LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

WGMS™ User Guide

Piloting, Mission Planning, and Data Management

Revision C
April 2016
Part Number 05910

LIQUID ROBOTICS®

WGMS™ User Guide: Piloting, Mission Planning, and Data Management

Copyright © 2016 Liquid Robotics, Inc.

Confidential computer software. Valid license from Liquid Robotics, Inc. required for possession, use or copying. Consistent with FAR 12.211 and 12.212, Commercial Computer Software, Computer Software Documentation, and Technical Data for Commercial Items are licensed to the U.S. Government under vendor's standard commercial license.

Trademarks

Liquid Robotics®, LRI, Wave Glider®, Wave Glider Management System, WGMS™, and SHARC® are worldwide trademarks of Liquid Robotics, Incorporated. Other products and company names mentioned herein may be the trademarks of their respective owners.

Patents

The Wave Glider mechanism is patented under US Patent Number 7,371,136 and other patents pending. All aspects of the Wave Glider product have been developed at private expense by Liquid Robotics, Inc.

Warranty

The information contained herein is subject to change without notice. The only warranties for Liquid Robotics, Inc. products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as a warranty. LRI, Inc. is not liable for technical or editorial errors or omissions contained herein.

Revision History

Document Part Number	Revision	Publication Date	Changes
05910	A	June 2014	This is the initial release of this document.
05910	B	March 2015	Revision B of this document was released to make corrections to content in the “ Latitude and Longitude Representation ” (page 64) section in Ch. 4: "Using the WGMS Interface"
05910	C	April 2016	Revision C of this document was released to include changes to the WGMS user interface that were introduced in the WGMS releases that have occurred since March 2014.

Table of Contents

About this Document xv
1. WGMS Overview 1
WGMS System Components 1
Typical WGMS Communications Scenarios 2
LRI-Hosted WGMS 3
2. First Time Use of WGMS 6
3. WGMS UI Overview 17
WGMS UI Architecture 17
Accessing the WGMS User Interface 18
Gaining Access 18
Roles 18
The Five Primary WGMS Pages 19
WGMS Dashboard 19
Position Map 21
Map Toolbars 21
Communications Log 22
Commands Log 22
Dashboard Sidebar 23
Show System Menus Link 24
WGMS Home Page 26
Home Page Tool Bar 27
Home Page Sidebar 29
Home Menu 29
Vehicles Menu 30
App Services Menu 33
Data Page 34
Data Page Sidebar 35
Data Page Toolbars 39
System Page 40
System Page Sidebar 40
System Page Toolbars 42
Settings Page 42
Settings Page Sidebar 43
Settings Page Toolbars 45
4. Using the WGMS Interface 46
Toolbar Icons 46
Buttons 49
Links 49
Check Boxes 49
Single and Double Clicking 49
Text Input Boxes 50
Drop-down Menus 51
Icon Selection Boxes 51
Pages 52
Help Icon 52
Lists 52
Changing List Column Widths 53
List Page Selection 53
Records 54
Forms 55
Dialog Boxes 55

Using the Position Map 56
Vehicle Symbols 58
Waypoints 58
Telemetry Crumbs 61
Latitude and Longitude Representation 64
Using the Position Map Toolbar 64
SV2 Position Map Toolbar 64
SV3 Position Map Toolbar 65
Vehicle Health Status 67
Specifying the Data Time Frame 70
Refresh and Auto-refresh 71
Fast Mailbox Check (SV2 Only) 72
Battery Status Indicator 75
Online Help 76
Map Options 77
Map Options Tab 78
Tool Options Tab 81
AIS Options Tab 87
Using the Map Utility 91
Measure a Distance on the Position Map 93
Create Waypoints 96
Create a Circular Course 102
Create a Circular Operation Polygon 107
Create a Square Course 113
Create a Square Operation Polygon 118
Create a Spiral Course 124
Using the Piloting Panel 129
Using the Piloting Panel for Vehicle Headings Information 130
Using the Piloting Panel to Center the Position Map 133
Using the Dashboard Sidebar 135
Communications Log 139
Commands Log 140
Data View Page - Custom Reports 141
Data View - Table Format 145
Data View - Graph Format 148
Data View - Map Format 151
ADCP C2 and ADCP C4 Data Display 152
ADCP C2 and C4 Table Format 152
ADCP C2 and C4 Graph Format 156
ADCP C2 Bin Map Format 157
SV3 Commands Window 161
SV3 AMPS Modules Status Information 168
5. Administrative Tasks - Home Page 175
View or Edit Vehicle Data 175
Viewing Vehicle Parts Information 178
Adding or Changing Vehicle Alarm Thresholds 180
6. Administrative Tasks - Data Page 187
Viewing Payload Data 187
Viewing Sensor Data Records 187
7. Administrative Tasks - System Page 189
Updating Lists 189
Exporting Records 195
8. Administrative Tasks - Settings Page 200
About WGMS Organizations, Users, and Roles 200

Organizations 200
Users 200
Roles 200
Typical Organization Initialization Tasks 201
Accessing the Organization Info 201
Editing Organization Information and Settings 202
Editing the Organization Tab Settings 204
Editing the Maps Tab Settings 207
Editing the Contact Info Tab Settings 208
Editing the Formatting Rules Tab Settings 209
Editing the Description Tab Information 210
Standard Administrative Tasks 211
Adding New Users 211
Assigning or Removing User Roles 217
Deleting a User 221
Specialized Administrative Tasks 224
Accessing an Organization 224
Viewing Roles for an Organization 224
Viewing Permissions 226
Changing Permissions 229
Changing Catalog Images 229
Advanced Organization Options 232
Advanced Settings Options - Record Customization 233
9. Provisioning a Wave Glider 235
Provisioner Role Requirements 235
Entering a Vehicle into the Database 235
Organizations 235
Vehicle Name 235
Create and Name a New Vehicle 236
Initializing the Part Info Tree (SV2 Only) 240
Obtaining the IMEI Number 240
Adding Part Info Data 240
Adding Event Definitions 244
Creating New Event Definitions 244
Copying Event Definitions 247
Changing or Deleting Event Definitions 250
Adding Operation Polygons 250
Operation Polygon Definition 250
Creating New Operation Polygons 250
Copying Operation Polygons 255
Adding Waypoints 256
Creating New Waypoints 257
Copying Waypoints 258
Adding a List 259
Creating a New Escalation List 260
Copying Existing Escalation Lists 267
Completing the Part Info Tree (SV2 Only) 269
Powering Up the Vehicle 270
Getting Part Info Data 271
Adding Serial Numbers (SV2 Only) 275
Setting the Float Serial Number 276
Setting Remaining Serial Numbers 277
Complete Vehicle Provisioning 277
Commenting On Provisioning 277

LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

10. Troubleshooting 279
Troubleshooting a WGMS Installation 279
I don't see any Vehicles when I start the WGMS 279
There is no response from the Vehicle 279
Commands are not being ACKed/NAKed 280
A Vehicle no longer responds to WGMS commands 280
Map is not being displayed in the WGMS Dashboard 281
XBee doesn't seem to be working (SV2 Only) 281
I'm not getting Iridium messages 281
Mobile WGMS is not working 281
I changed and then lost the Administrator's password 282
Troubleshooting C&C Initiated Alarms 282
Troubleshooting WGMS Initiated Alarms 283
General Alarm Response 283
Intermittent Alarms 284
Multiple Alarms 284
XBee Communication (SV2 Only) 284
Contacting Liquid Robotics 284
C&C Alarm Responses 284
Sub Leak Alarm 284
Float Leak Alarm 284
Sub-to-Float Comm Error 285
Payload Alarm 285
Float Battery Low 285
Umbilical Fault 285
GPS Not Functioning 286
Sub Reboot Alarm 286
Float-to-Sub Comm Error 286
Float Temperature Exceeded 286
Float Pressure Outside Range 287
EPROM Error 287
Float Reboot Alarm 287
Shore Alarm Responses 288
Report Timeout 288
Link Error 288
Invalid GPS 288
Empty Record 288
Checksum Error 289
Out of Bounds 289
Other Vehicle Problems and Actions 289
No XBee Connection (SV2 Only) 289
No Iridium Connection 289
LED Light Won't Turn ON/OFF 290
IR Light Won't Turn On/OFF 290
No Float Payload Power 290
No Sub Payload Power From C&C 290
Float Continuously Reboots 291
Sub Continuously Reboots 291
Contacting Liquid Robotics 291
A. Solar Flux 292
B. Roles and Permissions 293
Glossary 297

List of Figures

1.1. Wave Glider Management System Components 1
1.2. Example: Some Wave Glider SV3 Communications Channels 3
1.3. LRI-Hosted WGMS 4
1.4. Example: Wave Glider SV2 Deployed with LRI-hosted WGMS 5
2.1. Sign-In to WGMS Website 6
2.2. WGMS Login Page 7
2.3. Change Username Page 8
2.4. Accept License and Change Default Username 9
2.5. Sign In with New Username 10
2.6. Change Password Page 11
2.7. Changing the Default Password 12
2.8. Initial UI Display Page 12
2.9. UI Display with System Menus 13
2.10. Initial User Admin Form 14
2.11. Edited Email - Initial User Admin Form 15
2.12. Initial Vehicles List 16
3.1. WGMS Dashboard SV3 Vehicles 20
3.2. WGMS Dashboard SV2 Vehicles 20
3.3. WGMS Position Map 21
3.4. SV3 Map Toolbar 22
3.5. SV2 Map Toolbar 22
3.6. Communications Log 22
3.7. Commands Log 23
3.8. WGMS SV3 Dashboard Sidebar 23
3.9. WGMS SV2 Dashboard Sidebar 24
3.10. Show System Menus Link 24
3.11. Hide System Menus Link 25
3.12. Home Page, Data Page, and System Page Buttons 25
3.13. WGMS Home Page (SV3 Vehicle) 26
3.14. Vehicle Page Side Tab 26
3.15. Home Page Toolbar 27
3.16. Saved Exports Button 28
3.17. Select View Drop-Down Menu 28
3.18. Home Page Sidebar 29
3.19. Vehicles Window 30
3.20. Vehicles Toolbar 31
3.21. Raw Outputs Window 32
3.22. Raw Outputs Toolbar 32
3.23. Missions Window 33
3.24. Missions Toolbar 33
3.25. App Services Window 34
3.26. App Services Toolbar 34
3.27. Data Page 35
3.28. Data Page Sidebar 36
3.29. Example: Click on Icon in Record Listing 37
3.30. Payload Data Tabs Toolbar 39
3.31. Sensor Data Tabs Toolbar 40
3.32. System Page 40
3.33. System Page Sidebar 41
3.34. Settings Page - Logged Into 1 Organization 43
3.35. Settings Page Sidebar 44

3.36. Organizations Tab Toolbar 45
3.37. Record Customizations Tab Toolbar 45
4.1. Example: Toolbar Icons 46
4.2. Hover Cursor Over Toolbar Icon 46
4.3. Example: New Icon 47
4.4. Example: Print Icon 47
4.5. Example: Export Icon 48
4.6. Example: Saved Exports Icon 48
4.7. Example Buttons 49
4.8. Example Link 49
4.9. Example Checked and Unchecked Boxes 49
4.10. Example: Single Click on List Item 50
4.11. Example: Double Click on List Item 50
4.12. Example: Text Input Box 51
4.13. Example: Predefined and No-Entry Text Boxes 51
4.14. Example: Drop-down Menu 51
4.15. Example: Icon Selection Box 51
4.16. Click Help: Access WGMS Documentation 52
4.17. List Sorting Example 53
4.18. List Page Selector 54
4.19. A Typical WGMS Record 54
4.20. A Typical WGMS Form 55
4.21. A Typical WGMS Dialog Box 56
4.22. Position Map Display Features 57
4.23. Terrain Option for the Map Display Type 57
4.24. Position Map Vehicle Symbols 58
4.25. Waypoints for Selected Vehicle (Red) and Other Vehicles (White) 59
4.26. Waypoint Pop-Up 60
4.27. Click on Link to Open Waypoint Record 60
4.28. Arrival Distance Circle 61
4.29. Telemetry Crumb (Vehicle Icon) Pop-Up 63
4.30. Click on Link to Open Vehicle Record 63
4.31. Example: Latitude and Longitude Displayed in WGMS 64
4.32. SV2 Position Map Toolbar 65
4.33. SV3 Position Map Toolbar 66
4.34. Example: Vehicle Health Window - ALARM 68
4.35. Alarm Reset Dialog Box 68
4.36. Example: Vehicle Health Window - SELFCORR 69
4.37. Example: Vehicle Health Window - OK 70
4.38. Default Time Frame Settings in the Position Map Toolbar 70
4.39. Example: Display Data for 45 Minutes Prior to Last Known Data 71
4.40. Example: Display Data for 2 Days Prior to 02/18/2016 at 01:17:43 71
4.41. Refresh Icon, Time of Last Refresh and Auto-refresh 72
4.42. Auto-refresh Cycle Countdown 72
4.43. Turn Fast Mailbox Check ON 74
4.44. Turn Fast Mailbox Check OFF 75
4.45. Click on Battery Status Indicator 75
4.46. Online Help Icon 76
4.47. Online Help Menu 77
4.48. Map Options Button 77
4.49. Map Options Dialog Box Open to the Map Options Tab 78
4.50. Map Options Vehicle Menu 79
4.51. Vehicle Selected in Dashboard Sidebar 80
4.52. Tool Options Tab 81

4.53. Select PacIOOS Currents Check Box - Global 82
4.54. Select Currents Check Box 25 hr Averaging 83
4.55. Select Currents Check Box Most Recent 83
4.56. Select Label Op-Regions and Most Recent Point 84
4.57. Nautical Charts Check Box 85
4.58. Example: NOAA Nautical Charts Display 86
4.59. Iridium Coordinates Enabled 86
4.60. Iridium Tracking Enabled 87
4.61. AIS Options Tab - AIS Data Display Disabled 87
4.62. AIS Options Tab - AIS Data Display Enabled 88
4.63. AIS Options Tab - Enable AIS Data Display Selected 89
4.64. AIS Options Tab - Enable AIS Data Display Selected 90
4.65. AIS Options Tab - Enable AIS Data Display Selected 90
4.66. Vehicle Selected in Dashboard Sidebar 91
4.67. Map Utility Displayed on the Position Map 91
4.68. Example: Set Starting Point for Distance Measurement 94
4.69. Example: Set End Point for Distance Measurement 94
4.70. Example: Move End Point 95
4.71. Example: Add Legs to Distance Measurement 96
4.72. No Waypoints Have Been Created for R/V Peter-Test 97
4.73. Click to Create a Waypoint on the Position Map 98
4.74. Waypoint: New Form 99
4.75. Waypoint on the Position Map is Red and Numbered 1 100
4.76. New Waypoint Saved to the Vehicle Waypoint List 101
4.77. Delete the Waypoint from the Waypoint List 101
4.78. Creating a Circular Course with Waypoint 1 in the Center 102
4.79. Example: Render a Circular Course 104
4.80. Click the Send WPs Button 105
4.81. New Waypoints Sent to Vehicle and Displayed on Position Map 106
4.82. New Waypoints Saved to the Vehicle Waypoint List 106
4.83. Example: Render a Circular Operation Polygon 107
4.84. Example: Click on Send OPs Button 108
4.85. Example: Operation Polygon Created 108
4.86. Example: Operation Polygon Added to Vehicle Operation Polygons List 109
4.87. Example: Operation Polygon Edit Form - Default Exclusion Zone 110
4.88. Example: Operation Polygon Edit Form - Change to Inclusion Zone 111
4.89. Example: Operation Polygon Saved as Exclusion Zone 112
4.90. Example: Circular Exclusion Zone 113
4.91. Creating a Square Course with Waypoint 1 in the Center 114
4.92. Example: Render a Square Course 115
4.93. Click the Send WPs Button 116
4.94. New Waypoints Sent and Dispayed on Position Map 117
4.95. New Waypoints Saved to the Vehicle Waypoint List 117
4.96. Example: Render a Square Operation Polygon 118
4.97. Example: Click on Send OPs Button 119
4.98. Example: Inclusion Zone 120
4.99. Example: Op Region 44 Added to Vehicle Operation Polygons List 120
4.100. Example: Operation Polygon Edit Form - Default Inclusion Zone 121
4.101. Example: Operation Polygon Edit Form - Change to Exclusion Zone 122
4.102. Example: Operation Polygon Saved as Exclusion Zone 123
4.103. Example: Circular Exclusion Zone 124
4.104. Creating a Spiral Course with Waypoint 1 in the Center 125
4.105. Example: Render a Spiral Course 126
4.106. Click the Send WPs Button 127

