VideoRay Basic Workspace Manual

Date: 06.09.2020

Software Version: 4.0.3

Document Version: 003

Table of Contents

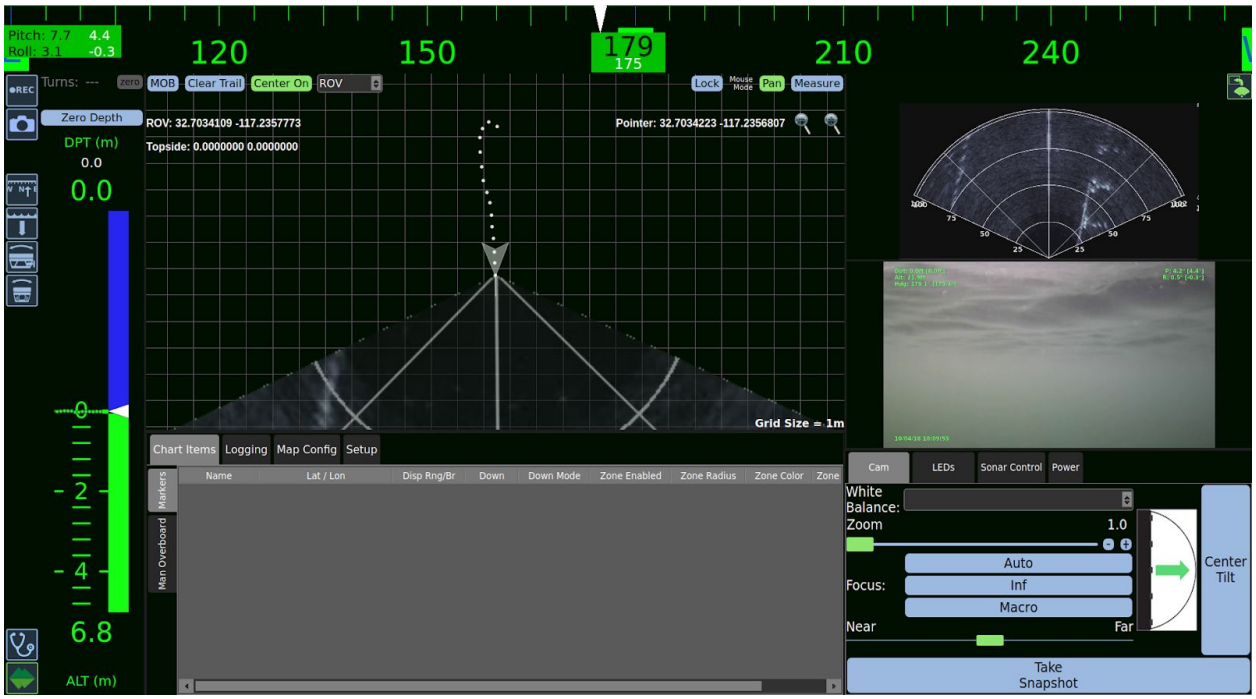
Proprietary and Confidential Information

Revision History

Revision	Initials	Date	Comments
001	CB	04.28.20	Initial doc adapted from the VR EOD Workspace Manual
002	CB	05.28.20	● 2.2, 2.4.1 - Added note the jitter that can occur with the depth gauge, this is expected behavior. ● 2.9 Systems using a USBL - Added section. ● 2.10.4.1 Declination Subtab - Added new image. Reworked section for clarity. ● 5.2.4 Sonar Mode - Corrected Image
003	CB	06.09.2020	● Updated Software version number to match released software. ● Removed 2.10.3.2.3.3 Hide Waypoint Text

1 What you Will Find in This Guide

Greensea's Workspace represents years of development resulting in a robust, user-oriented platform to complete mission objectives. Workspace allows operators to use a single screen interface to easily direct and maneuver your vehicle and quickly adapt to changing mission objectives. It is designed and able to be used on multiple devices and configurations.



This guide is separated into five sections: Flight View, Dynamic Waypoint Positioning, Diagnostics View, Alarms, and Controller Mapping.

1.1 Flight View

Flight View is the operational side of Workspace. It is the primary view that you will interact with as you plan, conduct, and review missions. This section will describe the functions available in Flight View.

1.2 Diagnostics View

The Diagnostics View is used to access the functions and systems of the vehicle. If you are trying to diagnose an issue with your sensors, this is the place to start.

1.3 Alarms

Alarms are a visual alert that will trigger when specific criteria are met. These can be based around any signal, this can include things like the vehicle reaching a certain depth, or a loss of comms. This section will describe the alarms on your system.

1.4 Controller Mapping

This section details the controller inputs and modes when using either the IP65 or XBOX Controller.

2 Flight View

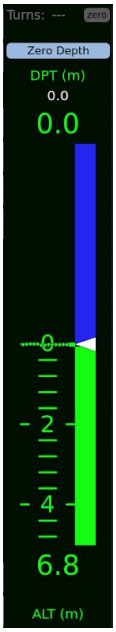
Flight View is what you will be using for the majority of the time when performing tasks and completing operations. All navigational readouts and tools for directing the vehicle and planning missions are found in this view.

This section is organized by the widgets that are a part of Flight View and describes their functions.

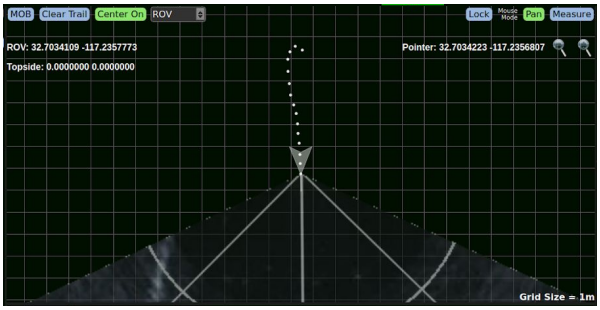
Heading Bar

Control Bar

Depth & Altitude Bar



Mission View



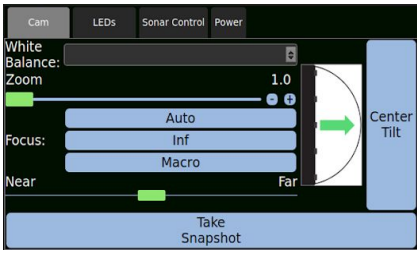
Sonar & Video View

Mission View Tools

(Appears at the bottom of Mission View)

Control Tools

(Appears at the bottom of Sonar and View View)

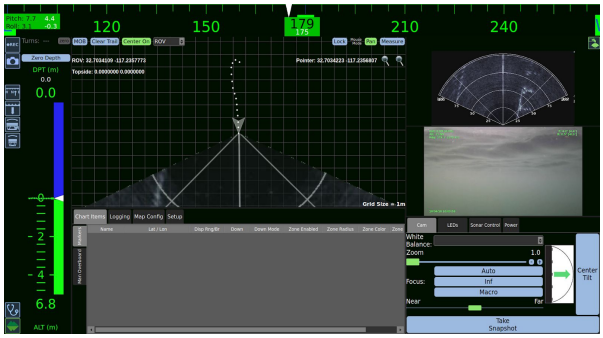


2.1 Cycling Views

You are able to cycle through default Workspace views using the F1 - F6 keys.

F1 - Default View

- Returns Flight View to its default state.

