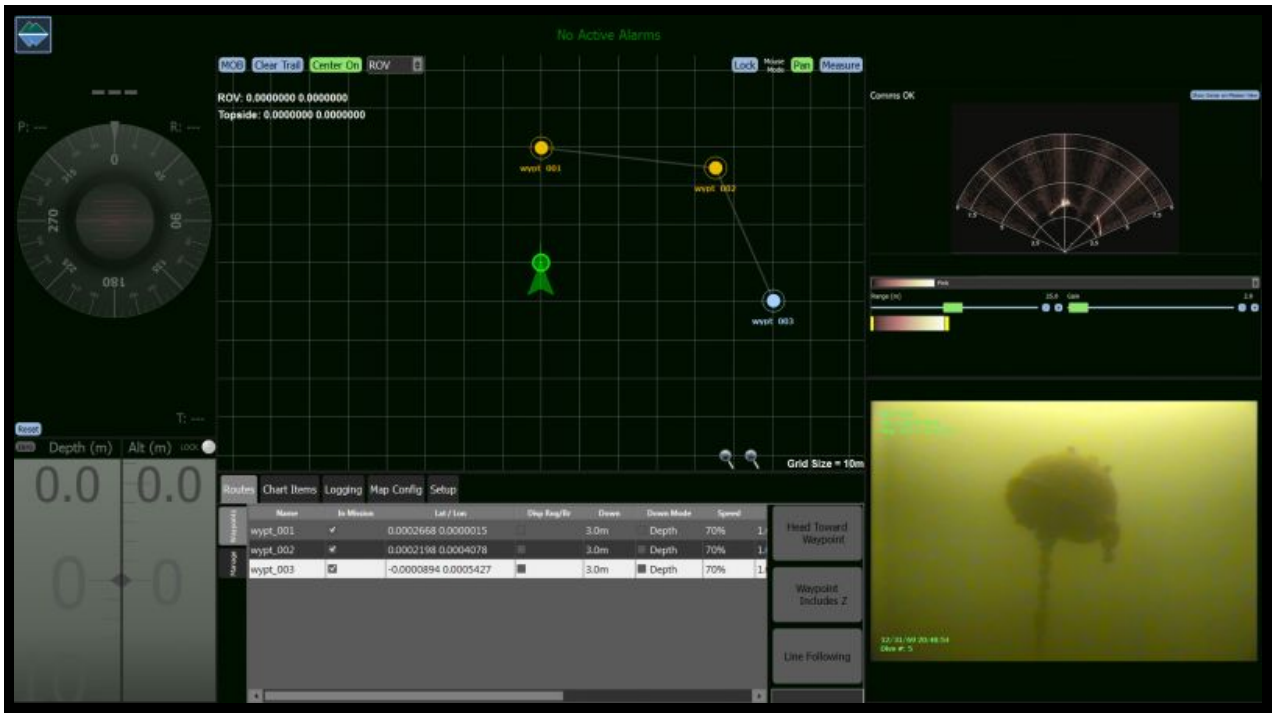
Workspace Guide

4.1.2018

Flight View



Flight View is a customizable display used as the default Greensea Workspace to plan and execute missions.

It is generally the first view opened upon launching Workspace, and can be accessed by clicking the Greensea icon.

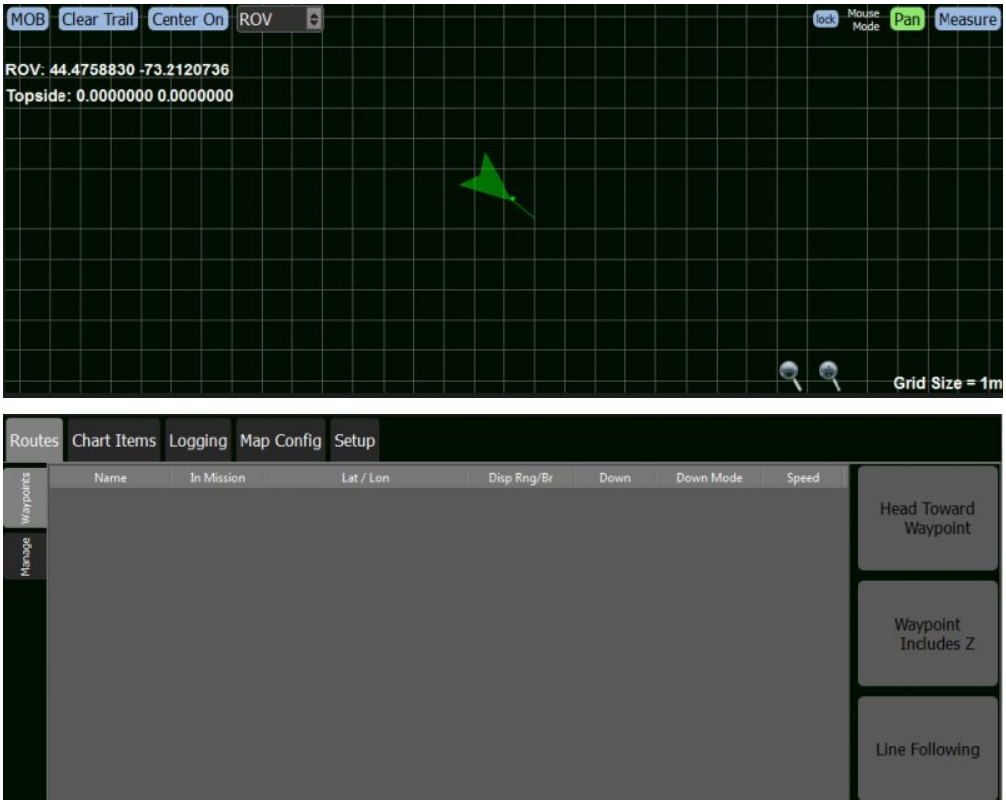
The majority of tools for both monitoring, controlling, and data feeds from the ROV are brought together in Flight View. Flight View is customizable, and your version of Flight View and may differ based on your components and Workspace configuration.

The general components in Flight View can be divided into the following parts.

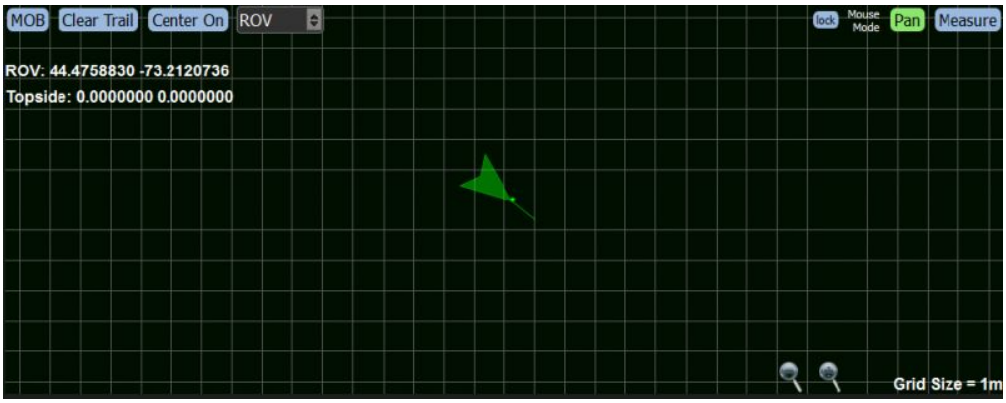
Component	Location	Description
View Selector	Top Left	 The Navigation Bar is where shortcuts to Flight View, Alarm Manager, Data Plotter, Signal Mapper, and Device Diagnostics are located. The Navigation bar is located in the top left corner of the workspace and facilitates quick and easy navigation about the workspace.
Alarms	Top Center	Displays current Space for the operator to quickly determine the active alarms on the vehicle.
Navigation	Left Side	Displays Compass Rose, Depth and Altitude, and autopilot controls (Not Pictured).
Mission View	Center	Includes map view and map configuration tabs.
Sonar View	Upper Right	Displays sonar fan and sonar basic controls.
Video View	Lower Right	Displays video feed.

Mission View

Mission View is used to plan, execute, and track the progress of missions. It is made up of two primary components: The Map View and the Tools Menu. The Map View displays the locations of the vehicle, ship, waypoints and marks; the Tools Menu offers tools to allow you to configure Mission View; create, edit, save, load, record, and playback missions.