4.107. Click the Send WPs Button 128
4.108. New Waypoints Saved to the Vehicle Waypoint List 128
4.109. The Selected Vehicle 129
4.110. Piloting Panel Displayed on Position Map 130
4.111. Piloting Panel - Headings Information 130
4.112. Example: Piloting Panel Envelope 360 Degrees Positive 131
4.113. Example: Piloting Panel Envelope Positive and Negative 131
4.114. Example: Get Heading For 45 Degrees 132
4.115. Example: Get Heading For 90 Degrees 132
4.116. Example: Get Heading For 135 Degrees 132
4.117. Example: Get Heading For 225 Degrees 133
4.118. Piloting Panel Displayed on Position Map 133
4.119. Enter Waypoint 251 in the Recenter Field 134
4.120. Click Recenter to Center the Position Map 134
4.121. Click Home to Center the Position Map 135
4.122. Position Map Centered on the Most Recent Location of the Selected Vehicle 135
4.123. WGMS SV3 Dashboard Side-Bar 136
4.124. WGMS SV2 Dashboard Side-Bar 137
4.125. Communications Log 139
4.126. Commands Log 140
4.127. Selecting a Vehicle and a Data Type 142
4.128. Data View Page 143
4.129. Data View Page - No Data Available 143
4.130. Datawell MOSE Records 144
4.131. Data View Page Toolbar 144
4.132. Data View - Table Format 146
4.133. Changing the Columns that are Displayed 147
4.134. Split Button and Reset Button 147
4.135. Split Display - Table and Graph 148
4.136. Custom Reports Page - Graph Format 149
4.137. Graph Format toolbar 149
4.138. Custom Reports Page - Graph Format Time Slider 150
4.139. Split Display - Graph and Table 151
4.140. Data View - Map Format 151
4.141. Custom Reports Page - ADCP Table Format 153
4.142. Data View Page Toolbar 153
4.143. ADCP C2 and C4 Table Format toolbar 154
4.144. Rows Drop-Down Menu 155
4.145. Settings: Bins and Magnitude Menus 156
4.146. Compass Icons 156
4.147. Data View - ADCP Graph Format 157
4.148. ADCP C2 and C4 Graph Format Toolbar 157
4.149. Data View - ADCP C2 Bin Map Format 158
4.150. Date and Time of Bin Map Data 158
4.151. ADCP C2 Bin Map Format - All Bins Mode 159
4.152. Settings Button - All Bins Mode Toolbar 159
4.153. Data View - ADCP C2 Bin Map - Map Mode with Data 160
4.154. Map Mode Toolbar 160
4.155. AMPS Summary Report 170
4.156. AMPS Output Power Report 170
4.157. AMPS Battery Port Report 171
4.158. AMPS Solar Input Port Report 171
4.159. AMPS Bridge Power Port Report 172
5.1. WGMS Home Page 175

5.2. Vehcles Window 176
5.3. Example - Vehicle Form 177
5.4. Example Expanded Part Info Tree 179
5.5. Edit Part or Attach Note 180
5.6. Part Form for the Iridium Modem 180
5.7. Vehicle Form 181
5.8. Event Definitions List 182
5.9. New Event Definition - Alarm Counts Form 183
5.10. New Event Entered - Alarm Counts Form 184
5.11. Save and Close Event Definition 184
5.12. Updated Event Definitions List 185
5.13. Edit Event Definition - Alarm Counts Form 186
6.1. Sensor Data - Fluorometer Records List 188
7.1. Lists Side Tab - Lists Window 190
7.2. Escalation List - List Form 191
7.3. New Icon 191
7.4. List Item Form 192
7.5. Contact List Records 193
7.6. Example New List Item 194
7.7. Select Name in List Form 194
7.8. Delete List Item Icon 194
7.9. List Deletion Dialog Box 195
7.10. Delete Record Dialog Box 195
7.11. Record Exports List 196
7.12. Example - Export Dialog Box 197
8.1. Organizations List 202
8.2. Organization Form 203
8.3. Org Admin Form 204
8.4. Org Admin Form - Organization Tab 205
8.5. Changing Logo 206
8.6. Image Library Dialog Box 207
8.7. Org Admin Form - Maps Tab 208
8.8. Org Admin Form - Contact Info Tab 209
8.9. Org Admin Form - Formatting Rules Tab 210
8.10. Org Admin Form - Description Tab 211
8.11. Organizations Window 212
8.12. Organization Dialog Box 213
8.13. Example List of Users 214
8.14. User: New Form 215
8.15. Completed New User Account Example 217
8.16. Organization Form 218
8.17. WGMS Organization Users Example 219
8.18. User Admin Form Example 220
8.19. User Related Roles Form 221
8.20. Organization Form 222
8.21. Name Selected for Deletion 223
8.22. Users Dialog Box Toolbar 223
8.23. Deletion Confirmation Dialog Box 223
8.24. Organizations List 224
8.25. Roles List 225
8.26. Master Role Form 226
8.27. Master Role Description 226
8.28. Master Role Form 227
8.29. Master Role Permissions Window 228

LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

8.30. Permission Icon Descriptions 228
8.31. Master Vehicles Permissions 229
8.32. Catalog Images List 230
8.33. Image Library Upload Dialog Box 231
8.34. Image Library Remove Dialog Box 232
8.35. Advanced Organization Options Side Tabs 233
8.36. Record Customization Side Tab 234
9.1. Data Page, Vehicles Tab 236
9.2. Changing Pages in the Vehicles Tab 236
9.3. Click on New 237
9.4. Vehicle: New Form 237
9.5. Vehicle Icon Drop-Down Menu 238
9.6. Click Save or Save and close Vehicle 239
9.7. Copy from another Vehicle 240
9.8. New Vehicle Edit Dialog Box 241
9.9. New Part Dialog Box 242
9.10. Part Info Box with Float Info 243
9.11. Part Info Box Initial Setting 244
9.12. Event Definitions Empty Specification 245
9.13. New Event Definition Dialog 245
9.14. Completed Event Definitions Specification 247
9.15. Event Definitions Copy Dialog 248
9.16. Copy-To Dialog Box (Event Definition) 249
9.17. Operation Polygons List (Empty) 251
9.18. New Operation Polygon Definition 252
9.19. Operation Polygon Coordinates List (Empty) 253
9.20. New Operation Coordinates Entry Dialog 253
9.21. Operation Polygon Coordinates List 254
9.22. New Operation Polygon Specification 254
9.23. Example Operation Polygons List 255
9.24. Operation Polygons Copy Dialog 255
9.25. Copy-To Dialog Box (Polygons) 256
9.26. Empty Waypoint List 257
9.27. New Waypoint Dialog 257
9.28. Example New Waypoints List 258
9.29. Waypoints List for Copying 259
9.30. Lists (Empty) 260
9.31. New List Dialog Example 261
9.32. Escalation List Name Entry 262
9.33. Escalation List Edit Dialog (Empty) 263
9.34. New List Item Dialog 264
9.35. Contact List Records 265
9.36. New List Item Example Entry 266
9.37. Example New Escalation List 267
9.38. List of Vehicle Lists 268
9.39. Vehicle Selecton List 269
9.40. Attaching a Solar Panel Connector 270
9.41. Inserting the Power Key 271
9.42. Vehicle Name Select 272
9.43. Retrieve Identification Command Dialog 272
9.44. Vehicle Icon 273
9.45. Received Part Identification 273
9.46. Part Identification Edit Dialog 274
9.47. Completed Part Info Data Tree 275

LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

9.48. Vehicle Edit with Part Info 276
9.49. Float Part Info Dialog 277
9.50. Provisioning Completed Comment 278

List of Tables

4.1. Fast Mailbox Check Icon: OFF and ON 73
10.1. C&C-Initiated Alarms 282
10.2. WGMS SV2 Software Alarms 283

About this Document

This document is a reference to the Liquid Robotics Inc. (LRI) Wave Glider Management System (WGMS). The audience is WGMS users assigned a Master Role or lower.

The Wave Glider is a platform for long-duration deployment of ocean surface sensor systems. WGMS provides browser and programmatic interfaces for people and applications to send commands to the Wave Glider, including its payloads, and to receive data from the Wave Glider and its payloads. WGMS is easily configured to support a variety of deployment scenarios.

Note

This document is focused on WGMS features and functionality independent of browser context menus accessed with a mouse right-click, or from the browser toolbar.

Note

"Sub" is the preferred naming convention for the sub-marine wave motion propulsion component of the Wave Glider vehicle. "Glider" is an alternate (and discouraged) term used to refer to the Sub. If you see the term "Glider" used in this manual, it will be because "Glider" appears in the WGMS User Interface and has not yet been changed to "Sub."

For detailed information on the Wave Glider SV2 and the commands you can issue to the SV2 using WGMS, see the most recent revision of the Wave Glider® SV2 Interface Control Description.

For detailed information on the Wave Glider SV3 and the commands you can issue to the SV3 using WGMS, see the most recent revision of the Wave Glider® SV3 Interface Control Description.

WGMS Release Notes are available in the WGMS online help and on the Liquid Robotics Open Oceans Portal..

Chapter 1. WGMS Overview

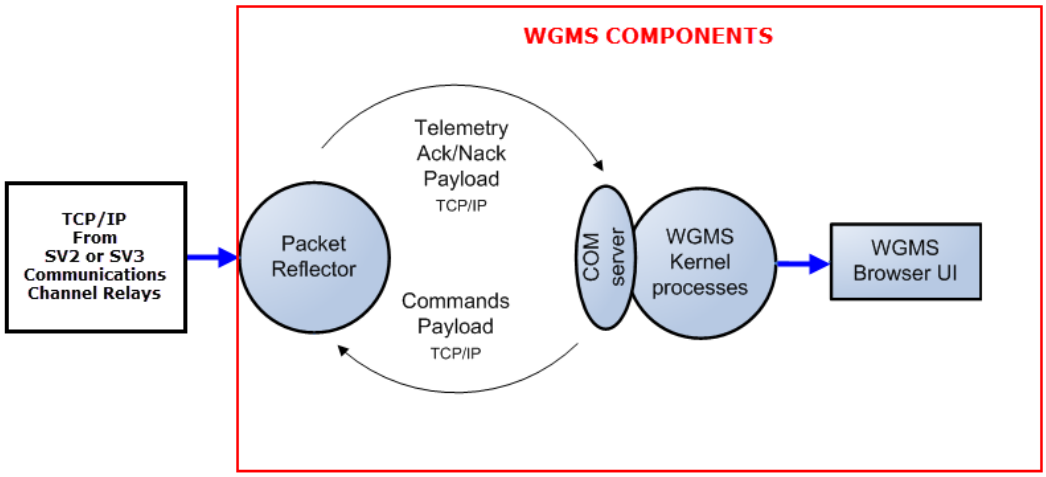
WGMS is a Web application for remote Wave Glider mission management that includes piloting and data management tools. From the WGMS *UI* you can:

- Access administrative tools
- Access mission planning tools
- Access piloting tools
- Issue commands to the vehicle
- Issue commands to payloads
- Display and Store vehicle data
- Display and Store system data
- Display and Store payload data

WGMS System Components

Figure 1.1 illustrates the components of complete WGMS configuration.

Figure 1.1. Wave Glider Management System Components



WGMS includes the following components:

- **Packet Reflector** – A Packet Reflector routes traffic between one or more WGMS kernels and one or more communications relays, including associated protocol processing. Packet Reflectors use TCP/IP for all communications with other processes.
- **COM Server** – The COM Server interfaces between the Packet Reflector and the WGMS server application in the kernel. The COM Server communicates with the kernel using Web Services.

- **WGMS Kernel Processes** – These include the WGMS Kernel and the database server. WGMS also uses email for sending alarms to users, so the host system must have the ability to send email. Primary services include filters for access control, data consistency, and concurrency management. Communications with application programs is through Web Services technologies. Communications with browsers rely on standard HTML and JavaScript. WGMS relies on Microsoft SQL Server.

- **WGMS Browser UI** – This is the dashboard UI for managing the Wave Glider. Communications with browsers use standard HTML and JavaScript over a mix of HTTP and HTTPS. No additional configuration is required for browser access.

Regardless of the communications channel between a Wave Glider Vehicle and WGMS, the Packet Reflector receives and transmits TCP/IP and the WGMS components communicate with each other using TCP/IP. WGMS components can be resident entirely on one computer, or on multiple computers.

Commands are sent from the WGMS browser UI to the WGMS kernel. The kernel performs authentication, authorization and validation checks on the request. Once approved, it passes the command in an internal format to the Packet Reflector to be forwarded to the Wave Glider Vehicle using the indicated communications channel relay. The communications channel relay manages the details of the underlying communications technology. Depending on the command addressing, the Wave Glider Vehicle either executes the command locally, or forwards it to a payload for processing.

Data such as telemetry is returned from the Wave Glider through a similar mechanism. It is sent to the appropriate communications relay which forwards it to the appropriate Packet Reflector. The Packet Reflector performs validations and some protocol processing and then forwards the data to one or more WGMS Kernels, based on the configuration. The WGMS Kernel stores the data in its database for later use.

Typical WGMS Communications Scenarios

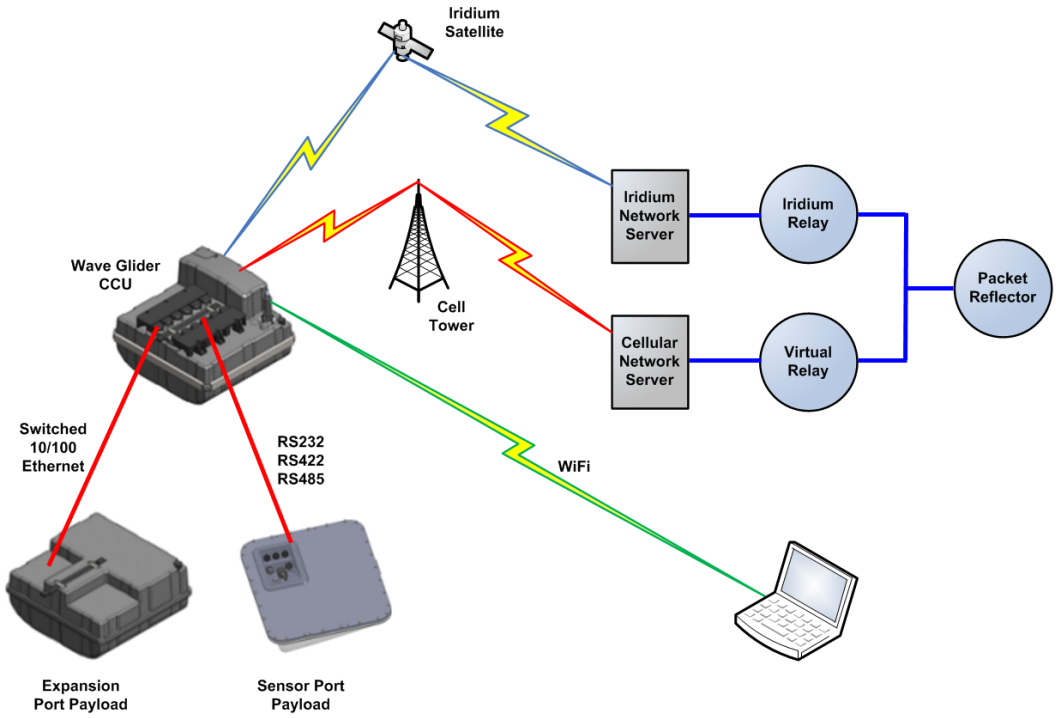
Wave Glider Vehicles can use a variety of channels to communicate with WGMS, depending on mission locale and requirements:

- For world-wide long range off-shore operations, Wave Glider Vehicles typically use the Iridium Satellite Network. WGMS connects to the Iridium Satellite Network over an Internet link to an Iridium data center.

- For near shore or near ship operations XBee (SV2 Only), WiFi, and Cellular communications are supported.

- XBee (SV2) and WiFi (SV3) communications are typically used for on-shore payload development and testing.

Figure 1.2. Example: Some Wave Glider SV3 Communications Channels

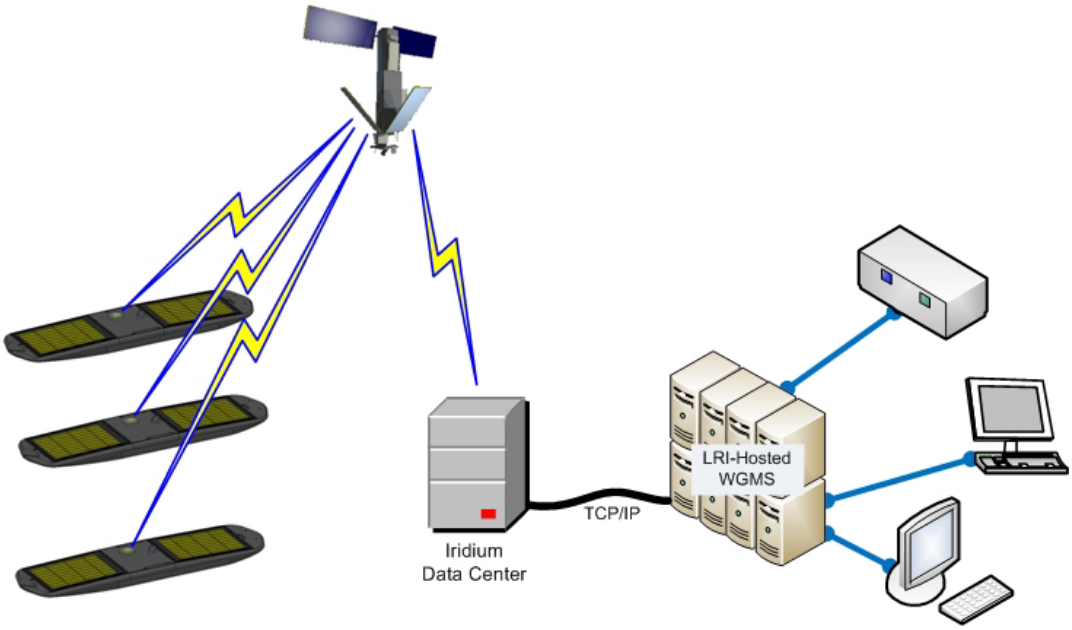


For more information on Wave Glider and WGMS supported communications channels see the most recent revision of the*Wave Glider SV2 Interface Control Description* or the *Wave Glider SV3 Interface Control Description*.