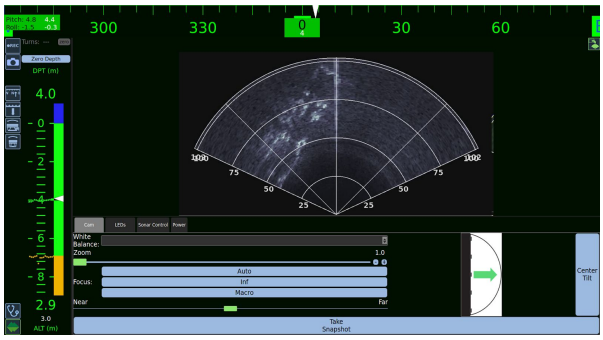


F2 - Video View

- Focuses on Video
- Areas shown
  - Video
  - Heading Bar
  - Control Bar
  - Depth and Altitude

F3 - Sonar View

- Focuses on Sonar
- Areas shown
  - Sonar
  - Heading Bar
  - Control Bar
  - Depth and Altitude

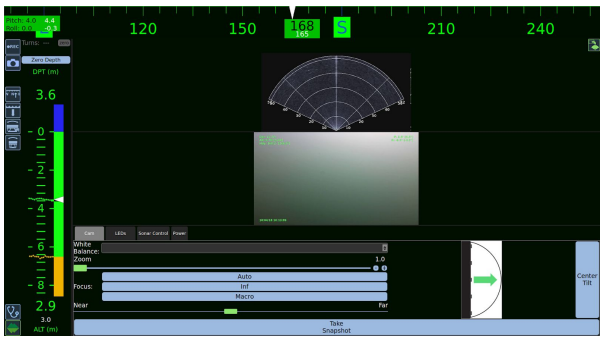


F4 - Mission View

- Focuses on Mission View
- Areas shown
  - Mission View
  - Heading Bar
  - Control Bar
  - Depth and Altitude

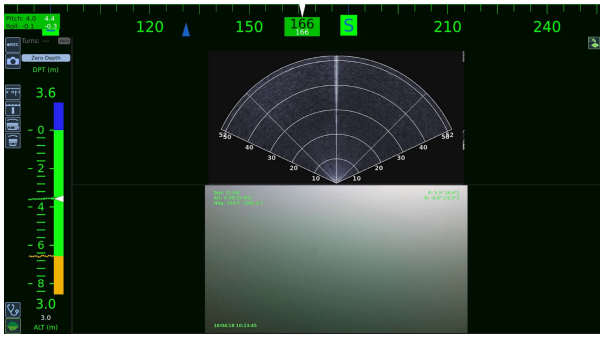
F5 - Sonar and Video View

- Focuses on Sonar and Video Together
- Areas shown
  - Sonar and Video
  - Heading Bar
  - Control Bar
  - Depth and Altitude



F6 - Show/Hide Control Tools

NOTE: Will only be shown in views that include sonar or video.



2.2 Heading Bar

The Heading Bar displays the vehicle pitch and roll, heading, course over ground, and any alarms that are currently active. The compass is centered on the current vehicle heading.

2.2.1 Heading

The current heading is displayed in black. If auto-heading is enabled, there will be a smaller number displayed using white text beneath the Current Heading, this is the Vehicle's Heading Setpoint. The setpoint is also known as the commanded heading.

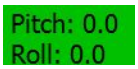
Auto-heading Disabled

Auto-heading Enabled

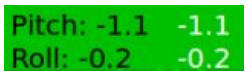
2.2.2 Pitch and Roll

The vehicle's current pitch and roll is displayed in black text. If auto-pitch and roll is enabled, there will be a smaller number in white to the right of the current pitch and roll. These are the pitch and roll setpoints.

The pitch setpoint can be controlled from the hand controller. The roll setpoint can be locked at the current position or zeroed using the hand controller.



Auto-Pitch and Roll Disabled



Auto-Pitch and Roll Enabled

2.2.3 Alarms

Alarms will appear on the right side of the Heading Bar. For more information about alarms, please see section 5 Alarms.

2.2.4 Compass Markers

There are two compass markers or "carrots" displayed on the Heading Bar. These markers may or may not be displayed depending on the orientation of the vehicle and if you are using auto-heading.

	Heading Setpoint	The commanded heading. This is only visible if Auto Heading is enabled.
	Course Over Ground	This is the direction your vehicle is currently traveling and is independent of Heading. The Heading Bar prioritizes vehicle heading, so the Course Over Ground marker will not always be displayed. Instances where this might occur include if the vehicle is lateralling or traveling backwards.

2.3 Control Bar

The Control Bar is a collection of icons toggle used to access vehicle functions and toggle navigation modes for the vehicle.

Each Icon in the control bar can have three possible states.

- Enabled - When the icon is green, the function is enabled.
- Disabled - When the icon is blue, the function is disabled.
- Inactive - When the icon is gray, the function is unavailable.

Icon	Name	Function
	Record	Toggles mission logging. When enabled, the icon will turn green, and Logging will appear at the top of Mission View.
	Screenshot	Take a screenshot of the current Workspace View.

Icon	Name	Function
	Auto-heading	Toggles auto-heading. When enabled, the vehicle controls will use the heading setpoint to direct the vehicle. The initial setpoint will use the current heading.
	Auto-depth	Toggle auto-depth. When enabled, the vehicle will maintain and follow the depth set point. This will start with the current depth. **NOTE:** Due to the limitations of hardware on the basic system, the Depth may appear jittery on the depth gauge.
	Auto-Pitch	Toggles Auto-Pitch. When enabled, the vehicle will maintain and follow the Pitch setpoint. Pitch can be controlled and zeroed from the hand controller.
	Auto-Roll	Toggles Auto-Roll. When enabled, the vehicle will maintain its current roll. Roll can be zeroed from the hand controller.
	Diagnostics View	Changes to the diagnostic view.
	Flight View	The default Workspace View, this will be used for day-to-day vehicle operation.

2.4 Depth and Altitude Bar

The Depth and Altitude Tracker Bar tracks the depth and or altitude of the vehicle. These are tracked in Meters or Feet depending on your settings, which are applied from the Mission View Tools.

2.4.1 Depth

The vehicle's current depth is displayed at the top of the tracker. If Auto-depth is enabled, the depth setpoint will be displayed as a white number above the current vehicle depth. The setpoint is the current commanded depth of the vehicle, the setpoint will be shown as a white marker on the depth and altitude bar.

NOTE: Due to the limitations of hardware on the basic system, the Depth may appear jittery on the depth gauge.

2.4.2 Altitude

The vehicle's current altitude is displayed at the bottom of the tracker. If Auto-altitude is enabled, the altitude setpoint will be displayed as a white number below the current vehicle altitude. The setpoint is the current commanded location of the vehicle, the setpoint will be shown as a white marker on the visual tracking bar.

2.4.3 Vehicle Setpoint

The vehicle setpoint is shown by both a white number and white marker on the visual tracking bar. This is the commanded depth (or altitude) the vehicle will attempt to achieve and hold.

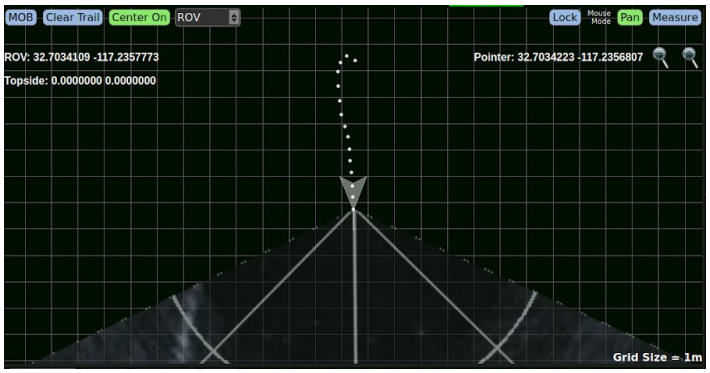
2.4.4 Visual Tracking

The vehicle's current and recent historic vertical position is tracked by the green dots or breadcrumbs, the spacing of these dots can be used to show how fast or slow the vehicle is moving vertically. If you have achieved bottom lock with the Doppler Velocity Log (DVL) you will see the bottom tracked with orange breadcrumbs.

The vehicle tracking meter bar displays three colors:

- Blue - Showing above water.
- Green - Showing the water.
- Orange - Tracking the location of the bottom.

2.5 Mission View



Mission View is a 2D display that shows the vehicle, ship, and the vehicle's position, ship's position, and any active charts that have been imported. You will be using Mission View to plan and conduct missions.

2.5.1 Heads-Up Display (HUD)

The Mission View HUD is superimposed across the four corners of the Mission View. It can be enabled or disabled from using the Mission View Tools under the Map Config tab, in the Misc. subtab.

The top-left HUD shows the vehicle position.