Map View



Map View is a 2D display that shows vehicle, ship, and the vehicle's position, ship's position, and any charts loaded into the map view. You can use the Map View to create navigational elements like markers and waypoints.

Heads-Up Display

The Map View Heads-Up Display (HUD) is superimposed across the four corners of the Map. It can be enabled or disabled from the Misc. tab within Map Config.

The top-left HUD shows both the vehicle's and ship’s name and 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. Once a measurement is taken, only the last taken measurement will be displayed.

The bottom-right HUD shows the map's scale.

Map View Functions

Waypoints

Coordinates used to mark a location used as part of a route to create a mission.

Markers

Markers are used to note specific locations on the map and are not used to define a route.

To add a marker to the map, right-click on location you want to place a marker and select Add Marker.

Unselected markers are colored green, when selected, they turn blue. You can adjust the position of markers by clicking and dragging them to a desired location on the map, or by manually setting editing their position parameters in the Markers menu.

Markers can be locked along with Waypoints by clicking the Lock button in the upper-right corner of the map view.

All Marker data can be accessed from the Mission View Tools Menu, selecting Chart Items tab, and then the Markers subtab.

To delete markers, right-click the marker you want to remove, and select Delete. Alternatively, select the marker from the list in the Markers subtab and click the red X in the Delete column.

Adjusting the Map Scale

You can use the mouse's scroll wheel to zoom in and out. Alternatively, you can click the magnifying glasses located next to the Grid Size in the bottom-right corner of the map.

Map View Pop-Up Menus

By right-clicking locations in the Map View you are able to open pop-up menu shortcuts to allow you to quickly interact with items in and on the map.

Right-clicking an open area on the map opens a general pop-up menu with the following selections.

Menu Item	Description
Go to Position	Commands the vehicle to travel to the selected location.
Add Waypoint	Creates a Waypoint at the selected location.
Add Marker	Creates a marker at the selected location.
Clear History	Clears the vehicle trail.
Copy Cursor Position to Clipboard	Copies the current location to a clipboard, it can be pasted elsewhere.

Waypoint Pop-Up Menu

Right-clicking on a Waypoint opens a waypoint specific pop-up menu with the following options.

Option	Description
Go to Waypoint	Commands the vehicle to go to the selected Waypoint.
Delete Waypoint	Deletes the selected Waypoint.
Show/Hide Safety Zone	Toggles the display of the Waypoint Safety Zone.
Show/Hide Waypoint Tolerance	Toggles the waypoint's tolerance display.

Marker Pop-Up Menu

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

Option	Description
Go to Marker	Commands the vehicle to go to the selected marker.
Delete Marker	Deletes the selected marker.
Show/Hide Safety Zone	Toggles the display of the safety zone surrounding the Marker.

Map Controls

The top of the Map View includes several controls their function is described below.

MOB (Man Overboard)

Man Overboard (MOB) is a specialized marker that, saves vehicle attitude, position, and time created in addition to normal marker data.

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

Man Overboard markers appear as a green triangle beneath the vehicle with the triangle pointing in the direction of the vehicle's heading when the MOB was created.

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

If Display Range/Bearing is enabled from the MOB tab on the navigation menu, it will display in the upper-right of the map view.

Clear Trail

Clicking this button will clear all travel history from the map but will preserve all other Markers and Waypoints.

Center On

When enabled, Center On will keep the Map View focused on the vehicle selected from the dropdown to the right of the Center On button. When Center On is enabled (highlighted green) the Map View will snap the vehicle to the center of the Map View whenever the vehicle moves off the visible area, or you move the map away from the vehicle.

Lock

Locks all waypoints and markers. When lock is active, the Lock Button will colored green.

Pan

Selecting Pan mouse mode allows the operator to pan the grid view. This will allow you to click and drag the mouse to move the map.

Measure

Measure 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 the Map View, the distance between and bearing between the two points will appear at the termination of the measurement. These will remain onscreen until the map is clicked again.

Adding a Chart to the Map View

By default, there is no chart loaded in the Mission View. For information on importing a chart into the Map View use the Map Config tab in the Mission View Menu.

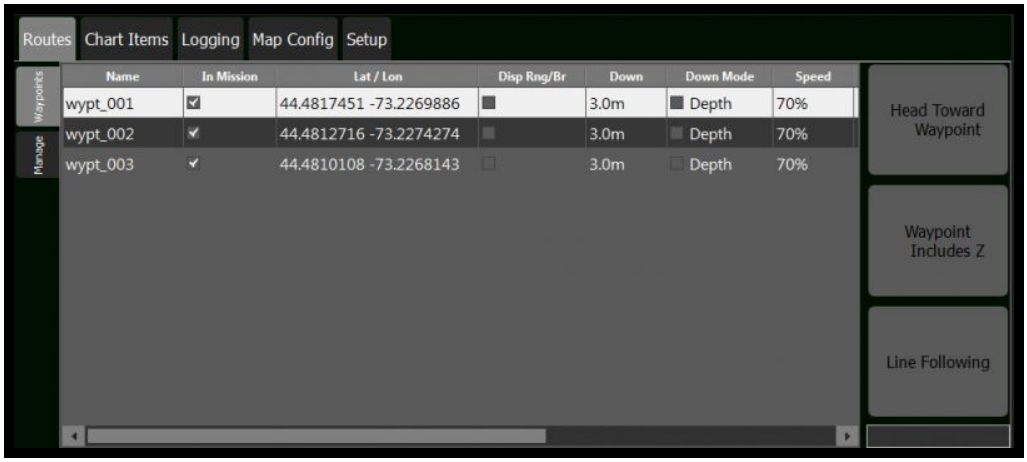
The Mission View Tools Menu

The Mission View Tools Menu is comprised of five main options accessed from tabs below the Map View. These tabs are: Routes, Chart Items, Logging, Map Config, and Setup; from these tabs you are able to edit waypoints, markers, save and load missions, edit map display settings, or configure navigation display settings. Click the tabs below to find out more about the functions and subtabs for each.

Routes Tab

The Routes Tab allows users to edit and reorder Waypoints as well as managing missions, this includes saving, loading.

Waypoints



Head Toward Waypoint

The Head Toward Waypoint button directs the vehicle to set its heading to the bearing of the current waypoint. As long as this option is selected, the vehicle will point itself towards the waypoint it is currently traveling to.

Disabling this option allows the operator to control the vehicle's heading independently of the waypoint. This can be useful for missions where you are performing a survey.

Waypoint Includes Z

Waypoint Includes Z enforces a vertical component when achieving waypoints. Waypoint depth (or altitude if selected) must be reached before the waypoint is considered to have been met.

If this option is disabled, the vehicle will still attempt to reach a designated depth or altitude, but will only use X and Y coordinates to determine if the designated waypoint has been met.

Line Following

When enabled, the vehicle will be directed to closely follow the connecting lines when traveling between Waypoints.

If this option is disabled, the vehicle will travel using the path of least resistance to reach a waypoint. This means that it will expend more energy towards the end of its travel time to reach the waypoint.

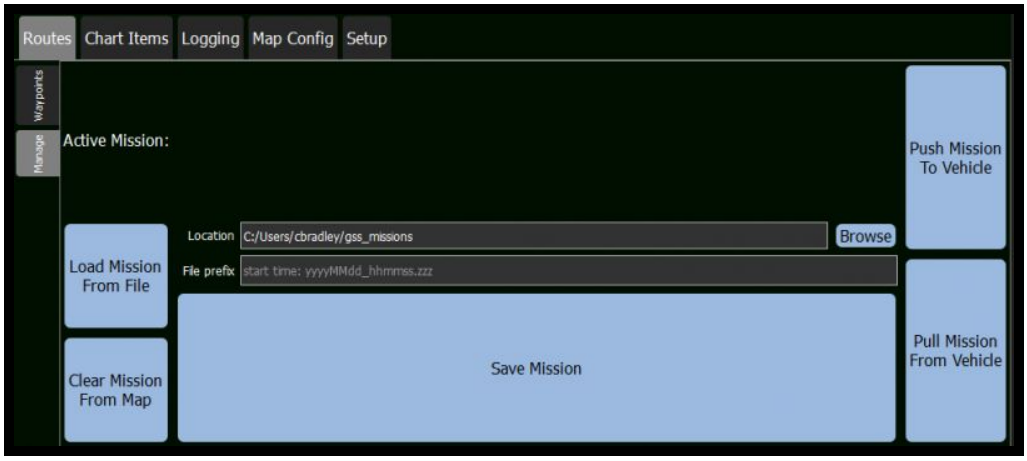
Editing Waypoints from the Waypoints Tab

Each field in the Waypoint Tab is editable, to edit these fields double click the cell.