LRI-Hosted WGMS

The most common deployment option is to let LRI manage the hosting of WGMS on your behalf. The WGMS software is deployed on redundant, high performance servers in two secure, high availability data centers. LRI Operations and Support Staff configure the system for you and administer your system on a 24x7 basis. Figure 1.3 illustrates this deployment option.

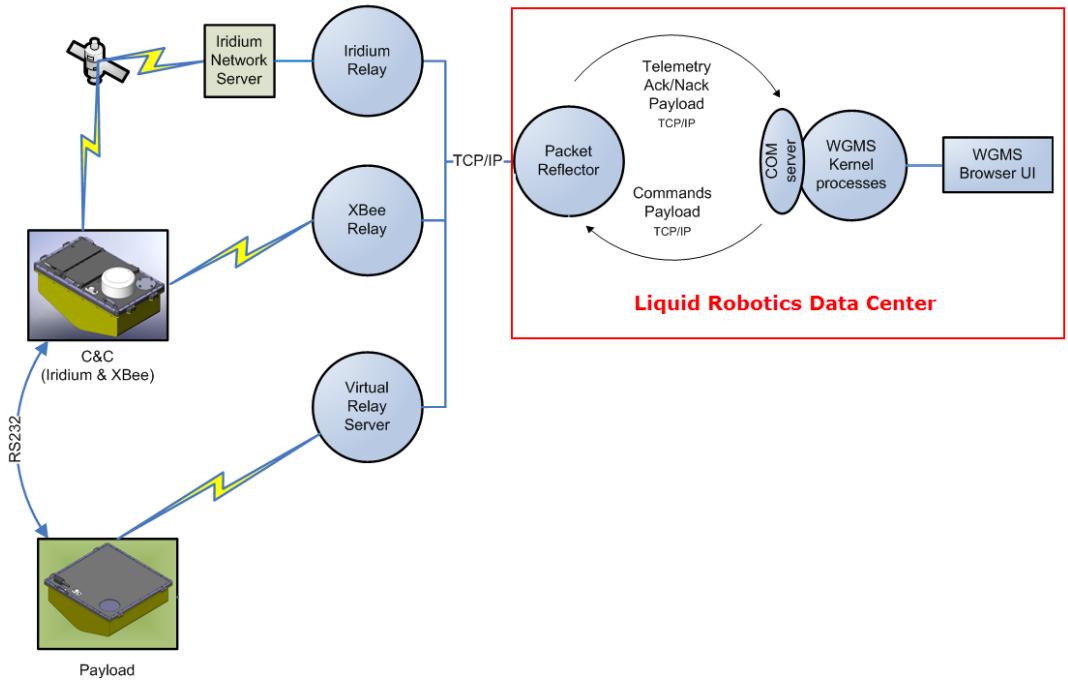
Figure 1.3. LRI-Hosted WGMS



With the LRI-hosted service option you are allocated a private domain name in the **<name>.liquid-robotics.com** format, to be shared by all of your users and Wave Gliders. Your users log in to this domain to manage the Wave Gliders associated with the domain. The private domain is known in WGMS as an “Organization” or “Org”. Since authentication credentials and permissions are managed on a per-Org basis, you can be confident that you control who has access to your Wave Gliders and what privileges they have been granted.

With an LRI-hosted WGMS deployment, LRI Operations handles all of the configuration details on your behalf. Typically the commercial Iridium satellite constellation is used for communications. You have direct operational control of your Wave Gliders, backed up by LRI’s professional operations team. The typical communications flow is illustrated in Figure 1.4.

Figure 1.4. Example: Wave Glider SV2 Deployed with LRI-hosted WGMS



Chapter 2. First Time Use of WGMS

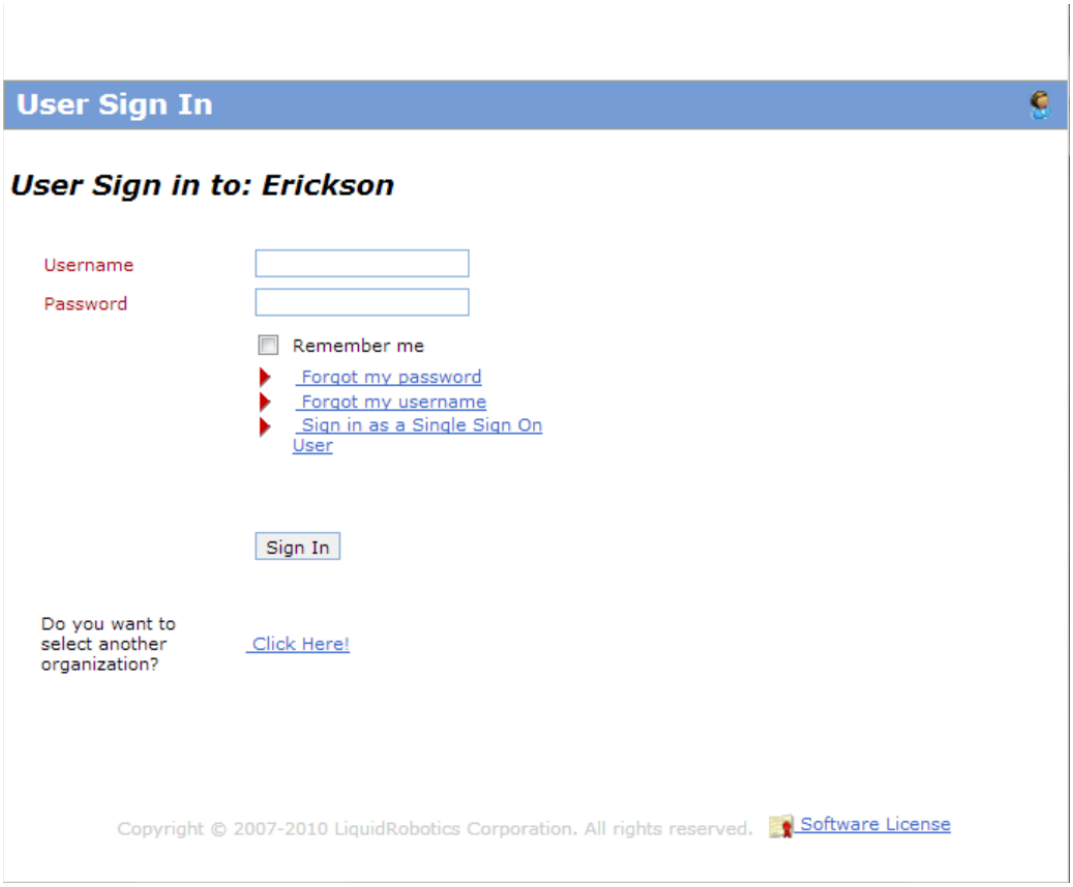
Before using WGMS for the first time, you must login to WGMS.

1. To verify the WGMS installation, navigate to your WGMS login page using a browser.

   - If you are verifying a hosted WGMS instance on a laptop or tablet computer, use http://YourOrgName.wgms.com to access the WGMS login page.
   - If you are verifying a Mobile WGMS instance on a laptop or tablet computer, use http://YourServerDomainName to access the WGMS login page.

   The following sign-in page will appear.

   Figure 2.1. Sign-In to WGMS Website



2. - If you are verifying a hosted WGMS instance on a laptop or tablet computer, WGMS sends a "new user" email message containing the login credentials you need to use.
   - If you are verifying a Mobile WGMS instance, login to WGMS with the following credentials:

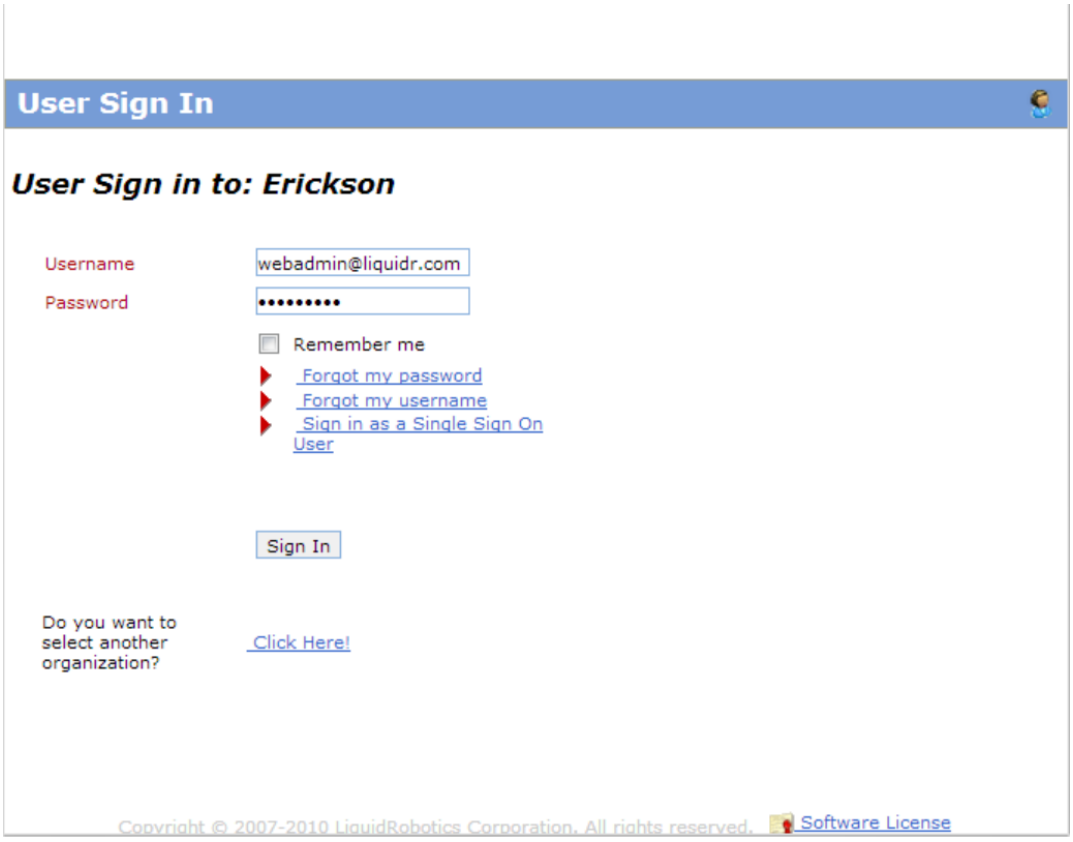
     webadmin@liquid-robotics.com

     and use the password:

     WGMSlog!n

In both cases the credentials are predefined in the database. You will have the option to change them later.

Figure 2.2. WGMS Login Page



3. You will be asked to accept the Software License and change your Username on first login. Note: the **Current User Name** field will be "grayed-out" and can be ignored.

Figure 2.3. Change Username Page

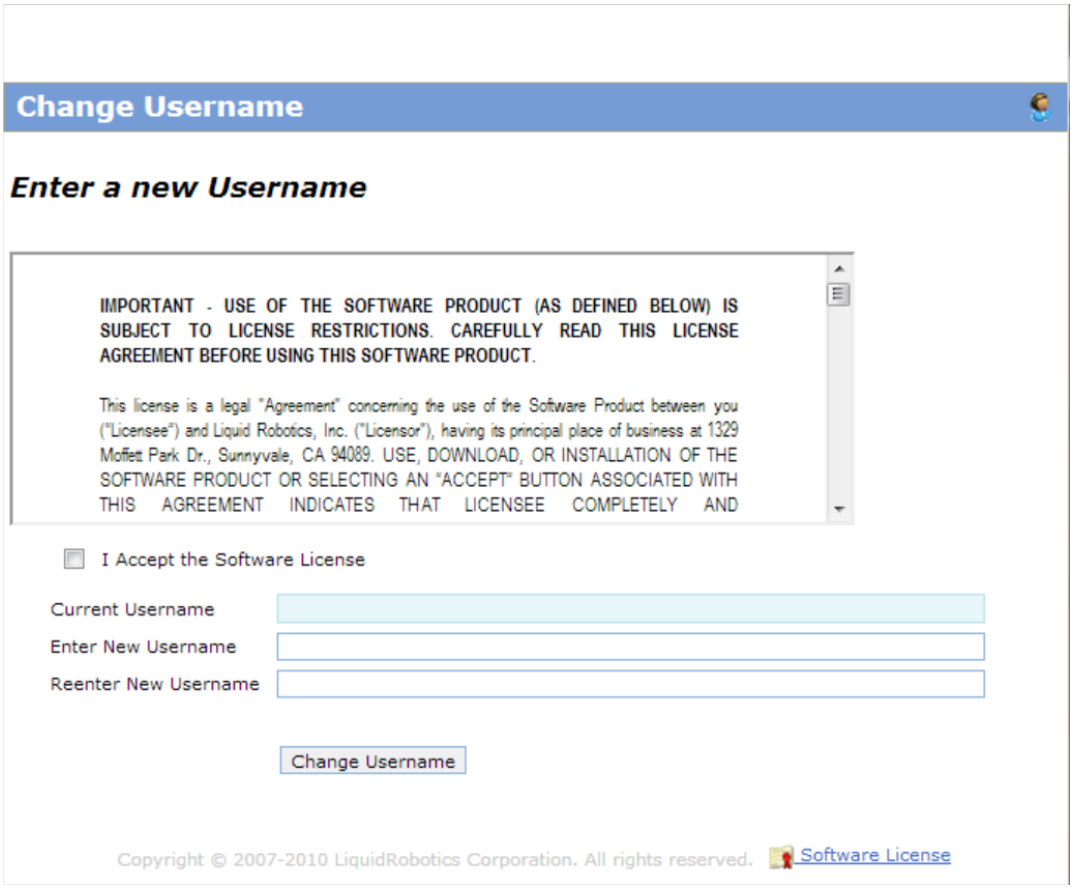
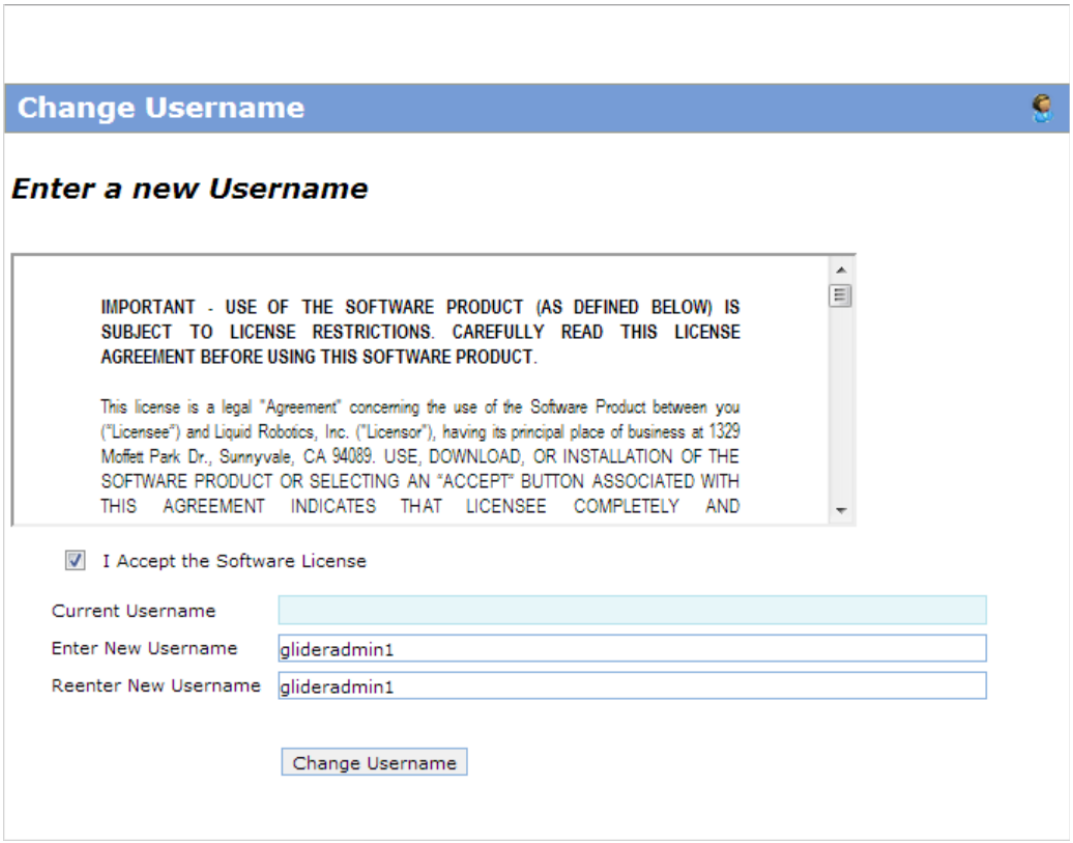
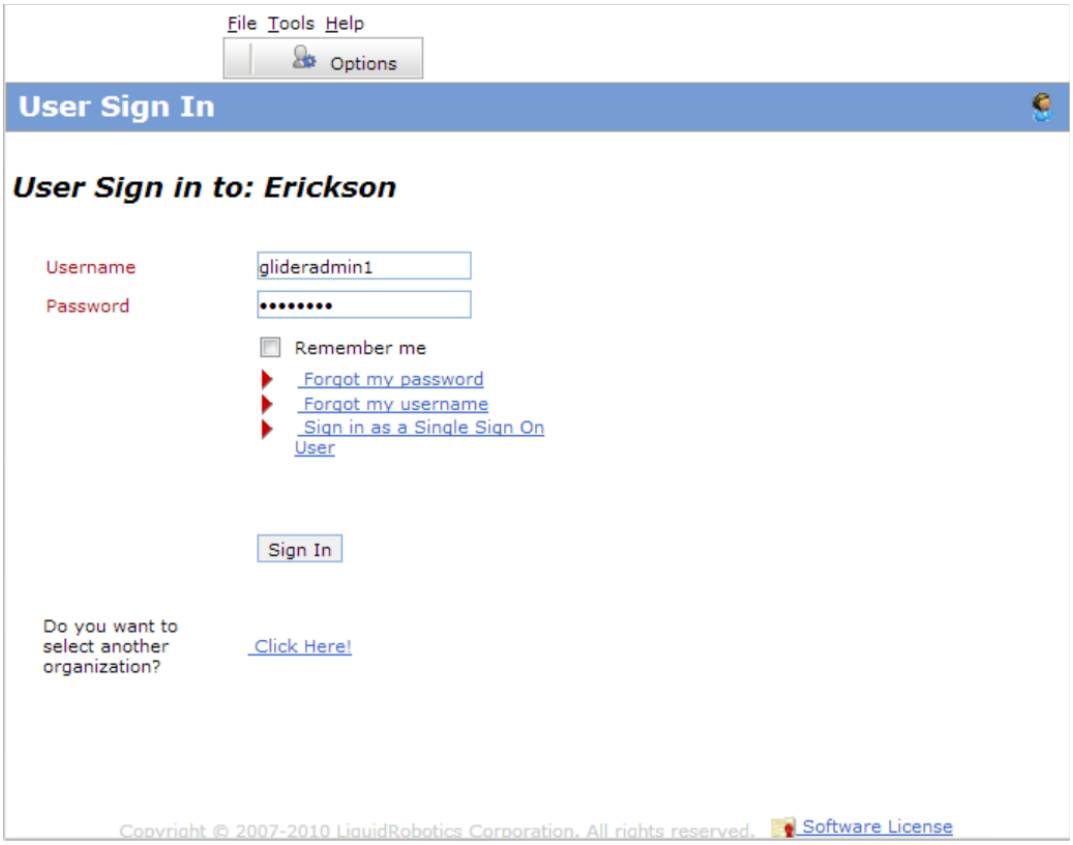