The top-right HUD shows the current coordinates of the cursor.

The bottom-left HUD shows the results of the last measurement taken with the Measure Tool.

The bottom-right HUD shows the current scale of Mission View.

2.6 Mission View Controls

The top of Mission View includes several controls. Their functions are described below.

2.6.1 MOB (Man Overboard)

Man Overboard (MOB) is a specialized marker that saves vehicle location, attitude, and time created.

To create a MOB marker, click the MOB button in the top-left corner of Mission View. Unlike standard markers, the MOB records instantaneous vehicle attitude and position when the button is pressed.

Man Overboard Marker appears as a green triangle beneath the vehicle with the triangle pointing in the direction of the vehicle heading when the MOB was created.

MOB marker data is stored in the Man Overboard tab under Chart Items in the Mission View Tools.

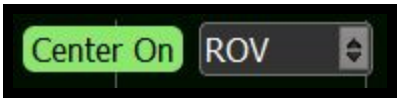
If Display Range/Bearing is enabled from the MOB tab on the navigation menu, it will display in the upper-left corner of Mission View.

2.6.2 Clear Trail

Clicking this button will clear the vehicle breadcrumb trail on the map. It will preserve all Markers and Waypoints.

2.6.3 Center On

When enabled (highlighted green), Center On will keep the Map focused on the item selected from the dropdown to the right, in the case of the example to the right, the map will be focused on the ROV. The map will continue to snap the ROV to the center of Mission View whenever it moves off the visible area, or you move the map away from the ROV.



There is an alternate Center On mode, the True mode will keep the vehicle in the center of Mission View. This is changed from the Mission View Tools.

2.6.4 Lock

Locks all waypoints and markers. When a lock is active, it will be colored green.

2.7 Mouse Modes

2.7.1 Pan

Pan mode allows you to use the mouse to pan Mission View. It is enabled by default. When enabled, you click click and drag the mouse to move the map.

NOTE: If you have Center On True enabled, you will be unable to move the map. If you are using Center On Bounded, Mission View will snap back to the object you are centered on. This is described in 3.10.5.3.2 Center Mode True.

2.7.2 Measure

The Measure tool allows you to click and drag the mouse to measure the distance and heading between the point clicked and the point the mouse was released. After measuring, the coordinates of the two points will display in the bottom left corner of Mission View, the distance between and bearing between the two points will appear at the termination of the measurement. These will remain on screen until the map is clicked again.

2.8 Mission View Pop-Up Menus

By right-clicking locations and objects in Mission View, you are able to open a menu of options allowing you to quickly interact with items in Mission View.

2.8.1 Map Pop-Up Menu

By right-clicking an open area on Mission View, a general pop-up menu with the following selections.

Menu Item	Description
Add Marker	Creates a marker at the selected location.
Copy Position	Copies the latitude and longitude location of the cursor.

2.8.2 Marker Pop-Up Menu

Right-clicking a marker opens a pop-up menu with the following options.

Option	Description
Delete Marker	Deletes the selected marker.
Show/Hide Safety Zone	Toggles the display of the safety zone surrounding the Marker. A Safety Zone is a visual indicator on Mission View noting an area to be cautious of. **NOTE:** The Safety Zone is a visual reminder only, and will not prevent the vehicle from entering the area if commanded.

2.9 Systems using a USBL

Some Basic systems may come with an Ultra-Short Baseline or USBL to assist with vehicle positioning. If your system is using a USBL your vehicle position will update itself regularly in mission view. It is important to note that the USBL is only used as an estimate for the vehicle's position and may appear to move even if the vehicle itself is stationary.

CAUTION

If you have a vehicle with a USBL and the vehicle moves out of the USBL's line of sight for more than a few seconds, such as when surfacing, the vehicle position may snap to position 0,0. Once it returns to the USBL's line of site it will return to its estimated position.

2.10 Mission View Tools

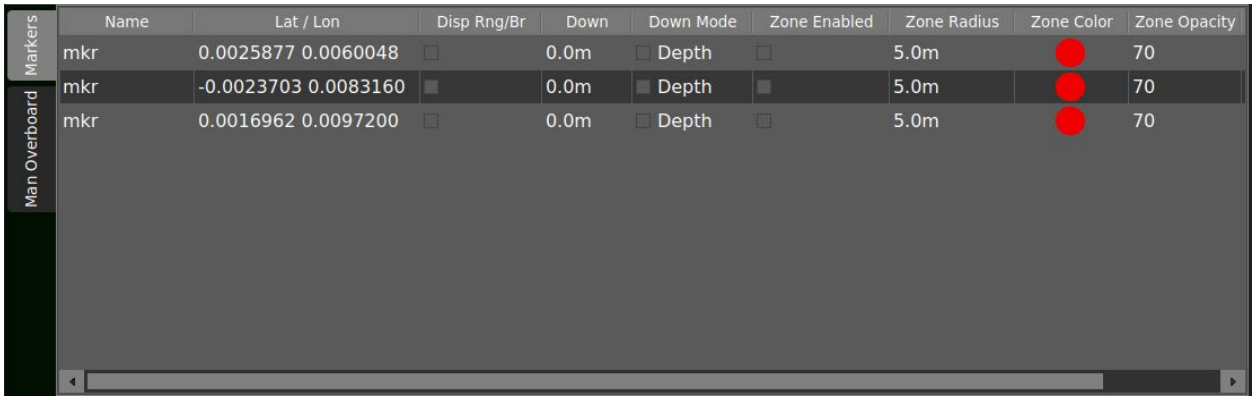
The Mission View Tools are located at the bottom of Mission View and are usually hidden. It can be accessed by either hovering over the bottom of Mission View, or by using the drag handle at the bottom of Mission View. It is made up of four tabs: Chart Items, Logging, Map Config, and Setup.

2.10.1 Chart Items Tab

The Chart Items tab allows you to interact with markers appearing on Mission View.

2.10.1.1 Markers Subtab

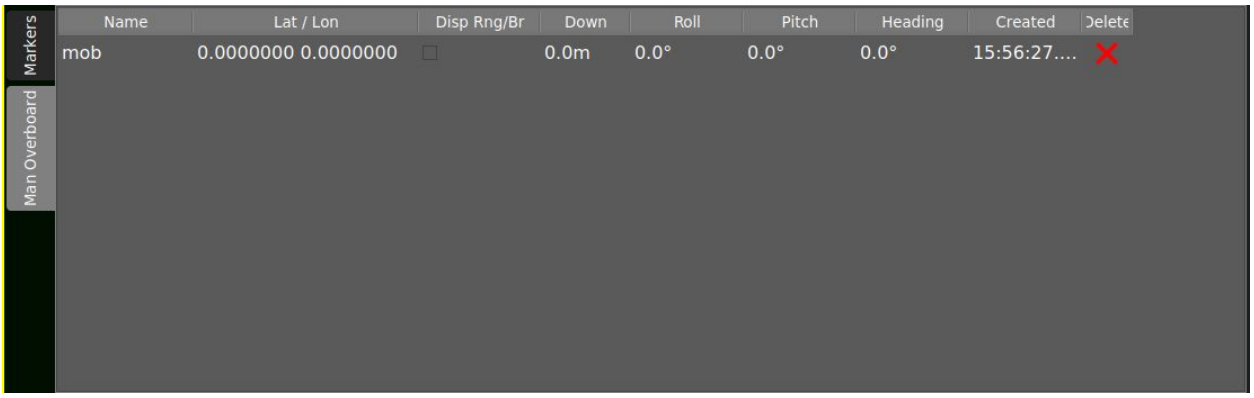
Lists all markers currently in Mission View. Marker properties can be edited by double-clicking the fields in the table shown below.