Field	Description
Name	Unique identifier given to a specific waypoint by editing its name field.
In Mission	Indicates whether or not the waypoint is currently included in the mission.
Lat / Lon	The latitude and longitude of the waypoint.
Disp Rng/Br	Selecting this box will show or hide the range and bearing from the vehicle to the waypoint. This is displayed in the upper-left corner of the Map View.
Down	The vertical position of the waypoint. This is measured either from the surface or the bottom as dictated by the Down Mode.
Down Mode	The location from which the vertical position is measured. Depth measures from the surface, Altitude measures from the bottom.
Speed	The percent of maximum speed the vehicle will travel to reach the waypoint.
Tolerance	The threshold which the vehicle must meet to be considered to have reached the waypoint. ***Note:*** *Tighter tolerances will require greater effort by the vehicle to achieve the waypoint. This may result in undesirable behavior in some instances.*
Zone Enabled	Enables or disables the display of the Safety Zone for each waypoint. This zone is informational only, and has no effect on the vehicles travel.

Zone Radius	Dictates the radius of the Safety Zone around a waypoint.
Zone Color	Shows the current color of the Safety Zone. The color can be changed by double-clicking the circle and selecting a color from the dropdown.
Zone Opacity	Shows the current opacity of changes the shading of a Safety Zone. A higher zone opacity will result in a more darkly shaded zone.
Delete	Clicking the X in the selected line deletes the waypoint.

Manage



Load Mission From File

Clicking this button opens a file viewer, allowing you to select and load a previously saved mission from a .yml file.

Clear Mission From Map

Clearing a mission is not reversible and does not require confirmation. If you want to reuse a mission, make sure to save it prior to clearing a mission.

Clears all Mission Markers from the Map. This includes Waypoints and markers. This action is not reversible without a prior save.

Save Mission

Clicking this allows you to save the current mission to a .yml file. The default format will be yyymmdd_hhmmss.zz

Push Mission to Vehicle

Pushes the current mission in the Mission View to the vehicle. This is required to have the vehicle follow waypoints.

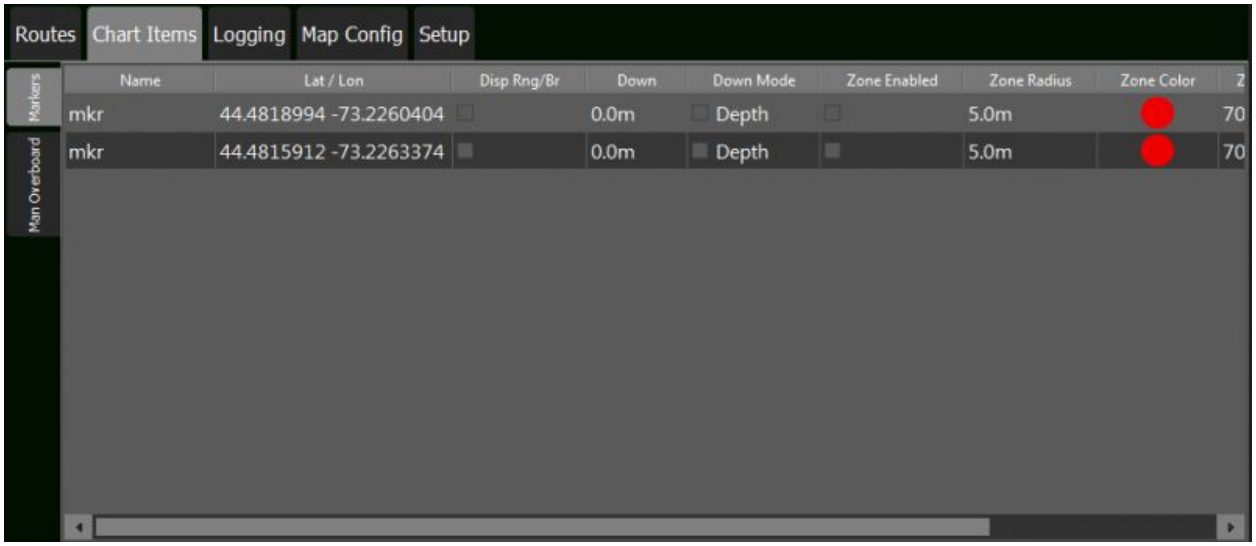
Pull Mission From Vehicle

Pulls the current mission from the vehicle to Workspace.

Chart Items

Markers

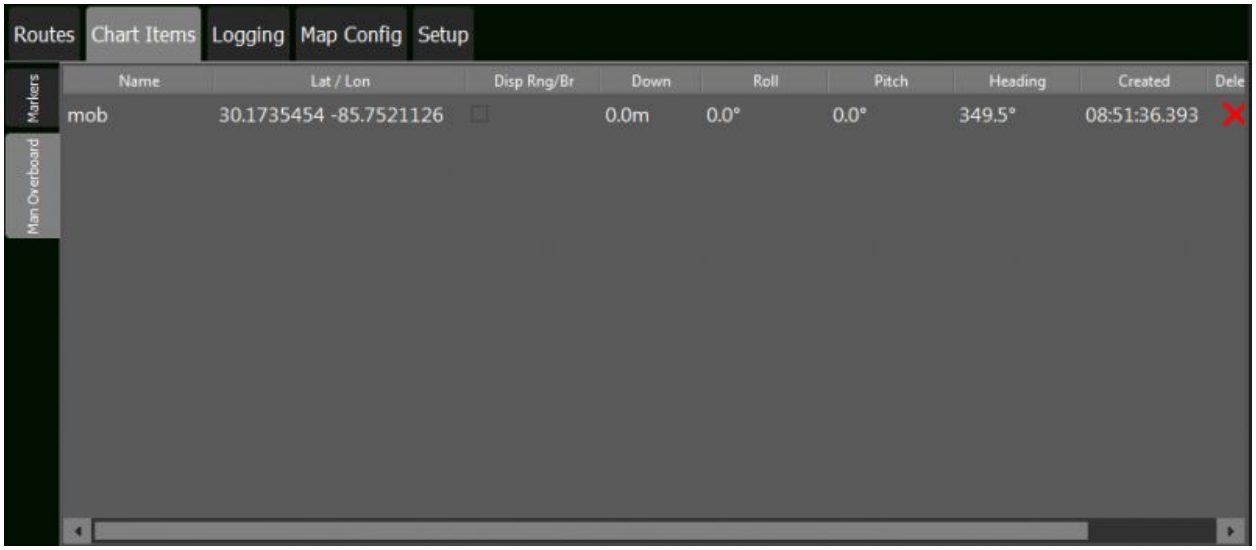
Lists all markers currently in the Mission View. Markers can be edited by double-clicking the field in the table shown below.



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	The location from which the vertical position is measured. Depth measures from the surface, Altitude measures from the bottom.
Zone Enabled	Enables or disables a Safety Zone displayed 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.