Figure 2.4. Accept License and Change Default Username



4. After changing your Username, you will be prompted to sign in using your new Username:

Figure 2.5. Sign In with New Username



5. After signing in with your new Username, you will be prompted to create a new password:

Figure 2.6. Change Password Page

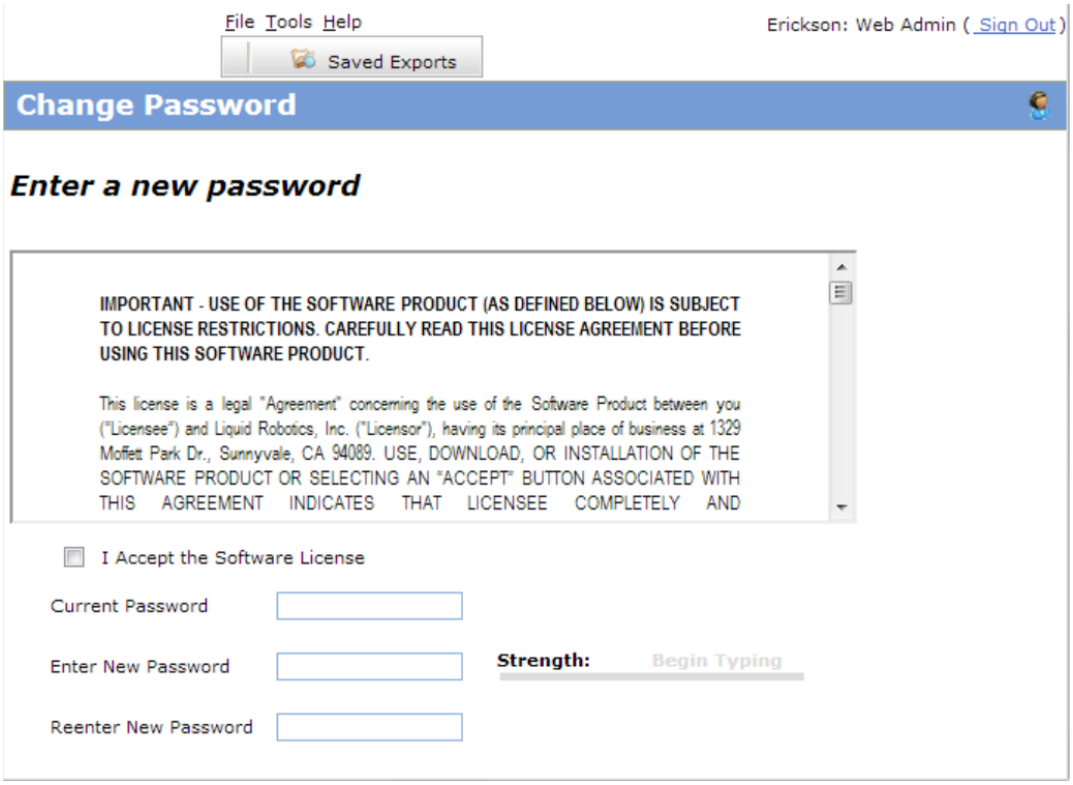
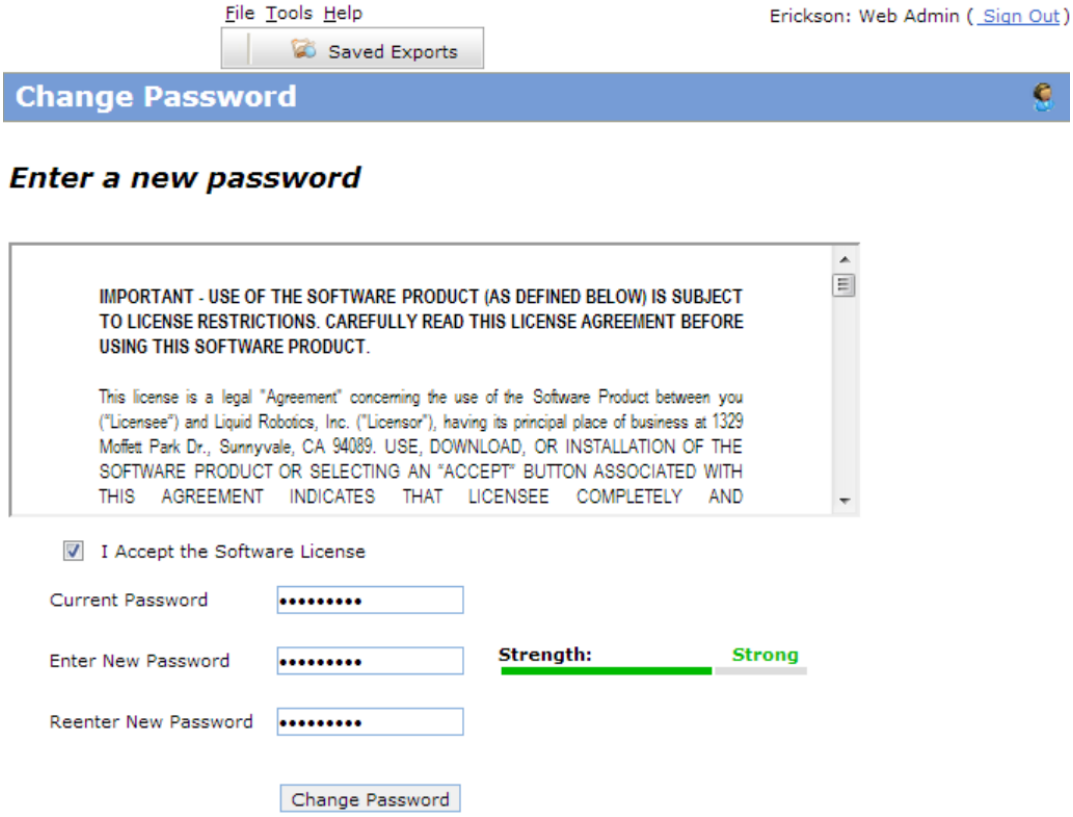
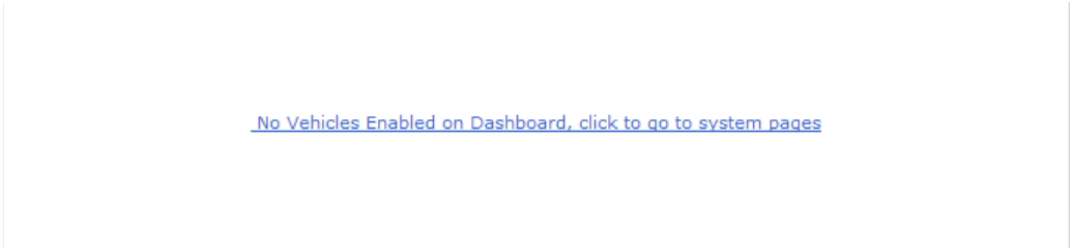


Figure 2.7. Changing the Default Password



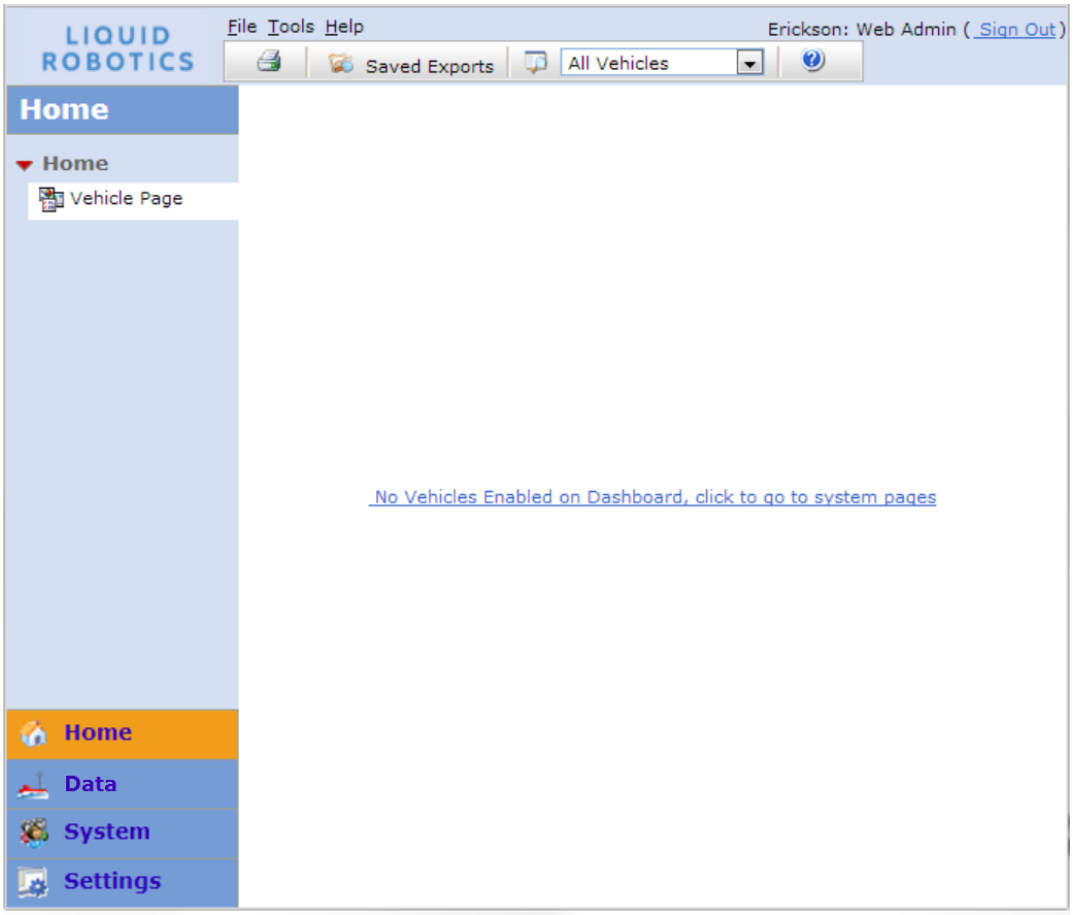
6. After changing your password, the intitial user interface (UI) display page will appear. If no vehicles have been defined in the initial database by LRI, the display will be empty except for a link to the System Menus.

Figure 2.8. Initial UI Display Page



7. Click on **No Vehicles Enabled on Dashboard, click to go to system pages** to open the WGMS **Home** page where you can access the System Menus.

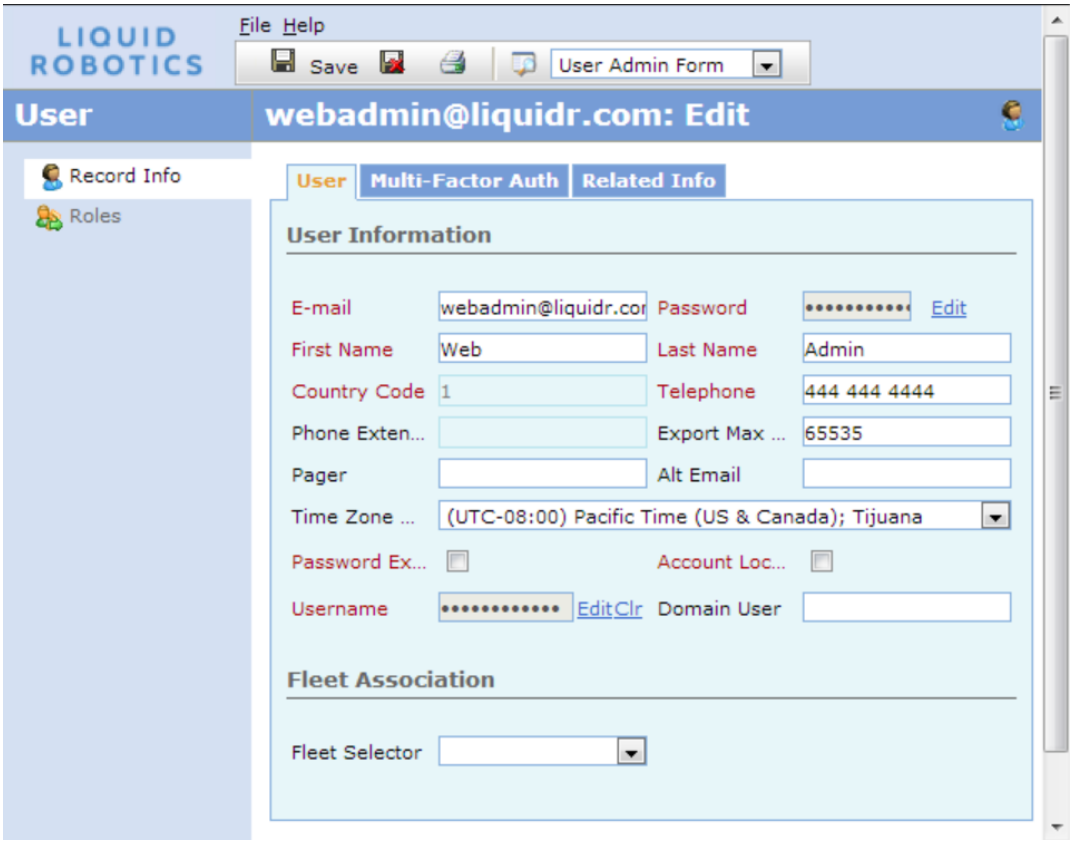
Figure 2.9. UI Display with System Menus



8. The database is preconfigured with webadmin@liquid-robotics.com as the initial system administrator user. That address is also that user's account name and login ID. You may change it if you wish.