Field	Description
Name	Unique identifier given to a specific marker.
Lat/Lon	The marker's latitude and longitude, measured in degrees.
Disp Rng/Br	Shows or hides the range and bearing of a marker in the top left HUD.
Down	The vertical position of the marker. This is either measured from the surface or the bottom as dictated by the Down Mode.
Down Mode	Toggles how the vehicle's vertical position is measured. The field displays the current down mode. Depth measures from the surface, Altitude measures from the bottom.
Zone Enabled	Enables or disables a Safety Zone displayed on the marker.
Zone Radius	Sets a Safety Zone radius around the marker.
Zone Color	The color of the Safety Zone around the marker. The color can be changed by double-clicking on the circle and selecting a new color from the menu that appears.
Zone Opacity	Changes the shading of a Safety Zone. A higher zone opacity will result in a more darkly shaded zone. This can be changed by double-clicking the zone opacity field, pressing the up and down arrows, or manually entering the desired value.
Delete	Removes a marker from the map by clicking the red 'X' in the delete field.

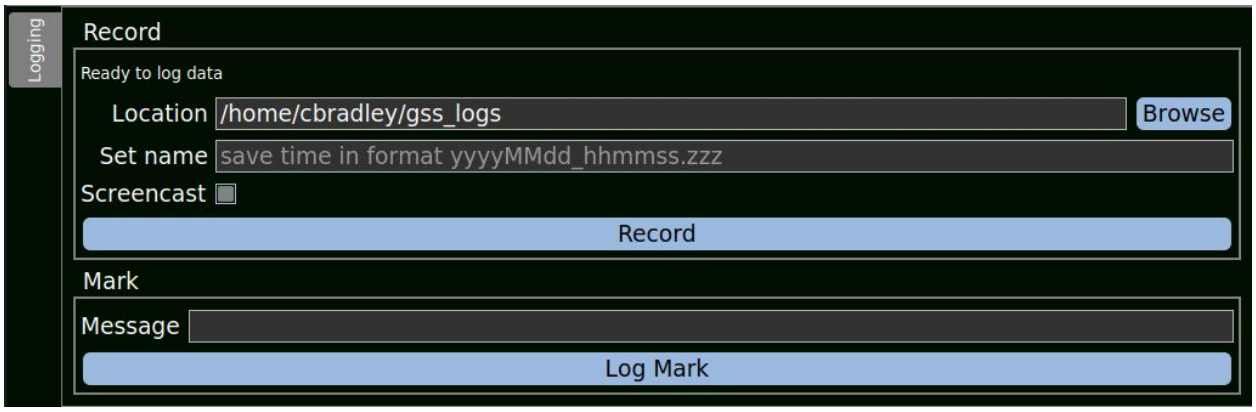
2.10.1.2 Man Overboard Subtab

Lists all MOB markers. Each MOB property can be edited by double-clicking the field in the table shown below.



Field	Description
Name	The default for a MOB marker is mo
Lat/Lon	The vehicle's latitude and longitude when the MOB button was clicked.
Disp Rng/Br	Enables or disables the Range and Bearing of the MOB marker in relation to the vehicle in the top left HUD.
Down	The vertical position of the marker.
Roll	The roll of the vehicle when the MOB button was clicked.
Pitch	The vertical tilt of the vehicle when the MOB button was clicked.
Heading	The heading of the vehicle when the MOB button was clicked.
Created	The system time when the MOB button was clicked.
Delete	Removes the MOB from the map by clicking the red 'X' in the delete field.

2.10.2 Logging Tab



NOTE: Logging can be more quickly initiated by using the Rec Icon found on the Control Icon Menu.

2.10.2.1 Record

Starts mission recording of your current Workspace session. The record button toggles the recording of data. The log will be saved in the location dictated by the Location field. When recording, Workspace will create three files: a telemetry file and two MP4 videos of the video feed and the sonar feed.

NOTE: Stop logging prior to closing Workspace.

2.10.2.2 Screencast

When the screencast checkbox is checked, Workspace will create a third MP4 file when taking a log. This MP4 is a video log of Workspace as it was being used by the operator.

NOTE: You may notice a visual slowdown when recording a screencast.

2.10.2.3 Mark

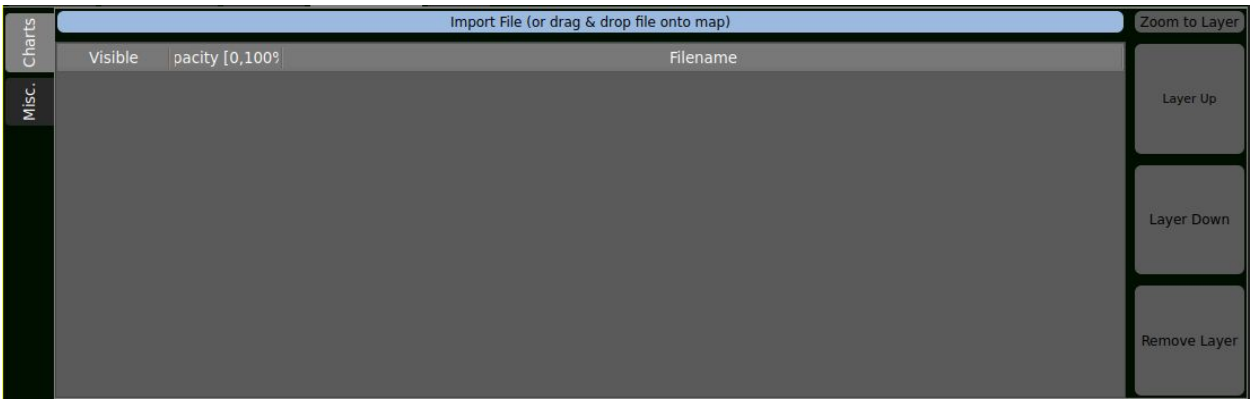
Clicking the Mark button creates a LCM signal on a channel called BALEFIRE_LOG_MARK marking a point in time during a log. These marks can be seen using the Convert to CSV tool. This can be used to note an event that has occurred during a recording.

2.10.3 Map Config Tab

The Map Config tab allows you to edit the information displayed on the map.

2.10.3.1 Charts Subtab

The Charts Subtab allows you to add, edit the visibility of, and move the Chart Layers in Mission View.



2.10.3.1.1 Chart Visibility

From the Visible Column, you can toggle whether or not a chart is displayed. The checkbox indicates that the chart is currently visible, if unchecked, the chart will be hidden.

2.10.3.1.2 Chart Opacity

The Opacity field allows you to adjust the opacity of the selected chart layer. By double-clicking the field, you are able to adjust the opacity of the selected chart.

2.10.3.1.3 Zoom to Layer

The Zoom to Layer button moves and adjusts the focus of Mission View to center on and fit the entirety of the selected chart in the view.

2.10.3.1.4 Layer Up / Layer Down

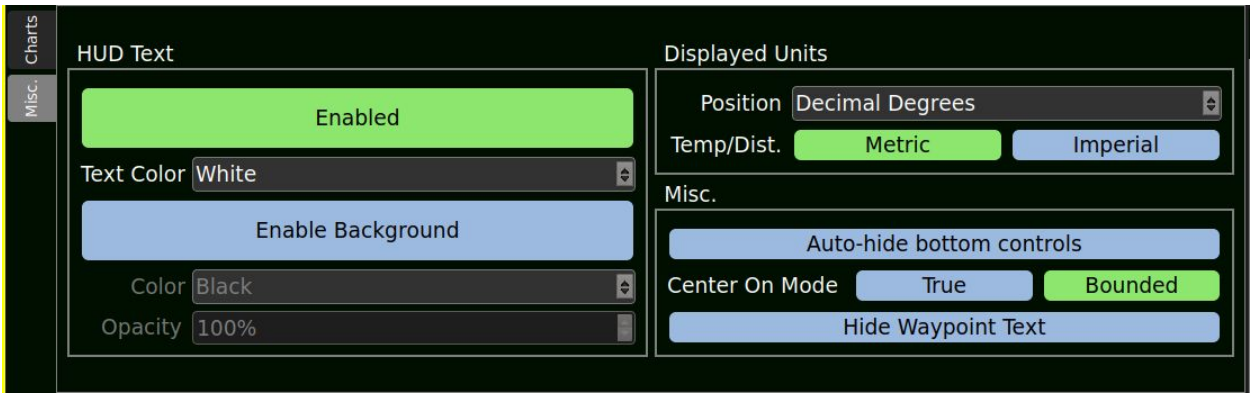
The Layer Up and Layer Down buttons move the selected chart up or down in the chart stack.