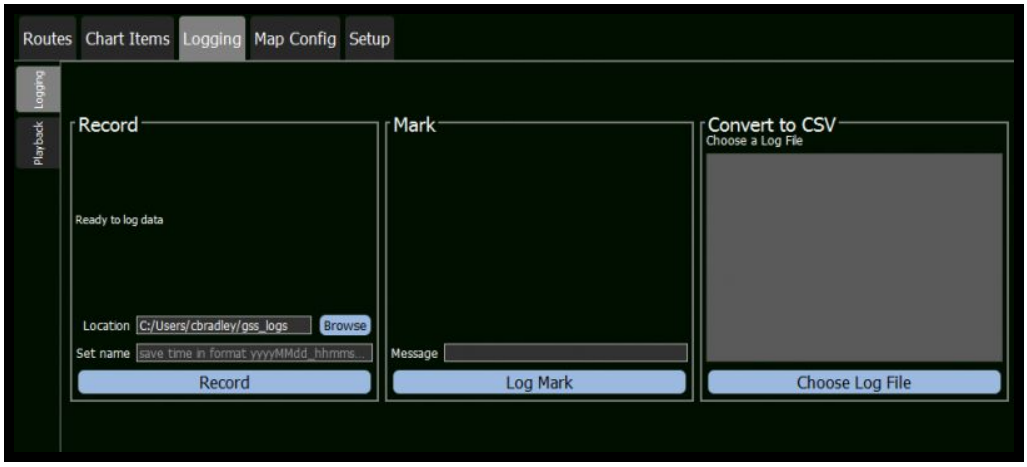
Man Overboard

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



Field	Description
Name	The default for a MOB marker is mob.
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.
Yaw	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.

Logging



Record

Allows you to record your session in Workspace. Clicking the Record button toggles the recording of data. The log will be saved in the location dictated by the Location field.

Mark

This feature is currently disabled.

Clicking the Mark button creates a mark in the playback. This can be used to note an event that has occurred during an in process recording.

Convert to CSV

Opens a file viewer to select a log file to be converted to a CSV file.

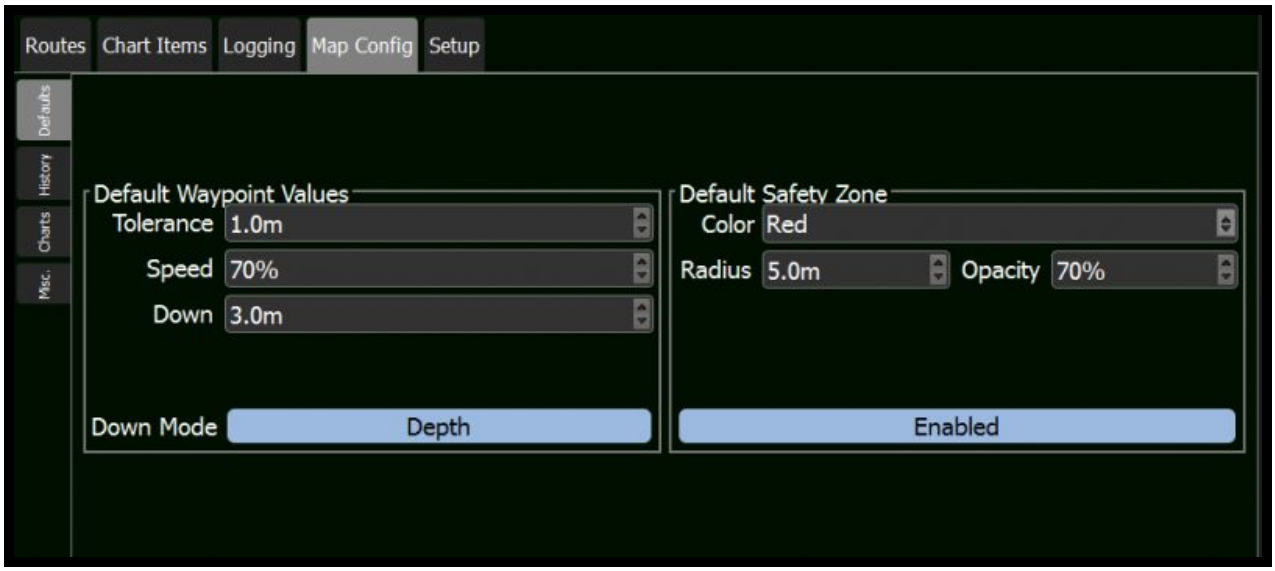
Playback

Allows you to playback a previously recorded session in Workspace.

Map Config

Defaults

The Defaults Subtab in Map Config allows you to set both Waypoint and Safety Zone default values.



Default Waypoint Values

By default Waypoints are set to:

Tolerance: 1m. Speed: 70%

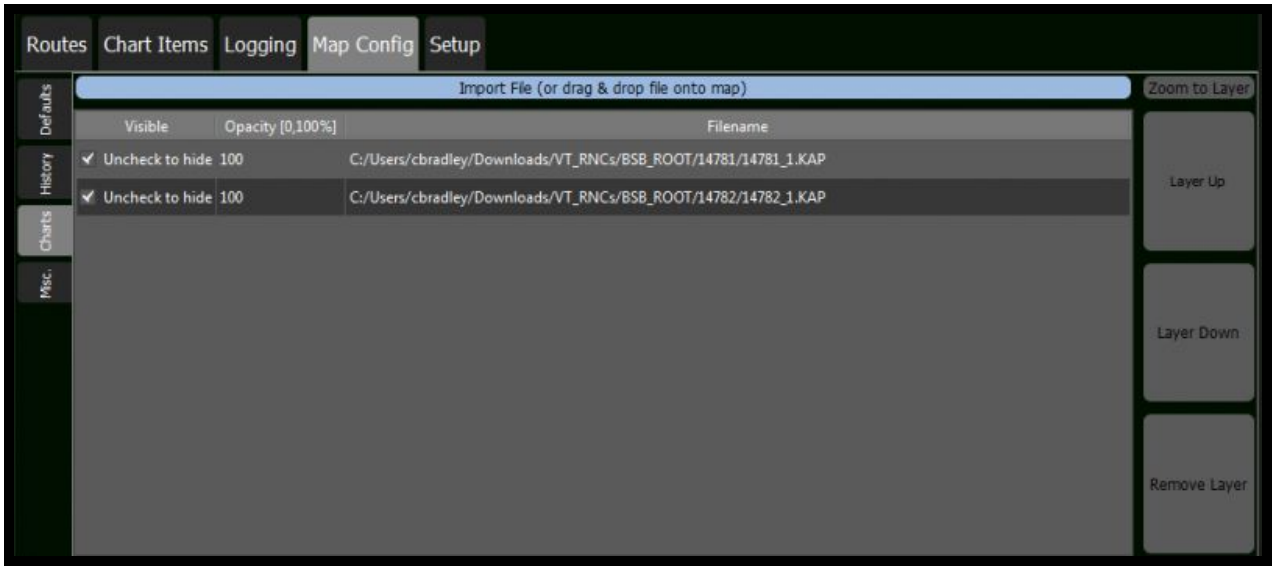
Down: 3m. Down Mode: Depth

Default Safety Zone

The safety zones are not enabled by default. The default color for the Safety Zones are red, have a radius of 5.0m, and an opacity of 70%.

Chart Items

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



Importing a Chart to Map View

Workspace is able to accept charts in .KAP format.

By default, there are no charts loaded in Mission View. If you want to import a chart, click the Import File button at the top of the Charts Subtab. Alternatively, you can drag and drop a chart file onto the map directly.

You can find and import charts for the United States by following the directions below

1. In your web browser, go to the NOAA chart downloader http://www.charts.noaa.gov/
2. Use chart locator and select the chart region you want to add
3. Under Available Products select RNC
4. The chart will be download as a .zip file, select “show in folder”.
5. Unzip map file
6. Select the “#####_#.KAP” file, and drag onto Map View.

Converting Google Earth Images to .KAP Format

Workspace is only able to input .KAP chart files. However, there is an external program that is able to convert Google Earth Images into .KAP files, these converted files can be imported into Workspace.

This program is called GE2KAP, and can be found here: GE2KAP

Additionally, you will need to download and configure Google Earth according to the GE2KAP setup instructions, within the GE2KAP program you can find the Google Earth Setup instructions by pushing the F1 key.

NOTE: These tools are not supported by Greensea directly.

Chart Visibility

From the Visible Column, you can toggle the visibility of uploaded charts. The checkbox indicates that the chart is visible, if unchecked the chart will be hidden.

Chart Opacity

The Opacity fields allow 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.

Zoom to Layer

The Zoom to Layer button adjusts the Map View to center on and fit the entirety of the selected chart.