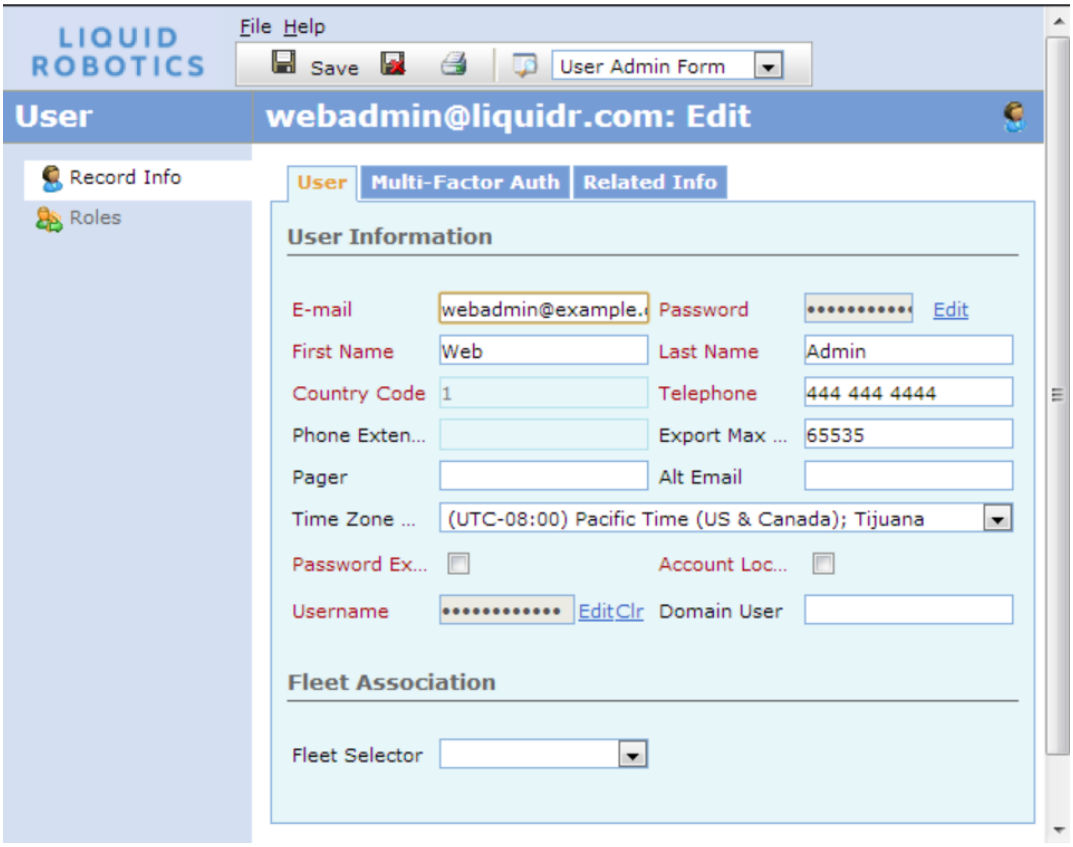
   To change the default administrator email for your WGMS deployment, you first change it in the WGMS UI. Log in as webadmin@liquid-robotics.com and click on **Tools**, then select **Options** from the drop-down menu to open the User Admin Form.

Figure 2.10. Initial User Admin Form



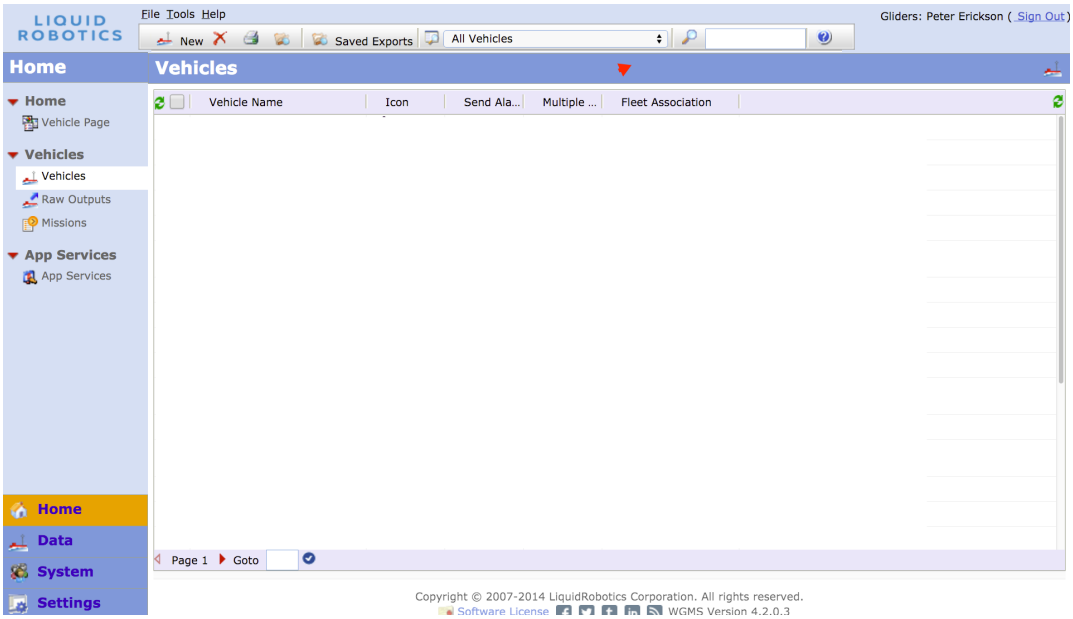
9. Change the E-mail field to the appropriate email (for example webadmin@example.com) and then click Save and Close button in the menu bar at the top of the User Admin Form.

Figure 2.11. Edited Email - Initial User Admin Form



10. To create a vehicle and its parts, click on **Vehicles** tab to open the **Vehicles** list. Follow the vehicle provisioning steps outlined in Chapter 6: *Administrative Tasks - Data Page* .

Figure 2.12. Initial Vehicles List



Chapter 3. WGMS UI Overview

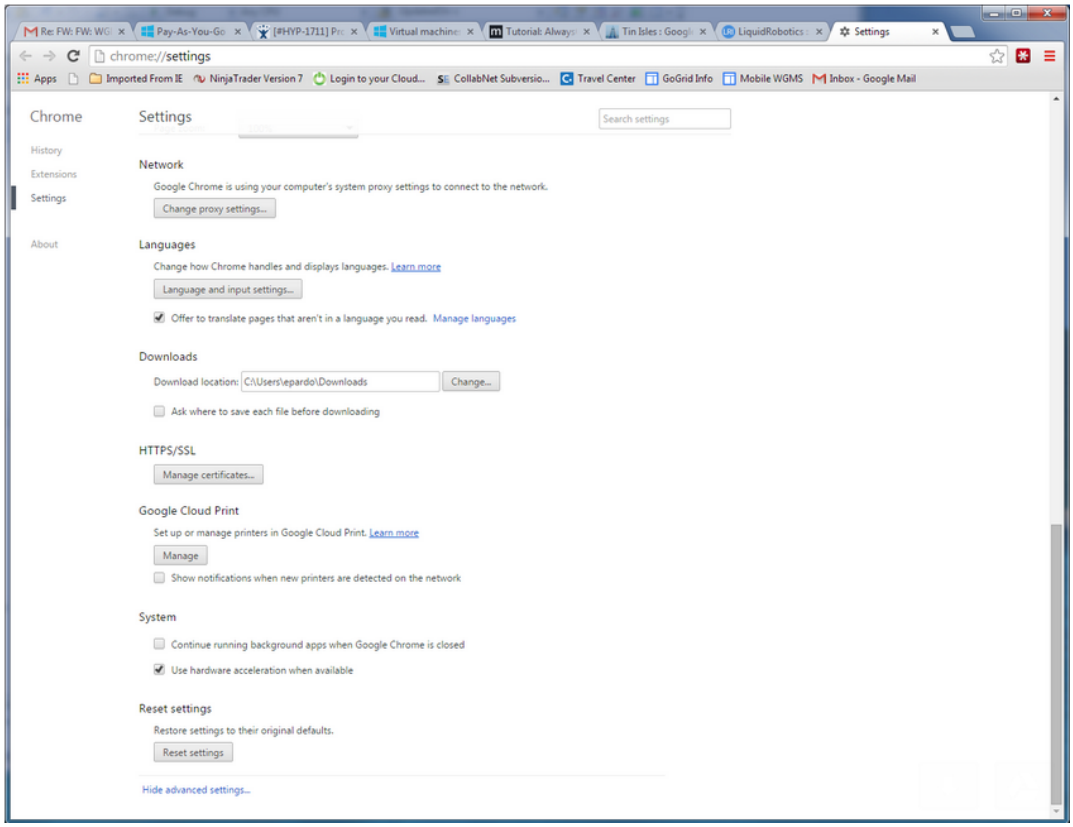
All Wave Glider Piloting, Data Management and Mission Management tasks can be performed from the WGMS UI.

WGMS supports recent versions of the following browsers:

- Chrome
- Internet Exlporer
- Safari (on Apple iOS only)
- Firefox

Note

When using Google Chrome, LRI recommends clearing the cache upon exiting Chrome. You should also turn OFF (un-check) the **Continue running background apps when Google Chrome is closed** option in the **System** section of the **Settings** tab advanced settings:



WGMS UI Architecture

The WGMS UI is comprised of HTML Web pages displayed in windows. There are five primary WGMS web pages that open to full screen, and a wide range of smaller windows containing lists, forms, and dialogs.

Each primary WGMS web page is organized for performing related tasks, or accessing related data. These pages are described in "The Five Primary WGMS Pages" (page 19).

The primary WGMS web pages include menus with links to lists containing related data records. All Wave Glider Vehicle data, WGMS system data, and Wave Glider integrated sensor data, is displayed in lists where each row contains a data record. Each data record is linked to a form where you can view, and in some cases edit, the record data.

The primary WGMS pages also include links to modal "dialog" windows for issuing commonly used commands and for changing the WGMS display settings and other administrative tasks.

Related WGMS windows are linked to one another facilitating a variety of ways to get from one window to another. Typically there is more than one way to complete the same task. This manual explains how to perform tasks starting from one of the primary WGMS pages. This manual does not explain the various other ways you may be able to perform a task from a different starting point. The intent is to shorten the learning curve. As your experience and confidence using WGMS increases, you may discover other ways to complete tasks based on the links between related windows.

Accessing the WGMS User Interface

To use the on-line WGMS user interface, you must have role-based access rights and privileges that are assigned by the System Administrator for the WGMS Organization you want to work with. The System Administrator has access to all of the WGMS program settings and features, including some privileges not available to any other users.

Gaining Access

Your WGMS System Administrator will set up an account for you, give you the URL for signing on, and assign an initial password. The System Administrator will also assign you an appropriate Role, as described below. Contact the System Administrator if you have problems with WGMS, or if you want to perform tasks that are not available to the Role assigned to you. For more information see Chapter 2: *First Time Use of WGMS* .

Roles

All Users of the WGMS system are assigned Roles that determine what features they have access to, and what tasks they can perform.

The Roles are:

Guest User: A Guest User can only view the status of Vehicles that have been configured for display to guests.

Data Analyst: A Data Analyst can view existing Vehicle and WGMS data and can download from the WGMS database data.

Master: A Master manages Vehicle provisioning, mission planning or operations, as well as payload and web services development.

Admin: A System Administrator who has all the permissions required to handle the day-to-day administration of WGMS, adding users, managing customizations, and managing data.

Developer: A Developer is an incremental role that allows a user to gain access to payload data.

Root: A Root user has full access to all aspects of the Vehicle and WGMS. A user with the Root role will either be an LRI developer or a customer under close direction from LRI.

Some features described in this document may not be displayed, or may not be operative on your system. That is because you have been assigned a Role that doesn't allow access to, or control of, that feature. More information on Roles is provided in the *WGMS Administrators Guide*.

The Five Primary WGMS Pages

All WGMS UI entities are HTML Web pages contained in windows. The five primary WGMS pages are windows that open to completely fill your display, similar to a "screen" in a desktop application. Each primary WGMS page has a toolbar, a sidebar and sections containing piloting tools or data. The five primary WGMS pages are:

- **Dashboard** - The main piloting page that includes the map display and easy access to data and commands typically used by Pilots. For more information see "WGMS Dashboard" (page 19).
- **Home Page** - Expands the Dashboard to include easy access to the menus for the **Home**, **Data**, **System**, and **Settings** pages. For more information see "WGMS Home Page" (page 26).
- **Home Page** - Display and edit information for all Vehicles, Raw Outputs, Missions, and App Services.
- **Data Page** - Display Payload Data and Sensor Data. For more information see "Data Page" (page 34).
- **System Page** - Display and edit WGMS Alarms, Reports and System information. For more information see "System Page" (page 40).
- **Settings Page** - Display and edit WGMS Organization settings. For more information see "Settings Page" (page 42)

WGMS Dashboard

When you log in, WGMS opens to the **Dashboard**, which is the page where Pilots spend most of their time. The **Dashboard** is also included as a major section of each of the other 4 WGMS pages. Unless you have a large, very-high resolution monitor, you will not see the entire **Dashboard** - you will need to use the scroll bars to move around.

Figure 3.1. WGMS Dashboard SV3 Vehicles

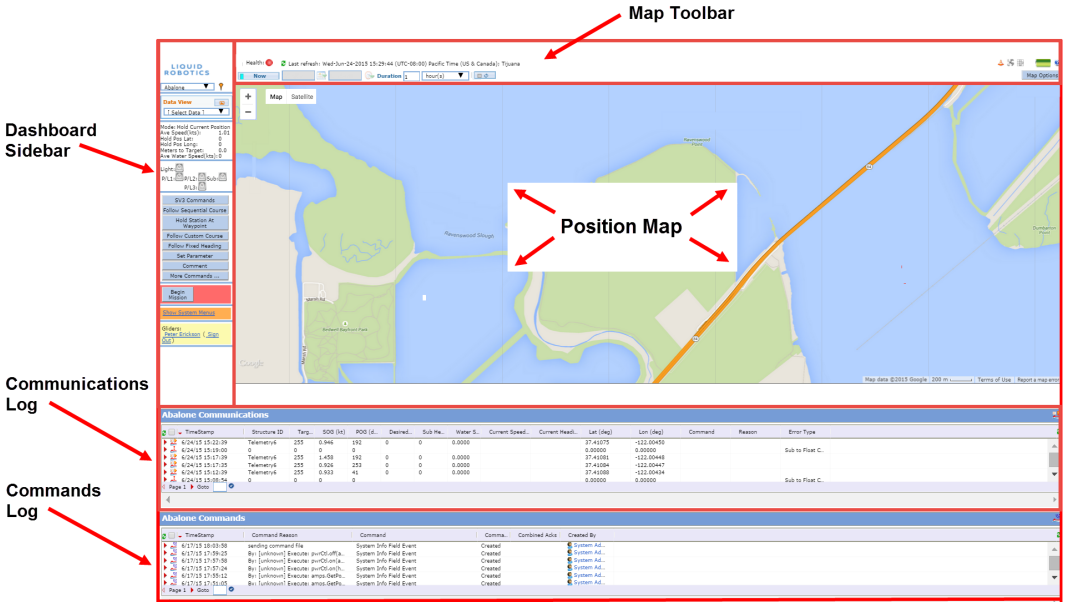
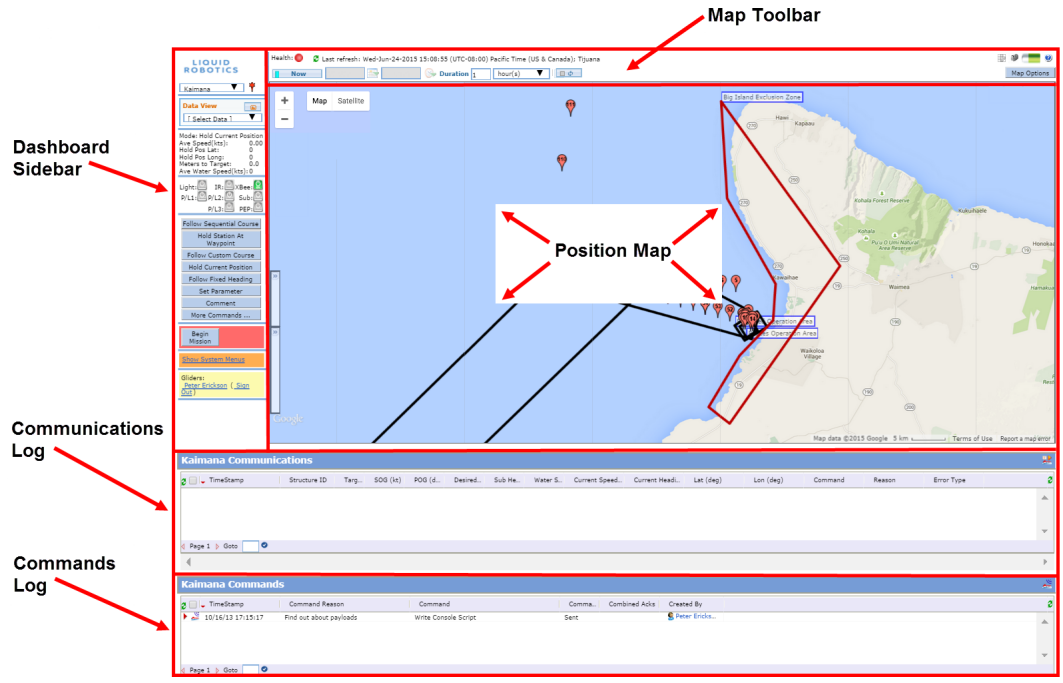


Figure 3.2. WGMS Dashboard SV2 Vehicles



The WGMS Dashboard for both SV3 and SV2 vehicles includes the following five sections:

- WGMS Position Map
- Map Toolbar (slightly different on SV3 than on SV2)

- Dashboard Sidebar (slightly different on SV3 than on SV2)
- Communications Log
- Commands Log

Note

If you are looking at a blank map, the Position Map has probably defaulted to full zoom-in and is showing you a very small patch of water or land. In this case, use the zoom bar in the upper-left corner of the Position Map to zoom out (note the position of the slider in Figure 3.1.)

Note

Depending on your Organization and the particular Vehicle you are monitoring, the Position Map and other data may appear different than the screen captures in this document. For example, the color scheme may be different based on the WGMS administrative settings, and the custom reports and command menus available may be different, depending on which Vehicle you are viewing. In any case, using WGMS will be the same. It is instructive to be logged in to WGMS while reading this document so you can interact with some of the WGMS features.

Position Map

The Position Map appears in the standard Google Map format and can be manipulated using the same methods. When you use the map controls there is no need to click the refresh icon - the display will refresh automatically. An annotated position map image is shown in Figure 3.3. For more information see “Using the Position Map” (page 56).

Figure 3.3. WGMS Position Map

Map Toolbars

The Map Toolbar for an SV3 Vehicle is slightly different than the Map Toolbar for an SV2 Vehicle.