2.10.3.1.5 Remove Layer

Deletes the selected chart layer from Mission View.

2.10.3.2 Misc. Subtab

The Misc Subtab allows you to configure the Heads-Up Display, displayed units, and button display preferences.



2.10.3.2.1 HUD Text

The HUD text enables or disables the text overlay on Mission View. You can also select the color of the text.

Background color and opacity can be set from a menu of colors based on your preference.

2.10.3.2.2 Displayed Units

Position can be displayed in Decimal Degrees; Degrees, Minutes, Seconds; Degrees, Decimal Minutes; and UTM. As well, you can choose between Imperial and Metric units for Temperature and Distance.

2.10.3.2.3 Misc.

2.10.3.2.3.1 Auto-hide bottom controls

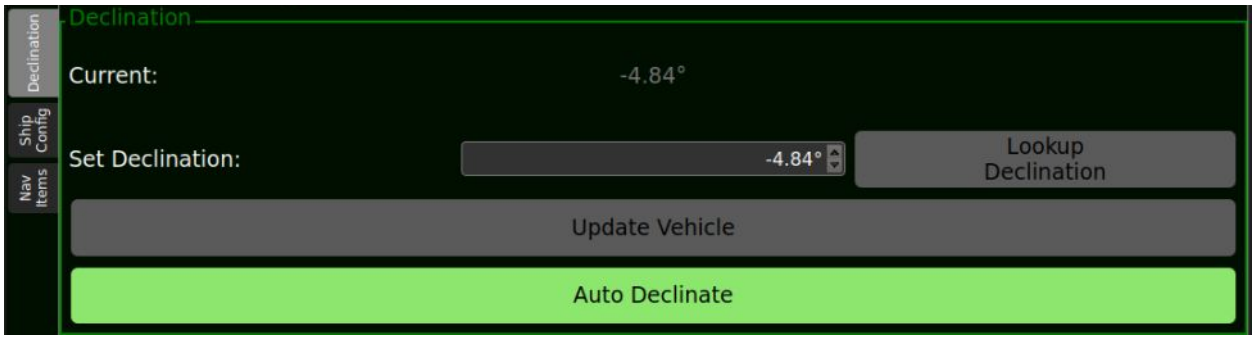
Auto-hide bottom controls will toggle the Mission View Tools to be hidden by default. Once hidden, the menu can be accessed by moving your cursor on the bottom of Mission View.

2.10.3.2.3.2 Center Mode True

Center Mode True disables the Pan Mouse Mode and keeps the selected vehicle in the center of the map at all times.

2.10.4 Setup Tab

2.10.4.1 Declination Subtab



2.10.4.1.1 Auto Declinate

This button enables Auto Declination; when enabled, the widget will listen for a valid GPS message. If successful, the resulting declination will be pushed down to the vehicle and be posted as both the "Current" and "Commanded" declination values. If the lookup fails, nothing will be pushed to the vehicle and "0.00" will remain in the Commanded value, Current will not be altered. The system will continue to retry declination lookups every 5 seconds as long as valid GPS messages are present.

When auto-declination is active, "Lookup Declination" and "Update Vehicle" will be disabled.

If you are using Auto Declination and turn it off, declination will not be altered further until you manually update it.

If you are in manual declination mode and turn Auto Declination on, the first valid GPS fix will set the declination.

2.10.4.1.1.1 Lookup Declination

If you are using topside GPS, clicking Lookup Declination will update the commanded declination to the value of your current location.

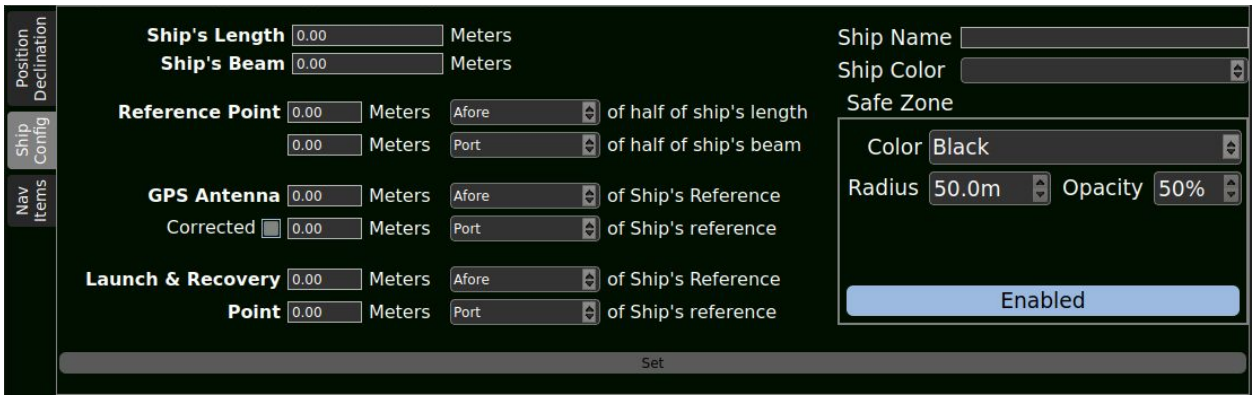
NOTE: Lookup Declination requires a valid position.

2.10.4.1.1.2 Update Vehicle

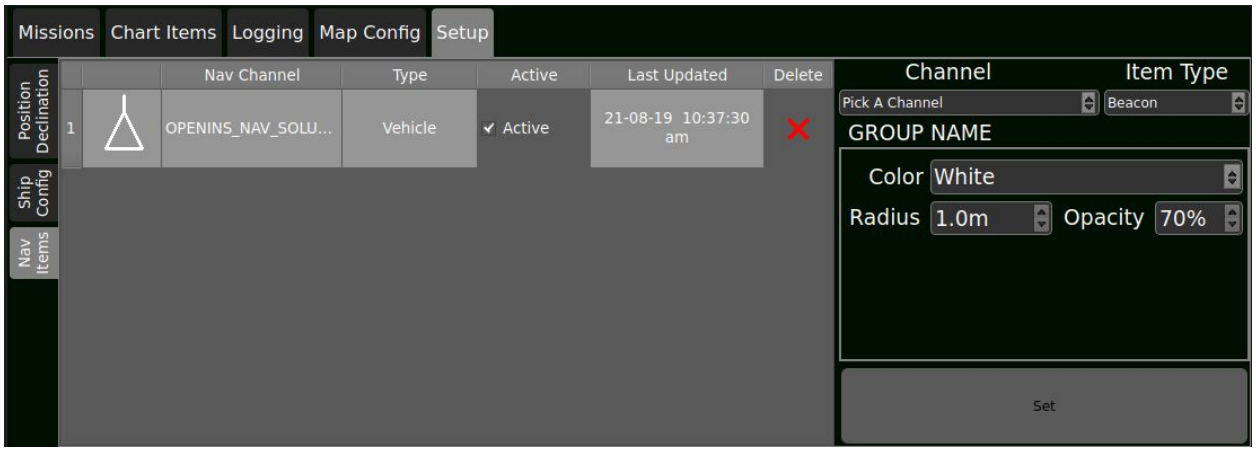
Updates the Vehicle's Declination to the Commanded Declination.

2.10.4.2 Ship Config Subtab

Allows you to define the dimensions and locations of key vehicle features, this includes a designated reference point of the ship, the location of the GPS, and a launch/recovery point.



2.10.4.3 Nav Items Subtab



The Nav Items Subtab allows you to create or edit nav items that will appear on the mission view.