Layer Up / Layer Down

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

Remove Layer

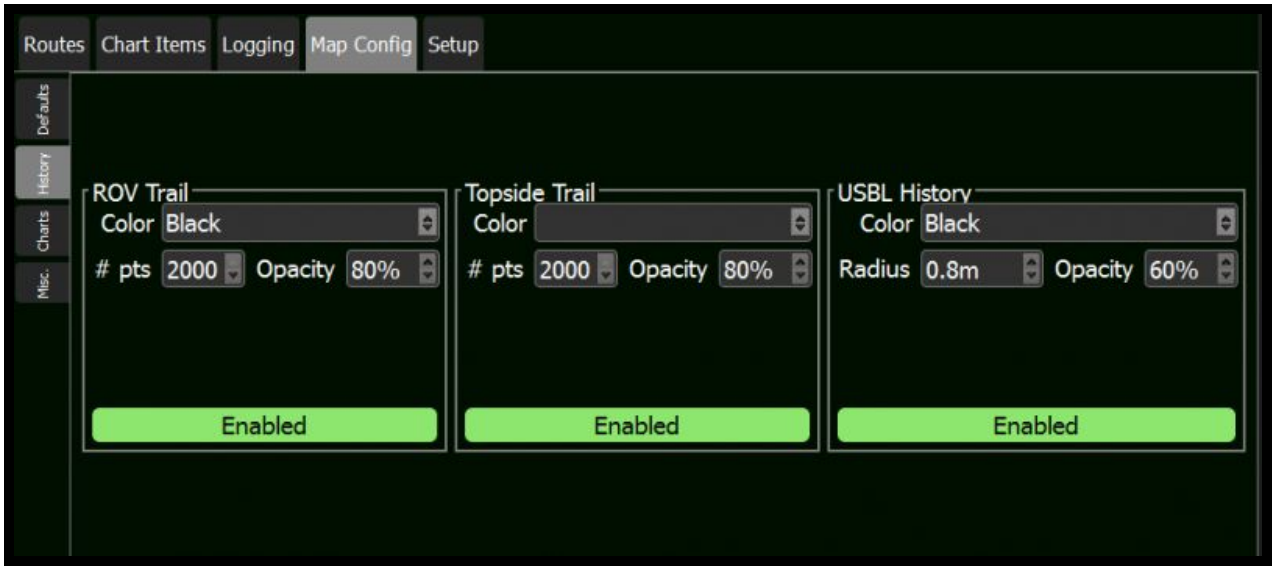
Deletes the selected chart layer from The Map View.

History

NOTE: History may not be enabled in all versions of Workspace.

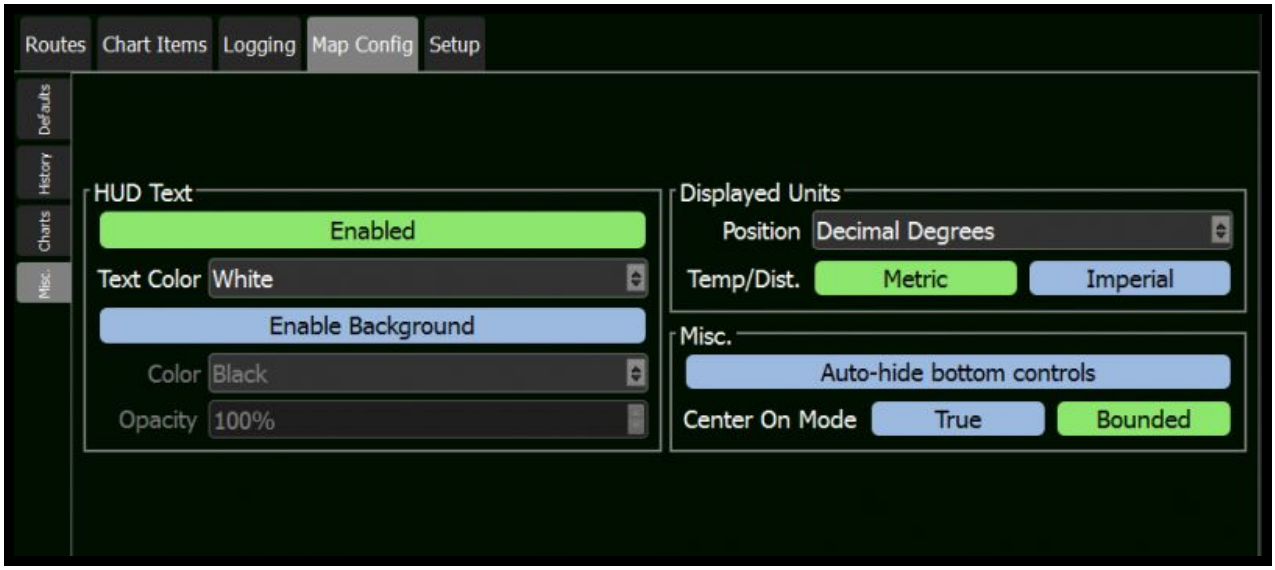
History allows you to toggle the trails of vehicles and the USBL points.

You are also able to edit the color, number of points, and ROV trails. For the USBL you are additionally able to edit the radius of the dots that appear for the USBL.



Misc.

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



HUD Text

The HUD text enables or disables the text overlay on the map 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.

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.

Misc.

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

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

Setup

Position Declination

Position

You can use the Copy Ship's Position button to auto fill the position textbox with the ship's current position.
The Position Textbox can also be used to update the position of the ROV.

Declination

Note: Lookup Declination requires a valid position.
It will calculate the declination based on the value of the vehicle's current position as displayed in Mission View. If the vehicle's position is 0,0 (as if no real position has been provided) it will calculate the declination at 0,0.

Auto Declination

This button enables Auto Declination Detection; 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.

Button Rules:

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.

Lookup Declination

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

Update Vehicle

Updates the Vehicle's Declination to the Commanded Declination.

Fuse USBL

Note: Fuse USBL is not available in all versions of Workspace.

Toggles the use of USBL (Ultra Short Baseline) as part of your navigation solution. Under certain conditions USBL can be noisy, or produce inaccurate readings, one of these situations can occur if and when the ROV is near the ship.

Disabling this option will remove USBL as part of your navigation solution.

When enabled, Workspace will use the USBL readings as part of your navigation solution.

Fuse GPS

Note: Fuse GPS is not available in all versions of Workspace.

Toggles the inclusion or exclusion of GPS data in your navigation solution. When your vehicle surfaces, you are able to fuse your GPS readings with the Navigation Solution.

Disabling Fuse GPS will remove USBL as part of your navigation solution.

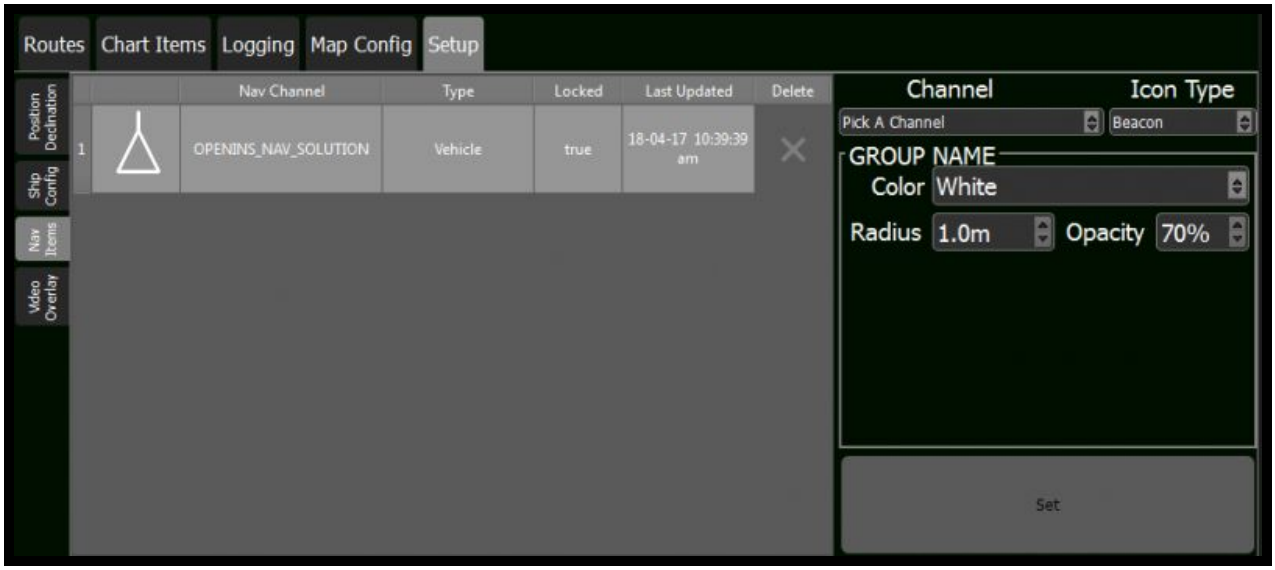
When enabled, Workspace will use GPS readings (if available) as part of your navigation solution.

