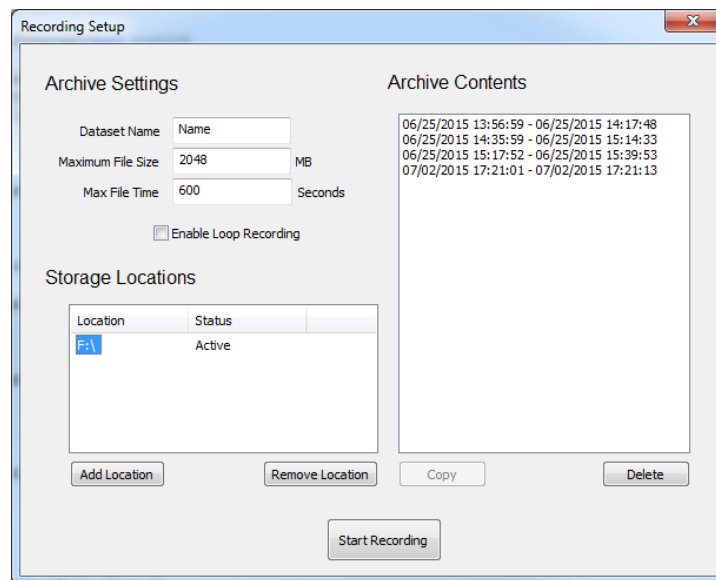
Procedure 2-2: To view the *sigma S6 Server Select Data File* window

1. Right click on the *sigma S6 Server* system tray icon.
 2. Select *Select Data File...* from the pop-up menu to open the *sigma S6 Server Select Data File* window.
-

2.3.3 Recording Options

The *Configure Recording...* menu item opens a *Recording Setup* window. Here the user can configure the system to record to various locations as well as set parameters for recording. Figure 2-5 displays the *Recording Setup* window.

Figure 2-5: Recording Setup



The general settings section contains parameters that apply to the recording process. These parameters are outlined in Table 2-2.

Table 2-2: General Archive Settings

Setting	Description
Dataset Name	Specifies the label attached to each folder and .sig file created during a recording
Maximum File Size	Specifies the maximum size in megabytes (MB) a .sig file will reach before automatically creating a new .sig file and continuing the recording process
Max File Time	Specifies the maximum amount of time in seconds that will lapse before the system automatically switches to a new .sig file and continues the recording process
Enable Loop Recording	When checked, the system will automatically delete the oldest .sig file among all the .sig files in the added storage locations once all the store locations are full and continue recording.

Storage locations section allows the user to add and remove locations or drives to the system for the archive system to utilize in recording data. The Storage Location list displays the logical path of each of the selected locations as well as the current status of that location. These parameters are outlined in Table 2-3.

Table 2-3: Storage Locations

Setting	Description
Add Location	Opens a folder browsing dialog. When a folder is chosen, the location will be added to the storage locations list. Upon adding the drive, the system will scan the location for existing recordings and add them to the Archive Contents list if datasets exist.
Remove Location	Removes the selected Storage Location in the List. Once removed, the system will remove the contents of that storage location from the Archive Contents list. Additionally, if the system is currently recording the removed drive, the system will automatically carry on recording on the next drive on the list.

The Archive Contents list displays any data segments that may exist on all of the added storage locations. These segments can be copied or deleted with the buttons provided. These parameters are outlined in Table 2-4.

Table 2-4: Archive Contents

Setting	Description
Copy	Opens a folder browsing dialog. When a folder is chosen, the system will copy all files associated with the selected segment and copy them to the chosen folder.
Delete	Removes all folders and files associated with the selected segment.

2.3.4 Shut Down sigma S6 Server Application

Procedure 2-3 describes how to shut down the *sigma* S6 Server application.

Procedure 2-3: To shut down the *sigma* S6 Server application

1. Right-click on the *sigma* S6 Server system tray icon to open the sigma S6 Server pop-up menu.
 2. Select Shut Down to stop the application.
-

3 *sigma* S6 WaMoS® II

The *sigma* S6 WaMoS® II application remotely measures spectral sea-state and surface current parameters, as well as high resolution current and bathymetry information. See Section 19 for more information about performing sea-state and surface current analysis.

3.1 Starting *sigma* S6 WaMoS® II

Double-click on the *sigma* S6 WaMoS® II icon on the Windows® Desktop or in the Windows® Start Menu to run the application. Figure 3-1 displays the *sigma* S6 WaMoS® II icon that appears in the Windows® system tray when the application is running.

Figure 3-1: *sigma* S6 WaMoS® II System tray icon



Note 1— The application starts in the default *User Mode* of operation. An additional *Installation Mode* is used only by qualified *sigma* S6 WaMoS® II service technicians during installation and commissioning operations.

Note 2— The *sigma* S6 WaMoS® II application automatically connects to the *sigma* S6 Server on startup. Upon connection to the *sigma* S6 Server, *Automatic Recording* is automatically started. If the *sigma* S6 WaMoS® II application cannot establish a connection to the *sigma* S6 Server, it will retry making the connection until it succeeds or the *sigma* S6 WaMoS® II application is shut down.

3.2 *sigma* S6 WaMoS® II System Tray Controls

The following operations are available in *User Mode* when the *sigma* S6 WaMoS® II System tray icon is right-clicked:

- Start and stop Automatic Recording of radar data for Sea-State and/or HRC analysis
- Switch to *Installation Mode* (password required, *Automatic Recording* must be stopped to access this item)
- View information for the *sigma* S6 WaMoS® II application, including version number
- Shut down the *sigma* S6 WaMoS® II application.

Figure 3-2 displays the *sigma* S6 WaMoS® II pop-up menu.

Figure 3-2: *sigma* S6 WaMoS® II pop-up menu

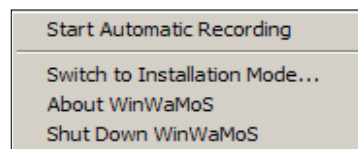


Table 3-1 describes the controls in the *sigma* S6 WaMoS® II pop-up menu.

Table 3-1: *sigma* S6 WaMoS® II pop-up menu controls

Control	Description
Start/Stop Automatic Recording	<p>Starts and stops <i>Automatic Recording</i> of radar data for <i>sigma</i> S6 WaMoS® II analysis. When the <i>sigma</i> S6 WaMoS® II application is started, it automatically connects to the <i>sigma</i> S6 Server and <i>Automatic Recording</i> is automatically started.</p> <p>If there is no connection to the <i>sigma</i> S6 Server, the <i>Automatic Recording</i> option is greyed out while the <i>sigma</i> S6 WaMoS® II application automatically attempts to re-establish the connection. During this period, <i>sigma</i> S6 WaMoS® II is not processing data. Once the connection is successfully re-established, the <i>Automatic Recording</i> option is made available again, and started automatically.</p>
Switch to Installation Mode	<p>Changes the application from <i>User Mode</i> to <i>Installation Mode</i>, allowing for configuration and modification of <i>sigma</i> S6 WaMoS® II settings.</p> <p>Note 1— The administrator password is required for this operation, which is only available to qualified <i>sigma</i> S6 WaMoS® II service technicians.</p> <p>Note 2— <i>Automatic Recording</i> must be manually stopped prior to entering <i>Installation Mode</i>. After exiting <i>Installation Mode</i> back into <i>User Mode</i>, <i>Automatic Recording</i> is started automatically.</p>
About WinWaMoS	Opens the <i>sigma</i> S6 WaMoS® II <i>About</i> window.
Shut Down WinWaMoS	<p>Shuts down the <i>sigma</i> S6 WaMoS® II application.</p> <p>Note 1— <i>Automatic Recording</i> must be manually stopped prior to shutting down the <i>sigma</i> S6 WaMoS® II application.</p>

3.3 Connecting *sigma* S6 WaMoS® II to a *sigma* S6 Server

The *sigma* S6 WaMoS® II application automatically connects to the local *sigma* S6 Server on startup. No operator intervention is required.

3.4 Shut Down *sigma* S6 WaMoS® II

Procedure 3-1 describes how to shut down the *sigma* S6 WaMoS® II application.

Procedure 3-1: To shut down the *sigma* S6 WaMoS® II application

1. Right-click the *sigma* S6 WaMoS® II System tray icon to open the pop-up menu.
 2. Select *Stop Automatic Recording*. This action may take the system 5-10 seconds to process, please wait for this step to complete before proceeding.
 3. Right-click the *sigma* S6 WaMoS® II System tray icon to open the pop-up menu.
 4. Select *Shutdown WinWaMoS*.
-

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4 Operator Controls for SeaView

When SeaView is running with a live or recorded image, you can access display settings, video processing options, information, and measurement tools. The following sections describe the terminology used for SeaView controls and alternative keyboard shortcuts that can be used instead of SeaView application controls.

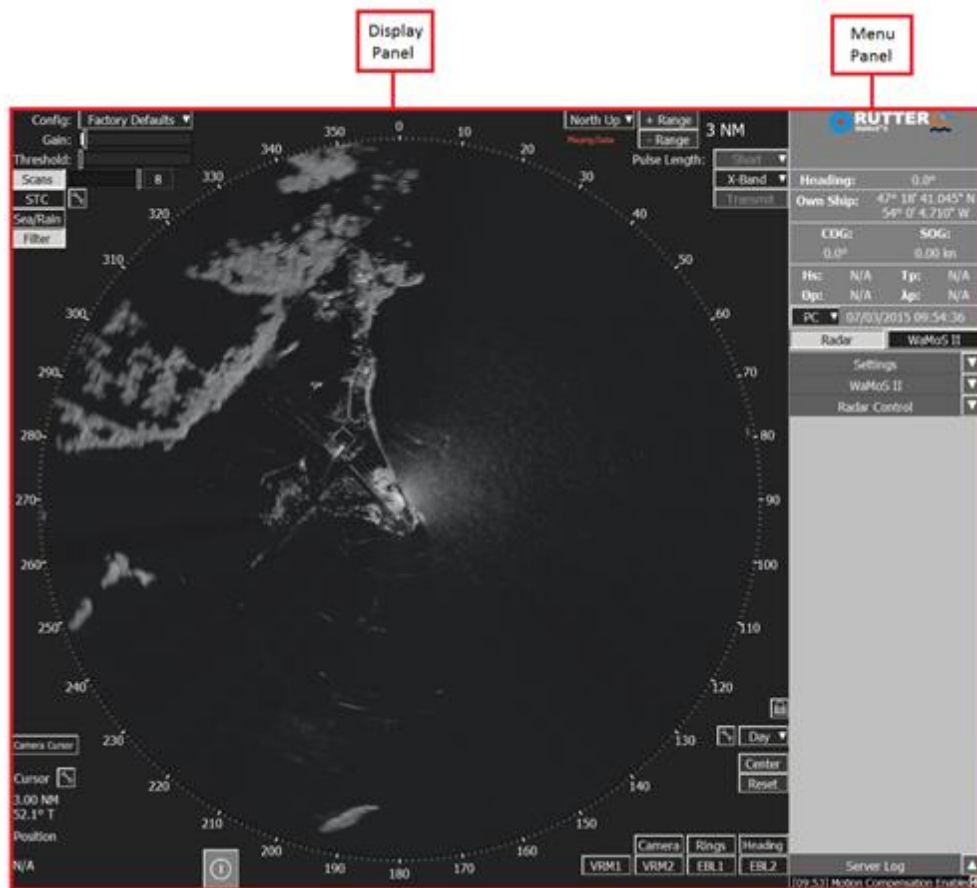
4.1 SeaView Application Window Control Terminology

The SeaView application window is divided into three distinct sections:

- *Display Panel* — the large square panel forming the left side of the application window
- *Menu Panel* — the vertical panel forming the right side of the application window
- *WaMoS® II Display Panel* — accessed by clicking the *WaMoS® II* button.



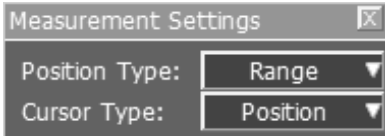






Figure 4-1 displays the SeaView application window.

Figure 4-1: SeaView application window



There are several types of controls within the *Display Panel* and *Menu Panel*. Table 4-1 describes the control types.

Table 4-1: Control types

Control	Use	Example
Toggle button	Click a toggle button to turn a feature on or off.	
Pop-up button	Click a pop-up button to open a pop-up window.	
Pop-up window	To close a pop-up window, click the X in the title bar. The window will also close two seconds after the cursor is moved outside the window.	
Select button	A select button has a triangle on the right side of the button. Clicking the arrow opens a select menu.	
Select menu	Click an option from a select menu to choose it.	
Slider bar	The slider bar is a horizontal scroll bar used to change a configuration setting value. The small indicator that moves along the bar is the slider.	
Slider display box	The slider display box is located to the right of a slider bar. It displays the current value of the slider bar.	
Scroll box	A scroll box is a text window that includes up and down arrows to the right of the box.	
Text box	A text box is a text field that can be edited by the operator.	

4.2 Keyboard Shortcuts

Table 4-2 lists the keyboard shortcuts available.

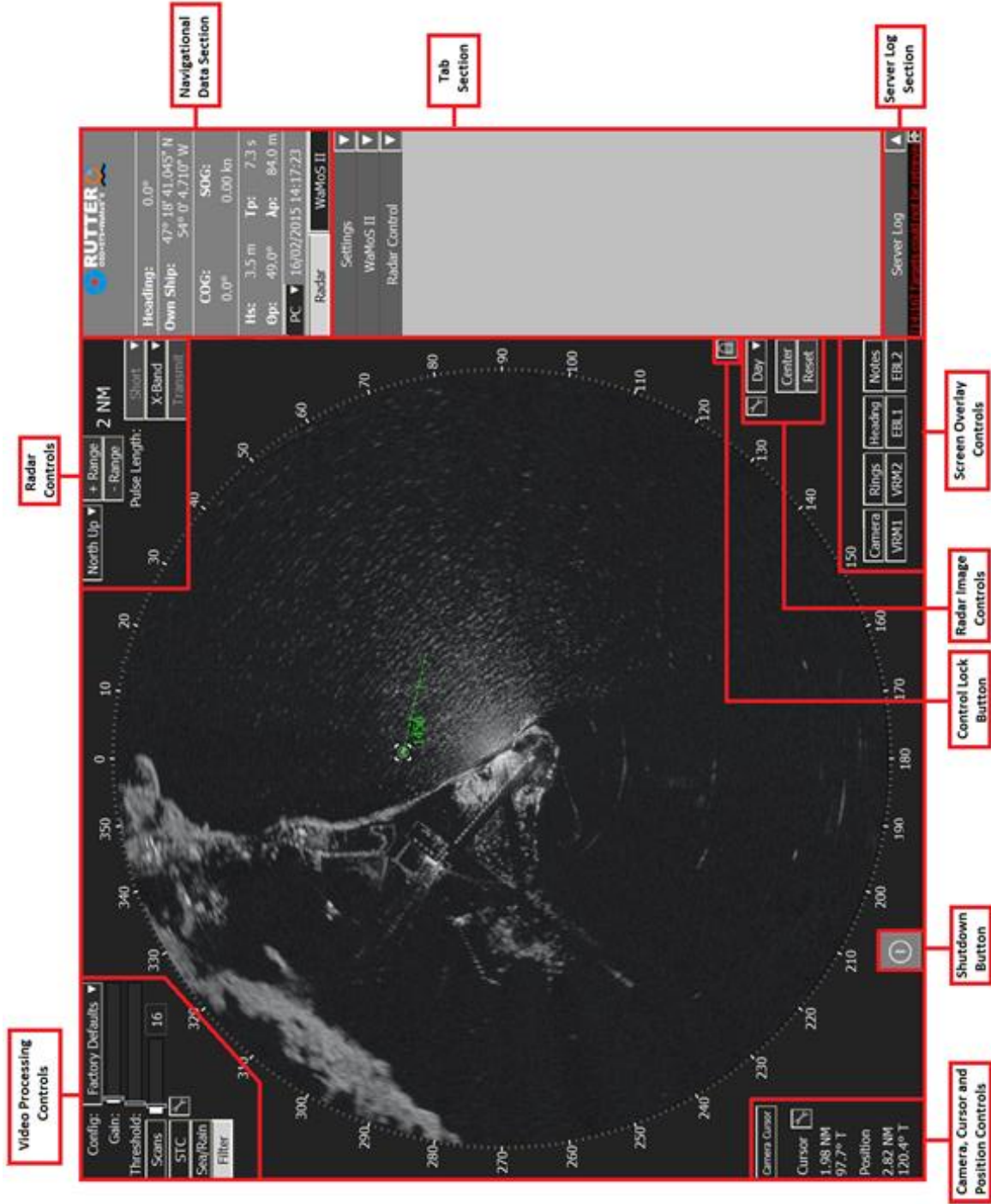
Table 4-2: Keyboard shortcuts

Shortcut	Description
↑ and ↓	Adjusts the selected values of scroll boxes.
Alt+↵	Toggles between the full screen and windowed display.
Alt+F4	Closes the SeaView application.
Ctrl+Alt+1	Saves a screen shot to the SeaView folder. The screen shot is saved as <i>ScreenShot###.png</i> , where ### is the incremental number of the screen shot taken.
↵	Activates the selected button.
F11	Toggles between the full screen and windowed display.
F2	Rename a configuration in the Configuration Settings list.
Shift+Tab	Select the previous control.
Space	Activates the selected button.
Tab	Select the next control.

4.3 Locating SeaView Controls

Figure 4-2 displays the SeaView interface and control sets.

Figure 4-2: SeaView interface and control sets



4.4 Display Panel

There are controls in each corner of the *Display Panel*. Table 4-3 gives a brief description of these control sets.

Table 4-3: Control sets

Control Set	Description
<i>Video Processing</i>	Located in the upper left corner of the <i>Display Panel</i> , these controls are used to enable and adjust <i>Radar Display</i> filters to optimize the image for visual observations.
<i>Radar</i>	Located in the upper right corner of the <i>Display Panel</i> , these controls are used to select the <i>Radar Display</i> orientation, set the radar range and select the radar source.
<i>Camera, Cursor and Position</i>	Located in the lower left corner of the <i>Display Panel</i> , these controls are used to specify the behavior and display of the cursor on the <i>Radar Display</i> . The cursor can be used to place either a position marker or a distance measurement on the <i>Radar Display</i> . The position can be displayed as either range and heading coordinates relative to the radar position, or in absolute geographic coordinates. Using the <i>Cursor</i> button allows the user to direct a camera, if the optional Camera Integration Module is purchased and enabled.
<i>Radar Image</i>	Located in the lower right corner of the <i>Display Panel</i> , these controls are used to change the <i>Radar Display</i> center and to change the day/dusk/night mode.
<i>Screen Overlays</i>	Located in the lower right corner of the <i>Display Panel</i> , these controls are used to enable or disable screen overlays on the <i>Radar Display</i> . The <i>Camera</i> button will open a separate pop-up window when the optional Camera Integration module is enabled and SeaView is operating on a 1280 x 1024 display. Other buttons enable variable range markers, electronic bearing lines and the ship's heading line, etc.



Note— When playing recorded data, “Playing Data” is displayed under the *Image Orientation* select button in the *Radar* control set. When recording data, “Recording Data” is displayed.

The *Display Panel* also includes the *Shut Down* and *Control Lock* buttons. The *Shut Down* button is the rectangle at the bottom left. The *Control Lock* button, in the lower right, locks and unlocks the SeaView controls.

4.5 Menu Panel Controls

The *Menu Panel* is divided into three sections:

- *Navigational Data* section— displays the SeaView product type information, and displays the ship's heading, course, speed, position and current time. This information is taken from the ship's GPS and gyro. If a connection to a wind anemometer and/or a depth sensor is available, the output wind speed and direction, and/or the output water depth may also be displayed in this section, if enabled under the *SeaView Settings Preferences* tab. This section also includes buttons to switch between the *Radar* and *WaMoS® II* display modes.
- *Tab* section— located in the middle of the *Menu Panel* and holds the *WaMoS® II* and *Settings* tabs. Each tab opens a menu of other controls that allow the operator to control the related settings.
- *Server Log* window— located at the bottom of the *Menu Panel*, lists messages about the operation of the *sigma S6 WaMoS® II System* in a scrollable log. This window can be opened or closed using the arrow at the right side of the *Server Log* bar.

4.6 Understanding the Effects of SeaView Controls

Using the SeaView controls to adjust settings can result in different effects on the system, depending on where in the system the settings are applied. Effects include changes to the displayed radar image, and changes to the target detection processing of the system. Changes are applied either:

- locally to SeaView
- to the *sigma S6 Server* application
- to the *sigma S6 WaMoS® II* application

Settings changes that are applied locally to SeaView do not impact other SeaView clients in a multi-client system. Settings changes applied to the *sigma S6 Server* application will impact all SeaView clients connected to the system.

Table 4-4 provides a subset of SeaView controls and how adjustments to them may impact other SeaView clients in the system.

Table 4-4: SeaView control impacts

SeaView Control	Applied To	Impact		
		Single Client	Multi-Client (Global)	WaMoS® II
Config & Configurations Gain Threshold Cursor & Position Control Set Radar Range Centering Display Mode Screen Overlays Screen Capture Preferences Connections	SeaView	Yes	No	No
Camera Settings/Controls Notes	SeaView	Yes	Yes	No
Scans STC Sea/Rain Filter Pulse Length & Transmit Playback / Record Radar Controls	S6 Server	Yes	Yes	Yes – Filter, Pulse Length, Transmit, Playback / Record, and Radar Controls all impact WaMoS® II processing. Scans, STC and Sea/Rain do not impact WaMoS® II processing.

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5 Quick Start

Procedure 5-1 describes how to start the *sigma* S6 WaMoS® II System.



Note—This procedure describes how to start the system when the PC(s) are running without the software started. To start the entire system, OceanWaveS advises rebooting the PCs.

Procedure 5-1: To start the *sigma* S6 WaMoS® II System

1. Start the *sigma* S6 Server application by double-clicking on the *sigma* S6 Server desktop icon.
 2. Start the *sigma* S6 WaMoS® II application by double-clicking on the *sigma* S6 WaMoS® II desktop icon.
 3. Start the SeaView application by double-clicking on the SeaView desktop icon.
 4. In the SeaView application, click the *Connections* button under the *Settings* tab.
 5. Connect SeaView to a *sigma* S6 Server application:
 - a. If the *sigma* S6 Server application is running on the same PC running the SeaView application:
 - i. Select *Local* in the server list.
 - ii. Click the *Connect* button.
 - b. If the *sigma* S6 Server application is running on a different PC than the SeaView application, and that PC is listed in the server list:
 - i. Select the PC in the server list.
 - ii. Click the *Connect* button.
 - c. If the *sigma* S6 Server PC is not listed in the server list:
 - i. Click the *Manual* button. The *Manual Connection* window appears.
 - ii. In the *Manual Connection* window, enter the *PC Name*, *IP Address*, and *Port*.
 - iii. Click the *Connect* button.
-

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6 Display Panel Controls

There are operational *Radar Display* controls in each of the four corners of the *Display Panel*:

- **Video Processing**—located in the upper-left corner
- **Radar**— located in the upper-right corner
- **Radar Image**— located in the lower-right corner
- **Camera, Cursor and Position**—located in the lower-left corner
- **Screen Overlays**—located in the lower-right corner

The *Display Panel* also includes:

- **Shut Down button** – the red square in the bottom-left
- **Control Lock button** – located above the *Radar Image* control set, allowing you to lock all application controls in their current state.

6.1 Shut Down Button

The *Shut Down* button opens a pop-up window confirming that the SeaView application should be shut down. Figure 6-1 displays the *Shut Down* button.

Figure 6-1: Shut Down button



6.2 Control Lock Button

The *Control Lock* toggle button allows you to lock and unlock the SeaView controls. When toggled on, the *Display Panel* dims slightly, and all SeaView controls are locked. Click the button again to unlock the controls. The *Display Panel* brightens slightly.

Figure 6-2 displays the *Control Lock* button.

Figure 6-2: Control Lock button



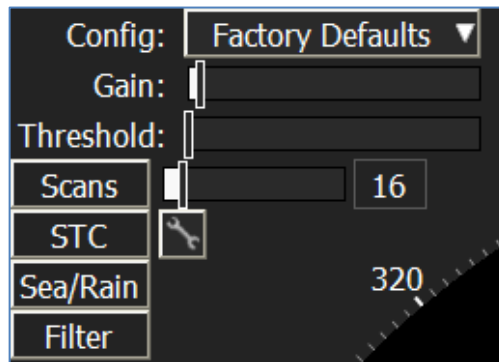
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7 Video Processing Control Set

The controls in the *Video Processing* control set in the upper-left corner of the *Display Panel* affect the *Radar Display*.

Figure 7-1 displays the *Video Processing* control set.

Figure 7-1: Video Processing control set



7.1 Config

The *Config* select button allows you to choose from the list of configurable display settings previously saved in the *Configurations* window.