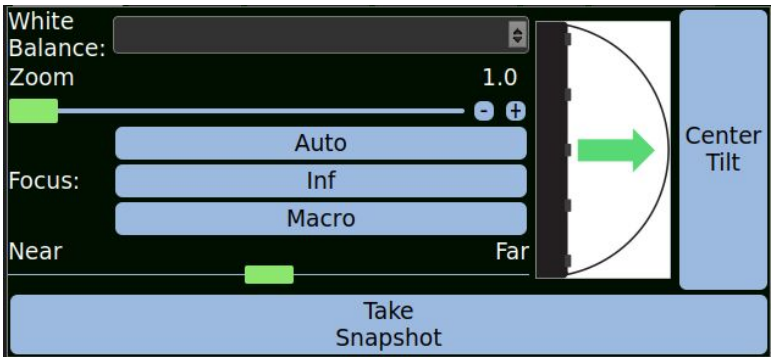
2.10.4.3.1 Creating a Nav Item Beacon

1. Select the Setup tab in the Mission View Menu.
2. Select the Nav Items subtab.
3. Select the channel you want to create a beacon for such as OPENINS_GPS_STAT.
4. Select the item type Beacon.
5. Select the color for the beacon.
6. Select the radius, this will set the size of the beacon.
7. Set the opacity.
8. Click the Set button. The beacon will now begin appearing in mission view.

2.11 Control Tools

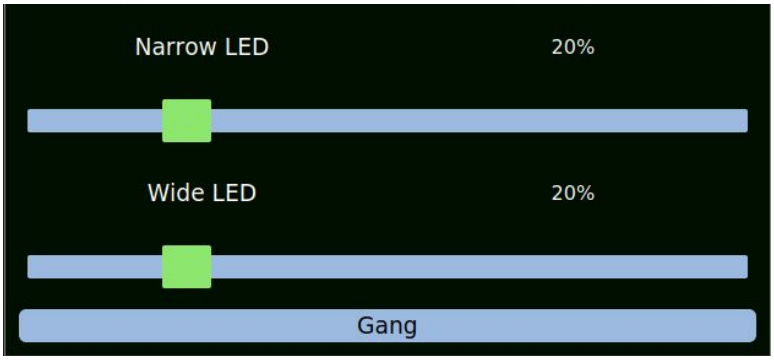
The Control Tabs are a group of controls found in the lower-right corner of Workspace. They are available in all Flight View configurations except the Chart View. It can be toggled using the F6 Key. There are five tabs within the Control Tabs.

2.11.1 Cam Tab



Allows you to select the White Balance for changing light conditions, zoom, focus, and tilt the camera. You can also use the Take Snapshot button to take a picture using the onboard camera.

2.11.2 LEDs Tab



Control the total brightness of the LED banks. The Gang button ties these controls together.

2.11.3 Sonar Control Tab

Allows you to adjust the Sonar image, this includes palette, Range, Gain Bias and Span.

2.11.4 Power Tab

The power slider sets the total thruster power. This will affect the autopilot controls overall aggressiveness.

3 Diagnostic View

The Diagnostic View is generally not used while performing tasks or completing operations. There are four tabs in the Diagnostic View: Vehicle Configuration, Vehicle NEtwork, Vehicle Sensors, and In this view, you will be able to see the status of all navigational devices connected to both Topside and Subsea as well as the status of vehicle thrusters (if applicable).

3.1 Vehicle Configuration

Vehicle Configuration is broken into four sub areas.

3.1.1 Temperature

The current Water Temperature. Surrounded by a colored box, it can have two states Red or Green. This tells whether or not Workspace is receiving data from the sensor.

- Green - The Sensor is communicating.
- Red - The Sensor is not communicating.

3.1.2 Joystick Data

Surrounded by a colored box, it can have two states Red or Green. This tells whether or not Workspace is receiving data from the Joystick.

- Green - The Sensor is communicating.
- Red - The Sensor is not communicating.

Communicates the position of each Hand Controller Joystick input. This is useful for diagnosing hand controller inputs that are not in null.

3.1.3 Buttons

Surrounded by a colored box, it can have two states Red or Green. This tells whether or not Workspace is receiving data from the Joystick.

- Green - The Sensor is communicating.
- Red - The Sensor is not communicating.

There are three possible statuses for each possible button LED.

- Blue - The button is inactive, not currently being pushed.
- Green - The button is active, this will only be green when the button is pressed.
- Grey - The button is unavailable, not currently active.

3.1.4 Video Overlay

This is where you are able to select text that will appear on the video Overlay.

3.2 Vehicle Network

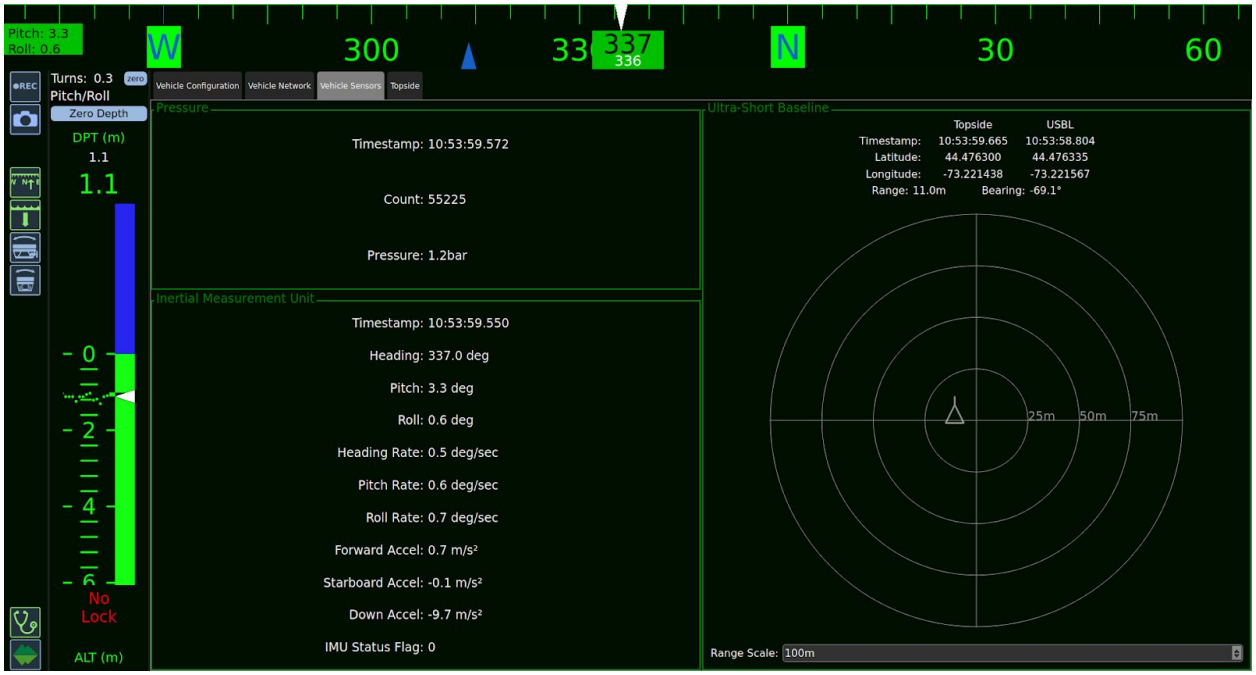
Details the status of each device connected to the network. This includes the thruster, LED Panel, and Camera. The LED for each device identifies whether or not the device has faulted, available information from the device, and Network ID of the device.

3.3 Vehicle Sensors

Each sensor is surrounded by a colored box that can have one of three states Red, Green, or Grey. This tells whether or not Workspace is receiving data from the sensor.