Ship Config

NOTE: Ship Config is not available in all versions of Workspace.

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

Nav Items



Video Overlay

NOTE: Video Overlay is not available in all versions of Workspace.

Depending on your Workspace configuration Video Controls will either be found the Mission View Tools Menu, under Setup, in the Video Overlay Subtab; or the specifc Video Page in Workspace.

Mission Planning

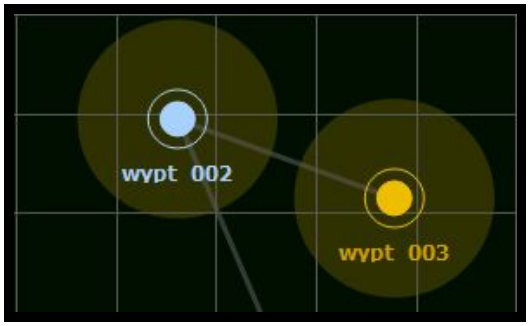
Waypoints

A Waypoint is a coordinate mark used to define a mission route.

Creating a Waypoint

Right-click a location in the Map View and select Add Waypoint.

A waypoint can be selected at any time by left-clicking it. Normally a waypoint will be gold, a selected waypoint will be blue.



The waypoint on the left has been selected, the translucent circle around each is the Waypoint Tolerance.

Each waypoint will be connected by a solid line, this lines define the travel path that the vehicle will take while performing waypoint following.

Waypoint Default Settings

Waypoints have four default values: Tolerance, Speed, Down, and Down Mode.

Tolerance: The distance from the Waypoint's location which the vehicle must reach in order to have been considered to have met its target. The smaller the Tolerance, the more energy the vehicle will expend to reach a waypoint.

Note: Tolerance cannot be less than 1m (3.3ft)

Speed: The percentage of maximum speed the vehicle will use to reach a waypoint.

Down: The vertical location of the waypoint. Measured by the altitude or depth, this is dictated by the Down Mode.

Down Mode: The location from which the waypoint is measured. Altitude is measured from the bottom, Depth is measured from the surface.

Changing Waypoint Defaults

To change waypoint defaults, select the Map Config tab in Mission View Tools Menu, then select the Defaults subtab. Each field can either be edited manually by clicking on and then typing in the desired text field, or by using the arrow to the right of each field.

Down Mode can be toggled by clicking the button to the right of the Down Mode.

Note: Changing Waypoint Defaults affects only waypoints created after the change.

Safety Zones

A Safety Zone is a highlighted area around a waypoint or marker used to designate an area that requires additional attention. Safety Zones have no effect on autopilot or vehicle travel.

Safety Zones are disabled by default. You can change the default from the Map Config tab in Mission View Tools Menu, in the Defaults subtab.

Note: Enabling Safety Zones only effects waypoints and markers created after being enabled.

Editing Waypoints

To edit a waypoint, select the Routes tab in the Mission View Tools Menu, then select the Waypoints subtab. Clicking on a waypoint will highlight the Waypoint in line and vice versa. You are able to edit all waypoint values from this line.

Changing Waypoint Order

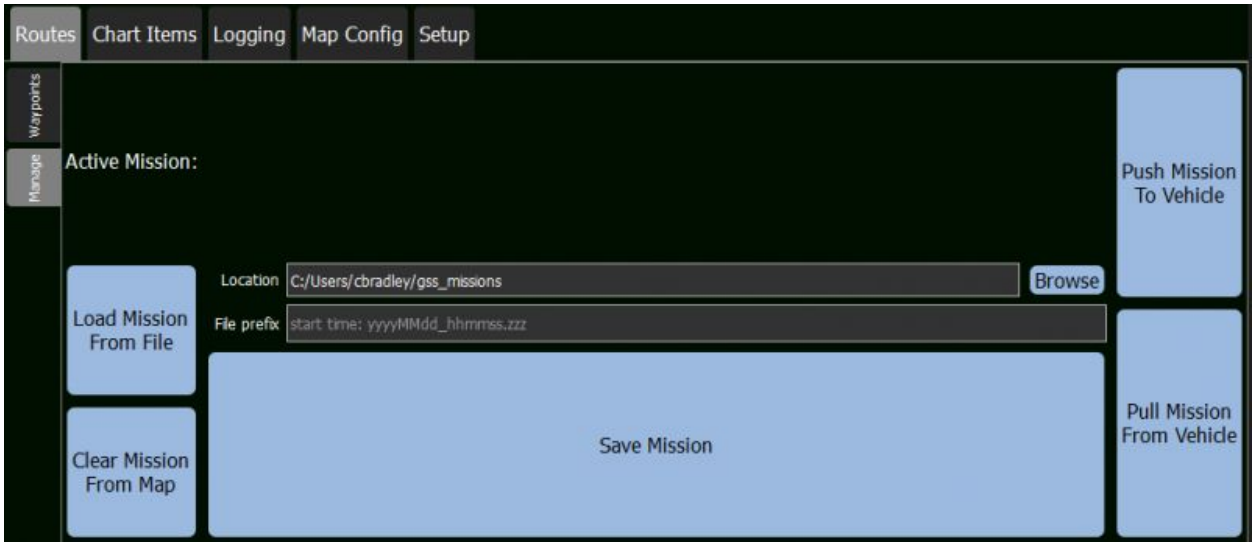
The vehicle will travel from waypoint to waypoint, in order, from the top to the bottom of the waypoint list. This list is found under the Routes tab in the Mission View Tools Menu, in the Waypoints subtab.

To change the order of waypoints, click and drag the item in the waypoint list.

Manage Missions

Managing missions includes saving and loading, pushing a mission route to a vehicle, pulling a mission route from a vehicle, or clearing a mission from the Map View.

To open Mission Management, select the Routes tab from the Mission View Tools Menu, and select Manage.



Saving a Mission

Select the Routes tab from the Mission View Tools Menu, select Manage, then click Save. Prior to saving a mission you can define the location to save the file, and the filename. By default the mission will be saved in the format yyyymmdd_hhmmss.zzz.

The mission will be saved in .yml format.

Loading a Mission

Select the Routes tab from the Mission View Tools Menu and select Manage. Click Load Mission From File, browse for your mission in the file selector, and click Open.

Push Mission to Vehicle

Before a vehicle can start a mission, it has to be pushed to the vehicle. To push the mission to a vehicle, select Routes from the Mission View Tools Menu, select Manage, and click Push Mission to Vehicle. This will enable Waypoint Following in the Autopilots view.

When you are ready to begin the mission, click Waypoint Following under Autopilots, the vehicle will begin traveling to each waypoint starting with the first.

Pull Mission from Vehicle

To pull a mission from the vehicle, select Routes from the Mission View Tools Menu, select Manage, then click Pull Mission From Vehicle.

Clear Mission

Selecting this will clear all data from the Mission View.

When you no longer need a mission, or want to create a new mission, you can clear a mission from Mission View.

To do this, select Routes from the Mission View Tools Menu, select Manage, then click Clear Mission From Map.

Executing a Mission

To execute a mission, it must be pushed to the vehicle and then activated. The mission is pushed to the vehicle by selecting the Push Mission To Vehicle button from the Mission tab of the navigation control. Once the mission has been given to the vehicle, it is activated and deactivated by the Waypoint Following button within the Autopilot Control. If the waypoints are modified they must be pushed to the vehicle again before the vehicle will begin following the new instructions.

Mission Logging

Mission Logs

You can work with Logs by clicking the Logging tab in the Mission View Tools Menu and select the Logging subtab on the left side of the menu.
Before you begin a mission, it is important to make sure it is logged.
Data logging is a fundamental component of using the Workspace effectively. Missions can be saved in order to to archive job data and can be used to troubleshoot any issues that occurred during a particular mission.
The data logging system logs every variable in the system with a time-stamp.