When SeaView is first started and connected to the *sigma S6 Server* application, the initial image shown on the *Radar Display* starts with the *Factory Defaults* configuration:

- Short Pulse mode
- 8 Scans averaged
- STC off
- 3 Nm range

You can manipulate SeaView settings to create configurations applicable to your preferred mode of operations to be saved and recalled as required. See Section 15.4 for more information.

7.2 Gain

The *Gain* slider bar allows you to adjust the overall intensity of the *Radar Display*. Gain is controlled by clicking and dragging the slider on the bar. For fine tuning, click on the control and use the ← and → keys.

See Procedure 7-1 for instructions on how to properly adjust the *Gain* setting in conjunction with setting the appropriate *Threshold* levels to provide the greatest greyscale contrast.

7.3 Threshold

The *Threshold* slider bar enables the operator to remove less intense objects, including background noise, from the image shown in the *Radar Display*. *Threshold* is controlled by clicking on the control and dragging the slider on the bar. For fine tuning, click on the control and use the ← and → keys. All radar video signals with intensity below the selected value will be given an intensity of 0, appearing black in the *Radar Display*. Signals above the value are rescaled and mapped over the display's full range of intensity levels.

Procedure 7-1 describes how to adjust the *Gain* and *Threshold* settings for optimal radar image results.

Procedure 7-1: To adjust and fine tune *Gain* and *Threshold* for optimal radar image

1. Adjust the *Threshold* slider such that the low-level background noise is just visible. Keeping the background noise just visible provides a good visual reference for actual targets.
 2. Increase the *Gain* slider until the strongest targets are clearly visible.
-

7.4 Scans

The *Scans* toggle button enables Scan Averaging for the radar image in the *Radar Display*. The *Scans* slider bar, located to the immediate right of the *Scans* toggle button, controls the number of scans (radar antenna revolutions) to average into the radar image when the *Scans* toggle button is enabled.

The Scan Averaging process intensifies the visibility of targets by averaging the video signal intensity of two or more consecutive scans, reducing the visual impact of noise interference and sea clutter.

The *Scans* slider bar is controlled by clicking and dragging the slider bar. For fine tuning, click on the control and adjust the slider using the ← and → keys. You can select a Scan Averaging value of up to 8 scans.



Note— There is a time delay between when the *Scans* slider bar value is set and when the number of scans averaged actually reaches the set value. The moving color on the *Scans* slider bar indicates the number of scans currently being averaged.

See Appendix A.1 for more information about Scan Averaging.

7.5 STC

STC is a function that compensates for the decrease of signal strength with the signal travel time or range by linearly attenuating video gain within a specified range setting. The *STC* toggle button enables STC processing.

The *STC* controls can be used to match near-range clutter return to the clutter return beyond the affected range, providing constant image intensity across all displayed ranges, allowing for improved visual target detection in the near-range. Enable STC in moderate to rough seas to reduce near-range sea clutter. This prevents saturation, indicated by excessive brightness, of the near-range portion of the image allowing you to increase the overall image gain for more sensitivity at further ranges.



Note—Apply STC carefully to avoid suppressing important near-range target echoes.

The maximum gain reduction, set by the *Clutter Suppression* parameter, occurs at the radar image center. The amount of applied video gain reduction decreases linearly with increasing range from the image center. At the maximum range set by the *Range* parameter, the amount of gain reduction applied is zero.

See Appendix A.3 for more information about STC.

7.5.1 STC Settings

The pop-up button to the right of the *STC* toggle button opens the *STC Settings* pop-up window. It contains slider bars to control *Clutter Suppression* and *Range*.

Figure 7-2 displays the *STC Settings* pop-up window.

Figure 7-2: STC Settings pop-up window

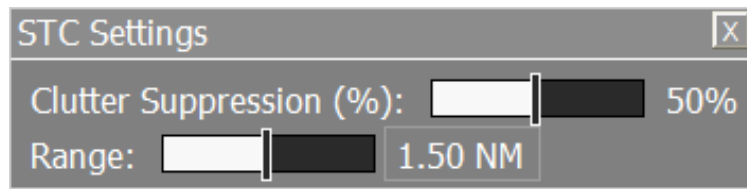


Table 7-1 describes the *STC Settings* pop-up window.

Table 7-1: STC Settings pop-up window

Setting	Description
Clutter Suppression (%)	<p>Specifies the maximum level of linear gain reduction applied when STC is enabled. Increasing the value increases the amount of clutter suppression in the near range. The value range is 0 to 100%.</p> <p>When set to 0%, no STC is applied. This is equivalent to disabling STC. When set to 100%, the maximum gain reduction is applied and the intensity at the “zero-range” is reduced to zero.</p>
Range	<p>Specifies the maximum range distance at which the STC filter affects the video signal. The value range is 0 ft. to 3 Nm.</p> <p>When the <i>Range</i> slider is selected, the screen overlay appears as a blue range ring on the <i>Radar Display</i> with a range value appearing beside it. To adjust the value, either:</p> <ul style="list-style-type: none"> • Move the <i>Range</i> slider • Click and drag the range ring <p>This control should be used to adjust the STC range to align with the range in the <i>Radar Display</i> where the near-range clutter no longer appears.</p> <p>When the <i>Range</i> slider is set to 0 ft., STC is not applied. This is equivalent to disabling STC.</p>

Procedure 7-2 describes how to properly adjust the STC settings to provide a consistent clutter return across all display ranges on the *Radar Display*.

Procedure 7-2: To adjust and fine tune STC for consistent clutter return across all display ranges on the *Radar Display*

1. Ensure the *Scans* toggle button is disabled.
2. Use the *+ Range* control in the *Range Centering* control set to adjust the display range out to or beyond 3 Nm, but not greater than 6 Nm.
3. Click the pop-up button, located to the right of the *STC* toggle button, to open the *STC Settings* pop-up window.
4. In the *STC Settings* pop-up window, adjust the *Range* slider bar such that it includes the higher intensity, near-range clutter return.
5. Adjust the *Clutter Suppression %* slider bar so that the displayed near-range clutter is reduced to provide a consistent clutter level across the displayed range.
6. Close the *STC Settings* pop-up window.
7. If required, click the *Scans* toggle button to re-enable Scan Averaging.

7.6 Sea/Rain

The *Sea/Rain* toggle button enables Sea/Rain processing for the radar image shown in the *Radar Display*. Sea/Rain processing uses a Constant False Alarm Rate (CFAR) filter which equalizes the probability of target visibility, regardless of the range of the target from the radar.

Enable the *Sea/Rain* toggle button to reduce rain and (severe) sea clutter and to improve the ability to detect targets. If *Sea/Rain* is enabled, then the *Gain* must be increased to bring up targets, and the *Threshold* should also be slightly increased to further reduce clutter.

See Appendix A.2 for more information about Sea/Rain (CFAR) filtering.

7.7 Filter



Note— For optimal accuracy and performance of the optimal *sigma* S6 WaMoS® II application, Rutter strongly recommends disabling the *Filter* toggle button, thereby disabling the pulse filter feature. When the pulse filter is enabled, it is possible that it can remove frequency data that is important to the WaMoS® II processing, which can result in non-optimal WaMoS® II results.

The *Filter* toggle button enables and disables the pulse filter. The pulse filter reduces signal interference caused by system noise. It also reduces signal interference caused by the presence of other operating radars in the local vicinity. Signal Interference caused by other operating radars will appear on the *Radar Display* as visible, bright, radial streaks. Enabling the pulse filter will also eliminate false target detections on signal interference in the radar image. The *Filter* toggle button is enabled by default.

The *Filter* toggle button may be disabled when operating in areas where there are no other radars operating in the vicinity. Disabling the pulse filter will slightly improve image sharpness.

See Section A.4 for more information about pulse filtering.

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8 Radar Control Set

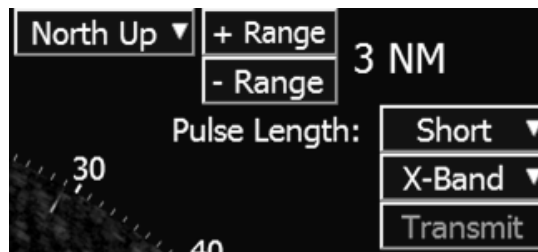
The *Radar* control set is located in the upper right corner of the *Display Panel*. This control set allows you to select the display range and, when the system is connected to multiple radars, select the radar source. When interfaced to a Rutter Radar-100S6 antenna and transceiver in a controlling configuration, this section will also display the *Transmit* toggle button to control the radar transmission.



Note—While the *sigma* S6 WaMoS® II System is in optional Playback mode it will display “Playing Data” in red letters under the *Image Orientation* select button in this section of the *Display Panel*. When recording it will display “Recording”.

Figure 8-1 displays the *Range/Centering* control set.

Figure 8-1: Range/Centering control set



8.1 Image Orientation

The *Image Orientation* select button allows you to select the orientation of the *Radar Display*. Clicking on this button allows you to choose:

- **North Up** – orients the *Radar Display* so that true north is always at the top of the display
- **Head Up** – orients the *Radar Display* so that the ship’s heading is always at the top of the display screen
- **STBL Head Up** – available only when the *sigma* S6 WaMoS® II System is connected to a GPS and gyro on a moving vessel. The radar uses the GPS and gyro information to become stabilized and compensates for heading and lateral vessel movement.



Note—The *Image Orientation* select button is not displayed in shore based/fixed platform systems.

8.2 Image Range

The *+ Range* and *- Range* toggle buttons change the range of the *Radar Display*. Click the *+ Range* toggle button to increase the range of the *Radar Display*. Click the *- Range* toggle button to decrease the range. The maximum range that can be selected is limited by the active pulse

length selection. If a longer range than allowed is required, you must first increase the pulse length setting. See Section 8.3 for more information.

The currently active range distance is displayed to the right of the toggle buttons. If the *sigma S6 WaMoS® II System* is a slave display off a pre-existing radar transceiver and display, then the *sigma S6 WaMoS® II System* range setting is set independent of the pre-existing radar display control's range setting.



Note—When the SeaView display units are configured as *Metric*, the range displayed is a nominal value. The display range of the *Radar Display* will be at minimum the range value selected, however will often display a range just beyond that selected by the *Image Range* control.

8.3 Pulse Length

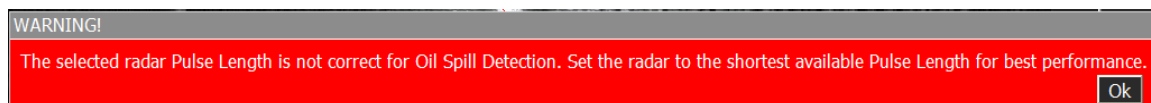
The *Pulse Length* select button has two possible functions depending on the type of system in use:

- A *sigma S6 WaMoS® II System* that controls a Rutter Radar-100S6
- A *sigma S6 WaMoS® II System* that serves as a slave display for non-Rutter radars



Note— For *sigma S6 WaMoS® II* operation, the radar must be operated in short pulse mode. If the radar is changed from short pulse mode, a red warning box is displayed (see Figure 8-2) prompting the user to change back to short pulse mode for optimal results. The user can acknowledge this warning box by clicking the *Ok* button on the warning box. Operation in any mode other than short pulse may result in inaccurate or invalid results from *WaMoS® II* processing. For information on how this warning may be permanently disabled under the *Preferences Settings* window, refer to Section 15.6.

Figure 8-2: Pulse Length Warning pop-up box



8.3.1 Pulse Length with Rutter Radar-100S6

The *Pulse Length* select button controls the radar pulse length when the Rutter Radar-100S6 control is enabled in the *sigma S6 WaMoS® II System*.

The *Radar Display* range scales available depend on the pulse length setting, and are configured during system commissioning in the Server Rutter Configuration Utility:

- **Short pulse**—available range scales of 0.25 to 4 NM
- **Medium pulse**— Useful range scales of 4 to 24 NM
- **Long pulse**—Useful range scales of 24 to 72 NM



Note 1— These ranges are the default settings and could be modified using the Server Rutter Configuration Utility.

Note 2— When the PLEN alarm is triggered, the background color of the *Pulse Length* select button turns red.

8.3.2 Pulse Length with SAM NACOS Radar

When using the *sigma* S6 System as a slave display for a SAM NACOS, the *Pulse Length* select button serves as an indicator that changes when the master radar's Pulse Repetition Frequency (PRF) changes.

Select the *Pulse Length* button to view the selections available in the *Mode and Maximum Range* drop down menu. This menu offers 12 Short pulse and 12 Long pulse mode settings, each with an associated maximum range. These settings are predetermined by the radar manufacturer.

The master radar's PRF can be changed by moving the range in and out in either the short pulse mode or the long pulse mode. Only the master radar may change the mode and select the desired maximum range on the *SeaView Radar Display*. If you are operating the master radar, select the *Pulse Length* button to view the *Mode and Maximum Range* drop down menu and choose the mode with the maximum range at which you want the radar image displayed.



Note — When the PLEN alarm is triggered, the background color of the *Pulse Length* select button turns red.

8.3.3 Pulse Length with Non-Rutter Radar

When using the *sigma* S6 WaMoS® II System as a slave display for a non-Rutter radar, the *Pulse Length* select button serves as an indicator that changes when the master radar's Pulse Repetition Frequency (PRF) changes.

The master radar's PRF changes when moving its range in and out; beginning at short pulse mode to medium pulse mode and finally long pulse mode at its longer ranges.

The *sigma* S6 WaMoS® II System will detect the PRF and automatically change and display the corresponding pulse length. If the master radar has multiple pulse length settings for a single PRF, then the setting on the *Pulse Length* select button must be confirmed and changed manually.

You must check the pulse length setting on the *SeaView Radar Display* to ensure that the *sigma* S6 WaMoS® II System has defaulted to the correct pulse length, and matches the setting in use on the master radar. If it does not match, you must manually change pulse length indicated on the *SeaView Radar Display* to match the radar pulse length in use on the master radar.



Note— When the PLEN alarm is triggered, the background color of the *Pulse Length* select button turns red.

8.4 Radar Scanner Selection

When the *sigma* S6 WaMoS® II System is connected to two radars, the *Radar Scanner* select button allows you to choose between the two (X-band and S-band) radar scanners. The radar image shown in the *radar Display* is always the image coming from the selected radar. When the system is connected to a single radar only, the other radar selection is not visible.

8.5 Transmit

When the *sigma* S6 WaMoS® II System is interfaced to a Rutter Radar-100S6 antenna and transceiver in a controlling configuration, the *Transmit* toggle button is displayed. When the *Transmit* toggle button is on, the Rutter Radar-100S6 transceiver is in transmit mode:

- The transceiver emits microwave pulses
- The antenna rotates

The *Transmit* toggle button is only available to enable when the Rutter Radar 100S6 transceiver is in a 'Standby' state, and there are no communications errors between SeaView, the *sigma* S6 Server application, and the Rutter Radar-100S6 transceiver. See Section 16.1 for more details on Rutter Radar-100S6 startup procedures.

9 Camera, Cursor and Position Control Set

The Camera, *Cursor and Position* control set is located in the lower left corner of the *Display Panel*. It provides an area to display current cursor position, and an area to display marker position and distance/bearing information. The *Camera Cursor* button allows you to use the cursor to select an onscreen position towards which a connected camera may be slewed or panned.

When the *Cursor Type* is set to *Position*, this control set displays:

- The current cursor position
- The position of an operator placed marker

When the *Cursor Type* is set to *Distance*, this control set displays:

- The current cursor position.
- The distance and bearing from one operator selected point in the radar image to a second operator selected point in the radar image.

Depending on the selected cursor *Position Type*, positions are displayed as a co-ordinate set or a range/bearing measurement from the *Radar Display* center. Distance measurements between two operator selected points are always displayed as a range/bearing measurement relative the first operator selected.

Figure 9-1 displays the *Cursor and Position* control set.

Figure 9-1: Cursor and Position control set



9.1 Measurement Settings

The *Cursor* pop-up button opens the *Measurement Settings* pop-up window. Figure 9-2 displays the *Measurement Settings* pop-up window.

Figure 9-2: Measurement Settings pop-up window

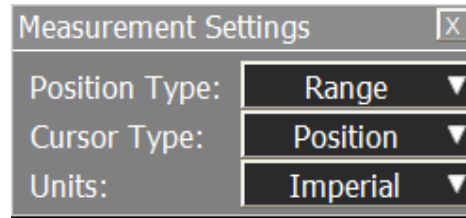


Table 9-1 describes the *Measurement Settings* pop-up window.

Table 9-1: Measurement Settings pop-up window

Parameter	Description
Position Type	<p>The <i>Position Type</i> select button specifies how the cursor position is displayed. The options are:</p> <ul style="list-style-type: none"> • Range – When selected, the range and heading of the cursor position is displayed, relative to the display center. • Coordinates – When selected, the latitude and longitude of the cursor position is displayed.
Cursor Type	<p>The <i>Cursor Type</i> select button specifies the type of measurement the cursor produces. The options are:</p> <ul style="list-style-type: none"> • Position – when selected, clicking on the radar image places a marker at that position. The position of that marker is displayed according to the selected <i>Position Type</i>. • Distance – When selected, clicking a start point and then an end point on the radar image creates a distance measurement between the two selected points, specified in range and bearing. The range and bearing measurement is displayed.
Units	<p>The <i>Units</i> select button specifies the type of measurement units displayed for the cursor operations. The options are <i>Imperial</i> and <i>Metric</i>.</p>

9.2 Cursor Position Display

The *Cursor Position* display shows the current position of the cursor. The cursor position is displayed as either the distance and heading relative to the display center or as the cursor's latitude and longitude, depending on the *Position Type* specified. See Table 9-1 for more information about setting the cursor *Position Type*.

9.3 Position/Distance Display

The *Position/Distance* display shows either:

- the position of a marker placed by the operator
- the range and bearing produced by the distance measurement tool

If no marker or distance measurement has been placed by the operator, the marker position is displayed as "N/A". The reference for the marker position depends on the configuration set in the *Measurement Settings* pop-up window. See Table 9-1 for more information about setting the cursor *Position Type*.

9.4 Marker Creation

Procedure 9-1 describes how to create a marker on the radar image.

Procedure 9-1: To create a marker

1. Click the Cursor pop-up button.
 2. Set the Cursor Type field to Position.
 3. Click the radar image where you want to create a marker. The marker appears as a small cross-hair surrounded by a white circle.
 4. Click a new position to move the marker.
 5. To disable the marker, right-click in the radar image.
-

9.5 Distance Measurement

Procedure 9-2 describes how to perform a distance measurement.

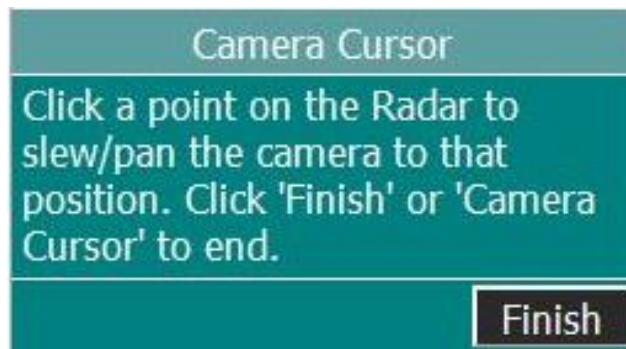
Procedure 9-2: To perform a distance measurement

1. Click the Cursor pop-up button.
 2. Set the Cursor Type field to Distance.
 3. Click the beginning position of your distance measurement on the radar image.
 4. Click the end position of your distance measurement on the radar image.
 5. A white line appears on the screen between the two points, along with the distance.
 6. Right-click in the radar image to remove the measurement.
-

9.6 Camera Cursor

Selecting the *Camera Cursor* button will bring up a *Camera Cursor Help* window in the *Menu Panel* area, shown in Figure 9-3, indicating to place the cursor within the radar image to send a command to the camera to slew or pan to the position/target chosen. This button is available only when the optional Camera Integration module is enabled in the system.

Figure 9-3: Camera Cursor window



Procedure 9-3 describes how to use the Camera Cursor button to pan/slew a camera to a specific position.

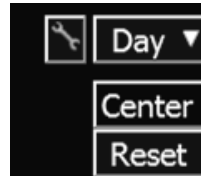
Procedure 9-3: How to use the Camera Cursor button to pan/slew a camera to a specific position.

-
1. Click the *Camera Cursor* button. The *Camera Cursor Help* window appears in the *Menu Panel* area.
 2. Click the target or position on the radar image where you want to pan/slew the camera. A marker is displayed, which appears as a small cross-hair surrounded by a white circle. The camera should now be panning/slewing to the selected target position.
 3. Click the *Finish* button on the *Camera Cursor Help* window, or the *Camera Cursor* button to exit the *Camera Cursor* function.
 4. To remove the marker, right-click in the radar image.
-

10 Radar Image Control Set

The *Radar Image* control set is located in the lower right corner of the *Display Panel*, above the *Screen Overlays* control set. This control set allows you to adjust the brightness of the screen for time of day operation, and to move the display center of the radar image shown on the *Radar Display*. Figure 10-1 displays the *Radar Image* control set.

Figure 10-1: Radar Image control set



10.1 Display Mode

The *Display Mode* select button allows you to adjust the display brightness. There are three settings for the display mode and a manual brightness control. The current display mode setting is shown on the *Display Mode* select button.

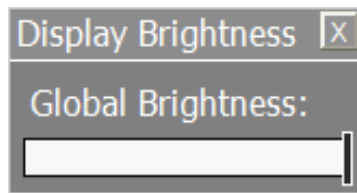
The display mode settings are:

- **Day** – normal display
- **Dusk** – dim display
- **Night** – dimmest display

To select one of these, click on the *Display Mode* select button and select the appropriate setting from the drop-down menu.

To manually set the display brightness, click on the pop-up button immediately to the left of the *Display Mode* select button to open the *Display Brightness* pop-up window. Use the *Global Brightness* slider bar to adjust the display brightness. Figure 10-2 shows the *Display Brightness* pop-up window.

Figure 10-2: Display Brightness pop-up window



10.2 Center

The *Center* toggle button allows you to reposition the center of the radar image within the *Radar Display*. By default, the *Radar Display* locates the radar scanner at the center of the screen. You can reposition the radar by clicking on the *Center* toggle button and then clicking a point on the *Radar Display*.

The centering method depends on the *Center Method* setting.

To select the *Center Method*:

Tab Section → *Settings* → *Preferences Menu button* → *Center Method* (either *point-to-center* or *center-to-point*)

10.3 Reset

The *Reset* toggle button resets the radar image to the default center position at the center of the *Radar Display*.

11 Screen Overlays Control Set

The *Screen Overlays* control set is located in the lower right corner of the *Display Panel*. This control set allows you to enable or disable various standard and optional screen overlays on the radar image.

Figure 11-1 displays the *Screen Overlays* control set.

Figure 11-1: Screen Overlays control set

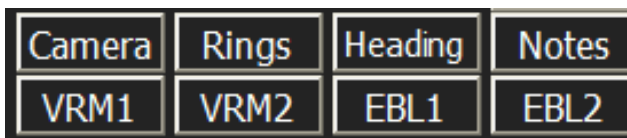


Table 11-1 describes the *Screen Overlays* control set.

Table 11-1: Screen Overlays control set

Field	Description
Camera	(Optional) Displayed only when SeaView is operating on a 1280 x 1024 or 1600 x 1200 pixel resolution display (4:3 aspect ratio), this button enables or disables the display of the <i>Camera</i> pop-up window, where the camera may be controlled, and where the active video stream from the active camera id displayed. If not running on a 4:3 aspect ratio display, instead of the <i>Camera</i> button, the <i>Camera</i> tab is displayed in the <i>Tabs</i> section.
Rings	Enables or disables the display of range rings.
Heading	Enables or disables the ship's heading line overlay.
Notes	Enables or disables the display of cursor annotations.
VRM 1 and VRM2	Enables or disables the display of variable range markers.
EBL1 and EBL2	Enables or disables the display of electronic bearing lines.

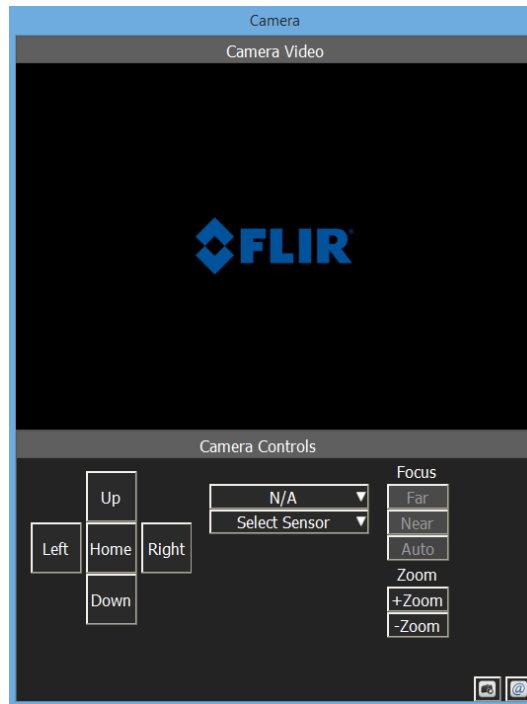
11.1 Camera

When SeaView is installed to a computer with a 1280 x 1024 or 1600 x 1200 pixel resolution display (4:3 aspect ratio), the camera video and controls are provided in a pop-up *Camera* pop-up window. This pop-up window may be moved to a second display, if available, such that camera controls and video can be always displayed while not inhibiting the view of the main SeaView display.