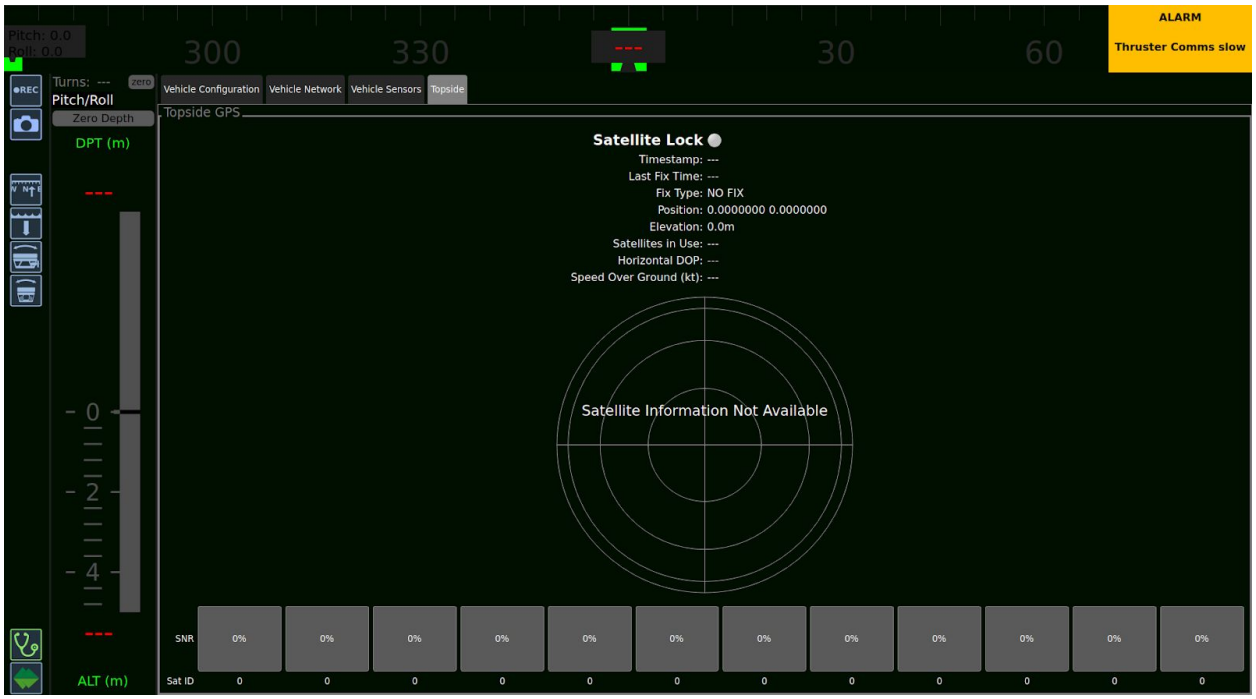
- Green - The sensor is communicating with Workspace.
- Red - The sensor is not communicating with Workspace.
- Grey - The sensor has not yet communicated with Workspace.

Provides the status for the Inertial Measurement Unit (IMU), Pressure Sensor, and Ultra Short Baseline (USBL). If you are having any problems with any of these sensors, this is the first place to look.

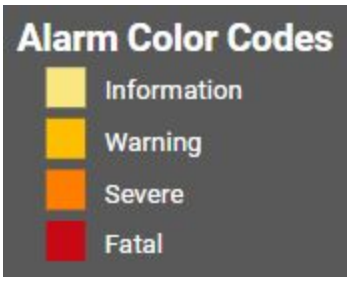


3.4 Topside

Information regarding the Topside GPS (If present).



4 Alarms



Alarms are used to alert you when a specific criterion is met. These can be based around any signal, this can be the vehicle reaching a certain depth, or a loss of comms.

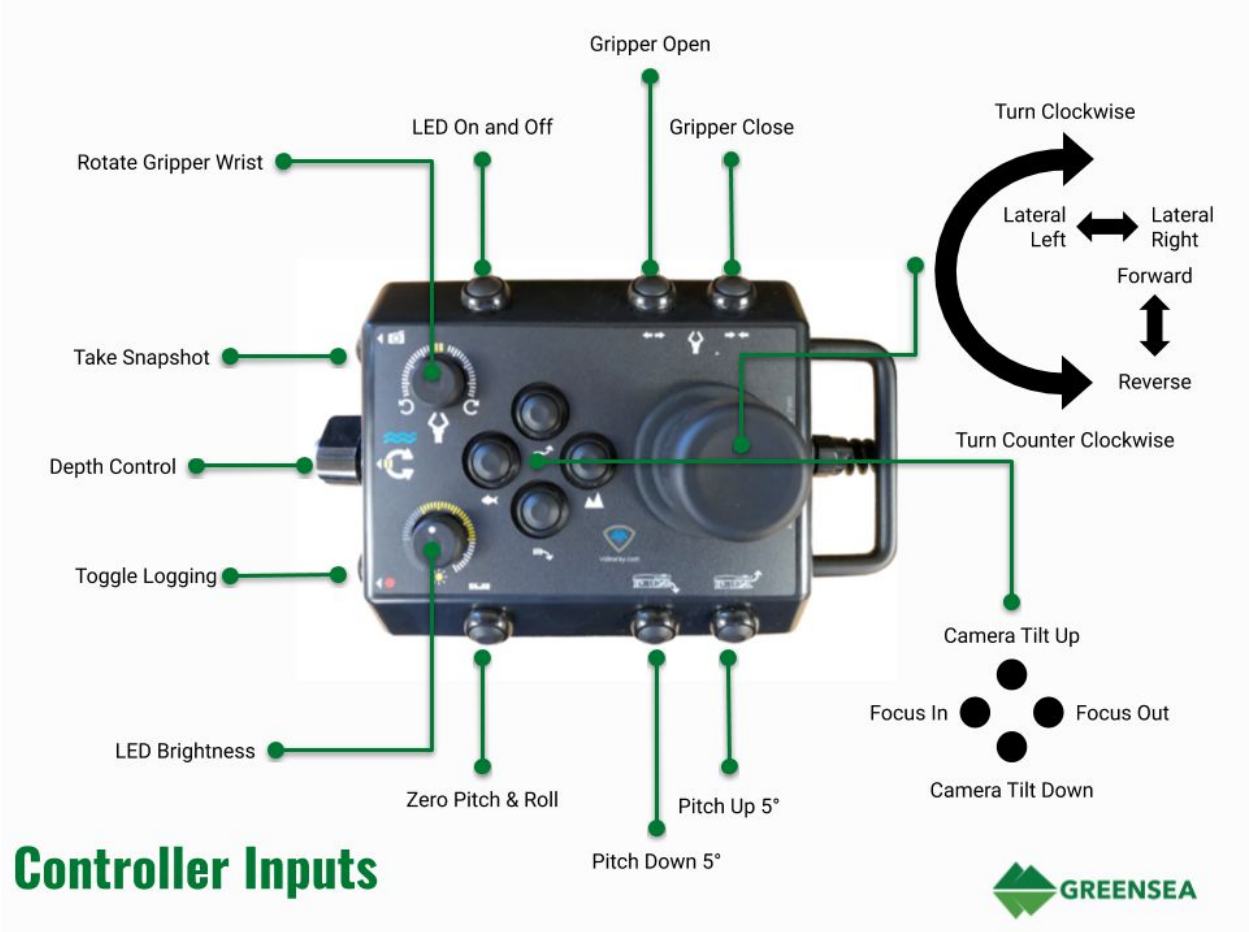
The most recent alarms will appear at the upper right-hand corner of Workspace. There are four alarm severity levels ranging from information only, to fatal.

The default alarms and their meanings are listed below.

Alarm	Severity	Meaning
Pitch Control	Info	Pitch Control error is too large, this could mean that the vehicle is stuck on an obstacle.
Roll Control	Info	Roll Control error is too large, this could mean that the vehicle is stuck on an obstacle.
Depth Setpoint Far	Info	Depth setpoint error is too large this could mean that you have pushed the setpoint beyond the bottom. The vehicle may be running into the ground.
Alt Setpoint Far	Info	Altitude setpoint error is too large this could mean that you have pushed the setpoint beyond the bottom. The vehicle may be running into the ground.
Heading Control	Info	Heading Control error is too large, this could mean that the vehicle is stuck on an obstacle.
Warning Thruster Comms Slow	Warning	The communications to the thruster network has slowed. Typically this means a fault within the thruster system. Check thrusters or power to the vehicle.
LED Hot	Warning	LED has gotten hotter than recommended.
Auto Positioning is Unavailable	Warning	The vehicle DVL has lost bottom lock and Dynamic Positioning and POI are unavailable, this can mean that the vehicle is either too close or too far from the bottom.
Nav Initializing	Severe	This occurs when the vehicle is powering on. Wait until this clears before piloting the vehicle.
DEPTH FAIL	Severe	Pressure sensor has failed.