Making a Log

To make a log file, click the Logging tab in the Mission View Tools Menu and select the Logging subtab on the left side of the menu.

In the Record box, you are able to use the browse button to select a location to save the file. By default, the file will save in the format yyyymmdd_hhmmss. When you are ready to start recording, click Record.

To stop the recording, press Record again.

Creating a Log Mark

This feature is currently disabled.

While logging, using Log Mark will make a mark in the playback. It can be used to make a mark that will appear in the playback.

Log Playback

Workspace supports playback of previously recorded log files. This can be used to review a mission, or to diagnose any issues that arose during a mission.

To playback a log, click on the Logging tab in the Mission View Tools Menu and select Playback. Click Browse, search your computer for the log file you want to review and click Open.

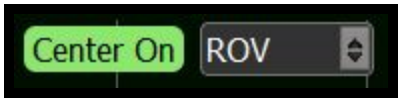
Mission View Troubleshooting

Locating your Vehicle

If you can't find your vehicle, you may have moved your map to an area away from your vehicle, focused on the topside vehicle, or magnified to a point where your vehicle is outside of the frame.

Select ROV (or Topside if locating the ship) using the dropdown at the top of the Map View, to the right of the Center On button.

Check the Center On button, if it is blue, click it. The map should now center on the ROV (or the ship if you selected Topside from the dropdown).



To move the map away from the vehicle, click the Center On button again, this will disable Center On.

Safety Zone Visibility

If you are unable to see a Safety Zone, first make sure it is enabled for the waypoint or marker.

To do this follow the steps below:

1. Select Routes from the Mission View Tools Menu (Chart Items, for a Marker Safety Zone).
2. Select the Waypoints subtab (Markers for a Marker Safety Zone).
3. Select the waypoint (or marker) that should have a Safety Zone.
4. Check the Zone Enabled Checkbox, if it is unchecked, click it.
5. Check Zone Radius, compare it to the grid size in the lower left corner of the Map View. If the grid size to too large, the zone may not be visible.
6. Check Zone Color, the color may blend into the background.
7. Check Zone Opacity, if the opacity is too low, the zone may not be visible on the map.

Navigation Tools

Compass Rose

The Compass Rose displays the vehicle's instantaneous pitch (P), Heading, roll (R) heading history, and number of full turns the vehicle has made (T).

Right-clicking on the compass rose provides a selection of compass rose settings including the option to display the ship, choose between north-up and vehicle-up orientations, and speed up or slow down the breadcrumb trail.

Right-Click Menu Items

You are able to right-click on the Compass Rose to open the Nav Compass Rose menu items. The menu options are explained below.

Item	Description
Show Topside/Hide Topside	Overlays a ship (topside) graphic and heading on the compass rose. "Hide topside" removes the topside graphic from the compass rose.
Set North-Up/Set Vehicle-Up	Orients the compass so that north (0°) is always in the up position. The vehicle will rotate to match the compass heading. "Set Vehicle Up" orients the vehicle in the up position. The compass will then rotate to match the compass heading.
Switch to Raw/Switch to Navigation Solution	Displays raw compass data as the heading above the Workspace compass, or displays the navigation solution heading above the compass.
Clear Dots	Clears the breadcrumb trail from the compass rose.
Speed-up Dots/Slow-down Dots	Speeds up or slows down the rate at which the breadcrumb trail populates the Workspace compass.

Heading

The current heading is displayed at the top of the Compass Rose, if it is green, the vehicle is following an Auto Heading set point, if yellow, the vehicle is being flown in open loop mode.

ROV Breadcrumb Trail

A breadcrumb trail is shown in the Compass Rose, displaying the vehicle's heading history. When the trail is yellow, the vehicle is being flown in open-loop mode. If it is green, the vehicle is following a set waypoint.

ROV Turns Gauge

The ROV Turns gauge tells you how many times the vehicle has executed a full 360° rotation about its z-axis. A positive value indicates the vehicle has turned in the positive psi direction, while a negative value indicates a turn in the negative psi direction. If the operator wishes to reset the turns counter, the zero button commands it back to 0.

Altitude and Depth Gauges

The depth and altitude gauges are positioned below the compass rose. They display the vehicle's current altitude relative to the floor

and the depth in meters (or feet if imperial is selected).

The depth and altitude are displayed in yellow when the vehicle is being flown in open-loop mode. These will be green if using an Auto Depth or Auto Altitude set point. A dashed breadcrumb trail displays the vehicle's depth and altitude history.

If comms are lost, this display will become gray and remain stationary at the last recorded depth and altitude.

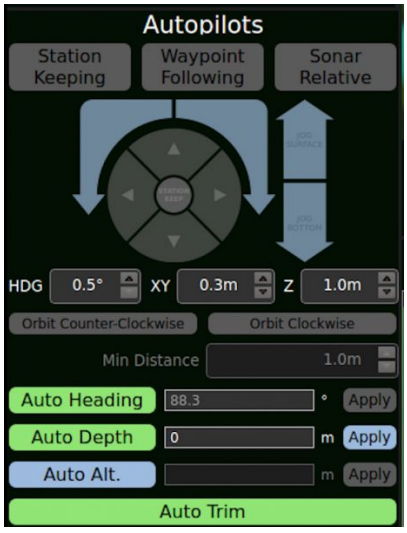
Zero

Zeroes the depth setting. This is useful to overcome linear offsets due to depth sensor mounting location. You can set the depth reading to 0m when the ROV is floating at the surface.

Comms LED

The green LED on the altitude gauge shows if bottom lock is valid.

Autopilot Control Menu



The Balefire Workspace contains several autopilot functions that enable precise and accurate autopilot control over the vehicle. The autopilot functions can be used concurrently and can be used to fully automate vehicle motion or to control the vehicle in fly-by-wire mode.

The autopilot functions are located directly beneath the vertical velocity gauge.

Function	Description
Station Keeping	When Station Keeping is enabled the vehicle keeps station at the current location. The arrow keys, overlaying the top-down image of the ROV, allow incremental axial and lateral movement, set using “XY” box. In Station Keeping mode, the operator can still use the joystick to control the vehicle. The joystick has open-loop control over the vehicle.
Waypoint Following	Waypoint Following mode commands the vehicle to fly a mission using waypoints to define the route it travels.
Auto Heading	The ROV maintains a heading set point. The arrow keys, overlaying the top-down image of the ROV, enable incremental heading changes, set using the “HDG” box. The joystick controls the vehicle in fly-by-wire mode while the vehicle is in Auto Heading mode. Rather than directly controlling thrusters, the joystick instead controls the Auto Heading set point.
Auto Depth	The ROV maintains a depth set point. The depth can be incrementally changed in Auto Depth similarly to Station Keeping and Auto Heading. The “Z” box sets the incremental changes in the positive and negative z-direction. Similar to Auto Heading, the joybox slider controls the auto-depth set point rather than the thrusters in fly-by-wire mode.
Auto Altitude	The ROV maintains an altitude set point. Similar to Auto Depth and Heading, the vehicle can be flown in fly-by-wire mode in while following an Auto Altitude set point.
Auto Trim	Some vehicles will have an option to Auto Trim, which will keep the vehicle level in the water, holding to zero pitch.
Orbit Counter-Clockwise and Orbit Clockwise	While in station-keeping mode, these options allow the operator to orbit clockwise or counter-clockwise around an object.
Sonar Relative	Moves the vehicle in relation to an object selected in the sonar.

Video Overlay Controls

Depending on your Workspace configuration Video Controls will either be found the Mission View Tools Menu, under Setup, in the Video Overlay Subtab; or the specifc Video Page in Workspace.

Button	Function	Overlay Location
Font	Allows you to adjust the font size of all items appearing in the video overlay.	N/A
Video Overlay	Toggles all Video Overlay functions	N/A
Record Overlay	Toggles whether or not the Video Overlay appears when a recording has been made.	N/A
Depth	Toggles Depth in the Video Overlay	Upper Left Corner
Altitude	Toggles Altitude in the Video Overlay	Upper Left Corner
Heading	Toggles Heading display in the Video Overlay	Upper Left Corner
Pitch	Toggles Altitude in the Video Overlay	Upper Right Corner
Roll	Toggles Altitude in the Video Overlay	Upper Right Corner
Time	Toggles Altitude in the Video Overlay	Lower Left Corner
Dive #	Toggles the Dive # In the video overlay, the text field to the right allows you to enter the dive number.	Lower Left Corner
Note 1	Toggles the Notes 1 display in the video overlay. The text field to the right of the button allows you to enter a note.	Lower Right Corner
Note 2	Toggles the Notes 2 display in the video overlay. The text field to the right of the button allows you to enter a note.	Lower Right Corner

On/Off

Each button in the Video Overlay Controls can be either toggled on or off.