Otherwise, when SeaView is installed to a computer with a 1920 x 1200, 1920 x 1080 or 1680 x 1050 pixel resolution display (widescreen display), the camera video and controls are embedded directly within the main SeaView display, under the *Camera* tab in the *Tabs* section.

As the controls are the exactly same for both display modes, refer to Section 18 where the camera video and controls are documented from the widescreen perspective, but the descriptions apply equally to the 4:3 display perspective. For reference, Figure 11-2 shows the *Camera* pop-up window, as displayed when operating SeaView on a 4:3 aspect ratio display.

Figure 11-2: Camera pop-up window, as seen on 4:3 aspect ratio displays



11.2 Rings

The *Rings* toggle button allows you to enable or disable the Range Rings overlay in the radar image. The distance increment of the rings is dependent on the range. When enabled the value of the range rings distance increment is displayed on the button.

11.3 Heading Line

The *Heading* toggle button enables the ship's heading line overlay on the radar image. The heading line overlay is a red line showing the ship's current heading.

11.4 VRM

The *VRM1* and *VRM2* toggle buttons enable two independent variable range-marker overlays on the radar image, each distinguished by a different color. To display a VRM, click on one of the

two VRM buttons. The enabled *VRM1* toggle button and circular overlay are colored green. The enabled *VRM2* toggle button and circular overlay are colored yellow.

To adjust the VRM radius, click the perimeter of the VRM, drag to the desired range, and release. The VRM range is displayed below the VRM button. The range value is also displayed next to the cursor while the VRM is being adjusted. When the cursor passes over a VRM overlay, the circle is highlighted and a window appears indicating either VRM1 or VRM2.

When a VRM is enabled it appears on the radar image with the last selected range value.

11.5 EBL

The *EBL1* and *EBL2* toggle buttons enable two independent electronic bearing line overlays on the radar image, each distinguished by a separate color. To display an EBL, click on one of the two EBL buttons and the bearing line will appear on the radar image.

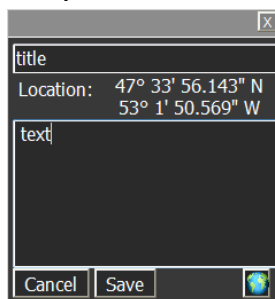
The enabled *EBL1* toggle button and bearing line are colored purple. The enabled *EBL2* toggle button and bearing line are colored blue.

To adjust the EBL, click on the line, drag it to the new position, and release. The EBL value is displayed under the *EBL* button and next to the cursor while the bearing line is being adjusted. When the cursor passes over an EBL overlay, the line is highlighted and a window appears indicating either *EBL1* or *EBL2*. When an EBL is enabled, it appears on the radar image with the last selected bearing.

11.6 Notes

The *Notes* toggle button enables the display of cursor annotation objects. These are user provided text objects that are associated with a geographic position. To show the cursor annotations, ensure the toggle button is enabled. To create a cursor annotation, right-click at the desired geographic location in the radar video display area and select the 'Create' menu item from the context menu that appears. The user will then be presented with a Note creation dialog similar to that shown in Figure 11-3. The user provided data consists of a title, the actual text and a flag denoting whether the note is local or global. Local notes remain on the local system. Global notes will be shared with all clients connected in a multi-client server setup. Only 'master' SeaView clients are able to create global cursor annotations.

Figure 11-3: Sample cursor annotation entry dialog box.



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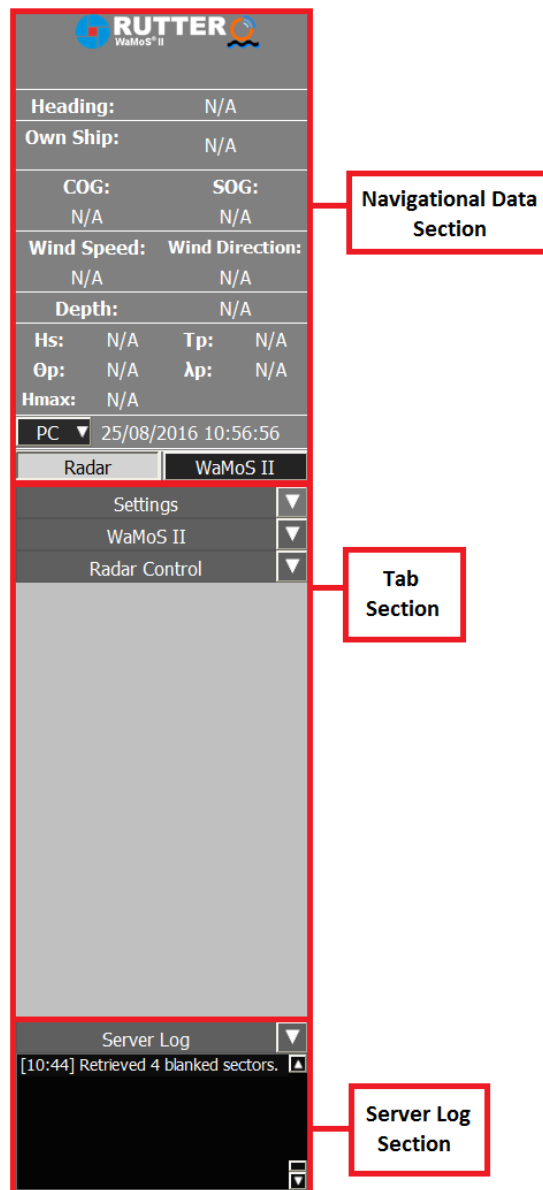
12 Menu Panel

The *Menu Panel* is divided into three distinct sections:

- Navigational Data
- Tabs
- Server Log

Figure 12-1 displays the *Menu Panel*.

Figure 12-1: Menu Panel



Additional tabs may be displayed in the *Tabs* Section, depending on the optional modules installed with SeaView. The following sections describe the *Menu Panel*.

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13 Navigational Data Section

The ship's heading, course, speed, depth, wind information, position and current time are displayed in the *Navigational Data* section at the top of the *Menu Panel*. This information is taken from the following ship's sensors:

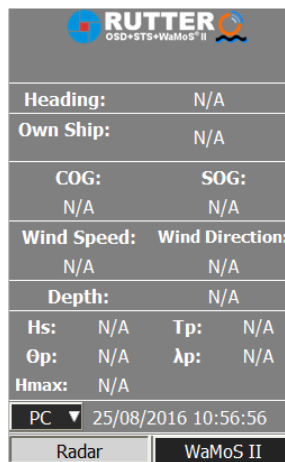
- GPS
- Gyro
- Wind Anemometer
- Depth sounder

Along with navigation data, the *Navigational Data* section displays *sigma S6 WaMoS® II* sea-state information:

- Significant wave height
- Peak wave direction
- Peak wave period
- Peak wave length

Figure 13-1 displays the *Navigational Data* Section.

Figure 13-1: Navigational Data Section



RUTTER OSD+STS+WaMoS® II			
Heading:	N/A		
Own Ship:	N/A		
COG:	N/A	SOG:	N/A
Wind Speed:	N/A	Wind Direction:	N/A
Depth:	N/A		
Hs:	N/A	Tp:	N/A
θp:	N/A	λp:	N/A
Hmax:	N/A		
PC	25/08/2016 10:56:56		
Radar	WaMoS II		

13.1 Heading

The ship's heading is displayed to the right of the *Heading* label.

The heading is read directly from the ship's gyro, and is updated approximately once per second.

To enable or disable the display of the heading information, select *Settings Tab* → *Preferences*. See Section 15.6.1 for more information.

13.2 Own Ship

The vessel position is displayed beneath the *Own Ship* label. The vessel position is read directly from the ship's GPS. If there is no GPS signal input into the system, a static position set during the system installation is displayed.

To set coordinates format, select *Settings Tab* → *Preferences*. See Section 15.6.1 for more information.

13.3 COG

The ship's Course Over Ground (COG) is displayed beneath the *COG* label.

COG is derived from the ship's GPS information, and updated approximately once per second.

To enable or disable the display of the COG information, select *Settings Tab* → *Preferences*. See Section 15.6.1 for more information.

13.4 SOG

The ship's Speed Over Ground (SOG) is displayed beneath the *SOG* label.

SOG is derived from the ship's GPS information.

To enable or disable the display of the SOG information, select *Settings Tab* → *Preferences*. See Section 15.6.1 for more information.

13.5 Wind Speed

The wind speed is displayed beneath the *Wind Speed* label.

Wind speed information is read directly from the ship's wind anemometer sensor, if available.

To enable or disable the display of the wind speed information, select *Settings Tab* → *Preferences*. See Section 15.6.1 for more information.

13.6 Wind Direction

Wind direction is displayed to the right of the *Wind Direction* label.

Wind direction information is read directly from ship's wind anemometer sensor, if available.

To enable or disable the display of the wind direction information, select *Settings Tab* → *Preferences*. See Section 15.6.1 for more information.

13.7 Depth

The water depth is displayed to the right of the *Depth* label.

Depth information is read directly from the ship's depth sounder, if available.

To enable or disable the display of the depth information, select *Settings Tab* → *Preferences*. See Section 15.6.1 for more information.

13.8 H_s

H_s displays the significant wave height, in meters. This parameter is a statistical parameter related to the energy of the sea-state. *H_s* is calculated from 20 minute sea surface elevation time series as the average of the highest one-third of all occurring wave heights. See Section 19 for more information.

13.9 Θ_p

Θ_p (*Direction*) displays the significant wave direction in degrees of the selected wave box. This parameter is calculated directly from the wave spectrum, representing the direction of the energy maximum within the computed wave spectrum. To obtain the energy maximum, *sigma* S6 WaMoS® II looks for the frequency interval of the energy maximum with 80%. See Section 19 for more information.

13.10 T_p

T_p displays the significant wave period of the selected wave box in seconds. This parameter is obtained directly from the wave spectrum, and represents the period of the energy maximum within the computed wave spectrum. See Section 19 for more information.

13.11 λ_p

λ_p displays the significant wave length of the selected wave box in meters. This parameter depends on the propagation speed in water. Speed changes with the water depth, resulting in different wavelengths in deep and shallow water for the same period. See Section 19 for more information.

13.12 H_{MAX}

Displays the peak wave H_{MAX} of the selected wave box in meters. See Section 19 for more information.

13.13 Time Source

The *Time Source* select button allows you to select the source of the system time. The options are:

- **PC** – displays the time from the PC on which SeaView is running.
- **GPS** – displays the time from the ship's GPS if available.
- **Server** – displays the time from the PC on which the *sigma* S6 Server application is running.



Warning— When playing pre-recorded data, choose the GPS or Server source time settings to display the time at which the data was recorded. The PC source time setting displays current PC time on the PC running SeaView, NOT the time at which the data was recorded.

13.14 Time

The Time display is at the bottom of the *Navigation Data* Section.

The date and time is displayed in “dd/mm/yy hh:mm:ss” format (day/month/year hour:minute:second).

The displayed time may also be shown as a Local time of referenced to UTC. This can be changed using the *Time Mode* select button found under *Settings Tab* → *Preference*. See Section 15.6.1 for more information.

13.15 System Master Status



Note— This field only appears on client PCs in a *sigma S6* SeaFusion System. See Section 21 for more information about SeaFusion systems.

The *System Master Status* section displays the name of the PC that currently has Master status in a SeaFusion system. Click the *Request Master* button to request Master status. See Section 21.3 for more information for more information about Master status.

13.16 Radar and WaMoS II Buttons

The *Radar* button, when clicked, switches the *SeaView Radar Display Area* to the standard SeaView radar display. When the *WaMoS II* button is clicked, the *Radar Display Area* displays the *WaMoS® II* display panel. See Section 19 for more information.

14 WaMoS® II

The *WaMoS® II* tab allows you to view the high-level sea-state analysis for the selected wave box, or averaged over all wave boxes. See Chapter 19 for more information about performing sea-state analysis.

Figure 14-1 displays the *WaMoS® II* tab.

Figure 14-1: WaMoS® II tab



Table 14-1 describes the *WaMoS® II* tab.

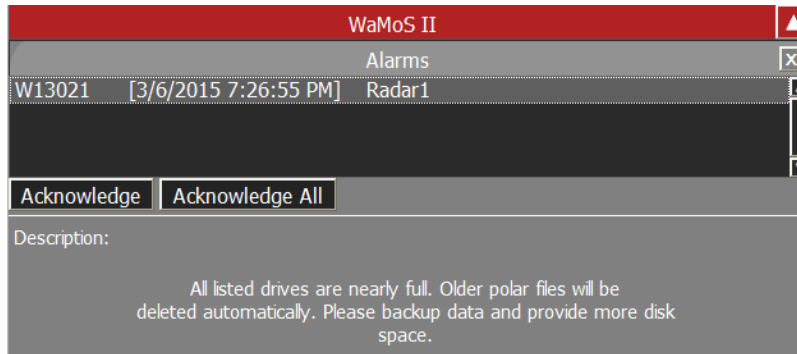
Table 14-1: WaMoS® II tab

Field	Description
Hs	Displays the significant wave height in meters.
Θ_p	Displays the peak wave direction in degrees.
T_p	Displays the peak wave period in seconds.
λ_p	Displays the peak wave length in meters.
H_{MAX}	Displays the peak wave H_{MAX} over the recording time of the selected wave box.
Current Speed	Displays the current speed in meters/second.
Current Direction	Displays the current direction in degrees.
Alarms	Opens the <i>Alarms</i> window. See Section 14.1 for more information.
Wave Boxes	Opens the <i>Wave Boxes</i> window. See Section 14.1.1 for more information about the <i>Wave Boxes</i> window.

14.1 Alarms Window

The *Alarms* window allows you to view and acknowledge alarms (individually, or all) raised by the *sigma* S6 WaMoS® II application. Figure 14-2 displays the *Alarms* window.

Figure 14-2: Alarms window



When the *sigma* S6 WaMoS® II application raises an alarm, the *WaMoS® II* tab heading turns red to indicate unacknowledged alarms. Procedure 14-1 describes how to acknowledge *sigma* S6 WaMoS® II alarms.

Procedure 14-1: To acknowledge *sigma* S6 WaMoS® II alarms

1. Open the *WaMoS® II* tab.
2. Click on the *Alarms* button. The *Alarms* window appears.
3. Click on an alarm from the list. A description of the alarm appears at the bottom of the *Alarms* window.
4. Click the *Acknowledge* button. The selected alarm is removed from the list.

14.1.1 Sea State Alarms

During commissioning of the system, it is possible to configure the *sigma* S6 WaMoS® II application to generate criterion based sea state alarms. When the defined criterion are exceeded, the generated alarm is displayed in the SeaView WaMoS® II *Alarms* window, and the *WaMoS® II* tab heading turns red to indicate unacknowledged alarms. Procedure 14-1 describes how to acknowledge WaMoS® II alarms. The following criterion may be selected to trigger sea state alarms:

- When the Significant Wave Height (H_s) is greater than x meters.
- When the Peak Wave Length (λ_p) is in the range of m meters +/- n meters AND the Significant Wave Height (H_s) is greater than y meters.
- When the Wave Encounter Angle is in the range of a degrees +/- b degrees AND the Significant Wave Height (H_s) is greater than z meters.

14.2 Wave Boxes Window

The *Wave Boxes* window allows you view information about the selected wave box and to enable it for display in the main *Radar Display* area. Figure 14-3 displays the *Wave Boxes* window.



Note— This applies when *sigma S6 WaMoS® II* is in Non-Spatial Averaging mode. When Spatial Averaging is enabled, the *Wave Boxes* window will display data averaged over all wave boxes.

Figure 14-3: Wave Boxes window

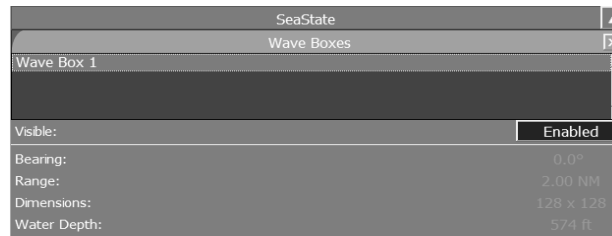


Table 14-2 describes the *Wave Boxes* window.

Table 14-2: Wave Boxes window

Field	Description
<i>Wave Box list</i>	Lists the configured wave boxes. Click on a listed wave box to display wave data related to it. Note 1 — Wave boxes are configured during commissioning.
Visible	Specifies if the selected wave box is visible in the <i>Radar Display</i> area when the <i>WaMoS® II</i> overlay is enabled. The options are: <ul style="list-style-type: none"> Enabled— the selected wave box appears in the <i>Radar Display</i> area. Disabled— the selected wave box does not appear in the <i>Radar Display</i> area. Wave boxes appear with two colored arrows: <ul style="list-style-type: none"> Blue— indicates the direction in which the current is going. Green— indicates the direction in which the wave is going.
Bearing	Displays the bearing of the selected wave box, relative to the bow of the vessel.
Range	Displays the range of the selected wave box.
Dimensions	Displays the dimensions of the selected wave box in pixels.
Water Depth	Displays the water depth of the selected wave box. Note — If the vessel's water depth sensor (echo sounder) is configured for use by the <i>sigma S6 WaMoS® II</i> application, the actual up-to-date reading from that sensor is displayed here.

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15 Settings Tab

15.1 Settings Overview

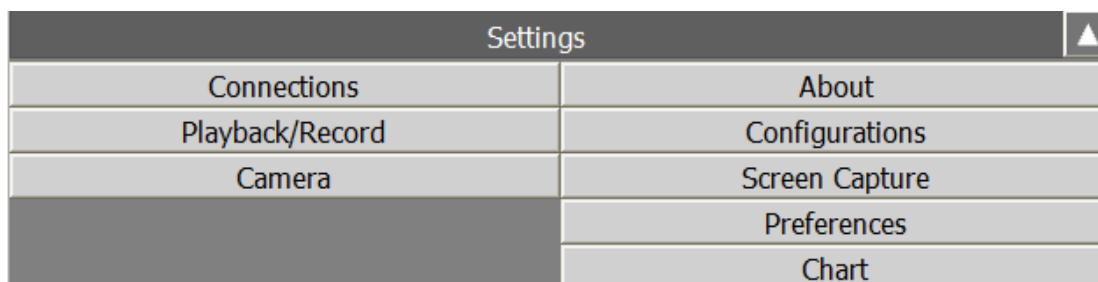
Click the *Settings* tab in the *Tab* section to open the *Settings* window. The *Settings* window allows you to personalize the *Radar Display*, and to adjust the application. Click a button to open the corresponding window.



Note— Not all tabs shown in Figure 15-1 will be displayed on your system. The actual tabs that are displayed are product type dependent.

Figure 15-1 displays the *Settings* tab.

Figure 15-1: Settings tab



The following sections describe the *Settings* window.

15.2 Connections

The *Connections* button opens the *Connections* settings window. The *Connections* settings window allows you to connect SeaView to the *sigma* S6 Server application to display live radar data. Figure 15-2 displays the *Connections* settings window.

Figure 15-2: Connections Settings window

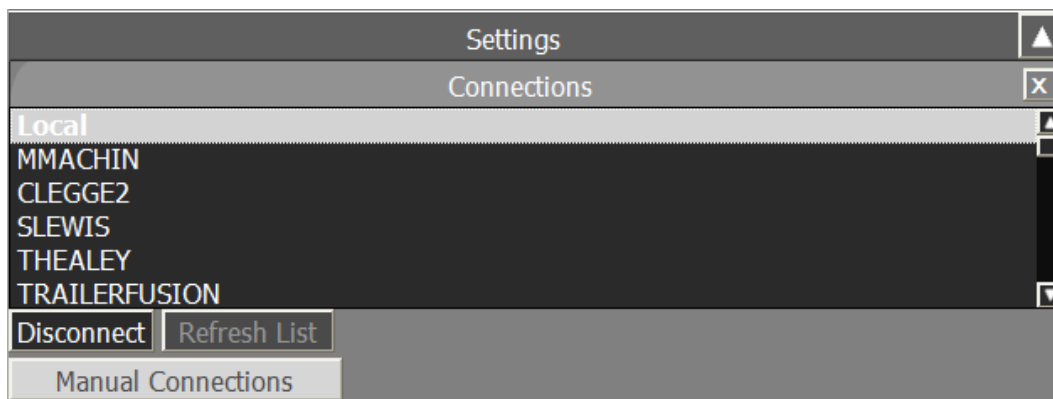


Table 15-1 describes the *Connections* settings window.

Table 15-1: Connections settings window

Field	Description
Server List	The server list section of the <i>Connections</i> window lists the PC names of computers on the local network running the <i>sigma</i> S6 Server application. In the server list, <i>Local</i> refers to the PC running the SeaView application, regardless of whether it is running the <i>sigma</i> S6 Server application or not.
Connect/Disconnect	The <i>Connect/Disconnect</i> button connects/disconnects SeaView to/from the <i>sigma</i> S6 Server application running on the PC selected in the server list.
Refresh List	The <i>Refresh List</i> button refreshes the server list.
Manual Connections	The <i>Manual Connections</i> button opens the <i>Manual Connections</i> settings window. See Section 15.2.1 for more information. The <i>Manual Connections</i> settings window is only accessible when SeaView is not connected to a <i>sigma</i> S6 Server application.

15.2.1 Manual Connections Settings Window

The *Manual Connections* settings window allows you to manually configure a connection to a PC running the *sigma* S6 Server application. Figure 15-3 displays the *Manual Connections* settings window.

Figure 15-3: Manual Connections settings window

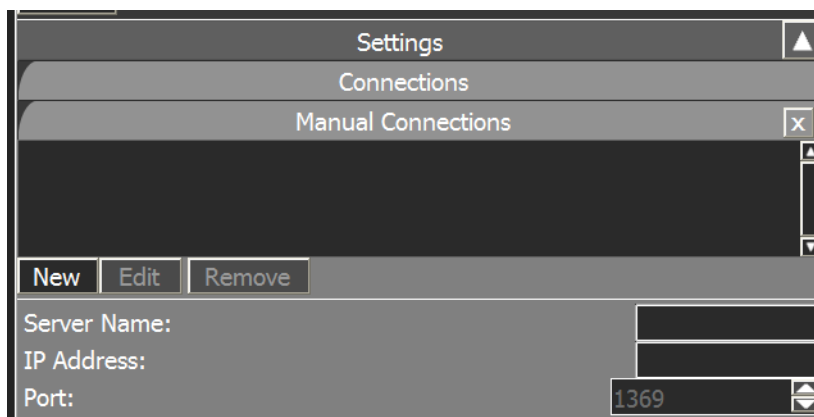


Table 15-2 describes the *Manual Connections* settings window.

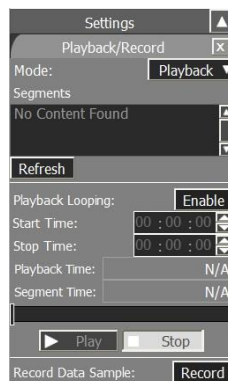
Table 15-2: Manual Connections settings window

Field	Description
Manual Connections List	Lists the previously created manual connections.
New	Creates a new manual connection.
Edit	Edits the currently selected manual connection.
Remove	Removes the currently selected manual connection.
Server Name	Specifies the name of the PC you want to connect to.
IP Address	Specifies the IP address of the PC you want to connect to.
Port	Specifies the port on the PC that you want to connect to.
Save	Saves the configuration information.
Cancel	Cancel the configuration.

15.3 Playback/Record

The *Playback/Record* button opens the *Playback/Record* window. The *Playback/Record* window allows you to record and play back recorded raw radar data and any available NMEA data. The *Mode* dropdown button is displayed only when the optional Raw Data Recording Module has been purchased and enabled on the system during commissioning. Figure 15-4 displays the *Playback/Record* window.

Figure 15-4: Playback/Record window





Note— This menu controls the optional *sigma* S6 Recording and Playback subsystem. It does not control the *sigma* S6 WaMoS® II data recording feature.

Table 15-3 describes the *Playback/Record* window.