SV3 Map Toolbar

The SV3 Map Toolbar is located directly above the Position Map on the WGMS Dashboard.

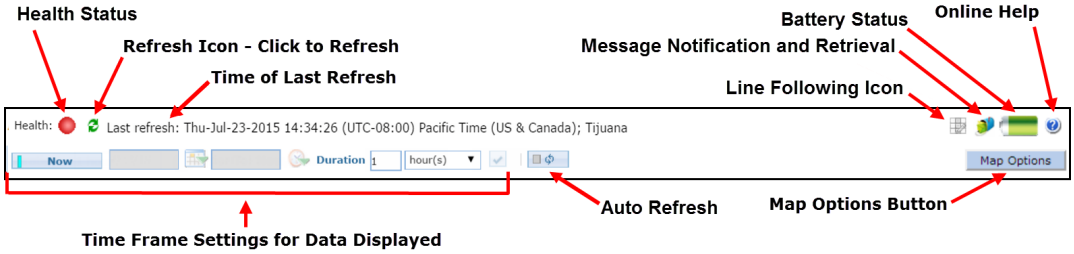
Figure 3.4. SV3 Map Toolbar

For more information see “ Using the Position Map Toolbar” (page 64).

SV2 Map Toolbar

The SV2 Map Toolbar is located directly above the Position Map on the WGMS Dashboard.

Figure 3.5. SV2 Map Toolbar

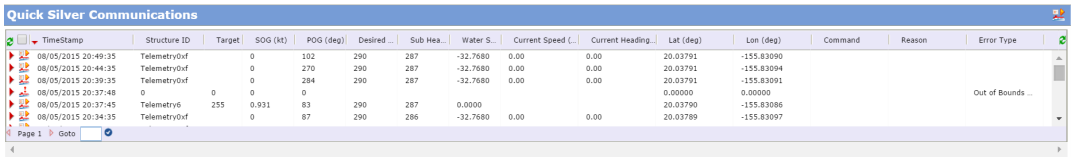


For more information see “ Using the Position Map Toolbar” (page 64).

Communications Log

The Communications log, located directly below the Position Map on the WGMS Dashboard, lists all telemetry and error messages received from the selected Vehicle and all commands sent to the selected Vehicle.

Figure 3.6. Communications Log

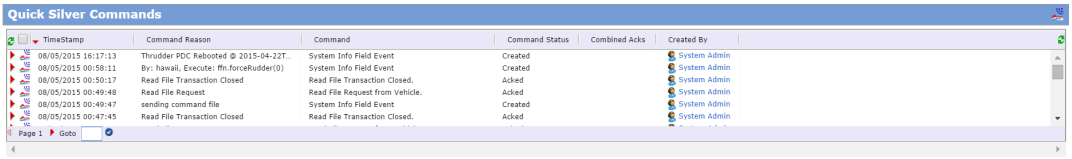


For more information see “Communications Log” (page 139).

Commands Log

The Commands log, located directly below the Communications log on the WGMS Dashboard, lists all commands sent to the selected Vehicle and the status of each command received from the selected Vehicle. Commands sent to the selected Vehicle are also listed in the Communications log.

Figure 3.7. Commands Log



For more information see "Commands Log" (page 140).

Dashboard Sidebar

The Dashboard Sidebar for an SV3 Vehicle is slightly different than the Dashboard Sidebar for an SV2 Vehicle. The primary difference is the **SV3 Commands** button, which is appears on the SV3 Dashboard sidebar only. The Dashboard sidebar runs vertically along the left side of the Position Map on the WGMS Dashboard.

Figure 3.8. WGMS SV3 Dashboard Sidebar

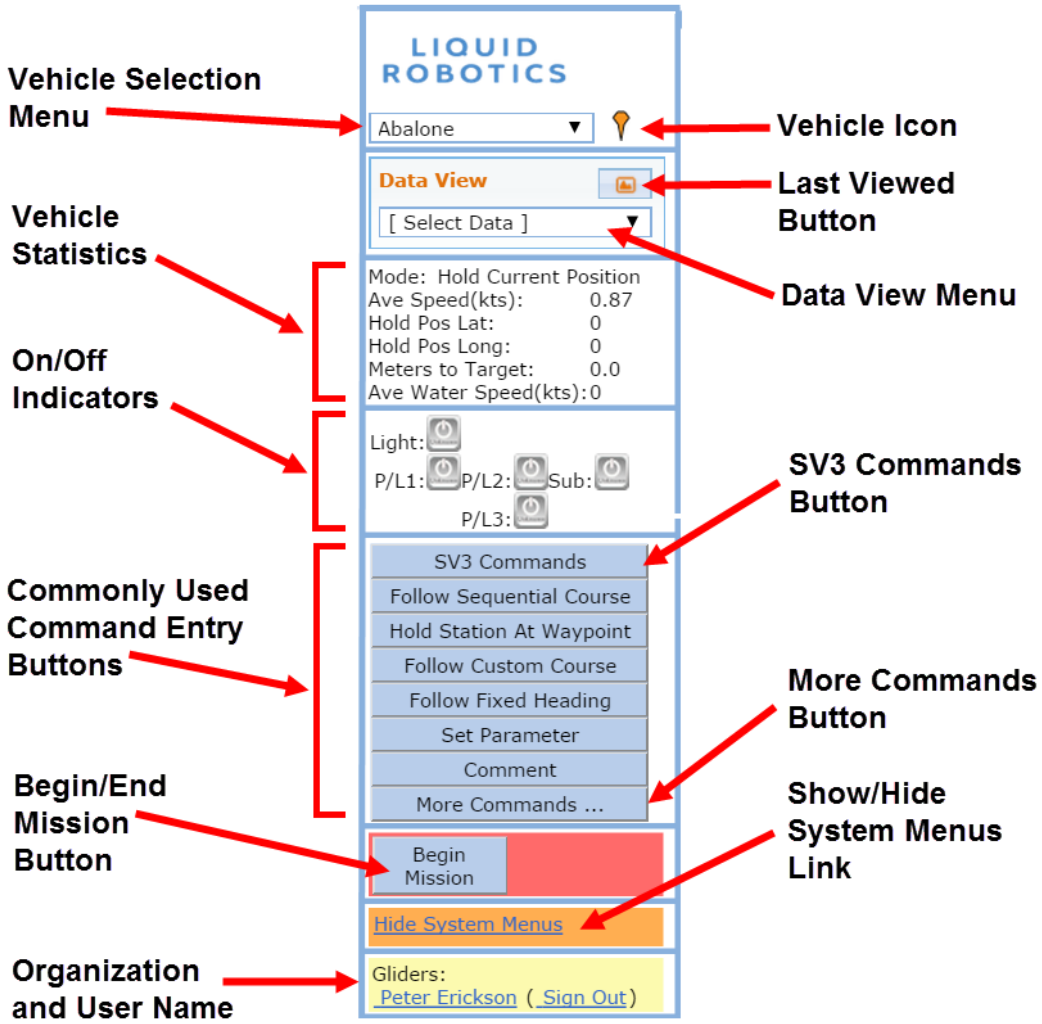
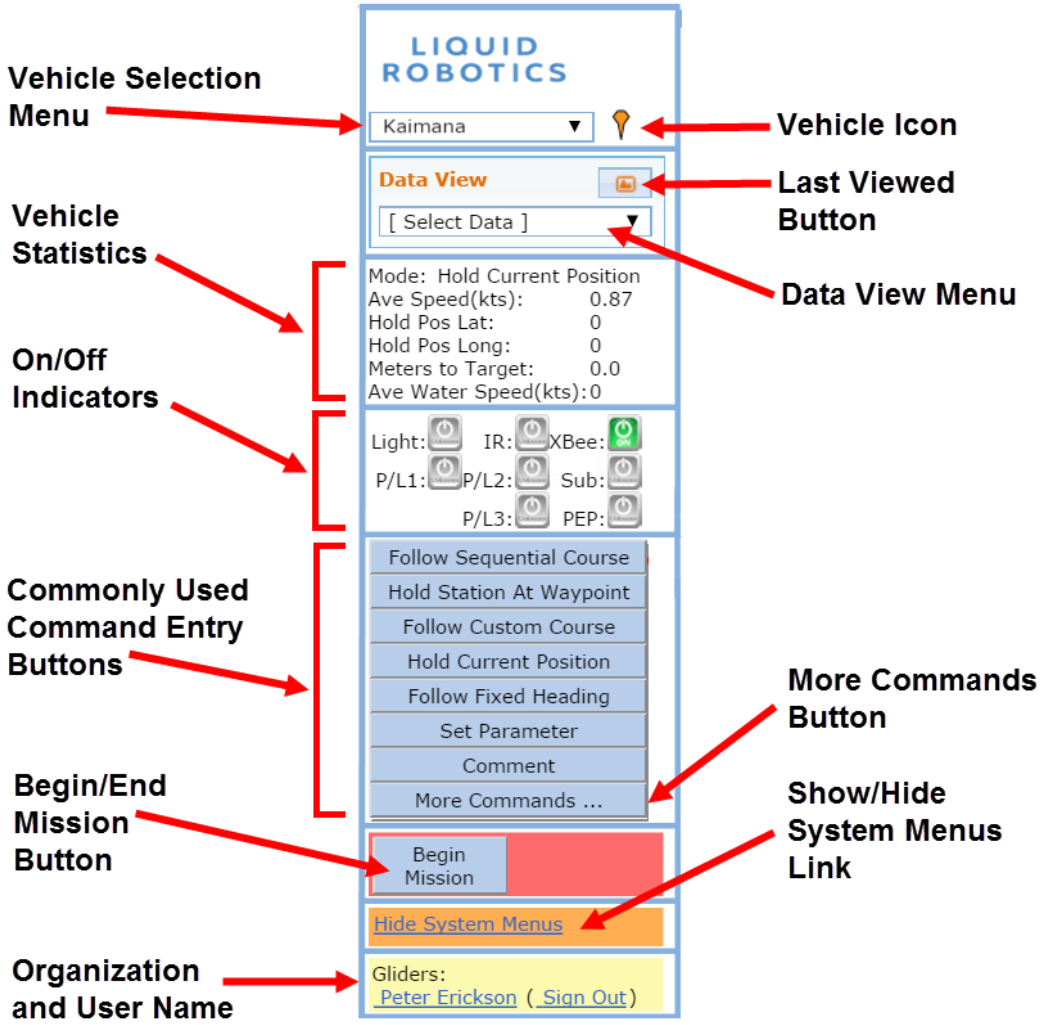


Figure 3.9. WGMS SV2 Dashboard Sidebar



For more information see "Using the Dashboard Sidebar" (page 135).

Show System Menus Link

When you click on the **Show System Menus** link, the WGMS Home page will open.

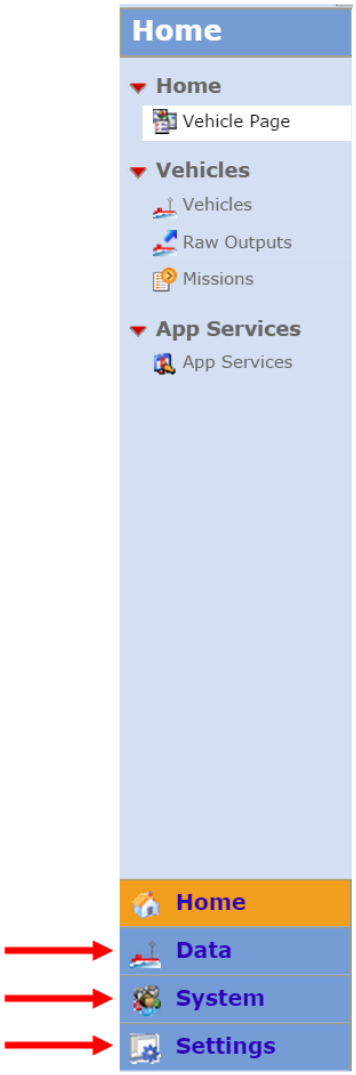
Figure 3.10. Show System Menus Link

The **Home** page sidebar and toolbar are hidden in the WGMS **Dashboard** view to allow more page space for piloting operations. You can return to the full-screen WGMS **Dashboard** by clicking on **Hide System Menus** in the **Dashboard** sidebar. The link changes back to **Show System Menus** when the full-screen **Dashboard** is displayed.

Figure 3.11. Hide System Menus Link

The buttons at the bottom of the **Home** page sidebar open the **Data** page, the **System** page, and the **Settings** page.

Figure 3.12. Home Page, Data Page, and System Page Buttons



- From the **Home** page you can display and edit information for all Vehicles. You can also display and edit information on Missions and you can add or export app services. For more information see "WGMS Home Page" (page 26).
- From the **Data** page you can view data for all payloads and integrated sensors. For more information see "Data Page" (page 34).
- From the **System** page you can display and edit WGMS system parameters, view reports, and view system data and events, including AMPS status. For more information see "System Page" (page 40).

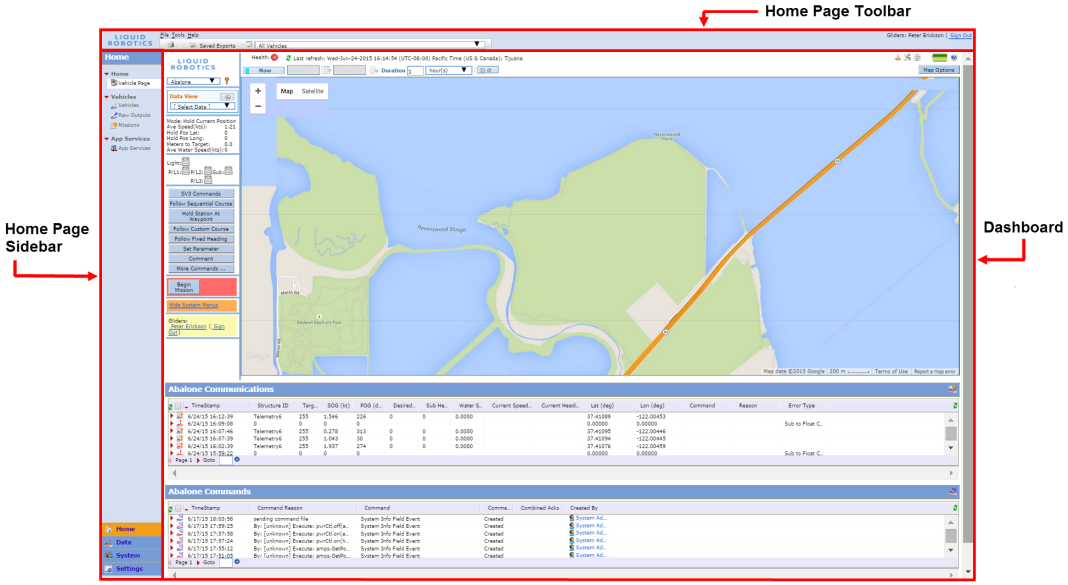
- From the **Settings** page you can display and edit WGMS Organization settings and customize records. For more information see "Settings Page" (page 42)

For more information see "Using the Dashboard Sidebar" (page 135).

WGMS Home Page

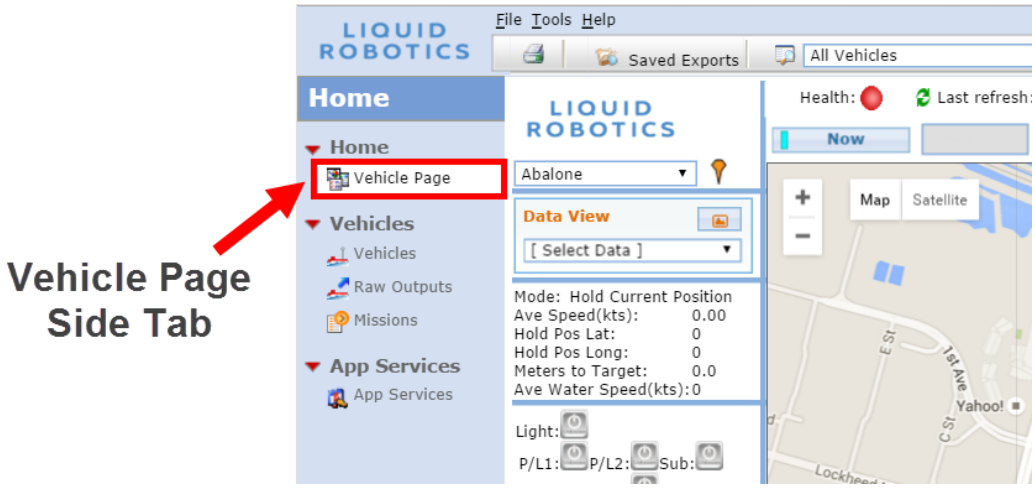
When you click on **Show System Menus** in the WGMS **Dashboard** sidebar, the full WGMS **Home** page is displayed. The WGMS **Home** page includes the WGMS **Dashboard**, flanked by the **Home** page toolbar and the **Home** page sidebar.

Figure 3.13. WGMS Home Page (SV3 Vehicle)



When the **Home** page first opens, the **Vehicle Page** side tab under the **Home** menu in the **Home** page sidebar is selected by default.