	
Enabled	**Disabled**

Sonar View

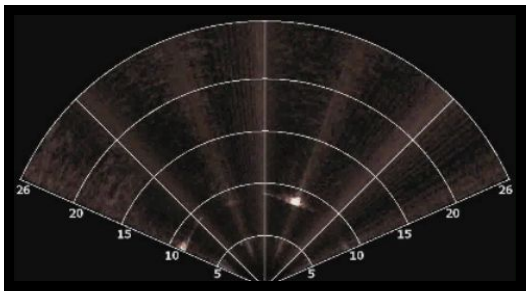
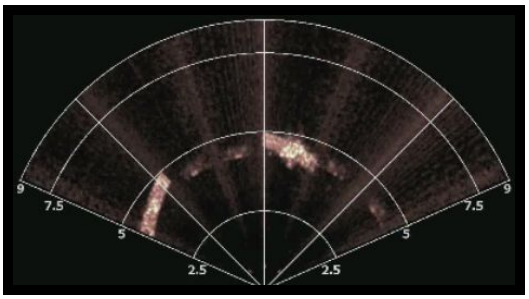
Sonar Tuning

Adjusting Range

Range is the distance the sonar is monitoring and what is displayed in the Sonar View, it can be

adjusted quickly using the slider or incrementally by using the - and + buttons to the right of the slider.

NOTE: When changing range, it is important to consider the size of the object that you are looking for; the larger the range, the smaller objects will appear in the sonar view. Additionally, be aware of your vehicle's speed when adjusting your sonar range the shorter the range, the less time you will have to react to an object. The example below shows the same object viewed at 26m and 9m range.

Object at 26m	Object at 9m
	

Adjusting Gain

Gain is a multiplier applied to information coming in from the return, by adjusting the slider or using the - and + buttons, you will increase the intensity of the colors used in the sonar image.

Too little gian will result in a mostly empty Sonar View, too far to the right and will result in close to maximum color.

Speed of Sound (Not all sonar systems)

In water, the speed of sound is not constant. It can be affected by pressure, temperature, and the salinity of the water. Adjusting the Speed of Sound slider will change the calculation for the speed of sound, this can be used to correct images that may appear misaligned. It does not change the speed of sound.

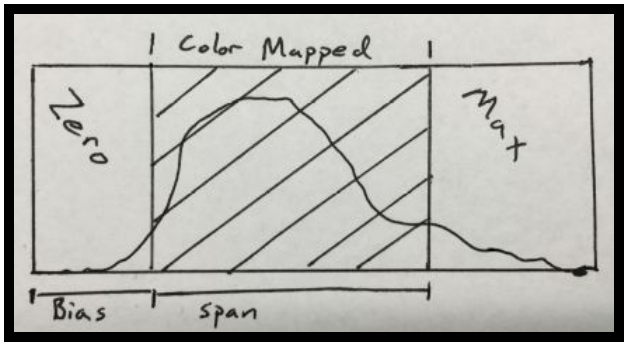
NOTE: In most cases this does not need to be changed.

Adjusting Bias and Span

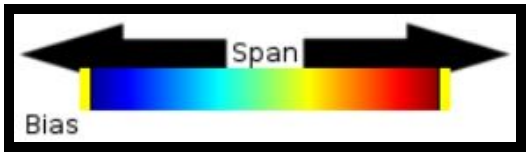
Bias and Span work together to set upper and lower bounds of colors mapped to intensities, Additionally and the range of colors tied to intensities in the Sonar View.

It is important when adjusting bias and span to only map the sonar intensities that are significant.

All intensity values between bias and (bias + span) will be color mapped, any intensities below the lower threshold will be black, and above will be displayed at the maximum value.



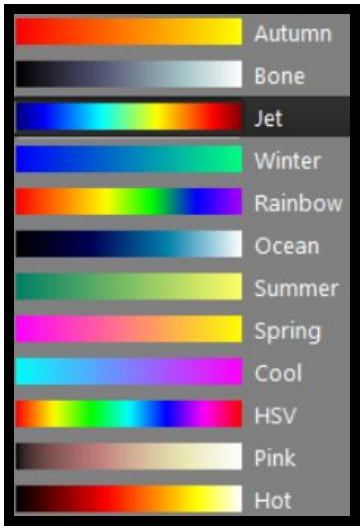
Bias and Span are adjusted by moving the yellow grab handles to the left and right. Additionally, the entire bar can be shifted to the left and right to further adjust the sonar color mapping.



All intensity values less than the bias will appear black on the screen.

All intensity values greater than bias + span will be displayed at the maximum color value of the palette.

Palette Selector



The color displayed in the sonar view is mapped to the intensity of the returns. In Workspace, there are multiple palettes to choose from, and can be selected based on user preference.

Generally, if you are new to using sonar try using the Jet palette, Pink and Bone are also popular, but it is a matter of personal preference.

Show Sonar on Mission View

To overlay the sonar display on the Mission View from the perspective of your vehicle, click Show Sonar on Mission View in the upper-right corner of the Sonar View.

Using Sonar

Detecting an Object

Before you are able to interact with an object using the Sonar View, you need to find an object. Below is a list of some things to consider when looking for an object using Sonar.

1. If you're are new to using Sonar, try using the palette Jet, this is the default. Other popular palettes include Pink and Bone.
2. Adjust range relative to the size of the object(s) you are looking for. The smaller the object, the shorter the rage you should use.
    a. Keep in mind, the shorter you set your range, the less time you will have to react to an object as it comes into view.
3. Sonar relies on reflected sound (in defined width and height) to establish an object's location, this is translated into 2D image. Objects that are perpendicular the transmitter will generally have a stronger return.
4. Be aware of “noise” in the sonar view, objects that seem to appear for a moment and disappear. This could be animals or, depending on vehicle depth, reflections off of the bottom and/or surface.

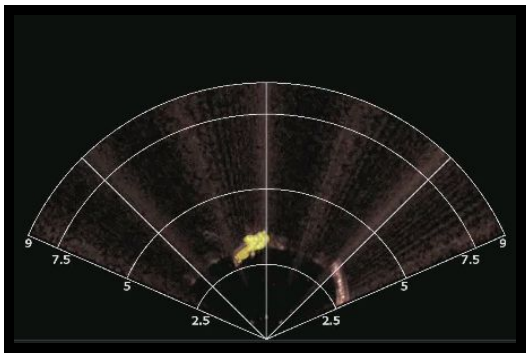
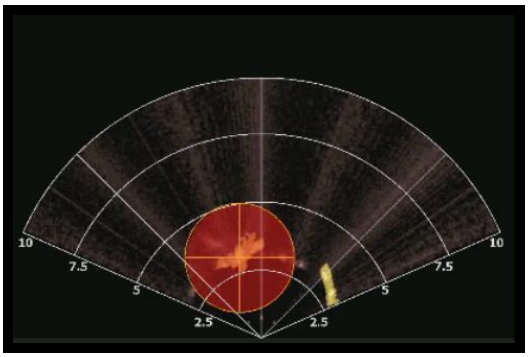
Target Tracking

To open the Target Tracking Features options select the Target Tracking from the Sonar Widget.

Click to Acquire

In Workspace Sonar View, you have the ability to lock on a target. This allows for alternative control options, such as Sonar Relative Control.

When you have found an object that you want to lock onto in the sonar view, use your cursor to double-left-click on it to acquire a sonar lock.

Object Before Lock	Object With Lock
	

Sonar Relative Control

Once you have acquired a sonar target in the Sonar Widget, the Sonar Relative button will become active in the Autopilot Widget. Autopilot will orient the vehicle to focus on the selected object. Selecting Sonar Relative changes vehicle control to be oriented around the selected object.