Table 15-3: Playback/Record window

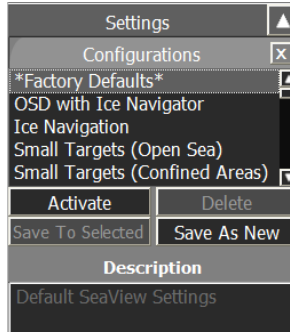
Field	Description
Mode	Specifies the mode of the SeaView application. The options are: <ul style="list-style-type: none">• Playback• Record Displayed only when the optional Raw Data Recording module is enabled.
Dataset Filename	Displays the name and location of the dataset file used for playback or recording. Select a dataset file by browsing to the file using the <i>Browse</i> window. The <i>sigma</i> S6 Server pop-up menu, revealed after right-clicking the <i>sigma</i> S6 Server icon, may also be used to select a dataset file for playback and recording. See Section 2.3 for more details.
Browse	Opens the <i>Browse</i> window used to select the dataset file for playback or recording.
Data Segments	
Segments	Lists the available data segments contained in the currently selected dataset file.
Refresh	Refreshes the list of data segments contained in the currently selected dataset file.
When in Playback Mode	
Start Time	Specifies the start time of the recording that you want to play back.
Stop Time	Specifies the stop time of the recording that you want to play back.
Playback Time	Displays the recorded time and date of the selected data segment.
Segment Time	Displays the length of time that the current segment has been playing.

Field	Description
Progress slider bar	Displays the total recorded time of the data segment. As a data file plays, the slider moves along the bar to show the playback status. The start and stop playback time may be adjusted by clicking and dragging the sliders at each end of the Time slider bar.
Play/Pause	Plays and pauses the selected data segment. <ul style="list-style-type: none"> Click the <i>Play</i> button to begin playback. The button text changes to read "Pause." Click the <i>Pause</i> button to pause the playback. The button text changes to read "Play." Click the <i>Play</i> button to resume playback.
Stop	Stops the playback.
When in Record Mode	
Recording Length	Displays the length of time SeaView has been recording data in the current recording session.
Rec.	Starts the data recording.
Stop	Stops the data recording.
Record Data Sample	
This section is displayed when the optional Raw Data Recording Module is not enabled on the system. It provides a utility to capture a short raw data recording for technician and debugging analysis.	
Record Data Sample	When clicked, the system begins to record a 512MB raw data sample to: C:\ProgramData\Rutter\SeaScan\RecDataSample\RecDataSample.sig When the recorded file size reaches 512MB (after approximately 1-2 minutes is typical), the recording is automatically stopped. Clicking the <i>Record Data Sample</i> button again will record a new 512MB file, overwriting any previously recorded sample data file.

15.4 Configurations

The *Configurations* button opens the *Configurations* settings window. Figure 15-5 displays the *Configurations* settings window.

Figure 15-5: Configurations settings window



The *Configurations* settings window allows you to save all configurable display settings as a set for specific operational conditions. The saved settings are:

- Gain
- Threshold
- Scans Averaging Enabled/Disabled
- Scans to Average
- STC On/Off
- STC Range
- STC Attenuation
- Sea/Rain Toggle
- North Up / Head Up

Table 15-4 describes the *Configurations* settings window.

Table 15-4: Configurations window

Field	Description
Configurations List	Lists the names of saved configuration settings. Click on a configuration name to select it. To rename a configuration setting: <ul style="list-style-type: none"> • Double-click the setting you want to change. • Type the new name • Press ↵ to save.
Activate	Activates the selected configuration setting.
Delete	Deletes the selected configuration setting.
Save To Selected	Saves the current application settings to the selected configuration name in the <i>Configurations list</i> . Note — <i>Save To Selected</i> overwrites the old application settings that were saved to the selected configuration name.

Field	Description
Save As New	Saves the current application settings to a new configuration name. The new configuration is named Setting 1, Setting 2, etc. You can rename the new configuration setting.
Description	Displays a short description of the selected configuration setting. Click in the <i>Description</i> to edit it.

15.5 Screen Capture

Click the *Screen Capture* tab in the tab section to open the *Screen Capture* settings window.

Figure 15-6 displays the *Screen Capture* settings window.

Figure 15-6: Screen Capture settings window

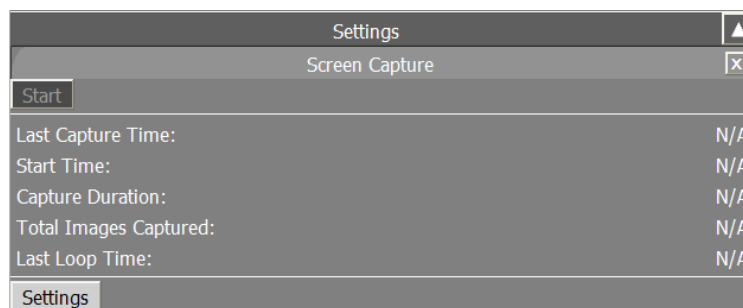


Table 15-5 describes the *Screen Capture* settings window.

Table 15-5: Screen Capture settings window

Field	Description
Start	Enables and disables the automatic screen capture function. Note —Cannot be selected when the radar is not transmitting.
Last Capture Time	Displays the time and date of the last time the automatic screen capture occurred.
Start Time	Displays the start time of the current automatic screen capture session.

Field	Description
Capture Duration	Displays the duration of the current screen capture session.
Total Images Captured	Displays the number of images saved in the current automatic screen capture session.
Last Loop Time	Displays the last loop time.
Settings	Opens the <i>Settings</i> window. See Section 15.5.1 for more information.

15.5.1 Settings

The *Settings* window allows you to configure the screen capture settings.

Figure 15-7 displays the *Settings* window.

Figure 15-7: Settings window

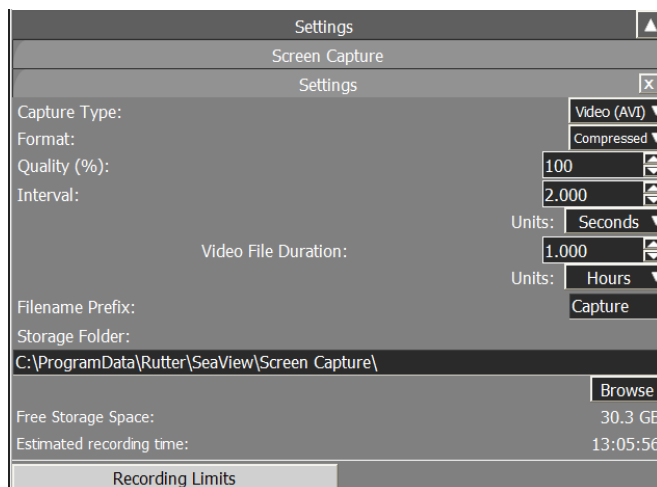


Table 15-6 describes the *Settings* window.

Table 15-6: Settings window

Field	Description
Capture Type	Specifies the type of screen capture you want to take. The options are: <ul style="list-style-type: none">• Images• Video (AVI)
Format	Specifies the image or video format. For images, the options are: <ul style="list-style-type: none">• JPEG• PNG For video, the options are: <ul style="list-style-type: none">• Compressed• Uncompressed
Quality (%)	Specifies the quality level of the image or video. This field is only applicable to JPEG images or Compressed Video.
Interval	Specifies the interval between screen captures.
Units	Specifies the units of time for the interval between screen captures. The options are: <ul style="list-style-type: none">• Seconds• Minutes• Hours
Video File Duration	Specifies the duration of the captured video file.
Units	Specifies the units of time for Video File Duration. The options are: <ul style="list-style-type: none">• Seconds• Minutes• Hours
Filename Prefix	Specifies the text prefix to apply to recorded files.

Field	Description
Storage Folder	Specifies the location to save the image files. Click the <i>Browse</i> button to navigate to the folder. Note — When using the E-mail function, all JPEG and PNG files in the storage folder are added to a zip file and sent. To minimize the size of the zip file, OceanWaveS recommends periodically archiving or removing these files from the directory.
Browse	Opens directory browser window, allowing you to choose alternate locations to store recorded file too.
Free Storage Space	Displays the available space on the drive selected to save the files on.
Estimated Recording Time	Displays the estimated recording time available based on the available storage space.
Recording Limits	Opens the <i>Recording Limits</i> window. See Section 15.5.2 for more information.

15.5.2 Recording Limits

Figure 15-8 displays the *Recording Limits* window.

Figure 15-8: Recording Limits window

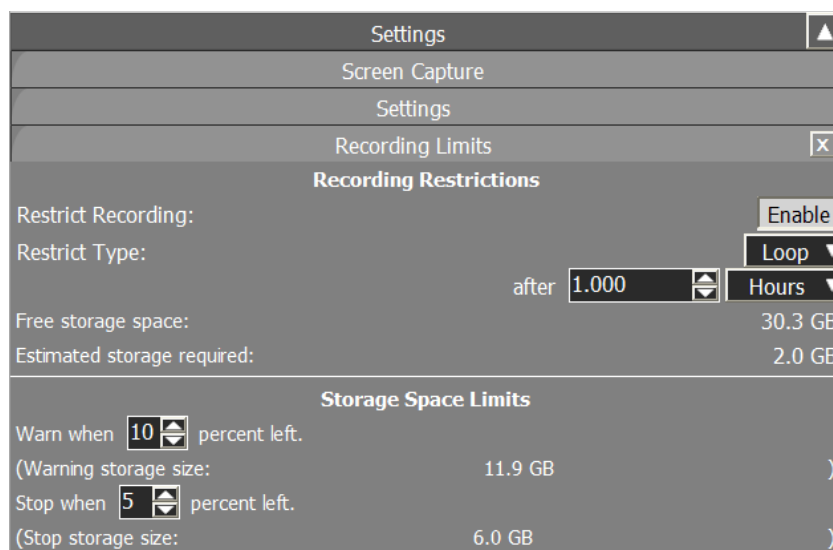


Table 15-7 describes the *Recording Limits* window.

Table 15-7: Recording Limits window

Field	Description
Recording Restrictions	
Restrict Recording	Enables the limiting of the amount of screen captures that occur once recording has started.
Restrict Type	Specifies the restriction type. The options are: <ul style="list-style-type: none"> • Loop — continuous loop recording for a specified time • Stop— stops recording after a specified time period
After	Specifies the amount of time to restrict the recording to. The select button specifies the time units. The options are: <ul style="list-style-type: none"> • Seconds • Minutes • Hours • Days
Free Storage Space	Displays the available storage space.
Estimated storage Required	Displays the estimated amount of storage space required to hold the amount of the configured recording.
Storage Space Limits	
Warn when __ percent left	Specifies the percentage of remaining storage space when a warning is raised.
Stop when __ percent left	Specifies the percentage of remaining storage space when to stop recording.

15.6 Preferences

The *Preferences* button opens the *Preferences* settings window. The *Preferences* settings window allows you to configure SeaView to best match your preferences.

Figure 15-9 displays the *Preferences* settings window.

Figure 15-9: Preferences settings window

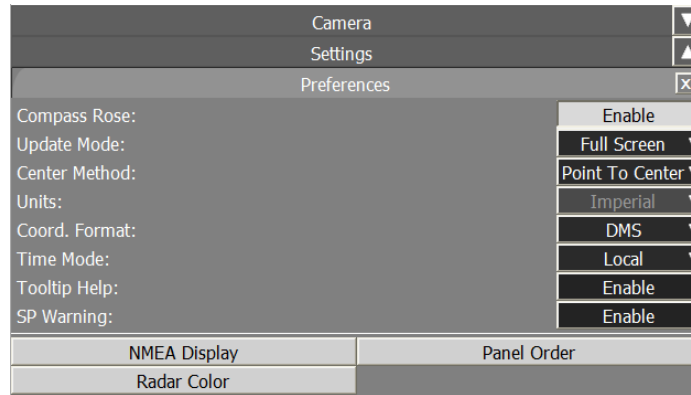


Table 15-8 describes the *Preferences* settings window.

Table 15-8: Preferences settings window

Field	Description
Compass Rose	Enables compass markings around the perimeter of the radar image.
Update Mode	Specifies the radar screen update mode. The options are: <ul style="list-style-type: none"> • Full Screen – the entire radar image is updated at one time once the radar data is received. • Quadrant – the radar image is broken into four quadrants which are updated one at a time as the quadrant’s radar data is received.
Centering Method	Specifies the centering method that is activated when the <i>Center</i> toggle button is enabled. The options are: <ul style="list-style-type: none"> • Center to Point – moves the radar scanner position from the center of the screen to the selected point • Point to Center – moves the selected point on the screen to the center of the screen
Units	Specifies the units of measurement displayed in the SeaView application. The options are: <ul style="list-style-type: none"> • Imperial • Metric <p>Note— This value is set during commissioning and cannot be changed during system operation.</p>

Field	Description
Coord Format	Specifies the format used to display coordinates. The options are: <ul style="list-style-type: none"> • Dec – Decimal Degrees • DM – Degrees, Minutes • DMS – Degrees, Minutes, Seconds
Time Mode	Specifies the mode used to display time. The options are: <ul style="list-style-type: none"> • Local Time Zone • UTC
Tooltip Help	Enables and disables the tooltip help feature. When enabled, hovering over a control with the cursor opens a pop-up window describing the control.
SP Warning	For <i>sigma</i> S6 WaMoS® II operation, the radar must be operated in short pulse mode. When the <i>SP Warning</i> button is enabled, if the radar is changed from short pulse mode, a warning box, is displayed prompting the user to change back to short pulse mode for optimal results. The user can acknowledge this warning box by clicking the <i>Ok</i> button. If the <i>SP Warning</i> button is disabled, the warning box is not displayed.
NMEA Display	Opens the <i>NMEA Display</i> settings window. See Section 15.6.1 for more information.
Panel Order	Opens the <i>Panel Order</i> settings window. See Section 15.6.2 for more information.
Radar Color	Opens the <i>Radar Color</i> settings window. See Section 15.6.3 for more information.

15.6.1 NMEA Display

The *NMEA Display* settings window allows you to select the navigational data to appear in the *Navigation Data* section of the *Menu Panel*. Figure 15-10 displays the *NMEA Display* settings window.

Figure 15-10: NMEA Display settings window

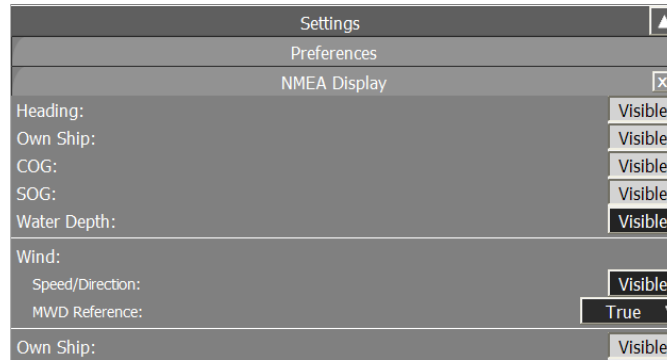


Table 15-9 describes the *NMEA Display* settings window.

Table 15-9: NMEA Display settings window

Field	Description
Heading	Enables or disables the <i>Heading</i> field in the <i>Navigation Data</i> section.
COG	Enables or disables the <i>COG</i> field in the <i>Navigation Data</i> section.
SOG	Enables or disables the <i>SOG</i> field in the <i>Navigation Data</i> section.
Water Depth	Enables or disables the <i>Depth</i> field in the <i>Navigation Data</i> section.
Wind	Enables or disables the <i>Wind Speed</i> field in the <i>Navigation Data</i> section. Also specifies the reference direction (True or relative) for MWD NMEA sentences.
Own Ship	Enables or disables the <i>Own Ship</i> field in the <i>Navigation Data</i> section.

15.6.2 Panel Order

The *Panel Order* settings window allows you to select the order of windows in the *Menu Panel*. Figure 15-11 displays the *Panel Order* settings window.

Figure 15-11: Panel Order settings window

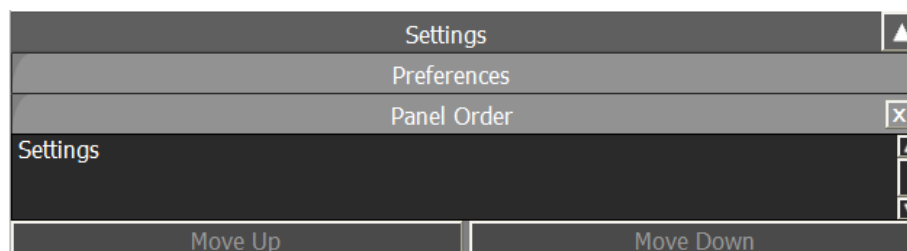


Table 15-10 describes the *Panel Order* settings window.

Table 15-10: Panel Order settings window

Field	Description
List of windows	Displays the windows, in order, in the <i>Menu Panel</i> section. Click a window name in the list to select it.
Move Up	Moves the selected window up in the order.
Move Down	Moves the selected window down in the order.

15.6.3 Radar Color

The *Radar Colors* settings window allows you to adjust the color of the *Radar Display*. Figure 15-12 displays the *Radar Color* settings window.

Figure 15-12: Radar Color settings window

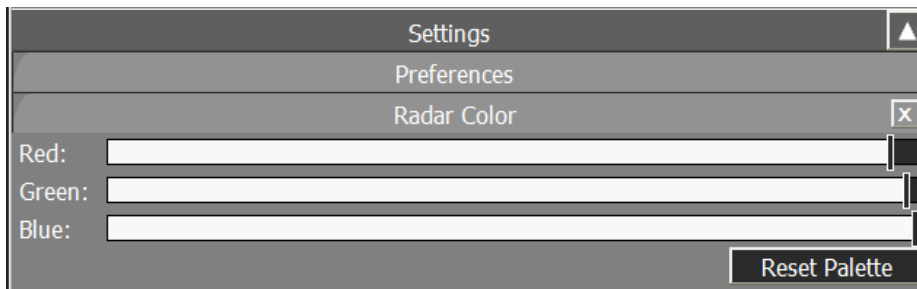


Table 15-11 describes the *Radar Color* settings window.

Table 15-11: Radar Color settings window

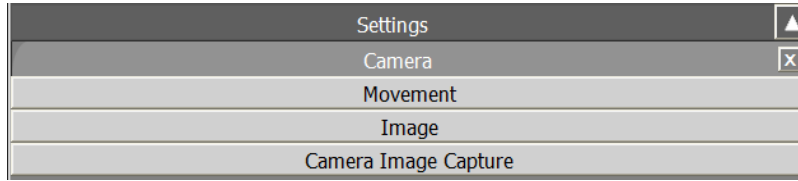
Field	Description
Red	Controls the red, green, and blue color components of the <i>Radar Display</i> . Note —Screen overlay colors and radar data are NOT affected by these controls.
Green	
Blue	
Reset Palette	Resets the <i>Radar Color</i> sliders to the default positions.

15.7 Camera

When the optional Camera Integration module is purchased and enabled, the *Settings* menu will display the *Camera* button. The *Camera* button opens the *Camera* window, shown in Figure 15-13. These menus accessed via the buttons in this window provide controls for camera

movement, camera imaging and camera image capture functions. Each of the windows opened by clicking each of the buttons is discussed in the following subsections.

Figure 15-13: Camera settings window



15.7.1 Movement

On the *Movement* window, shown in Figure 15-14, you will find controls that can be used to control and adjust the camera *Azimuth Speed* and *Elevation Speed*, when the camera is moving.

These controls are described in

Table 15-12.



Note— The setting presented in the *Movement* window are retrieved from the active camera. When no camera is connected to the system, these controls are greyed out and not editable.

Figure 15-14: Movement settings window

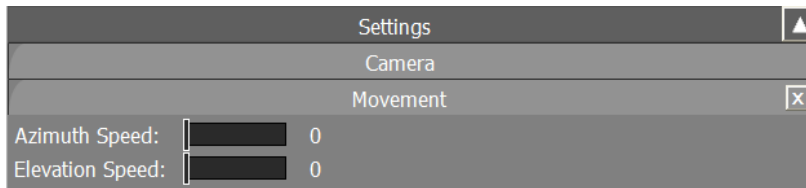


Table 15-12: Movement settings window

Field	Description
Azimuth Speed	<p>The <i>Azimuth Speed</i> slider bar allows the user to set the speed of the camera when it is moving or panning left or right. The units are degrees/second.</p> <p>Range: The maximum and default value is determined from the active camera upon connection to it. The default range defined by SeaView is 0-100, but this will be overridden upon connection to the camera.</p>
Elevation Speed	<p>The <i>Elevation Speed</i> slider bar allows the user to set the speed of the camera when it is moving up or down. The units are degrees/second.</p> <p>Range: The maximum and default value is determined from the active camera upon connection to it.</p> <p>NOTE—The default range defined by SeaView is 0-100, but this will be overridden upon connection to the camera.</p>

15.7.2 Image

The FLIR camera automatically adjusts to changing scene conditions to provide a high-contrast image that is optimized for most conditions. The preset AGC settings for each scene has been optimized to offer the most balance and high quality image for specific conditions. The setting to use depends on personal preference and environmental conditions. You may like the way the *Night Docking* setting looks, even though you are running on open water during the daytime. Experiment with the different settings, and find out for yourself which settings works best in different conditions. Figure 15-15 and Table 15-13 provides additional details.



Note— The *Contrast Mode* setting presented in the *Image* window are retrieved from the active camera. When no camera is connected to the system, or the selected camera is operating in DLTV mode, this control is greyed out and not editable, and displays N/A.

Figure 15-15: Image settings window

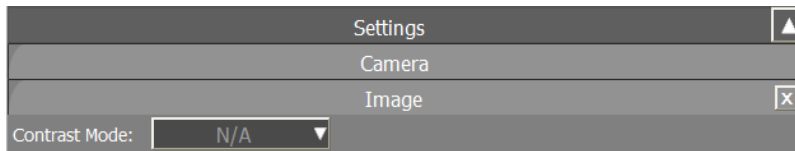


Table 15-13: Image settings window

Field	Description
Contrast Mode	<p>The <i>Contrast Mode</i> has several preset automatic gain control (AGC) settings, dependent on the configuration of camera(s), which change the image gain and level settings. The available settings are retrieved from the active camera and vary depending on the camera model. Examples include:</p> <ul style="list-style-type: none">• Night Running• Night Docking• Day Running• Man Overboard

15.7.3 Camera Image Capture

On the *Camera Image Capture* window, shown in Figure 15-16, you will find controls that can be used to control the capture of camera imagery to the system hard disk, or an external hard disk, if equipped. These controls are described in Table 15-14.



Note— The *Camera Image Capture* settings presented in the *Image* window are camera independent. Image capture will continue, as per the selected settings, as different cameras are selected as active.

Figure 15-16: Camera Image Capture settings window

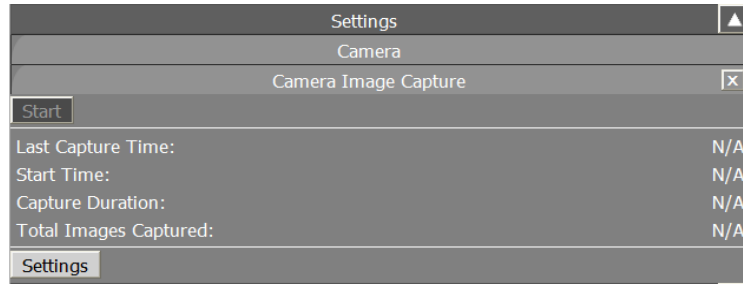


Table 15-14: Camera Image Capture settings window

Field	Description
Start	<p>When clicked, the <i>Start</i> button will start the camera image screen captures function, capturing .png or .jpg images as per the selected configuration settings (Refer to Section 15.7.3.1).</p> <p>Note – The <i>Start</i> button is only available to click when radar imagery is actively being displayed on the <i>Radar Display</i>. Otherwise, the <i>Start</i> button is greyed out and cannot be selected.</p> <p>Note – If you click <i>Start</i>, but the system does not start saving camera image screen captures (the <i>Start</i> button is not active), you will need to free up some disk space on the drive where the <i>Storage Folder</i> is specified, or select a <i>Storage Folder</i> on a different drive with sufficient disk space. Refer to Section 15.7.3.1 for more information on selecting a new storage folder.</p>
Last Capture Time	The last recorded time that an image was captured.
Start Time	The start time and date for the first time that an image was captured.
Capture Duration	This is the elapsed time since the “Start” button was clicked.
Total Images captured	The number of images that have been captured.
Settings	<p>Click the <i>Settings</i> button to access the <i>Camera Image Capture Settings</i> window, where adjustments to the image capture may be made. Refer to Section 15.7.3.1 for details.</p> <p>Note – The <i>Settings</i> button is only available to click when the <i>Start</i> button is not clicked. Otherwise, when the <i>Start</i> button is clicked, the <i>Settings</i> button is greyed out and cannot be selected.</p>

15.7.3.1 Camera Image Capture Settings



Caution— Never set the Storage Folder to reside on the C : \ drive of the PC. This may cause the C : \ drive, hosting the Windows® 7 Operating System, to fill up with data and will stop the *sigma* S6 WaMoS® II System from working.

In the Camera Image Capture Settings window, shown in Figure 15-17 you will find controls that can be used to adjust the format, frequency, storage location, quality, etc. of the captured camera imagery. These controls are described in Table 15-15.