Figure 3.14. Vehicle Page Side Tab

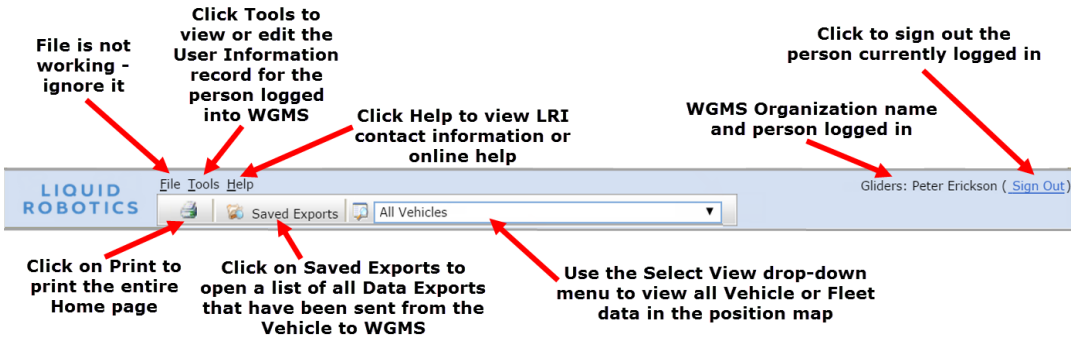


The **Vehicle Page** side tab displays the WGMS **Dashboard**, but in a smaller version that allows space for the **Home** page sidebar and toolbar.

Home Page Tool Bar

The **Home** page toolbar runs across the top of the **Home** page.

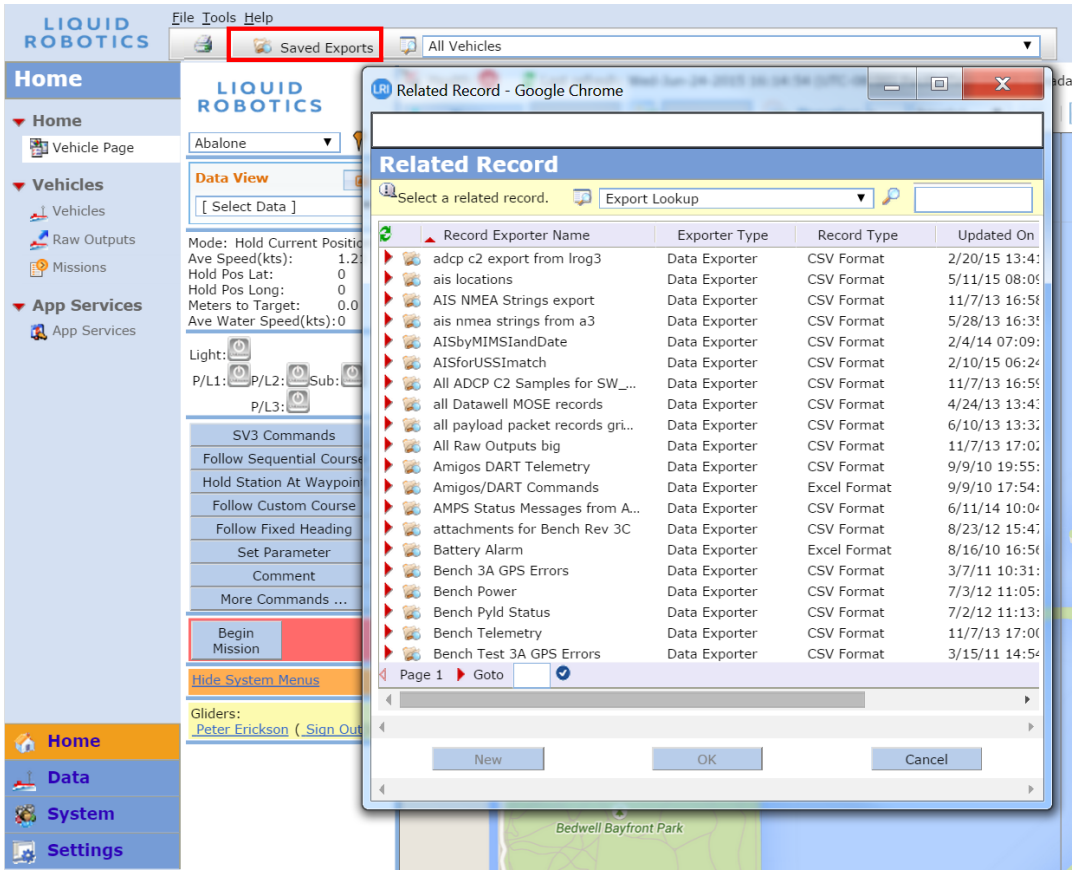
Figure 3.15. Home Page Toolbar



The **Home** page toolbar includes:

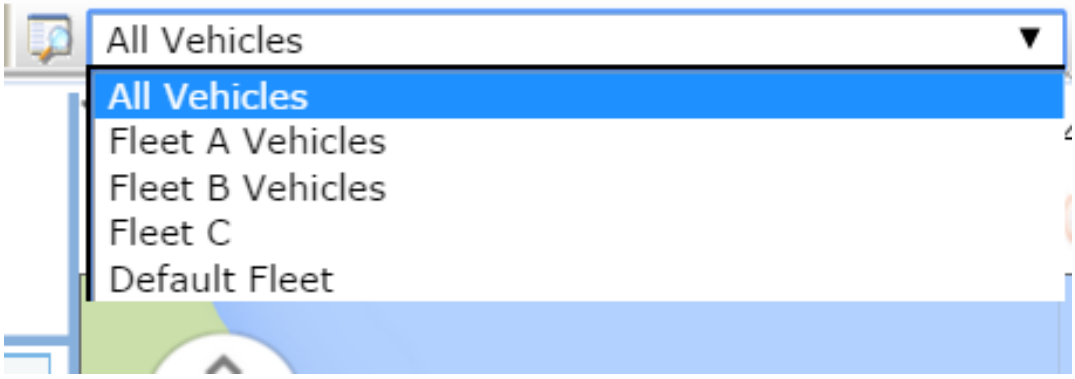
- Two click access (**Tools > Options**) to the user information record for the person logged in to WGMS.
- One click access (**Help**) to online help and LRI contact information.
- A **Print** button to print the entire **Home** page.
- One click access (**Saved Exports**) to a list containing all saved data export records.

Figure 3.16. Saved Exports Button



- A "Select View" drop-down menu to select which Vehicle data you want displayed in the Position Map. This feature provides a quick way to display data on the Position Map for all Vehicles in the WGMS Organization, or for individual Fleets in the WGMS Organization.

Figure 3.17. Select View Drop-Down Menu



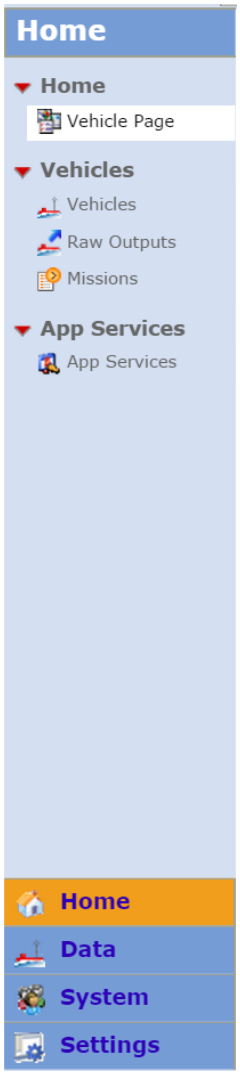
Note

A Fleet provides a view of a subset of the Vehicles and personnel in an Organization. For information on setting up Fleets see the *WGMS Admin Guide*.

Home Page Sidebar

The **Home** page sidebar contains 3 menus, **Home**, **Vehicles**, and **App Services**.

Figure 3.18. Home Page Sidebar



Home Menu

The **Home** menu contains the **Vehicle Page** side tab that displays the WGMS **Dashboard**. When you click on **Show System Menus** in the WGMS **Dashboard** sidebar, the WGMS **Home** page opens with the **Vehicle Page** side tab selected.

Vehicles Menu

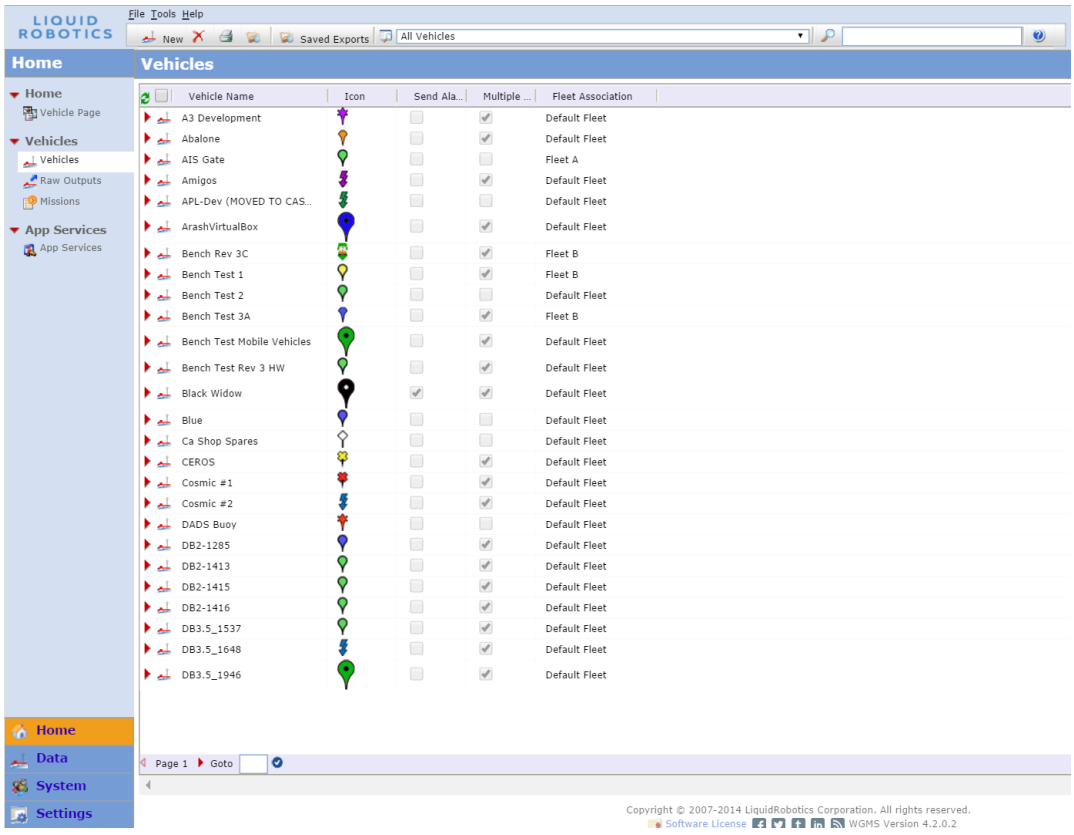
There are 3 side tabs under the **Vehicles** menu:

- **Vehicles**
- **Raw Outputs**
- **Missions**

Vehicles Side Tab

The **Vehicles** side tab opens the **Vehicles** window. The **Vehicles** window displays a list of all of the vehicles in the WGMS Organization, along with the vehicle icon, send alarms status, multiple vehicle display status, and Fleet association.

Figure 3.19. Vehicles Window



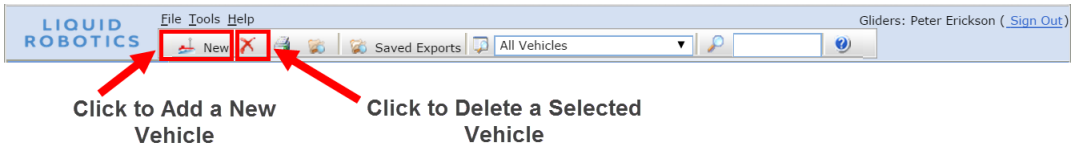
Each line item (record) in the **Vehicles** window is preceded by an **arrow** and an **icon** followed by the vehicle icon that appears in the position map, the vehicle's Send Alarms status, the Multiple Vehicle Display status, and Fleet Association.

When you click on an **arrow** , a window opens. If there is additional information associated with the record, it will appear in this window. Note, this feature does not work well in all browsers.

When you click on an **icon** , a Vehicle form opens. The Vehicle form contains extensive information about the selected vehicle and also allows you to edit some of that information. For more information see Chapter 4: *Using the WGMS Interface*.

The **Vehicles** tab toolbar is similar to the **Home** page toolbar, except that it includes buttons to add or delete vehicles from the WGMS Organization.

Figure 3.20. Vehicles Toolbar



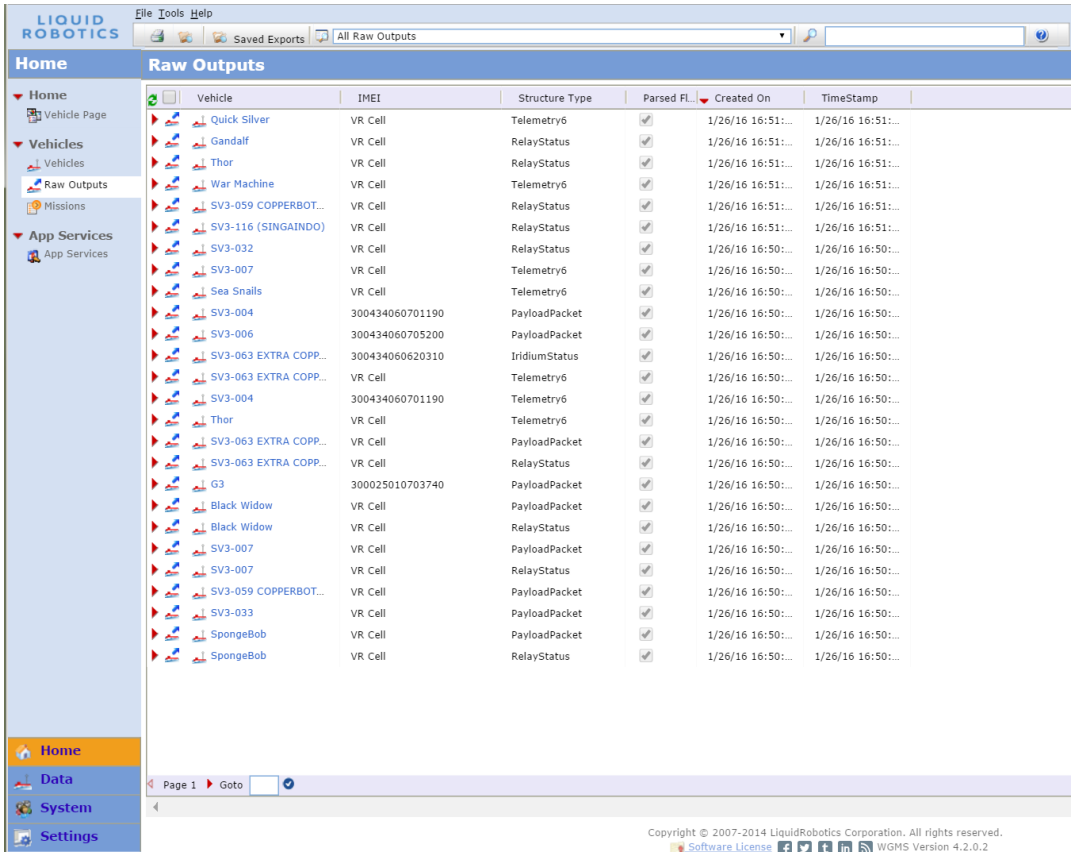
Click on the **New** button to open a **Vehicle: New** form where you can enter information to add a new vehicle to the WGMS Organization.

Select an existing vehicle from the list in the **Vehicles** window and click on the delete button - you will be prompted to ensure you really want to delete the vehicle from the WGMS Organization, before being allowed to click **OK** to delete the vehicle.

Raw Outputs Side Tab

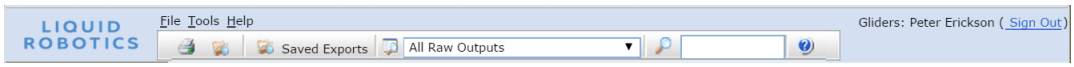
The **Raw Outputs** side tab opens the **Raw Outputs** window. The **Raw Outputs** window displays a chronological list of all data packets generated by vehicles in the WGMS Organization you are logged into. Each row in the list represents a data packet and includes the name of the vehicle that generated the data, along with the communications modem ID (IMEI), Structure Type, and related infromation.

Figure 3.21. Raw Outputs Window



The Raw Outputs Toolbar is the same as the Home page toolbar except for the addition of the Export Raw Outputs button.