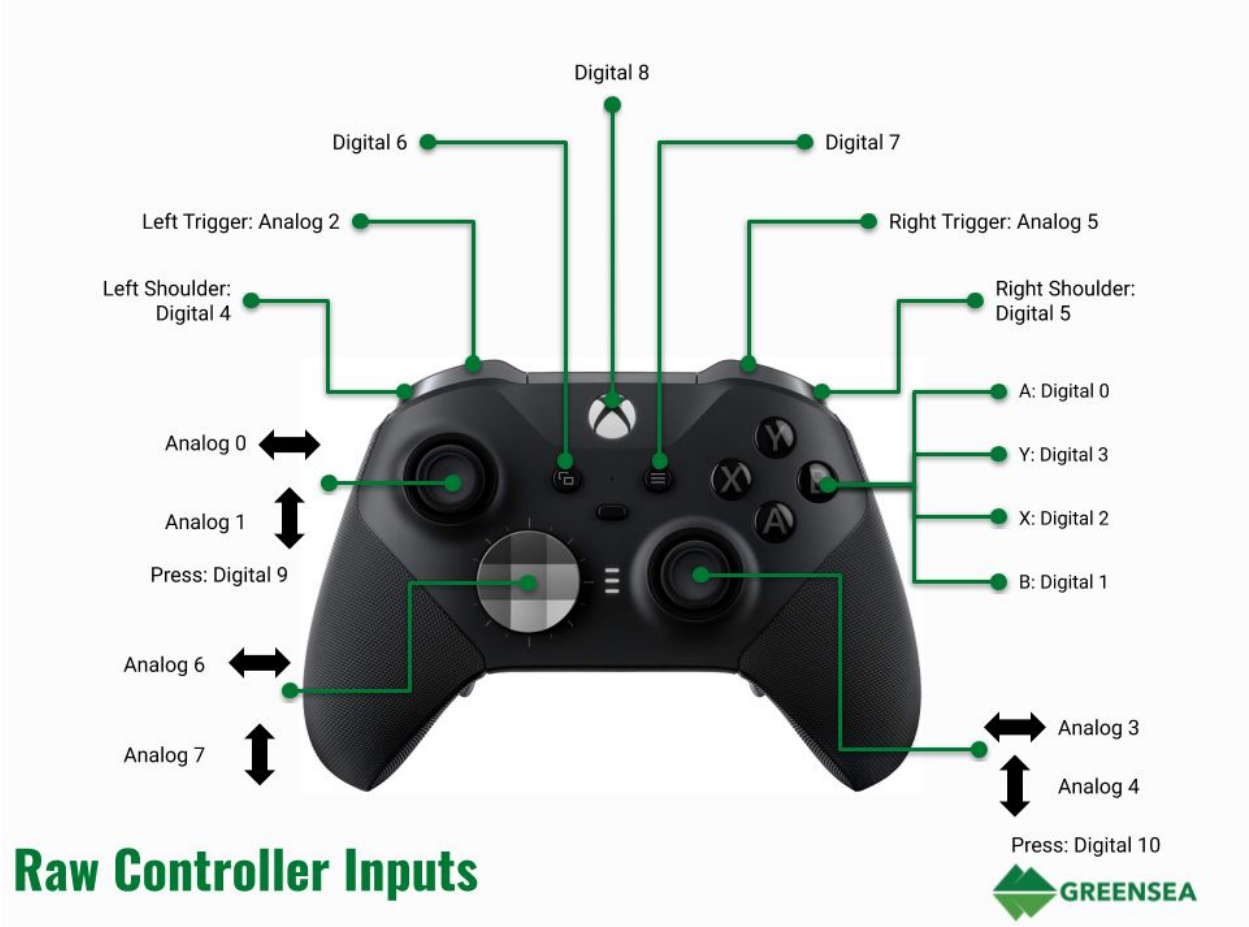
5 Controller Mapping

5.1 IP65 Controller Mapping



5.2 XBOX Controller Mapping

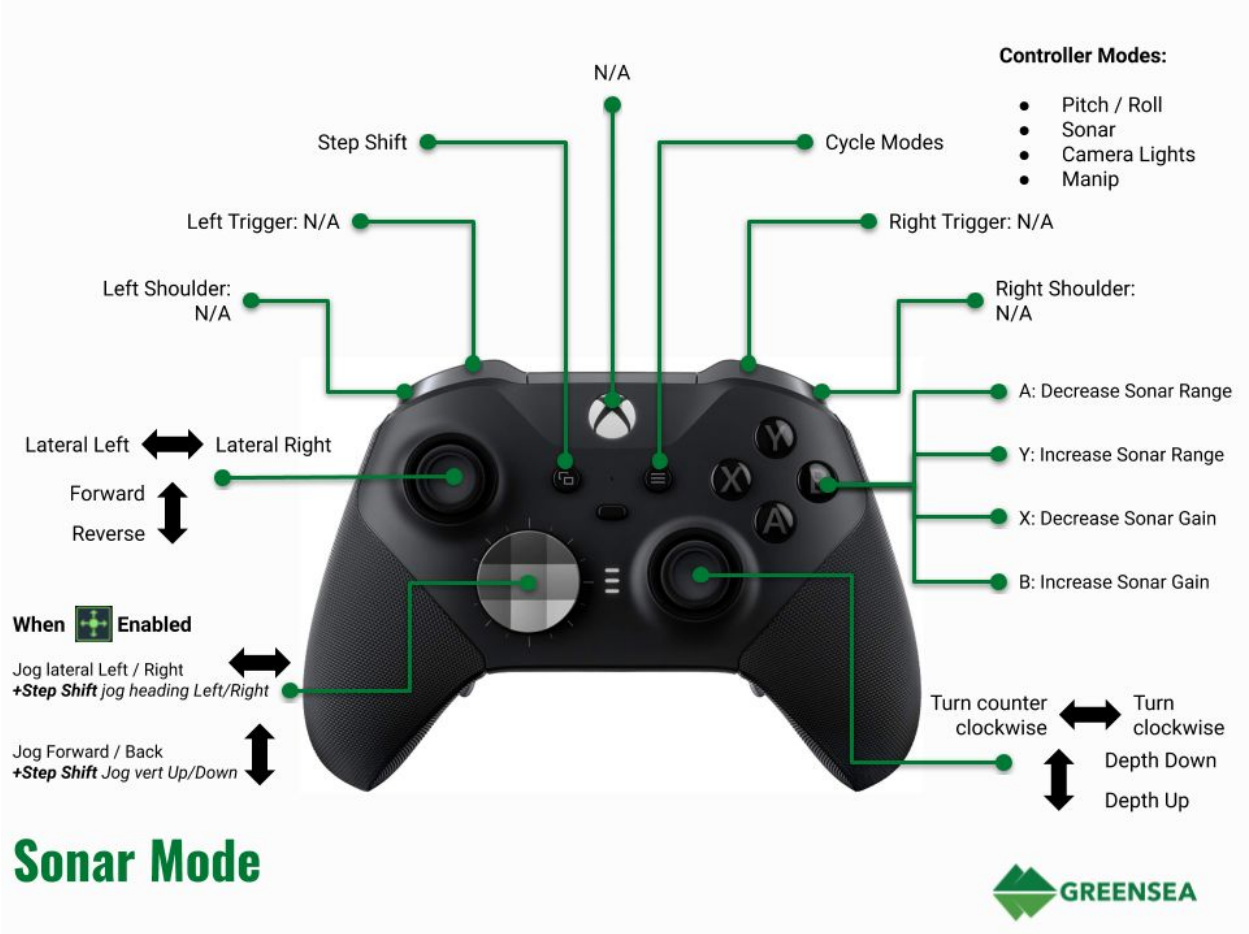
5.2.1 Raw Controller Inputs



5.2.2 Static Controller Inputs

5.2.3 Pitch/Roll Mode

5.2.4 Sonar Mode



5.2.5 Camera Lights Mode

5.2.6 Manip Mode