Captured images are saved to the location specified in the Storage Folder location file, and the filenames are always prefixed with the text entered into the Filename Prefix field. Each saved image will also have the capture time and GPS location appended to the filename, so the actual format becomes 'Capture_YYYYMMDD_hh_mm_ss_xxx_xx_xxN_yyy_yy_yyW.format'



Note— The *Camera Image Capture Settings* window is not accessible when the *Start* button, on the *Camera Image Capture* window is enabled. Image capture must be stopped before adjustments to the image format, frequency, storage location, quality, etc. can be made.

Figure 15-17: Camera Image Capture Settings window

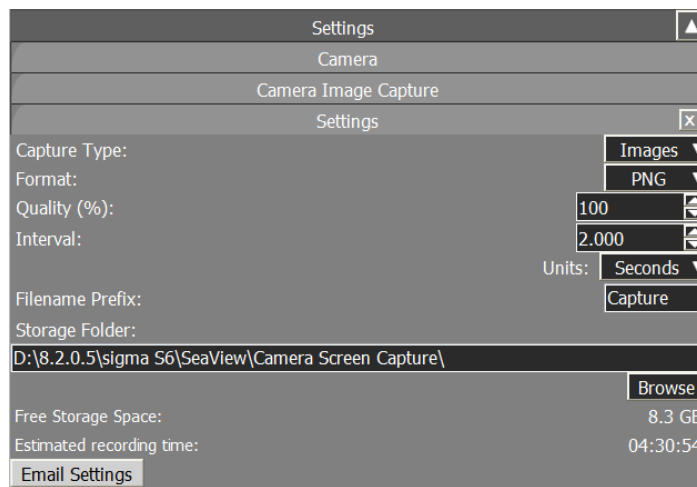


Table 15-15: Camera Image Capture Settings window

Field	Description
Capture Type	Specifies the camera image capture type. Currently, <i>Images</i> is the only option available.
Format	Allows the user to choose the camera image capture format – .png or .jpg are the available options.

Field	Description
Quality (%)	Determines the quality of resolution of the captured camera images. The allowable range is 0-100%. Note - If set to 100%, the best possible camera image is captured, but more disk space is consumed. The available disk space is calculated and displayed in the <i>Free Storage Space</i> field.
Interval	Specifies the interval between camera image captures. The minimum is 1 second. The time units may be adjusted using the <i>Units</i> dropdown menu, and may be set to <i>Seconds, Minutes, or Hours</i> .
Filename Prefix	The user may select a custom filename prefix for the saved camera image capture files by entering it into this field.
Storage Folder	The user may select a custom storage folder where the saved camera image capture files will be stored.
Free Storage Space	Indicates the free disk space available on the drive selected specified in the <i>Storage Folder</i> field.
Estimated recording time	Given the selected camera image capture file parameters (file format, quality, and frequency), and the <i>Free Storage Space</i> , this field gives an indication of how long <i>Camera Image Capture</i> can run before the disk automatically fills up with data, at which point <i>Camera Image Capture</i> will automatically stop.
Email Settings	Click the Email Settings button to open the <i>Camera Image Capture Email Settings</i> window, which is detailed in Section 15.7.3.1.1.

15.7.3.1.1 Camera Image Capture Email Settings

On the *Camera Image Capture Email Settings* window, shown in Figure 15-18, you will find controls that can be used to specify details for sending emails containing camera image captures as attachments. These controls are described in Table 15-16.

Emails are sent when the user clicks the *Send Email* button on the Camera window, described in Section 18 .



Note— Emails containing camera image captures can only be sent when the PC to which SeaView is installed has access to a valid mail server and network.

Figure 15-18: Camera Image Capture Email Settings window

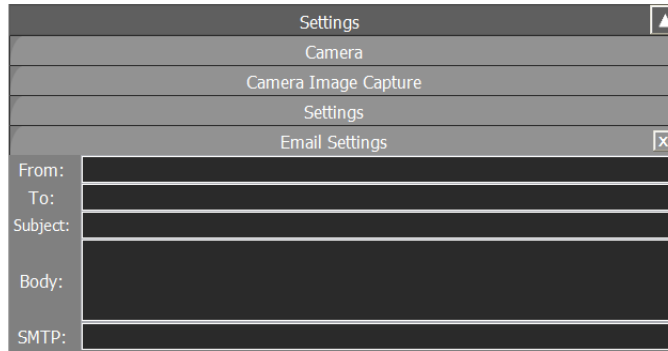


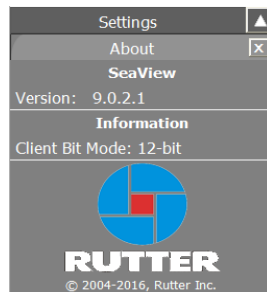
Table 15-16: Camera Image Capture Email Settings window

Field	Description
From	Enter a valid email address of the sender of the Email. The address must be in the format: <i>name@domain.com</i> .
To	Enter a valid email address of the recipient of the Email. Only one email address is accepted. The address must be in the format: <i>name@domain.com</i> .
Subject	Enter the subject of the Email, user specified.
Body	Enter the body of the Email, user specified, perhaps describing the attached camera image capture.
SMTP	Enter a valid SMTP (Simple Mail Transfer Protocol) mail server address. For example: ServerXYZ.CompanyXYZ.Local Note – If a valid SMTP address is not supplied, the email will not be sent.

15.8 About

The *About* button opens the *About* window. This window displays the SeaView application version number and the Client Bit Mode. Figure 15-19 displays the *About* window.

Figure 15-19: About window



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16 Rutter Radar—100S6 Controls

16.1 Overview

This section describes the principles and operational procedures for the control and operation of the Rutter Radar—100S6.

16.1.1 Warm-Up Requirement

Upon power-up of a “cold” transceiver, a minimum warm up period of 180 seconds must be allowed before the transceiver is allowed to transmit. This warm up period is required by the magnetron.

As soon as the transceiver is powered on, it immediately goes into warm up mode. Once the warm up mode period is complete, then the transceiver goes into standby mode.

16.1.2 Installation Parameters

When the radar is commissioned, the following parameters are configured for each transceiver:

- Heading marker offset
- Trigger delay
- Local oscillator tuning value
- Blanking sectors
- Performance monitor Xr attenuator value
- Performance monitor Xt attenuator value
- Performance monitor Rx mode tuning value
- Performance monitor system mode tuning value

16.1.3 Radar Tuning

The radar tuning adjustment optimizes the *Radar Display's* signal-to-noise ratio by adjusting the microwave frequency of the radar receiver to match the frequency of the received microwave echoes. By matching these frequencies the amplitude of the received microwave echo is maximized resulting in the optimal signal-to-noise ratio.

There are two levels of tuning adjustment:

- Coarse tune—set during radar installation and commissioning. This should not need re-adjustment for the lifetime of the radar.
- Fine tune—adjusts the tuning around the set coarse tune value and may be used to adjust the tuning as the radar frequency shifts over time



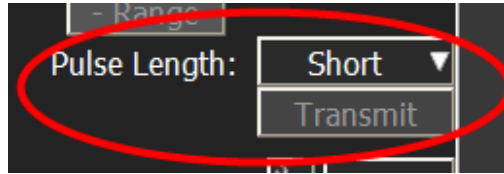
Note 1— *Coarse Tune* only appears when SeaView is in Commissioning Mode.

Note 2— Under normal operation, the fine tune should always be in AFC (Automatic Frequency Control) mode. It is only under special circumstances that the manual tune mode should be used.

16.2 Radar Controls on the Display Panel

Figure 16-1 displays the radar controls on the *Display Panel*.

Figure 16-1: Radar controls on *Display Panel*



16.2.1 Pulse Length

The *Pulse Length* select button controls the radar pulse length. The *Radar Display* range scales available depend on the pulse length setting, and are configured during system commissioning in the Rutter Server Configuration Utility:

- Short pulse—available range scales of 0.25 to 3 Nm
- Medium pulse— Available range scales of 3 to 6 Nm
- Long pulse—Available range scales of 6 to 24 Nm.



Note 1— These ranges are the default settings and could be modified using the Server Rutter Configuration Utility.

Note 2—When the PLEN alarm is triggered, the background color of the *Pulse Length* select button turns red.

16.2.2 Transmit

The *Transmit* toggle button switches the radar transceiver between Standby and Transmit modes. When the *Transmit* button is enabled, the transceiver is in Transmit mode. When the *Transmit* button is disabled, the transceiver is in Standby mode. The current transceiver mode is indicated in the *Status* field on the *Radar Control* window. See Section 16.3 for more information.

When the transceiver is in Standby mode:

- The transceiver is not transmitting any microwave pulses
- The antenna is stationary
- The transceiver can be switched to Transmit mode

When the transceiver is in Transmit mode:

- The transceiver emits microwave pulses
- The antenna rotates
- The transceiver can be switched to Standby mode

16.3 Radar Control

The *Radar Control* tab is located in the *Menu Panel*. Click the *Radar Control* tab to open the *Radar Control* window.

Figure 16-2 displays the *Radar Control* window.

Figure 16-2: Radar Control window



Table 16-1 describes the *Radar Control* window.

Table 16-1: Radar Control window

Field	Description
Status Message	
Status	<p>Displays the current mode of the radar transceiver. The modes are:</p> <ul style="list-style-type: none"> • Inactive—SeaView application is not connected to the transceiver. • Warm Up [XXX]s—The transceiver is connected to the SeaView application, and is in Warm Up mode. The message displays “Warm Up [XXX]s”, where [XXX]s is a count-up in seconds from 0 to 999. • Standby— The transceiver has completed its warm-up period. • Transmit—The radar is transmitting.
Tuning Controls	
Coarse Tune	Coarse tune—set during radar installation and commissioning, and is only available when SeaView is in Commissioning Mode.
Fine Tune	Allows you to fine tune the microwave frequency of the radar receiver to maximize the amplitude of the received microwave echo.

Field	Description
Tune Ind	Displays the level of tuning. The farther the bar appears to the right, the better the radar is tuned.
Tune Mode	Specifies the tuning mode of the receiver. The options are: <ul style="list-style-type: none"> • AFC—Automatic Frequency Control. The system automatically tunes the receiver fine tuning. This is the normal operating mode for the radar. • Manual—Receiver tuning is manual. This should only be used under special circumstances. <p>Note—For normal radar operations, <i>Tune Mode</i> should be set to AFC.</p>
Radar Status	
TX Status	Opens the <i>TX Status</i> window. See Section 16.3.1 for more information.
TX BIST	Opens the <i>TX BIST</i> window. See Section 16.3.2 for more information.
Perf. Monitor	Opens the <i>Performance Monitor</i> window. See Section 16.3.3 for more information.
Sector Blanking	Opens the <i>Sector Blanking</i> window. See Section 16.3.4 for more information.
Radar Alarms	
BIST	Displays red when an alarm is raised. See Section 16.4 for more information
PLEN	
COMM	
STBYTX	
Alarm List	Lists the triggered alarms.

16.3.1 TX Status

The *TX Status* window displays the status of the transceiver.

Figure 16-3 displays the *TX Status* window.

Figure 16-3: TX Status window

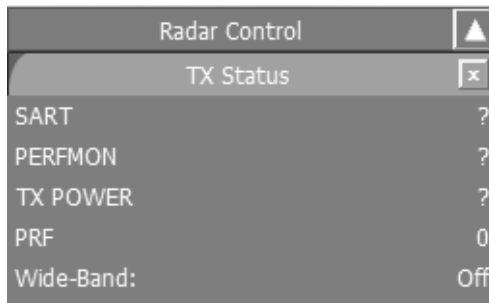


Table 16-2 describes the *TX Status* window.

Table 16-2: TX Status window

Field	Description
SART	Displays whether the SART (Search and Rescue Transponder) is installed in the radar transceiver. The options are: <ul style="list-style-type: none"> Fitted—the SART is installed Unfitted—the SART is not installed
PERFMON	Displays whether the <i>Performance Monitor</i> is installed in the radar transceiver. The options are: <ul style="list-style-type: none"> Fitted—The <i>Performance Monitor</i> is installed Unfitted—The <i>Performance Monitor</i> is not installed
TX POWER	Displays the power of the radar transceiver in kW.
PRF	Displays the current transmitting PRF (Pulse Repetition Frequency) of the transceiver in Hz.
Wide-Band	Specifies whether the transceiver wide-band function is enabled. The options are: <ul style="list-style-type: none"> On Off <p>Note—<i>Wide-Band</i> is only on when the radar pulse length is set to Long.</p>

16.3.2 TX BIST

The *TX BIST* (Built-in System Test) window displays data read from the transceiver’s built-in system test. Figure 16-4 displays the *TX BIST* window.

Figure 16-4: TX BIST window

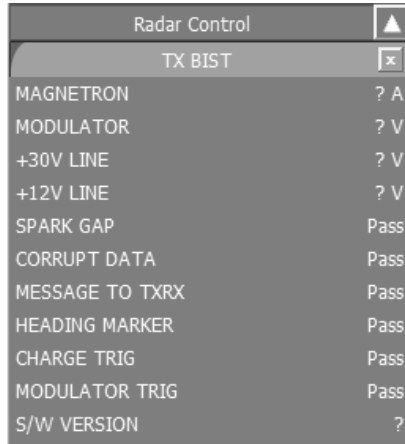


Table 16-3: TX BIST window describes the TX BIST window.

Table 16-3: TX BIST window

Field	Description
MAGNETRON	Displays the magnetron current in A.
MODULATOR	Displays the modulator voltage in V.
+30V LINE	Displays the monitored voltage of the 30 volt line.
+12V Line	Displays the monitored voltage of the 12 volt line.
SPARK GAP	Displays the results of the Spark Gap self-test. The options are: <ul style="list-style-type: none"> • Pass • Fail
CORRUPT DATA	Displays the results of the Corrupt Data self-test. The options are: <ul style="list-style-type: none"> • Pass • Fail
MESSAGE TO TXRX	Displays the results of the Message to Transmit/Receive self-test. The options are: <ul style="list-style-type: none"> • Pass • Fail
HEADING MARKER	Displays the results of the Heading Marker self-test. The options are: <ul style="list-style-type: none"> • Pass • Fail

Field	Description
CHANGE TRIG	Displays the results of the Change Trigger self-test. The options are: <ul style="list-style-type: none"> • Pass • Fail
MODULATOR TRIG	Displays the results of the Modulator Trigger self-test. The options are: <ul style="list-style-type: none"> • Pass • Fail
S/W VERSION	Displays the software version running on the transceiver.

16.3.3 Performance Monitor

The *Performance Monitor* allows you to assess the degradation of the transceiver and antenna performance. The *Performance Monitor* consists of four arcs in the radar display area. The arcs are approximately 0.3 Nm apart, starting at a range of 8 Nm. The arcs extend from 155° to 185° for X-band transceivers, and from 290° to 320° to S-band receivers. The *Perf. Monitor* button is only available when the radar is transmitting. Figure 16-5 displays the *Performance Monitor* for an X-band transceiver.

Figure 16-5: Performance Monitor

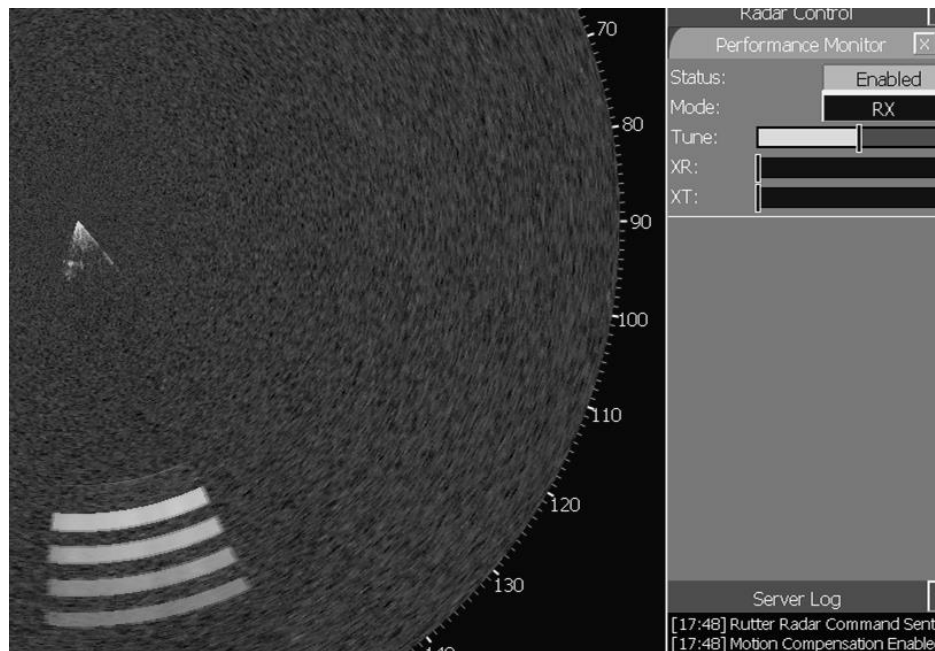


Table 16-4 describes the *Performance Monitor* window.

Table 16-4: Performance Monitor window

Field	Description
Status	Specifies the status of the Performance Monitor. The options are: <ul style="list-style-type: none">• Enabled• Disabled
Mode	Specifies the mode. The options are: <ul style="list-style-type: none">• RX— monitors the performance of the receiver path for incoming signals• SYSTEM—monitors the performance of the overall system
Tune	Specifies the frequency of the performance monitor to match the frequency of the transceiver.
XR	Normalizes the performance monitor in RX mode.
XT	Normalizes the performance Monitor in SYSTEM mode.

Procedure 16-1 describes how to use the *Performance Monitor*.

Procedure 16-1: To use the Performance Monitor

1. Disable all filters in the *Video Processing* control set in the *Display Panel*.
2. Disable sector blanking so the radar is transmitting in 360° (requires that Commissioning Mode be enabled on in SeaView):
 - i. Open the *Radar Control* tab.
 - ii. Click on the *Sector Blanking* button.
 - iii. Click the *Full Scan Mode* button to enable Full Scan Mode.
3. Ensure the AFC tuning mode is enabled:
 - i. Open the *Radar Control* tab
 - ii. Ensure the *Tune Mode* field is set to “AFC”.
4. Set the *Radar Display* range to 12 Nm.
5. Set the Pulse Length to Long.
6. Enable the Performance Monitor:

-
- i. Open the *Radar Control* tab.
 - ii. Click on the *Perf. Monitor* button.
 7. Click the *Status* button to enable. The button appears green.
 8. Set the *Mode* field to RX.
 9. Set the *Tune*, *XT*, and *XR* fields to Zero (0) by moving the sliders all the way to the left.
 10. Adjust the *Tune* and *XT* setting :
 - i. Slowly drag the *Tune* slider to the right until the four arcs visible on the display are at their brightest.
 - ii. Slowly drag the *XT* slider until the outermost arc is just visible.
 11. Set the *Mode* field to System.
 12. Adjust the *Tune* and *XR* field:
 - i. Slowly drag the *Tune* slider to the right until the four arcs visible on the display are at their brightest.
 - ii. Drag the *XR* slider until the outermost arc is just visible.
 13. Click the *Status* button to disable the *Performance Monitor*.
 14. Re-enable any previously disabled sector blanking settings.
-

16.3.4 Sector Blanking

The *Sector Blanking* button allows you to assess controls to configure specific sector blanked zones where radar transmission is inhibited.

The *Sector Blanking* button is only available when SeaView is in Commissioning Mode and the radar is transmitting.

16.4 Radar Alarms

This section contains the four system alarms that are displayed in red if there is an error with the radar.

16.4.1 BIST Alarm

The BIST alarm is triggered when the SeaView application is no longer receiving Built-In Self Test (BIST) data from the transceiver. The BIST alarm clears automatically when the SeaView application begins receiving valid BIST data.

16.4.2 PLEN Alarm

The PLEN alarm is triggered when the pulse length echoed back from the transceiver does not match the pulse length requested by SeaView. Once SeaView requests a new pulse length the transmitter has four seconds to change before the alarm triggers. The PLEN alarm clears automatically when either the requested pulse length matches the connected transceiver, or the display is switched to standby.



Note — When the PLEN alarm is triggered the background color of the Pulse Length select button flashes RED. This button is located in the *Range/Centering* control set of the *Display Panel*.

16.4.3 COMM Alarm

A COMM alarm is triggered if a valid message has not been received from the transceiver for more than 3 seconds. The transceiver COMM alarm is cleared when a valid message is received.

16.4.4 STBYTX Alarm

The STBYTX alarm is triggered when the status message echoed back from the transceiver does not match that requested by the SeaView. The standby/transmit error alarm clears automatically when the requested status matches that of its connected transceiver.

17 SAM NACOS Controls

17.1 Overview

This section describes the principles of and operational procedures for the control and operation of the SAM NACOS radar.



Note: Remote Desktop capability to a PC running the *sigma* S6 Server application is not supported when SAM NACOS functionality is enabled.

17.1.1 Warm-Up Requirement

Upon power up of a “cold” transceiver, a minimum warm-up period is required before the transceiver is allowed to transmit. This warm-up period is required by the magnetron.

As soon as the transceiver is powered on, it immediately goes into warm-up mode. Once the warm-up mode period is over, then the transceiver goes into standby mode.

17.1.2 Installation Parameters

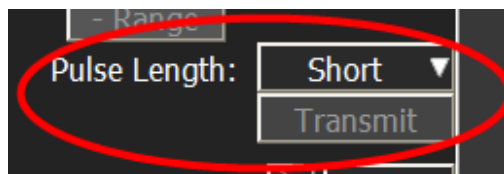
When the radar is commissioned the following parameters are configured for each transceiver:

- IP Address
- Heading marker offset
- Performance monitor Xr attenuator value

17.2 Radar Controls on the Display Panel

Figure 17-1 displays the five pulse length radar controls on the *Display Panel*.

Figure 17-1: Radar controls on *Display Panel*



The *Pulse Length* select button (Figure 17-1) controls the radar pulse length. Select the *Pulse Length* button to open the *Mode and Range Maximum* dropdown menu. It lists 12 maximum range scales available for each mode. For SAM NACOS you must indicate what pulse mode (Short or Long) and the maximum range associated with that mode that you want for the *Radar Display*:

- 12 Short pulse settings displayed with the associated maximum range; and
- 12 Long pulse settings available with the associated maximum range.

If you want the *Radar Display* to provide images at a range greater than the range currently selected then follow procedure 17-1.

Procedure 17-1: To change the display range for the master radar image

1. Left-click on the *Pulse Length* select button. The *Mode and Range Maximum* drop down menu appears.
 2. Select from the *Mode and Range Maximum* drop down menu the appropriate mode with the maximum that you want in the *Radar Display*
 3. The radar will automatically update the image to the selected pulse length and range.
-

Each of these modes and their associated maximum display ranges include

- Short pulse mode available range scales up to a maximum of:
 - 250 m
 - 500 m
 - 0.25 Nm
 - 0.50 Nm
 - 0.75 Nm
 - 1.5 Nm
 - 3 Nm
 - 6 Nm
 - 12 Nm
 - 24 Nm
 - 48 Nm
 - 96 Nm
- Long pulse mode available range scales up to a maximum of:
 - 250 m
 - 500 m
 - 0.25 Nm
 - 0.50 Nm
 - 0.75 Nm
 - 1.5 Nm
 - 3 Nm
 - 6 Nm
 - 12 Nm
 - 24 Nm
 - 48 Nm
 - 96 Nm



Note — When the PLEN alarm is triggered, the background color of the *Pulse Length* select button turns red.

17.2.1 Transmit

When the *Transmit* button is disabled, the transceiver is in Standby mode. When the *Transmit* button is enabled, the transceiver is in Transmit mode. The *Transmit* toggle button only works if the transceiver is not already transmitting. It will not stop transmission once initiated.



Caution: Once the SAM NACOS radar begins transmitting the only way to stop transmission and revert to standby is by terminating the *sigma* S6 Server application and ensuring there are no other clients operating on the network.

The current transceiver mode is indicated in the *Status* field on the *SAM NACOS Status* window. See Section 17.3 for more information.

When the transceiver is in Standby mode:

- The transceiver is not transmitting any microwave pulses
- The antenna is stationary
- The transceiver can be switched to Transmit mode

When the transceiver is in Transmit mode:

- The transceiver emits microwave pulses
- The antenna rotates
- The transceiver can be switched to Standby mode

17.3 Radar Control

The *SAM NACOS Status* tab is located in the *Menu Panel*. When SeaView is running you can click the *SAM NACOS Status* tab in the *Tabs* section to open the *SAM NACOS Status* window. The *SAM NACOS Status* window displays the radar status and the *Request Control* toggle button. The submenu buttons, when selected, display more detailed status information. Figure 17-2 shows the *SAM NACOS Status* window.

Figure 17-2: SAM NACOS Status window

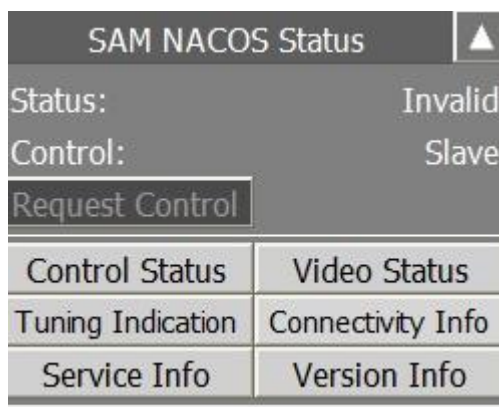



Table 17-1 describes the *SAM NACOS Status* window.

Table 17-1: SAM NACOS Status window

Field	Description
Status Message	
Status	<p>Displays the current mode of the radar transceiver. The modes are:</p> <p>Standby: Transceiver is warmed up and in Stand-by mode</p> <p>Warm Up: Transceiver is connected to SeaView Application and is warming up</p> <p>Transmitting: Transceiver is connected to Seaview application and is transmitting</p> <p>PerformanceMonitor: Transceiver is in Performance Monitor mode</p> <p>ServiceMenu: Transceiver is in Service Menu mode**</p> <p>Calibration: Transceiver is in auto calibration mode</p> <p>ARPA Training: Transceiver is in (ARPA) training mode</p> <p>Unknown: Transceiver status is unknown</p> <p>Inactive: Transceiver is inactive</p> <p>Invalid: Transceiver connection is invalid</p> <p>Valid: Transceiver connection is valid</p>
Control	<p>The first client on the network to connect to the transceiver is the granted control. If you are the first client connected it will display <i>Master</i>. Any other clients will display <i>Slave</i></p>
Request Control	<p>This toggle button when enabled allows SeaView to request <i>Master</i> control of the radar</p> 
Radar Control	
Control Status	Displays status information about transceiver control
Video Status	Displays status information about video data generated by the transceiver
Tuning Indication	Displays status information about transceiver tuning
Connectivity Info	Displays network settings through which connection has been established the transceiver.
Service Info	Displays diverse operational voltage and temperature.
Version Info	Displays the version of SAM NACOS that is running for the various components in the transceiver.

17.3.1 Control Status

The *Control Status* button opens the *Control Status* window that displays the information on the client identity and the radar master identity. Figure 17-3 shows the *Control Status* window.

Figure 17-3: Control Status window

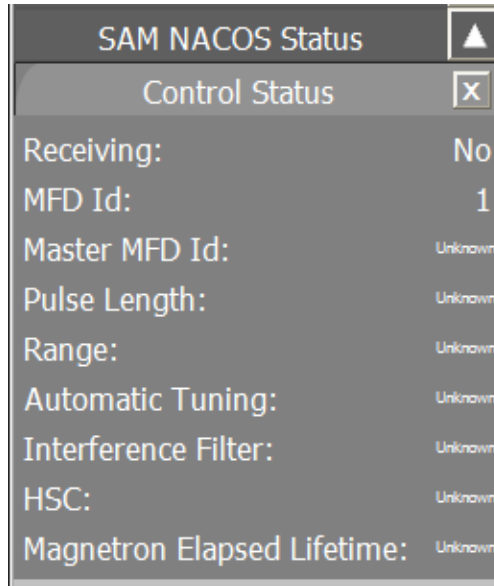


Table 17-2 describes the *Control Status* window.

Table 17-2: Control Status Window

Field	Description
Receiving	Displays Yes or No. If yes that indicates whether you are receiving data through the control protocol
MFD Id	Your client Identity
Master MFD Id	Displays the identity of the client that is controlling the transceiver.
Pulse Length	Displays Long or Short
Range	Displays the maximum range for that pulse length
Automatic Tuning	Displays whether the radar is in automatic or manual tuning mode
Interference Filter	Displays whether or not the Interference Filter is enabled

Field	Description
HSC	Displays whether the antenna is set to normal speed or high speed.
Magnetron Elapsed Lifetime	Displays the elapsed lifetime in hours for the magnetron for maintenance.

17.3.2 Video Status

The *Video Status* button opens the *Video Status* window that displays information to enable you to assess the status of the video transmission, resolution, format and bandwidth. Figure 17-4 shows the *Video Status* window in the Menu Panel.

Figure 17-4: Video Status window

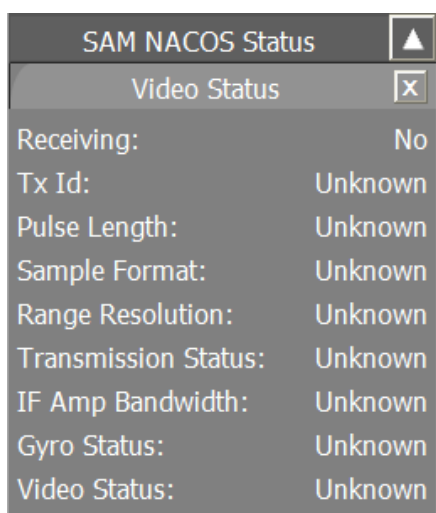


Table 17-3 describes the *Video Status* window.

Table 17-3: Video Status window

Field	Description
Receiving	Indicates whether or not the video data is being received by the sigma S6 Server application
Tx Id	The Identity of the transceiver to which you are connected
Pulse Length	The pulse length at which the transceiver that is currently operating in nanoseconds
Sample Format	Displays the compressed and uncompressed format being used in the video protocol.

Field	Description
Range Resolution	Displays the range resolution in nautical miles per sample
Transmission Status	Displays <i>Normal</i> if the video is being regularly transmitted and received and <i>Suppressed by Sector Blanking</i> and no video is being transmitted, in which case SeaView screen will be blank
IF Amp Bandwidth	Displays either 5 MHz or 25 MHz depending on the pulse length.
Gyro Status	Displays Valid or invalid depending on Gyro status.
Video Status	Displays Valid or invalid depending on Video status.

17.3.3 Tuning Indication

The *Tuning Indication* button opens the *Tuning Indication* status window that displays the tuning status of the transceiver. Figure 17-5 shows the *Tuning Indication* status window.

Figure 17-5: Tuning Indication status window

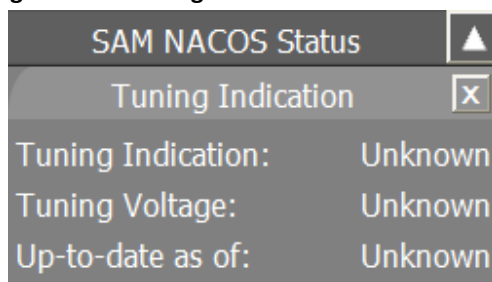


Table 17-4 describes the *Tuning Indication* window

Table 17-4: Tuning Indication status window

Field	Description
Tuning Indication	Displays tuning indication of the radar
Tuning Voltage	Displays tuning voltage of the radar
Up-to-date as of	Displays most current date for radar tuning indication values

17.3.4 Connectivity Info

The *Connectivity Info* status button opens the *Connectivity Info* status window that displays the IPs and client port through which the *sigma* S6 Server application sends control data. Figure 17-6 shows the *Connectivity Info* status window in the Menu Panel

Figure 17-6: Connectivity Info status window

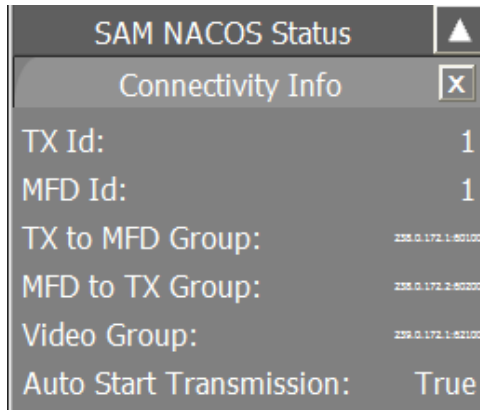


Table 17-5: Connectivity Info status window describes the *Connectivity Info* status window.

Table 17-5: Connectivity Info status window

Field	Description
TX Id	The identity of the transceiver to which the client is connected
MFD Id	The MFD identity of the client.
TX to MFD Group	Displays the IP address and port through which control data is received by the <i>sigma</i> S6 Server application
MFD to TX Group	Displays the IP address and port through which the <i>sigma</i> S6 Server application sends control data.
Video Group	Displays the IP address and port through which video data is received by the <i>sigma</i> S6 Server application
Auto Start Transmission	Displays whether or not Auto start transmission is enabled

17.3.5 Service Info

The *Service Info* button opens the *Service Info* status window and displays service information for the given date. Figure 17-7 shows the *Service Info* status window in the Menu Panel

Figure 17-7: Service Info status window

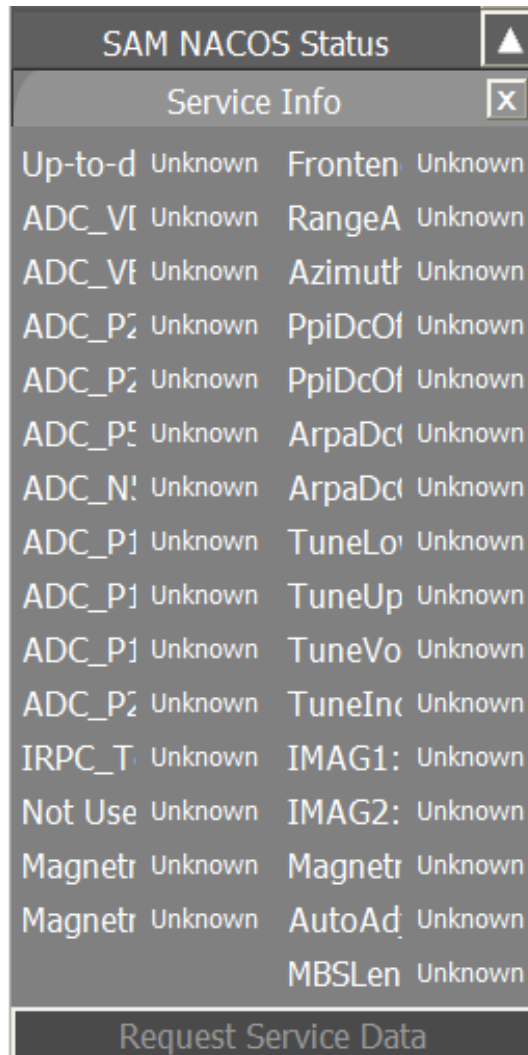
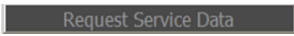


Table 17-6 describes the *Service Info* status window.

Table 17-6: Service Info status window

Field	Description
Up-to-date	Displays the most current date for the service information update
FrontendOk	Displays 0 ... 3V=defect; greater than or equal to 3V =good
ADC_VDD	Displays ADC_VDD

Field	Description
RangeA	Displays range alignment meter
ADC_VEE	Displays the ADC_VEE values where applicable
Azimuth	Displays azimuth alignment
ADC_P24v	Displays voltage of 24V +/- 1.5V
PpiDc1 (4MHz/48Nm)	Displays Volts values where applicable
ADC_P28v	Displays voltage in range of 24V ...35V
PpiDc2 (20MHz/24 Nm)	Displays Volts values where applicable
ADC_P5v0	Displays 5V +/- 1.0V
ArpaDcOffset1 (4MHz/48Nm)	Displays Volts values where applicable
ADC_N5v0	Displays -5V +/- 1V
ArpaDcOffset2 20MHz/24NM	Displays Volts values where applicable
ADC_P1V8	Displays 1.8V +/- 0.36V
TuneLow	Displays tune lower limit
ADC_P1v80	Displays 1.8V +/- 0.36V
TuneUp	Displays tune upper limit
ADC_P1v2	Displays 1.2V +/- 0.24V
TuneVo	Displays tune voltage values where applicable
ADC_P2V5	Displays 2.5V +/- 0.50 V
TuneIn	Displays tune indication values where applicable

Field	Description
IRPC_Temperature	Displays temperature -25 C ... 90 C
IMAG1	Displays IMAG1 values where applicable
Not Use	No values
IMAG2	Displays IMAG2 values where applicable
MagnetriBias	Displays magnetron bias in amperage of 1.1 A +/- 0.22 A
MagnetriHeater	Displays value for X where X=6.3V +/- 0.5V, S=5.8 V +/- 0.5 V
MagnetronCurrent	Displays the magnetron current values where applicable
AutoAd	Displays AutoTransceiverAdjustFailed values where 0=No auto adjust failure 1=Automatic PPI DC-offset adjust failed 2= Automatic ARPA_DC
MBSLenght	Displays meter-offset adjust failed
Request Service Data 	This toggle button when enabled allows the client to request service data

17.3.6 Version Info

The *Version Info* button opens the *Version Info* status window and displays the current versions of the radar hardware and software in use. Figure 17-8 shows the *Version Info* status window.

Figure 17-8: Version Info Status window

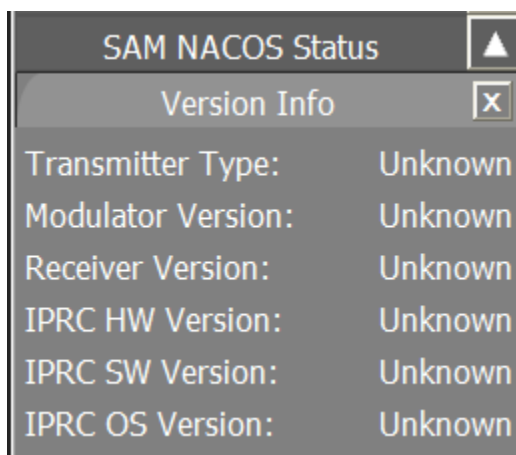


Table 17-7 describes the *Version Info* status window.

Table 17-7: Version Info status window

Field	Description
Transmitter Type	Depending on the radar being used on this vessel this displays S-Band 30 KW, X-Band 25 KW , X-Band 12 KW
Modulator Version	Displays the version of the modulator in the transceiver
Receiver Version	Displays the version of the receiver in the transceiver
IPRC HW Version	Displays the hardware version of the transceiver
IPRC SW Version	Displays the version of the software running in the transceiver
IPRC OS Version	Displays the version of the operating system in the transceiver

18 Camera

When the optional Camera Integration module is purchased and enabled, and the system is connected to and communicating with a camera, the *Camera* tab is displayed in the *Tabs* section of SeaView. Click the *Camera* tab to open the *Camera* window, displayed in Figure 18-1.

The controls provided on the *Camera* window allow you to control the active camera functions, where the active camera is selected on this page from the *Active Camera* dropdown menu, circled in red on Figure 18-1. If there is more than one camera connected and controlled by the *sigma S6 WaMoS® II* system, they will be listed under the *Active Camera* dropdown menu, by name. Just below the *Active Camera* dropdown menu is the *Select Sensor* dropdown menu, which allows the user to set the active camera in Daylight TV mode (DLTV) or in Infrared (IR) mode.

Figure 18-1: Camera window

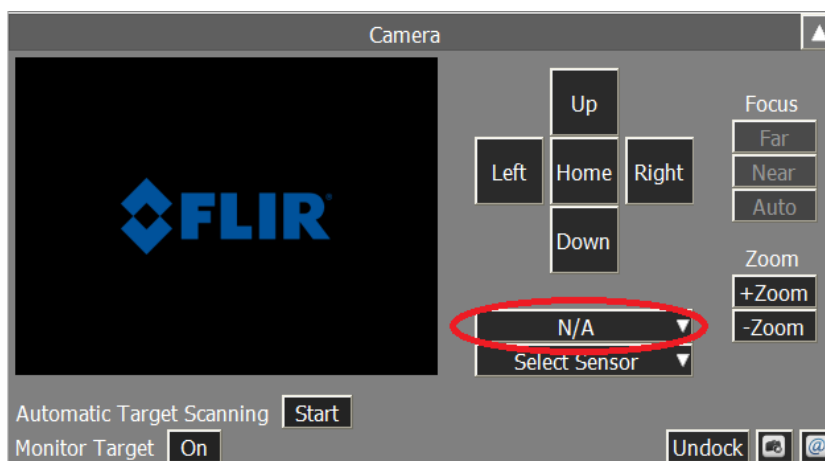




Table 18-1 describes the *Selected Tracks* window.

Table 18-1: Camera window

Field	Description
Camera Image Display	The <i>Camera Image Display</i> window will show the selected video stream (IR or DLTV) from the active camera.
Up/Down/Left/Right	Click and hold the <i>Up/Down/Left/Right</i> button to manually adjust the active camera position. While you are holding the button down, the camera will be moving at the <i>Azimuth Speed</i> or <i>Elevation Speed</i> defined under the camera <i>Movement</i> window described in Section 15.7.1. To stop the camera movement, release the button. To make very minor 1 degree adjustments to the camera position, quickly click the required button. These buttons can be used to adjust the active camera position on a moving target, as the target may not be centered in the <i>Camera Image Display</i> window.

Field	Description
Home	Click the <i>Home</i> button to manually force the active camera to return to the home position. The home camera position is defined during the installation and commissioning of the FLIR camera.
Active Camera	All cameras that are connected to the <i>sigma S6 WaMoS® II System</i> and that are available for control are listed in the <i>Active Camera</i> dropdown menu. Select a camera from this menu to make it the active camera. Only video from the active camera is displayed in SeaView at any one time, and any control commands that result from operator request (+/- Zoom, Up/Down/Left/Right/Home, etc.) are applied to the active camera only.
Select Sensor	Use the <i>Select Sensor</i> dropdown menu to choose the operational mode of the active camera. The sensor choices are retrieved from the active camera on connection.
Focus	Available only in DLTV mode, otherwise these buttons are greyed-out. <ul style="list-style-type: none"> - <i>Auto</i> will automatically set camera focus. - <i>Near</i> will focus the camera on near/foreground objects. - <i>Far</i> focus the camera on far/distant objects.
+Zoom	Click and hold <i>+Zoom</i> to zoom in on an object.
-Zoom	Click and hold <i>-Zoom</i> to zoom out on an object.
Undock	If desired, the <i>Camera</i> window may be undocked from the <i>Menu Panel</i> and moved to a second display, if available. After undocking, to dock the <i>Camera</i> window, simply click the <i>Dock</i> button that will be shown in the undocked <i>Camera Window</i> .
Camera Image Capture 	Each time the <i>Camera Image Capture</i> button is clicked, a screenshot is saved to the <i>Storage Folder</i> location as configured under the <i>Camera Image Capture Settings</i> window, described in Section 15.7.3.1.
Send Email 	When the <i>Send Email</i> button is clicked, and the <i>Email Settings</i> are correctly set as described in Section 15.7.3.1.1, a <i>Select Screenshot</i> window pops-up prompting you to select a screenshot to send to the recipient as an attachment. Select the required file(s) and click the <i>Open</i> button on the <i>Select Screenshot</i> window to complete sending the Email. Note – If the email fails to send, you will see an error in the <i>Server Log Section</i> of the <i>Menu Panel</i> that states “Error Sending Email”. If this occurs, verify the <i>From</i> and <i>To</i> email addresses and the <i>SMTP</i> address configured under the <i>Email Settings</i> window as described in Section 15.7.3.1.1.

19 *sigma* S6 WaMoS® II Sea-State Analysis and High Resolution Current

19.1 Overview

The *sigma* S6 WaMoS® II application uses X-Band radar data to remotely measure spectral sea-state and surface current parameters using the Sea-State Analysis module. This module has been designed for operation from fixed and moving platforms such as coastal sites, off-shore platforms, and ocean-going vessels. *sigma* S6 WaMoS® II provides continuous availability of sea-state and surface current data in a variety of conditions, including rough sea-states, harsh weather conditions, and in low visibility.

When the optional High Resolution Current (HRC) module is purchased, the *sigma* S6 WaMoS® II application can also remotely measure high resolution current and bathymetry information based on the input X-band radar data. The HRC module has been designed for operation from fixed platforms only, such as coastal sites and fixed off-shore platforms. *sigma* S6 WaMoS® II provides continuous availability of high resolution current and bathymetry data in a variety of conditions, including rough sea-states, harsh weather conditions, and in low visibility.



Note 1— The *Sea-State Analysis* module is required for the operation of the *High Resolution Current* module.

Note 2— For the *sigma* S6 WaMoS® II application to accurately derive sea-state and High Resolution Currents, the radar attached to the *sigma* S6 WaMoS® II System must be operating in Short Pulse mode. Operation in Medium Pulse or Long Pulse modes does not provide the required data resolution for accurate results for low to medium sea-states.

The following sections describe *sigma* S6 WaMoS® II operation with SeaView.

19.1.1 Temporal Averaging

In general, in-situ sensors such as buoys and lasers sample the sea surface elevation at a specific point over a period of approximately 20 minutes. Therefore, the obtained wave parameters represent 20-minute temporal means of point measurements. These measurements are not taken over a broad field of view.

In contrast, a single *sigma* S6 WaMoS® II wave measurement provides a mean value over one minute of data samples, and over an area several times the measured wave length. To be comparable with in-situ sensors, single *sigma* S6 WaMoS® II wave measurements are averaged over a period of 20 minutes.

19.1.2 Spatial Averaging

During the commissioning, the *sigma* S6 WaMoS® II application allows for the configuration of up to 5 Wave Boxes around the radar field of view for Sea-State Analysis processing. In a typical installation, two to four Wave Boxes is a common scenario.

If the *sigma* S6 WaMoS® II application is installed to a vessel which typically operates in a homogeneous wave and current regime (i.e. open ocean transits, offshore wind turbine parks, etc.), the sea-state results of the individual Wave Boxes are combined into a single spatial average, which are presented to the operator in SeaView.

If the *sigma* S6 WaMoS® II application is installed to a vessel or coastal site which typically operates in a non-homogeneous wave regime (i.e. area of varying water depth, under water surface features such as shoals, harbor entries, river estuaries, etc.), the sea-state results of the individual Wave Boxes are not averaged together, as important local wave and current phenomena to each Wave Box may be obscured. The results of each Wave Box are individually presented to the operator in SeaView.

19.1.3 Wave Systems

The *sigma* S6 WaMoS® II application is capable of measuring up to four independent wave systems, where they exist:

- 1st Swell System
- 2nd Swell System
- 3rd Swell System
- 1st Wind Sea System.

1st and 2nd are also referred to primary and secondary wave systems, respectively. The 1st wave system is also referred to as the dominant wave system, as it has higher peak wave energy compared to the 2nd wave system. This is visually represented in the directional frequency spectrum that can be shown in the *WaMoS® II Display Panel*. Swell systems are wave systems that originate in deep ocean waters, and generally consist of long period waves (> 10 seconds) with waves that have very shallow wave fronts. Wind sea wave systems are caused by local/regional wind conditions, and typically have short wave periods (< 10 seconds) and steep wave fronts.

Multiple swell systems can occur in a common area as distant, independent storm systems each cause swell systems that can travel long distances to interact with one another. SeaView displays wave parameters for both the 1st/2nd/3rd Swell systems and 1st Wind Sea system that are derived by the *sigma* S6 WaMoS® II Sea-State processing.

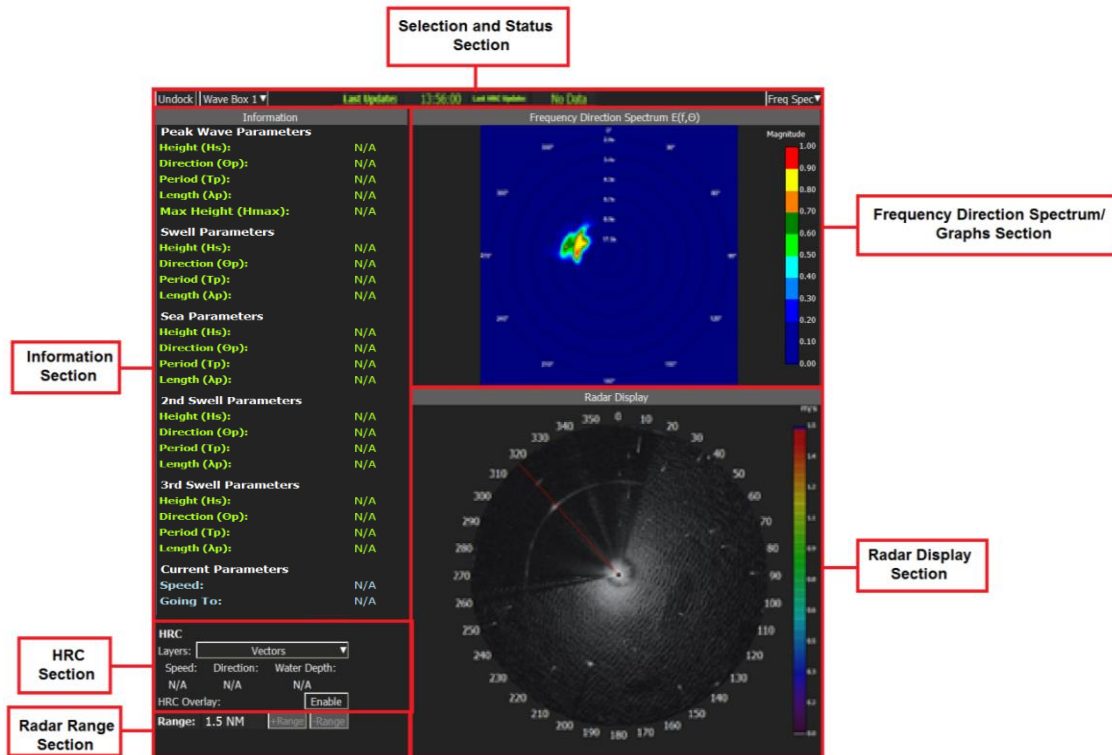
If one of the swell systems or the wind sea system cannot be isolated and the wave parameters cannot be thereby derived, SeaView displays N/A for each parameter. This is a possibility when a swell system is not present, or the local winds are too low to generate a wind sea. Generally,

local winds need to be at 2 m/s or greater to generate enough wind sea (> 0.5m) for proper and accurate Sea-State Analysis processing by the *sigma* S6 WaMoS® II System.

19.2 WaMoS® II Display Panel

The *WaMoS® II Display Panel* displays the results of the Sea-State Analysis and HRC processing. Figure 19-1 displays the WaMoS® II Display Panel.

Figure 19-1: WaMoS® II Display Panel



The following sections describe the *WaMoS® II Display Panel*.

19.3 Selection and Status Bar

The *Selection and Status* bar contains a series of buttons and status messages for *sigma* S6 WaMoS® II operation.

19.3.1 Radar Select Button

The *Radar Select* button (not shown in Figure 19-1) appears for SeaFusion system, allowing you to select the radar covering the area to be analyzed in a SeaFusion system.

19.3.2 Wave Box Select Button

If the *sigma* S6 WaMoS® II application is not configured for spatial averaging (refer to Section 19.1.2) the *Wave Box Selection* button is displayed. Otherwise, it is hidden. The *Wave Box Selection* button allows selection of the wave box for which information is displayed in the *WaMoS® II Display Panel*. If the *sigma* S6 WaMoS® II application is configured for spatial averaging, the *WaMoS® II Display Panel* always displays average data across all configured wave boxes.



Note— Wave boxes and Spatial Averaging are configured during *sigma* S6 WaMoS® II application commissioning.

19.3.3 Last Update Text Field

The *Last Update* field displays the last time *sigma* S6 WaMoS® II refreshed the sea-state data.

19.3.4 Dock/Undock Button

The Dock/Undock button allows you to undock the WaMoS® II panel from the SeaView display, allowing you to view the WaMoS® II panel on a second monitor from the main SeaView display screen.



Note— When viewing the WaMoS® II panel undocked from the SeaView display on a second monitor, the screen display resolution MUST be the exact same as the screen display resolution of the monitor showing the SeaView display.

19.3.5 Last HRC Update Text Field

The *Last HRC Update* field displays the last time *sigma* S6 WaMoS® II refreshed the HRC parameters displayed on the screen. This field only appears when the optional HRC module has been installed.

19.3.6 Freq Spec/Graphs Button

The *Freq Spec/Graphs* toggle button allows you to switch between the Directional Frequency Spectrum display and Graphs display.

When *Freq Spec* is selected, the *Directional Frequency Spectrum* is displayed. See Section 19.7 for more information about the *Directional Frequency Spectrum* display.

When *Graphs* is selected, a selection of graphs is displayed. See Section 19.8 for more information about the available graphs.

19.4 Sea-State

The *Sea-State* section displays information about the wave and current conditions as derived by the Sea-State Analysis module of the *sigma S6 WaMoS® II* application. If the *sigma S6 WaMoS® II* application is set up for spatial averaging of the individual wave boxes during commissioning, this area shows the spatially averaged wave and current parameters. If spatial averaging is not selected during commissioning time, this area shows the wave and current parameters for the wave box selected under the *Wave Box Selection* button.

Figure 19-2 displays the *Sea-State* Information section.

Figure 19-2: Sea-State Information section



Peak Wave Parameters	
Height (Hs):	N/A
Direction (Op):	N/A
Period (Tp):	N/A
Length (Ap):	N/A
Max Height (Hmax):	N/A
Swell Parameters	
Height (Hs):	N/A
Direction (Op):	N/A
Period (Tp):	N/A
Length (Ap):	N/A
Sea Parameters	
Height (Hs):	N/A
Direction (Op):	N/A
Period (Tp):	N/A
Length (Ap):	N/A
2nd Swell Parameters	
Height (Hs):	N/A
Direction (Op):	N/A
Period (Tp):	N/A
Length (Ap):	N/A
3rd Swell Parameters	
Height (Hs):	N/A
Direction (Op):	N/A
Period (Tp):	N/A
Length (Ap):	N/A
Current Parameters	
Speed:	N/A
Going To:	N/A

Table 19-1 describes the *Sea-State* section.

Table 19-1: Sea-State section

Field	Description
Peak Wave Parameters	
Hs	<p>Displays the significant wave height, in meters, of all systems.</p> <p>This value is a statistical parameter related to the energy of the sea-state. <i>Hs</i> is calculated from 20 minute sea surface elevation time series as the average of the highest one-third of all occurring wave heights.</p> <p>Note— If Spatial Averaging is enabled on <i>sigma</i> S6 WaMoS® II, the value represents an average across all Wave Boxes. If disabled, the value represents the average of the selected Wave Box.</p>
Θp	<p>Displays the direction in degrees that the peak wave is coming from.</p> <p>This value is calculated directly from the wave spectrum. It represents the direction of the energy maximum within the computed wave spectrum. To get the energy maximum, WaMoS® II looks for the frequency interval of the energy maximum with 80%.</p> <p>Note— If Spatial Averaging is enabled on <i>sigma</i> S6 WaMoS® II, the value represents an average across all Wave Boxes. If disabled, the value represents the average of the selected Wave Box.</p>
Tp	<p>Displays the peak wave period in seconds.</p> <p>This value is obtained directly from the wave spectrum, representing the period of the energy maximum within the computed wave spectrum.</p> <p>Note— If Spatial Averaging is enabled on <i>sigma</i> S6 WaMoS® II, the value represents an average across all Wave Boxes. If disabled, the value represents the average of the selected Wave Box.</p>
λp	<p>Displays the peak wave length.</p> <p>This value depends on the propagation speed in water. This speed changes with the water depth, thereby providing different wave length in deep and shallow water for the same period.</p> <p>Note— If Spatial Averaging is enabled on <i>sigma</i> S6 WaMoS® II, the value represents an average across all Wave Boxes. If disabled, the value represents the average of the selected Wave Box.</p>

Field	Description
H_{MAX}	<p>Displays the estimated maximum wave height, in meters, of the peak wave.</p> <p>The value for H_{MAX} is estimated from the significant wave height (H_s), and therefore based on statistical assumption. The default configuration for H_{MAX} = 1.44*H_s</p> <p>In practice H_{MAX} = 1.44*H_s is an appropriate relation and often used in buoy applications. However, the relationship between H_{MAX} and H_s is configurable during system commissioning time should an alternative definition be desired.</p> <p>NOTE 1— These relations are only estimates of H_{MAX} of the most probable maximum wave height with a wave height distribution. The actual value of H_{MAX} can be higher or lower depending the environmental conditions. Very extreme individual waves with H_{MAX} > 2*H_s which seem to be unrelated to the prevailing wave condition, are called rogue or freak waves. These are very rare and special and very temporally localized. These waves cannot be estimated.</p> <p>NOTE 2— If Spatial Averaging is enabled on <i>sigma</i> S6 WaMoS® II, the value represents an average across all Wave Boxes. If disabled, the value represents the average of the selected Wave Box.</p>
1st/2nd/3rd Swell Wave and 1st Sea Wave Parameters	
H_s	<p>Displays the significant wave height, in meters, of each Swell system and the Sea system.</p> <p>This value is a statistical parameter related to the energy of the sea-state. <i>H_s</i> is calculated from 20 minute sea surface elevation time series as the average of the highest one-third of all occurring wave heights.</p> <p>Note— If Spatial Averaging is enabled on <i>sigma</i> S6 WaMoS® II, the value represents an average across all Wave Boxes. If disabled, the value represents the average of the selected Wave Box.</p>
Θ_p	<p>Displays the direction, in degrees, that each Swell system and the Sea system is coming from.</p> <p>This value is calculated directly from the wave spectrum. It represents the direction of the energy maximum within the computed wave spectrum. To get the energy maximum, <i>sigma</i> S6 WaMoS® II looks for the frequency interval of the energy maximum with 80%.</p> <p>Note— If Spatial Averaging is enabled on <i>sigma</i> S6 WaMoS® II, the value represents an average across all Wave Boxes. If disabled, the value represents the average of the selected Wave Box.</p>

Field	Description
Tp	<p>Displays the wave period in seconds of each Swell system and the Sea system.</p> <p>This value is obtained directly from the wave spectrum, representing the period of the energy maximum within the computed wave spectrum.</p> <p>Note— If Spatial Averaging is enabled on <i>sigma</i> S6 WaMoS® II, the value represents an average across all Wave Boxes. If disabled, it represents the average of the selected Wave Box.</p>
λp	<p>Displays the wave lengths, in meters, of each Swell system and the Sea system.</p> <p>This value depends on the propagation speed in water. This speed changes with the water depth, thereby providing different wave length in deep and shallow water for the same period.</p> <p>Note— If Spatial Averaging is enabled on <i>sigma</i> S6 WaMoS® II, the value represents an average across all Wave Boxes. If disabled, it represents the average of the selected Wave Box.</p>
Current Parameters	
Speed	Displays the current speed in m/s.
Direction	Displays the current direction in degrees. This is the direction in which the current is moving to, relative to the Wave Box positions.

19.5 HRC

The *sigma* S6 WaMoS® II application has an optional High Resolution Current (HRC) module that allows the determination of high resolution surface currents and bathymetry by monitoring the wave field within the range of the X-Band radar, out to a maximum of approximately 2 NM.

When installed, HRC provides maps of current speed, current direction, and water depth on a grid overlay

Figure 19-3 displays the HRC section.

Figure 19-3: HRC section

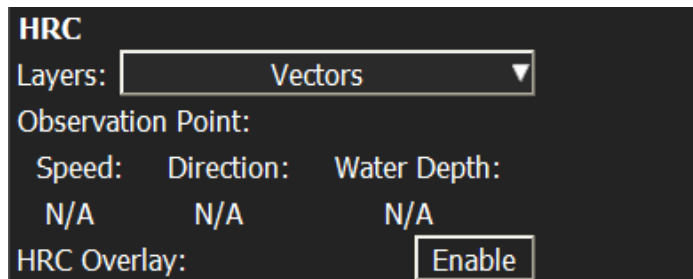


Table 19-2 describes the HRC parameters.

Table 19-2: HRC parameters section

Field	Description
HRC Overlay	Specifies whether the HRC Overlay is enabled on the <i>Radar Display</i> section. The options are: <ul style="list-style-type: none"> • Enabled— The HRC Overlay is enabled. • Disabled— The HRC Overlay is disabled. Note — Appears when optional HRC functionality is purchased and installed.
Layers	Specifies the HRC Overlay displayed in the Radar Display on the <i>Sea-State</i> panel. The options are: <ul style="list-style-type: none"> • Vectors • Vectors and Current Color Map • Current Color Map • Depth Color Map • Vectors and Depth Color Map Note — Appears when optional HRC functionality is purchased and installed.
Observation Point	
Speed	Displays the current speed at the observation point in m/s.
Direction	Displays the current direction at the selected observation point. This is the direction in which the current is moving to, relative to the selected observation point.
Water Depth	Displays the water depth at the selected observation point.

19.6 Range

The *+ Range* and *- Range* toggle buttons change the range of the *Radar Display*. Click the *+ Range* toggle button to increase the range of the *Radar Display*. Click the *- Range* toggle button to decrease the range. The maximum range that can be selected is limited by the active pulse length selection.



Note 1— For the *sigma* S6 WaMoS® II application to accurately derive accurate sea-state and High Resolution Currents, it is required to operate the radar attached to the *sigma* S6 WaMoS® II System in Short Pulse mode. Operating in Medium Pulse and Long Pulse modes does not provide the required data resolution for accurate results for low to medium sea-states.

Note 2 — Changing the range using the *+ Range* and *- Range* toggle buttons located on the *WaMoS® II Display Panel* will also similarly change the range on the main *Radar Display Panel*. Likewise, changing the range using the *+ Range* and *- Range* toggle buttons located on the main *Display Panel* will also similarly change the range on the *WaMoS® II Radar Display Panel*.

19.7 Directional Frequency Spectrum

The *Directional Frequency Spectrum* area provides a visual representation of the directional frequency spectra analysis.

The *Directional Frequency Spectrum* displays the spread of energy levels relative to the maximum energy. During the spectra analysis, the entire spectrum is normalized relative to the maximum level, with a scale of 0.0 to 1.0 (0% to 100%). The maximum point on the spectrum is displayed in red, showing the direction where the wave energy originates and the period of that wave energy.

This display assists in determining the wave direction. The direction of the maximum energy indicates the direction from which the wave energy is travelling relative to the ships heading or relative to north.

Different wave systems measured by the *sigma* S6 WaMoS® II processing can be visually differentiated by interpreting the results displayed on the *Directional Frequency Spectrum*. The *Directional Frequency Spectrum* shows the derived wave period as a series of circular rings drawn onto it, with the wave period for each ring shown in a unit of seconds. Wave systems with a period of longer than 10 seconds are generally Swell Systems. Wave systems with a period of less than 10 seconds are typically Wind Sea Systems.

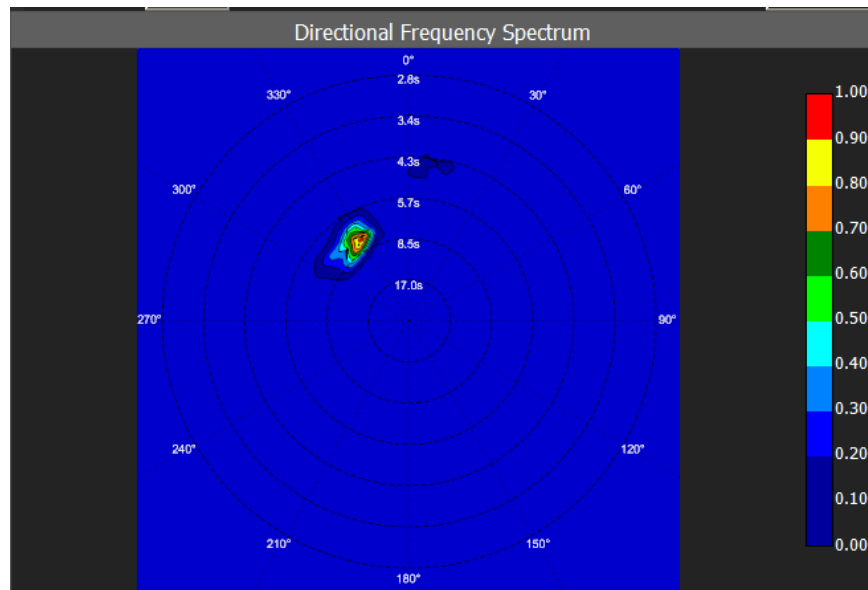


Note 1— It is common for multiple wave systems to be displayed on the *Directional Frequency Spectrum*. Typically, there will be one Swell system, and one Sea Wave system displayed, and one of those will be dominant of the other with respect to the energy (color) display. It is also possible to see more than one of each type of wave system (or some combinations of) in complex scenarios. This indicates multiple Wind Sea Wave systems and/or multiple Swell Systems. Section 19.1.3 describes the reasons behind such scenarios.

Note 2— During Commissioning, if the *sigma* S6 WaMoS® II application is set up for spatial averaging of the individual wave boxes, the displayed *Directional Frequency Spectrum* represents the average spectrum of all configured wave boxes. If spatial averaging is not selected during commissioning time, the *Directional Frequency Spectrum* specific to the wave box selected under the *Wave Box Selection* button is displayed.

Figure 19-4 displays the *Directional Frequency Spectrum* display.

Figure 19-4: Directional Frequency Spectrum display



19.8 Graphs

The *Graphs* area displays the *sigma* S6 WaMoS® II analysis history for specific parameters in a graph. The options are:

- **Frequency Spectrum E(f)**— Displays a graph of the frequency spectrum.
- **Wave History**— Displays the peak wave direction over the recording time.
- **Current History**— Displays the current speed and direction over the recording time.
- **Hs & Tp History**— Displays the significant wave height and the peak wave period over the recording time of the selected wave box.
- **H_{MAX} History**— Displays the peak wave H_{MAX} over the recording time of the selected wave box.



Note 1— If, during commissioning, the *sigma* S6 WaMoS® II application has been configured for spatial averaging of the individual wave boxes, the displayed

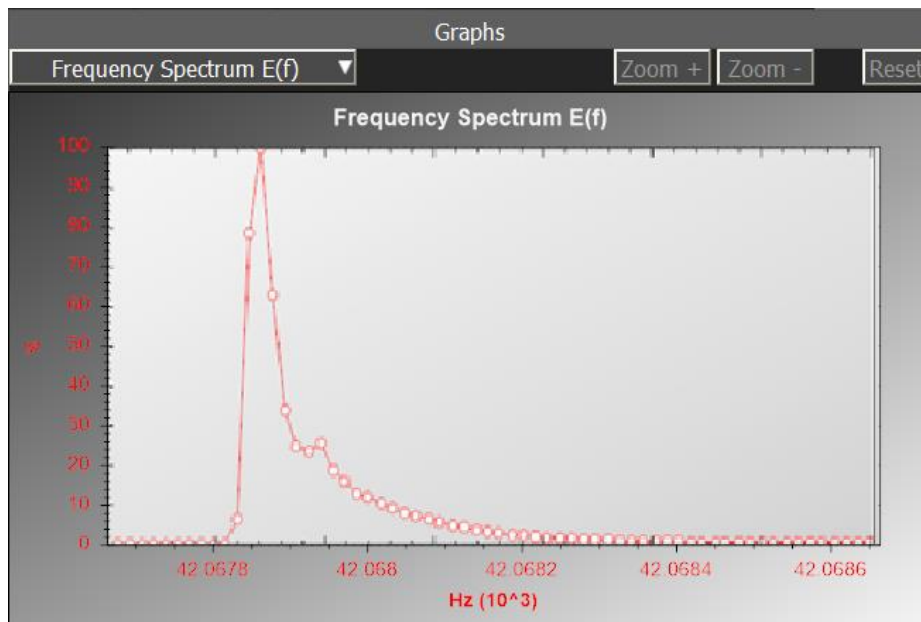
graphs show the average of all configured wave boxes. If spatial averaging was not configured, the displayed graphs are specific to the selected wave box.

Note 2— When operating in Playback mode, the system does not capture new data from the radar. During this time, the *sigma* S6 WaMoS® II processing is stopped, and no new wave and current data is recorded.

19.8.1 Frequency Spectrum $E(f)$

The *Frequency Spectrum $E(f)$* wave graph displays the mean wave energy by frequency over the recording time. Figure 19-5 displays the *Frequency Spectrum $E(f)$* graph.

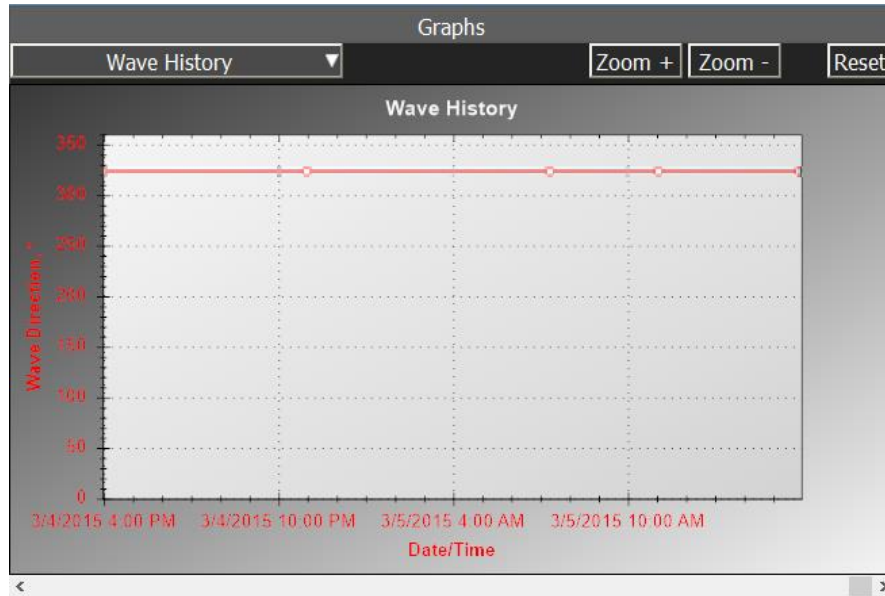
Figure 19-5: Frequency Spectrum $E(f)$ graph



19.8.2 Wave History

The *Wave History* graph displays the peak wave direction of the selected wave box over the recording time. Figure 19-6 displays the *Wave History* graph.

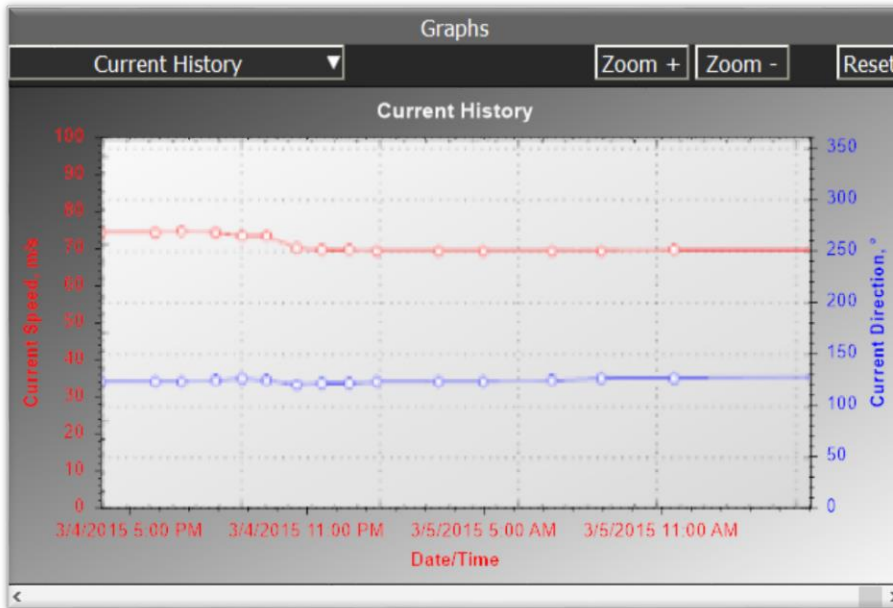
Figure 19-6: Wave History graph



19.8.3 Current History

The *Current History* graph displays the current speed over the recording time of the selected wave box. Figure 19-7 displays the *Current History* graph.

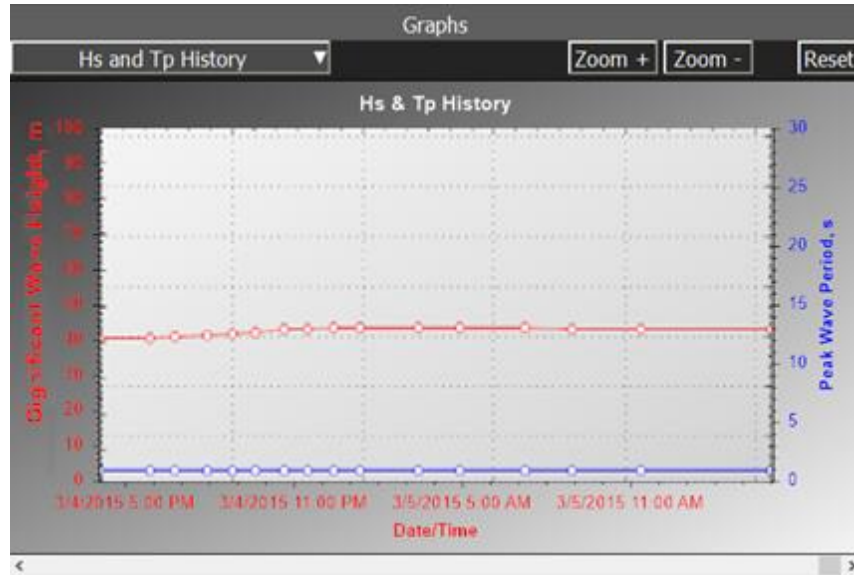
Figure 19-7: Current History graph



19.8.4 Hs & Tp History

The *Hs & Tp History* graph displays the significant wave height and the peak wave period over the recording time of the selected wave box. Figure 19-8 displays the *Hs & Tp History* graph.

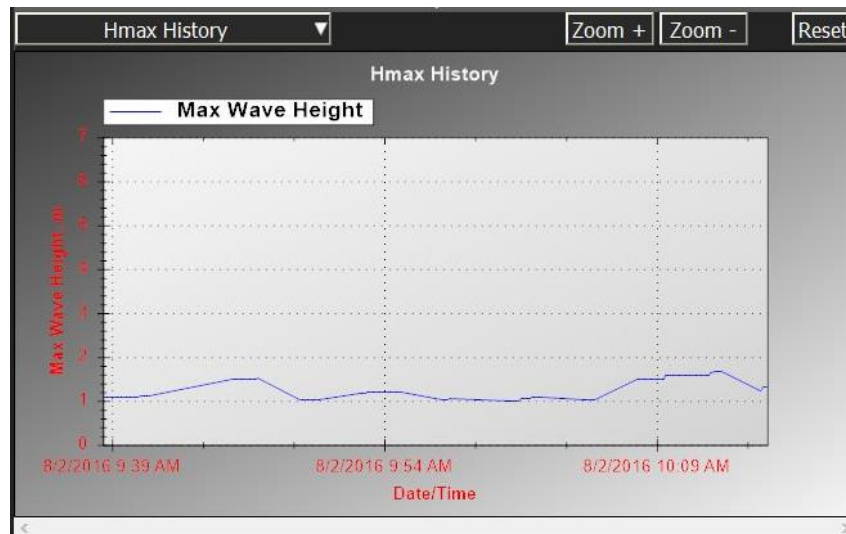
Figure 19-8: Hs & Tp History graph



19.8.5 H_{MAX} History

The *H_{MAX} History* graph displays the peak wave H_{MAX} over the recording time of the selected wave box. Figure 19-9 displays the *H_{MAX} History* graph.

Figure 19-9: H_{MAX} History graph.



20 Pulse Per Second

Some GPS receiver models have the capability to output an electrical signal called pulse per second (PPS). The PPS signal is a well-conditioned square wave, having a very sharply rising and falling edges, with a period of one second. PPS signals from GPS receivers, being stratum-0 sources, are often connected to data collection computers, such as the *sigma* S6 PC, used during scientific data collection trials for precise timekeeping of the captured data. It is noteworthy that a PPS signal is not a time source, rather is simply marks, very accurately, the start of each second according to the stratum-0 GPS receiver time.

Since the release of *sigma* S6 version 9.0.2, the *sigma* S6 WaMoS® II System may be commissioned such that if there is an available one second period PPS electrical signal, that signal may be injected directly into the RSi-5000 PCI card via a low-latency and low-jitter wire. This physical connection requires that the RSi-5000 PCI card be equipped with a PPS daughter card (RUT-03329) and that the RSi-5000 PCI card be programmed with the proper version of firmware (RUT-03131-BA or higher).

When the physical PPS connection is made to the PPS daughter card (mounted onto RSi-5000 card), it detects the PPS signals rising edge transition, and embeds that transition into the digitized raw radar data stream that is sent over the PCI bus. The digitized raw radar data stream is received off of the PCI bus into the *sigma* S6 Server application.

The *sigma* S6 Server application can record this digitized raw radar data stream, including the PPS signal and additional GPS and PC timestamp information, into the Raw Data Recording Module (if enabled) for future analysis. Also, the *sigma* S6 Server application will forward the digitized raw radar data stream, including the PPS signal and additional GPS and PC timestamp information, to the *sigma* S6 WaMoS® II application, where it is output into the WaMoS® II .POL file format, again for future analysis.

If interested in utilizing the PPS functionality available to the *sigma* S6 WaMoS® II System, please contact OceanWaveS GmbH technical support at the contact information located on the back cover of this document.



Note — The PPS function is not available on the *sigma* S6 WaMoS® II System when connected to a digital radar.

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21 SeaFusion

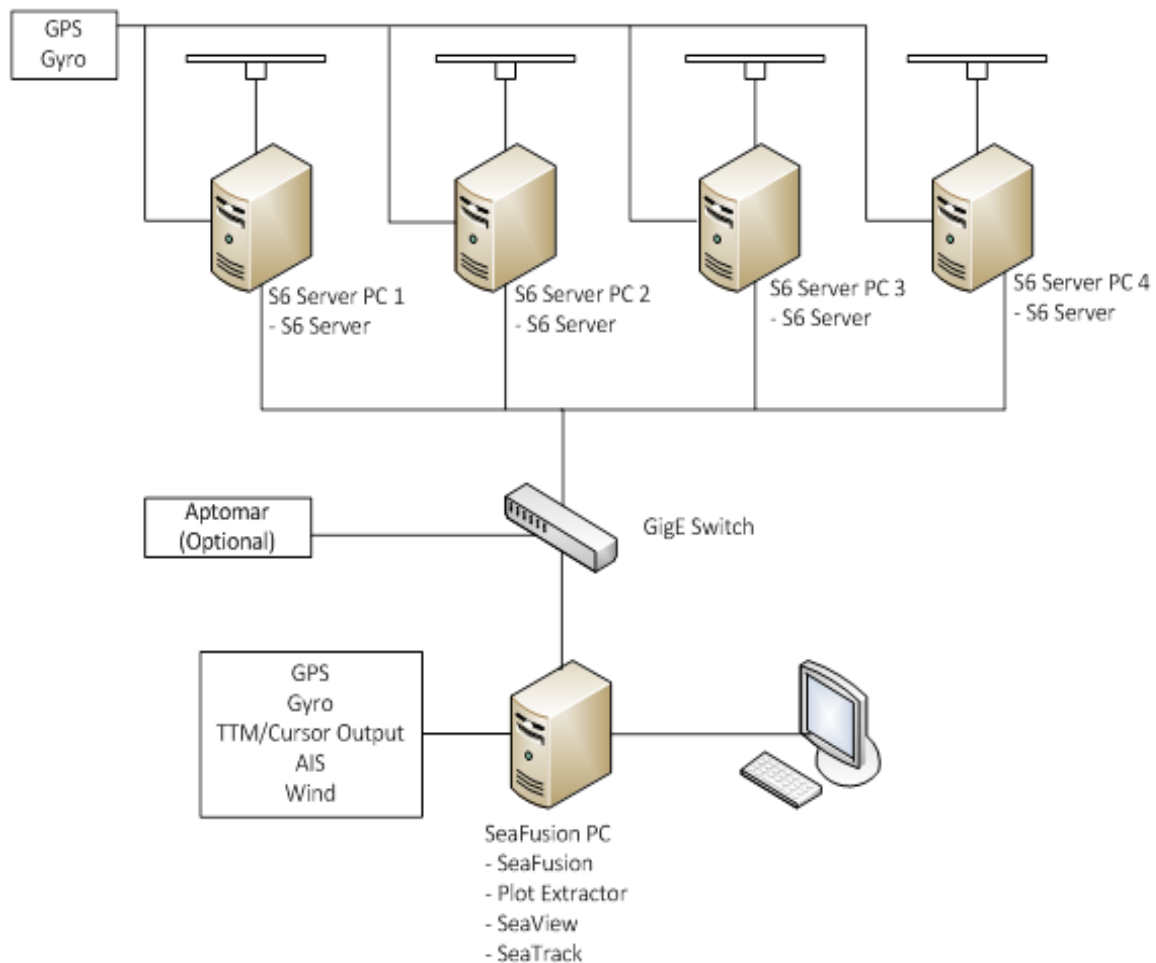
The *sigma* S6 SeaFusion System allows you to merge video data from two to four radars into a common radar image with a common track set derived from the merged radar image. The merged image and track set are displayed using SeaView.

21.1 Overview

Vessels and platforms often have multiple blind spots that require multiple radar antennas to provide complete coverage. The radars are configured to cover a specific area, with sector blanking enabled in areas where blind spots occur. Each radar provides partial image and plot data to a SeaFusion PC, where the data is merged into a common image and set of plots. Tracking operations are performed on the common set of extracted plots. The results are displayed to the operator using SeaView.

Figure 21-1 displays the network layout for the SeaFusion system using four radars.

Figure 21-1: Network layout for SeaFusion system with four radars



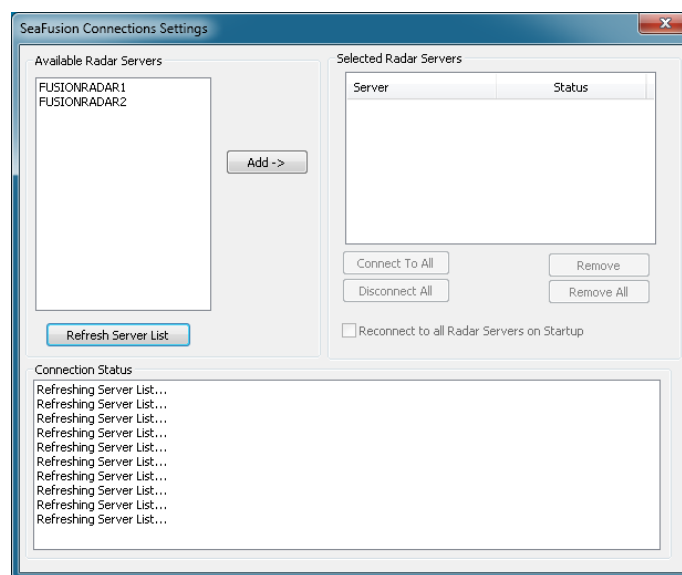
21.2 Connecting the SeaFusion System

Procedure 21-1 describes how to connect the multiple radars to the SeaFusion Server.

Procedure 21-1: To Connect to the SeaFusion system

1. Start the *sigma* S6 Server on each *sigma* S6 Server PC that you want to fuse data from.
2. On the SeaFusion PC, start the SeaFusion Server.
3. On the SeaFusion PC, right-click the SeaFusion Server icon in the system tray and select *Radar Server Connections...* from the pop-up menu. The *SeaFusion Connections Settings* window appears, as shown in Figure 21-2.

Figure 21-2: SeaFusion Connections Settings window



4. Select the *sigma* S6 Servers you want to connect to the SeaFusion Server:
 - i. In the *Available Radar Servers* list, select a radar server to connect to.
 - ii. Click the *Add ->* button. The server appears in the *Selected Radar Servers* list.
 - iii. Repeat substeps i and ii for the remaining radar servers you want to connect.
 5. Click the *Connect All Servers* button and close the window.
 6. On the SeaFusion PC, start SeaTrack and SeaView.
 7. Connect SeaView to the SeaFusion Server.
-

21.3 Master Control

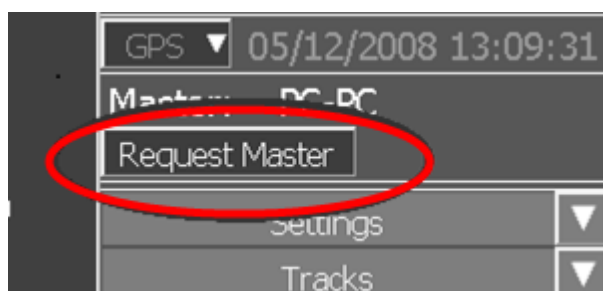
Only one SeaView client can control SeaFusion at a time. By default, the first SeaView client PC connected to the SeaFusion Server becomes the Master. All other SeaView client PCs are connected as slaves, with all controls locked.

A slave PC can gain Master Control of the SeaView system upon request. Procedure 21-2 describes how to gain Master Control of the SeaFusion system.

Procedure 21-2: To gain Master Control

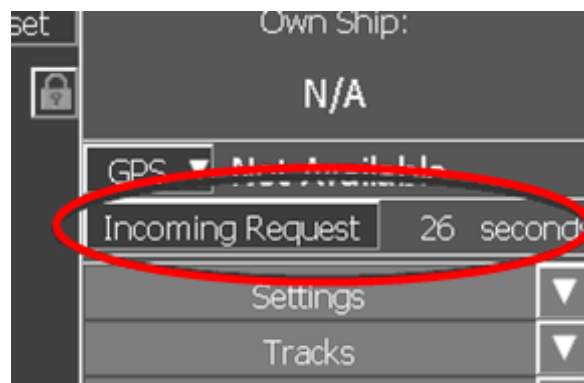
1. On the SeaView slave PC, click the *Request Master* button, as shown in Figure 21-3.

Figure 21-3: Request Master button



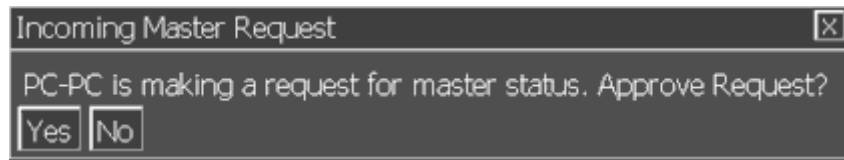
2. On the SeaView Master PC, the *Incoming Request* button appears with a countdown displaying the number of seconds before Master Control is transferred to the slave PC in step 1. Figure 21-4 displays the *Incoming Request* button and countdown.

Figure 21-4: Incoming Request button and countdown



-
3. Either:
 - a. Transfer Master Control immediately:
 - i. Click the *Incoming Request* button
 - ii. On the master PC, click the *Incoming Request* button. The *Incoming Master Request* dialogue box appears, as shown in Figure 21-5.

Figure 21-5: Incoming Request dialogue box



- iii. Click the *Yes* button. Master Control is transferred to the requesting PC.
 - b. Allow the countdown to conclude. Master Control is transferred to the requesting PC.
 - c. Decline the request:
 - i. On the master PC, click the *Incoming Request* button. A confirmation dialogue box appears.
 - ii. Click the *No* button.

21.4 Radar Control—Rutter Radar

The Radar Control panel allows you to control the radars attached to the SeaFusion Server.

Figure 21-6 displays the SeaFusion Radar Control tab for all servers.

Figure 21-6: SeaFusion Radar Control tab (all radars)



Figure 21-7 displays the Radar Control Tab with a selected radar.

Figure 21-7: Radar tab (radar selected)

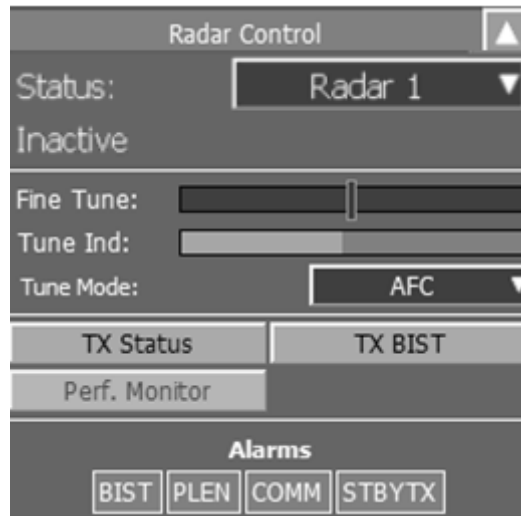


Table 21-1 describes the *SeaFusion Radar Control* tab.

Table 21-1: SeaFusion Radar Control tab

Field	Description
Status	<p>Displays the current mode of the radar transceiver(s). The modes are:</p> <ul style="list-style-type: none"> • Inactive—SeaView application is not connected to the transceiver. • Warm Up [XXX]s—The transceiver is connected to the SeaView application, and is in Warm Up mode. The message displays “Warm Up [XXX]s”, where [XXX]s is a count-up in seconds from 0 to 999. • Standby— The transceiver has completed its warm-up period. <p>Transmit—The radar is transmitting.</p>
<i>Radar list</i>	<p>Specifies the radar to control. The options are:</p> <ul style="list-style-type: none"> • All radars— All connected radars are controlled • Radar 1— Radar 1 is controlled. • Radar 2— Radar 2 is controlled. • Radar 3— Radar 3 is controlled. • Radar 4— Radar 4 is controlled.
Tuning Controls	
Coarse Tune	<p>Coarse tune—set during radar installation and commissioning, and is only available when SeaView is in Commissioning Mode and when a radar is selected from the <i>Radar list</i>.</p>

Field	Description
Fine Tune	Allows you to fine tune the microwave frequency of the radar receiver to maximize the amplitude of the received microwave echo.
Tune Ind	Displays the level of tuning. The farther the bar appears to the right, the better the radar is tuned.
Tune Mode	Specifies the tuning mode of the receiver. The options are: <ul style="list-style-type: none"> • AFC—Automatic Frequency Control. The system automatically tunes the receiver fine tuning. This is the normal operating mode for the radar. • Manual—Receiver tuning is manual. This should only be used under special circumstances. <p>Note—For normal radar operations, <i>Tune Mode</i> should be set to AFC.</p>
Radar Status	
TX Status	Opens the <i>TX Status</i> window. See Section 16.3.1 for more information.
TX BIST	Opens the <i>TX BIST</i> window. See Section 16.3.2 for more information.
Perf. Monitor	Opens the <i>Performance Monitor</i> window. See Section 16.3.3 for more information.
Sector Blanking	Opens the <i>Sector Blanking</i> window. See Section 16.3.4 for more information.
Radar Alarms	
BIST	Displays red when an alarm is raised. See Section 16.4 for more information
PLEN	
COMM	
STBYTX	
Alarm List	Lists the triggered alarms.

21.5 Radar Control—SAM NACOS

The SAM NACOS Radar Control panel allows the user to identify master or slave status and to request control if slave. The first client on the network to connect to the transceiver is the granted control. If you are the first client connected it will display Master. Any other clients will display Slave. See Figure 17-1: Radar controls on *Display Panel*. When the *Transmit* button is disabled, the transceiver is in Standby mode. When the *Transmit* button is enabled, the transceiver is in Transmit mode.



Note: The *Transmit* toggle button can only disable transmission **if the radar is not already transmitting**. It cannot disable transmission once the radar is initiated. If SAM NACOS radar is transmitting the only way to revert to standby is by terminating the *sigma* S6 Server application and ensuring no other clients are operating on the network.

Figure 21-8 displays the SAM NACOS Radar Control tab.

Figure 21-8: SAM NACOS Control tab

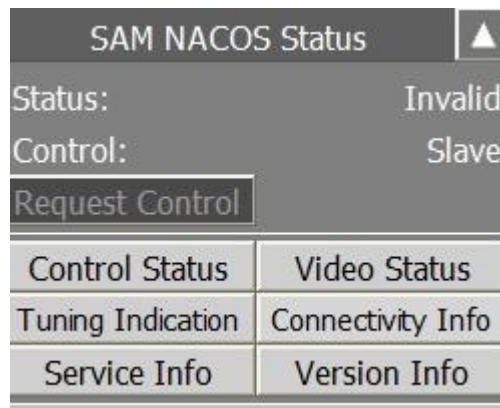
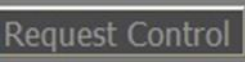


Table 21-2 describes the *SAM NACOS Radar Control* tab.

Table 21-2: SAM NACOS Radar Control

Field	Description
Request Control 	This toggle button when enabled allows SeaView to request <i>Master</i> control of the radar

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Appendix A— Theory of Operation

The *sigma* S6 WaMoS® II System has several types of filters/data processing functions that can be used to clean up *Radar Displays* in various ways, allowing you to interpret and extract useful information from the radar data. The following Sections give supplementary detailed information about these SeaView filters and data processing functions.

A.1 Scan Averaging

Scan Averaging is a technique for enhancing the view of very small slow moving targets; targets lost in sea clutter; and faint or intermittent targets in heavy seas.

The advantages of Scan Averaging include:

- Improved detection of small, slow-moving targets
- Removal of uncorrelated signals caused by sea clutter and interference

Scan Averaging is the process of averaging the intensity values of corresponding pixels from consecutive scans. This process emphasizes low intensity targets that appear in many consecutive scans and fades out high intensity targets that only appear in one or two scans.

To compensate for platform motion, the *sigma* S6 Server application retrieves current position information from the GPS device. It uses this data to remove the relative motion from each of the processed scans. This function is called “Motion Compensation”.



Note—Motion Compensation should only be disabled if the radar is on a fixed platform). If motion compensation is disabled and the radar is on a fast moving ship, or if a large number of scans are being averaged, then stationary radar targets will appear blurred as target display is spread along a range equal to the distance traveled during scan integration.

With the *sigma* S6 WaMoS® II System, up to 8 scans can be averaged.

A.2 Sea/Rain (CFAR) Filtering

Sea/Rain filtering is also known as CFAR filtering (Constant False Alarm Rate). This filter removes range dependence and local clutter background from the *Radar Display*. This filter makes the probability of detection (typically measured by a target being brighter than a fixed threshold) equal for all parts of the image.

The Sea/Rain filter calculates the average local radar signal level and then subtracts this average from the local signal level. The filter is applied across samples within one radar pulse but is NOT applied across radar pulses. This filter uses an ordered statistic CFAR to generate the background estimate. The “ordered statistic CFAR” estimates the background level by sorting the samples according to amplitude and then choosing a value as the background estimate.

A.3 STC Filter (Sensitivity Time Control)

The *STC* filter reduces the gain of the video signal at close range where maximum sensitivity is not generally required. This allows the operator to increase the overall gain for more sensitivity at farther ranges which increases the likelihood of weak target detection at longer ranges.

The *STC* filter is a range-dependent, video-signal-gain reduction control. The amount of video signal gain reduction applied varies over the distance from the radar center. The filter provides maximum gain reduction at zero range (i.e. image center). The amount of gain reduction applied decreases in a linear manner with increasing range (i.e. distance from image center). The farther away from center the less gain reduction is applied until the maximum range of the filter is reached where there is no gain reduction applied. The filter's maximum gain reduction value is set by the Clutter Suppression parameter in the *STC Settings* pop-up window. The maximum range affected by the filter is set by the Range parameter in the *STC Settings* pop-up window.

A.4 Pulse Filtering

The Pulse filter reduces signal interference caused by system noise and by the presence of other operating radars. The unfiltered interference from other radars can appear as radial streaks (blurred lines) in the *Radar Display*. The filter works by averaging video intensity across a group of adjacent samples in consecutive radar pulses (i.e. a group of adjacent samples in the Azimuth dimension). This type of averaging, enabled by the *Filter* toggle button in the *Video Processing* control set of the *Display Panel*, diminishes the radial streaks caused by noise and interference.

The Pulse filter uses a uniform-weight integrator to perform the pulse-to-pulse processing. The internal resolution of the integrator ensures that there is no loss of image grayscale resolution. The number of samples that the filter algorithm integrates at one time is called the filter's "window length." The window length is calculated from the radar PRF, antenna rotation speed and beam width. This calculation allows the integrator to be matched to radar characteristics.

Appendix B— *sigma* S6 Connect

B.1 Overview

The *sigma* S6 WaMoS® II System may be optionally configured to periodically output geospatial information including georeferenced radar video images and derived information such as tracks, oil spill outlines, etc. Depending on how the system was commissioned, the following items are output into the designated file system folder:



Note— The *sigma* S6 System offers the option on commissioning of saving radar video image files using one of two file naming formats:

Indexed files use the file-naming format (e.g. S6_OUT[0..n]) where “n” is a preset maximum number of image files to save before the *sigma* s6 system will stop recording radar image files or loop back to begin saving the newest files over the oldest files.

GPS data/time files use the file-naming format (e.g. S6_OUT2015_11_30_15_18_19.tif) in which a user-defined and configured amount of hard drive space is available for recording. Once this allocated space is full the *sigma* s6 system will either stop recording radar image files or loop back to begin saving the newest files over the oldest files.

B.2 File Formats

B.2.1 Radar Video Image File Formats

GeoTIFF – tagged image file format with embedded georeferencing information, e.g. S6_OUT[0..n].tif, where n is the maximum number of files to retain.

PNG – portable network graphics file format, e.g. S6_OUT[0..n].png. This format does not include georeferencing information but is suitable for overlaying onto a georeferenced context such as may be provided by Google™ earth or similar applications.

JPEG – joint photographic experts group file format, e.g. S6_OUT[0..n].jpg . This format also does not include georeferencing information. Like the PNG format, is suitable for image overlays.

B.2.2 Vector Data File Formats

Vector data files may also be configured to be output by the system. Depending on product type, the system can be commissioned to include: targets, tracks, oil spill outlines, manual ice outlines, *sigma* S6 WaMoS® II HRC data, *sigma* S6 WaMoS® II wave data and cursor annotations in each vector file it creates. The following formats are supported:

GML – Geography Markup Language, the XML grammar defined by the Open Geospatial Consortium to express geographical features. E.g. S6_OUT[0..n].gml. When GML is configured as an output option, the system will simultaneously generate an XML Schema Definition (XSD) file. This file is used to define and describe the contents of the associated GML document.

KML – Keyhole Markup Language, the XML notation used to display geographic data in mapping applications such as Google™ earth. E.g. S6_OUT[0..n].kml

DXF™ – Drawing eXchange Format, a tagged data representation of spatial information created by the Autodesk Corporation for use in AutoCAD® software. DXF™ is widely supported by many image manipulation applications. E.g. S6_OUT[0..n].dxf

ESRI – a geospatial vector data format developed and managed by Esri. It is used for interoperability among Esri and other GIS software products. E.g. S6_OUT[0..n].shp

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