Figure 3.22. Raw Outputs Toolbar

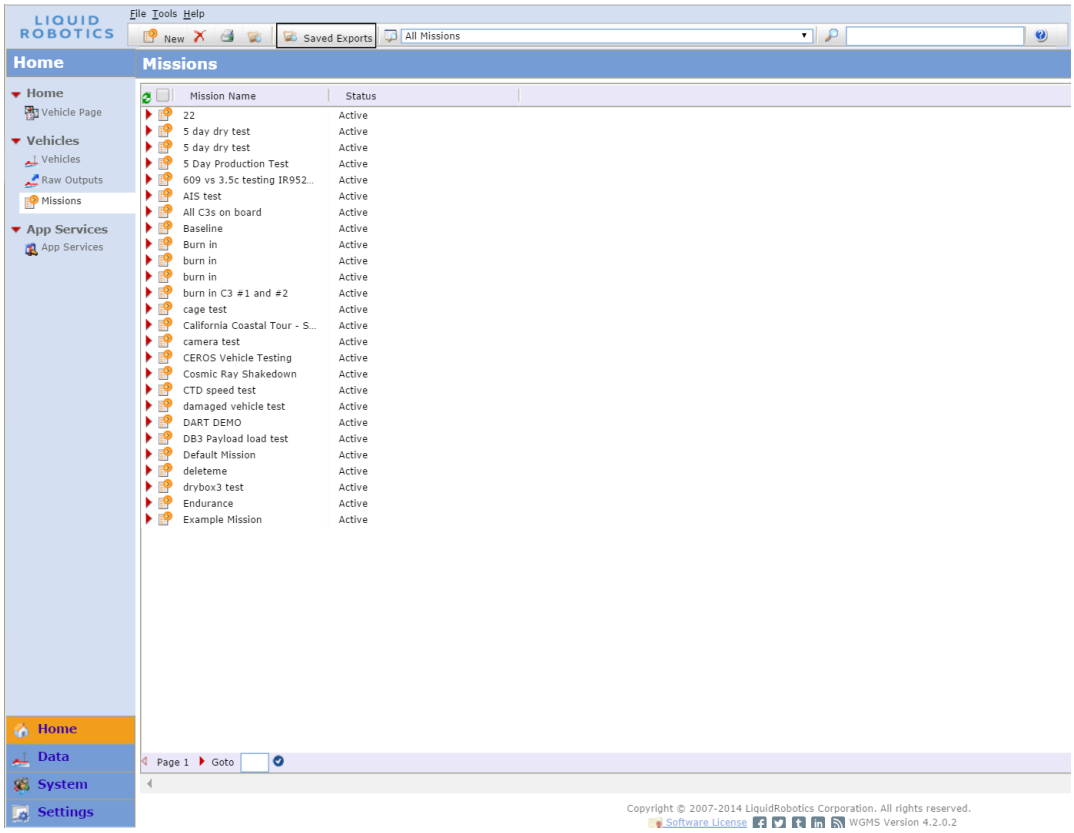


Click on the export raw outputs button to open a **Export VehicleRawOutput Records** form where you can enter information to specify which raw output records you want to export to your system.

Missions Side Tab

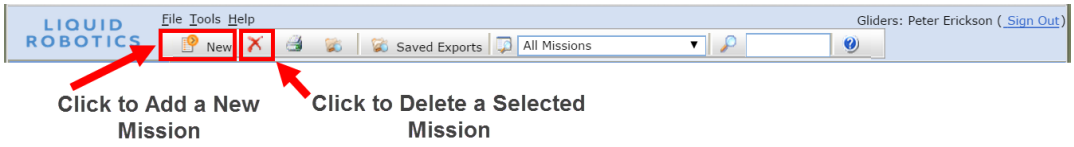
The **Missions** side tab opens the **Missions** window. The **Missions** window displays a list of all of the missions that have been entered into WGMS for the WGMS Organization you are logged into, along with the status of each mission (Active or Expired). By clicking on the icon at the beginning of each row, a Mission form will open where you can view or edit detailed information on the mission.

Figure 3.23. Missions Window



The **Missions** tab toolbar is similar to the **Home** page toolbar, except that it includes buttons to add missions to, or delete missions from, the WGMS Organization.

Figure 3.24. Missions Toolbar



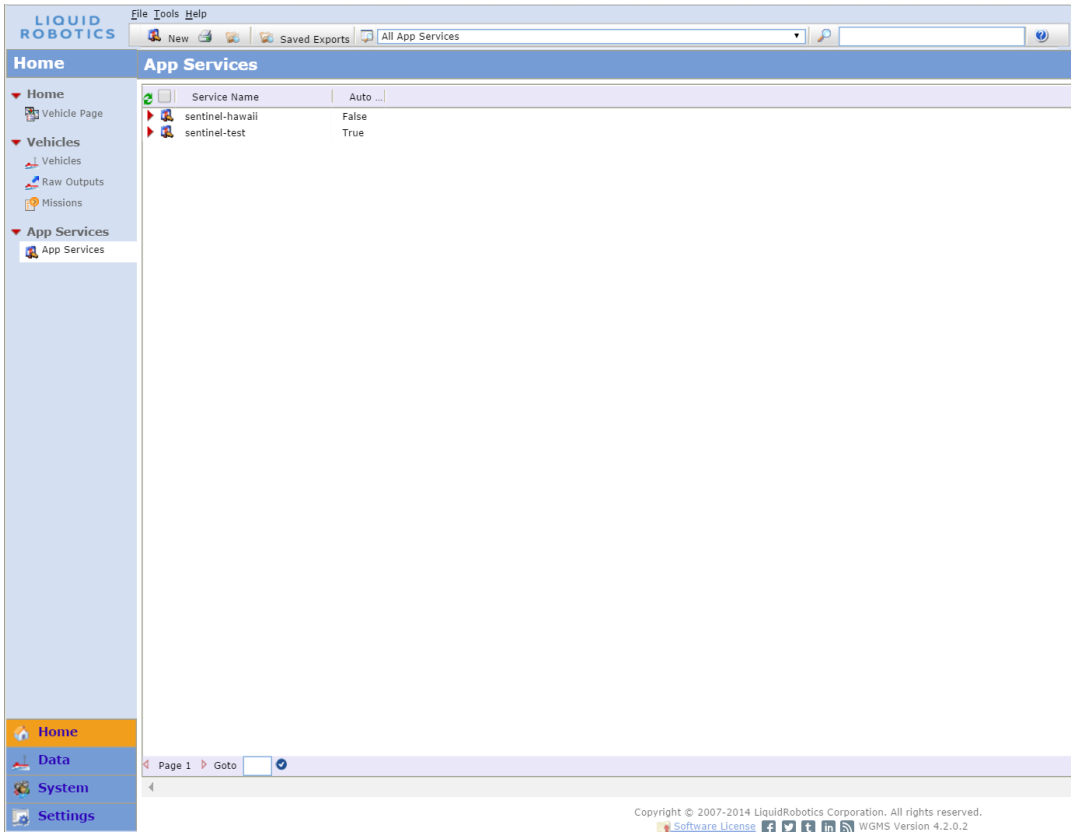
Click on the **New** button to open a **Mission: New** form where you can enter information to add a new mission to the WGMS Organization.

Select an existing Mission from the list in the **Missions** window and click on the delete button - you will be prompted to ensure you really want to delete the mission from the WGMS Organization, before being allowed to click **OK** to delete the mission.

App Services Menu

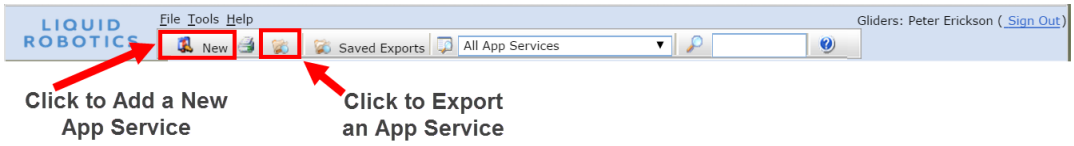
The **App Services** menu includes the **App Services** side tab. The **App Services** side tab opens the **App Services** window. For more information on the App Services menu, contact the Liquid Robotics Customer Support Organization - see “Contacting Liquid Robotics” (page 291).

Figure 3.25. App Services Window



The **App Services** toolbar is similar to the **Home** page toolbar, except that it includes buttons to add app services to, or export app services from, the WGMS Organization.

Figure 3.26. App Services Toolbar



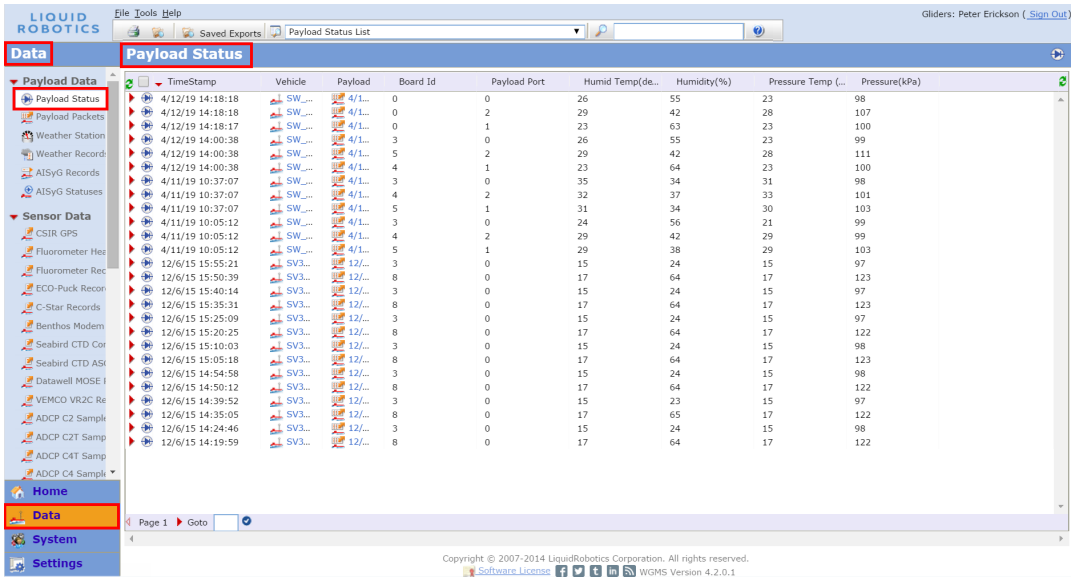
Click on the **New** button to open an **App Service: New** form where you can enter information to add a new app service to the WGMS Organization.

Select an existing app service from the list in the **App Services** window and click on the export button - an **Export AppService Records** form will open where you specify the app service records you want to export to your system.

Data Page

When you click on the **Data** button in the WGMS **Home** page sidebar, the WGMS **Data** page is displayed. The **Data** page opens to the **Payload Status** tab, flanked by the **Data** page sidebar and toolbar. The **Payload Status** tab provides a chronological list of the payload data received from all of the Vehicles in the WGMS Organization. Each row in the list includes detailed information on data received from a specific payload on a specific vehicle.

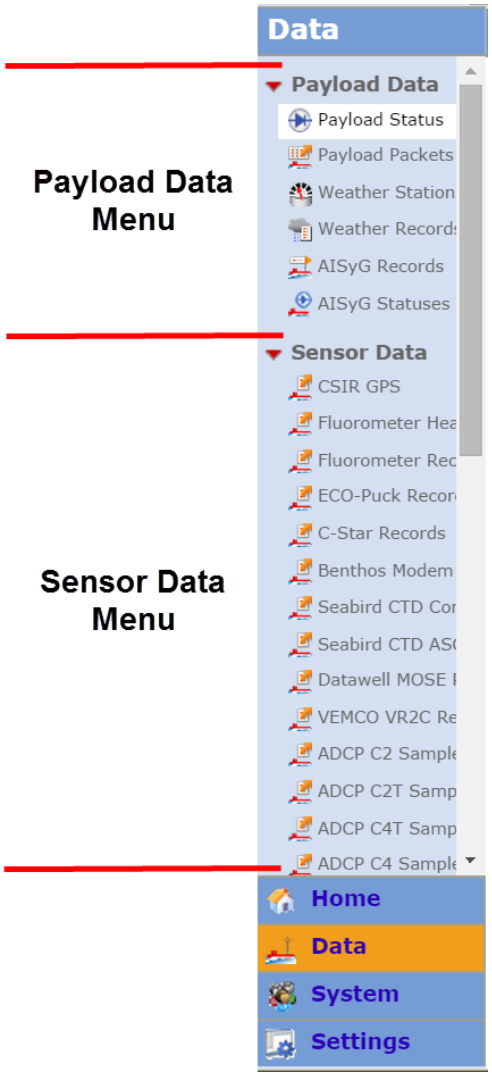
Figure 3.27. Data Page



Data Page Sidebar

The **Data** page sidebar includes two menus, **Payload Data** and **Sensor Data**:

Figure 3.28. Data Page Sidebar

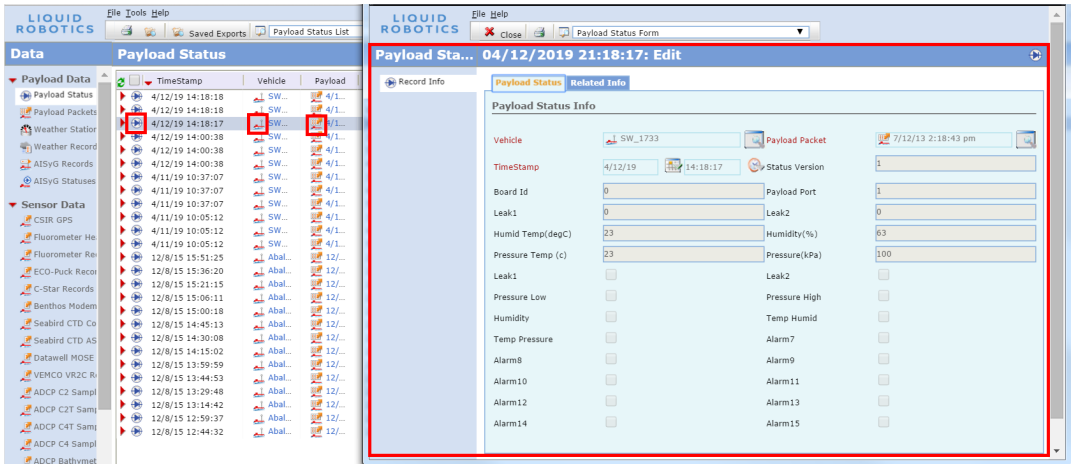


Each tab under the **Payload Data** and **Sensor Data** menus is a list of records. Each record is preceded by an **arrow** and an **icon**.

When you click on the **arrow** , a window opens. If there is additional information associated with the record, it will appear in this window. Note, this feature does not work well in all browsers.

When you click on any **icon** associated with a record, a form opens containing the details for the associated record. Depending on your WGMS Role and the type of form you are viewing, you may have the ability to edit the record. For example, by clicking on the Vehicle icon associated with the Vehicle named SW_1733, the Vehicle Form for opens.

Figure 3.29. Example: Click on Icon in Record Listing



Data Page Sidebar - Payload Data Menu

The **Payload Data** menu includes six tabs:

- **Payload Packets Tab** - A chronological list of all payload packets transmitted from each Vehicle in the organization. The form associated with each record contains the binary output. This information is also contained in the **Raw Outputs** tab under the **Vehicles** menu, but the **Raw Outputs** tab includes all output, not just payload packets.
- **Payload Status Tab** - A chronological list of payload status records for all Vehicles in the Organization. The form associated with each record contains information on the payload and its environment (temperature, pressure, humidity), if applicable.
- **Weather Stations Tab** - A list of weather stations available to the Vehicles in the Organization. The form associated with each weather station includes a chronological list of weather data broadcasts from that station.
- **Weather Records Tab** - A list of weather records from weather stations available to the Vehicles in the Organization.
- **AISyG Records Tab** - A chronological list of all AIS Relay Gateway records for all Vehicles in the Organization. The form associated with each AIS Relay Gateway record provides details on the vessel the AIS broadcast originated from.
- **AISyG Statuses Tab** - A chronological list of all AIS Relay Gateway status records for all Vehicles in the Organization. Some, but not all AIS receivers generate status data.

Data Page Sidebar - Sensor Data Menu

The **Sensor Data** menu includes a tab for each LRI supported Wave Glider-integrated sensor that has been entered into WGMS by the WGMS Administrator. Each tab is a chronological list of sensor-specific data records for all Vehicles in the Organization. For each type of sensor, data records from all of the Vehicles in the Organization equipped with that sensor are displayed in chronological order. The form associated with each record includes raw sensor output.

The number of tabs under the **Sensor Data** menu will vary depending on how many different types of sensors there are across all of the vehicles in the WGMS Organization. For example, the **Sensor**

Data menu for a large WGMS Organization with a variety of Wave Glider configurations might include any or all of the following sensor data tabs:

- **CSIR GPS**
- **Fluorometer Header Records**
- **Fluorometer Records**
- **ECO-Puck Records**
- **C-Star Records**
- **Benthos Modem Records**
- **Seabird CTD Compressed**
- **Seabird CTD ASCII Records**
- **Datawell MOSE Records**
- **Vemco VR2C Records**
- **ADCP C2 Samples**
- **ADCP C2T Samples**
- **ADCP C4T Samples**
- **ADCP C4 Samples**
- **ADCP Bathymetry Samples**
- **JAMSTEC Tsunami Sensor Data**
- **ADCP Header Samples**
- **Aquatracka Samples**
- **WHOI Micro Modem**
- **pCO2 Sensor**
- **LISST Sensor**
- **Vemco VM4 Information**
- **Vemco VM4 Realtime Tag**
- **Vemco VM4 Local Health**
- **Vemco VM4 Remote Health**
- **Vemco VM4 Daily Local Health**

- **Vemco VM4 Daily Remote Health**
- **Sonardyne Tsunami Sensor Data**
- **GPS Waves Sensor Data**
- **CEFAS Format 0**
- **CEFAS Format 1**
- **Marine Magnetics Magnetometer Records**
- **Generic Payload String**

Data Page Toolbars

The Data page displays different toolbars depending on which menu and which tab under that menu is selected.

The Select View drop-down menu and the Search utility in each of these toolbars can be configured by an Administrator with a WGMS Root user Role. By default the Select View drop-down menu is set to display all of the records in a tab.

The Search utility is also configured by an Administrator with a WGMS Root user Role. It can search some, or all, of the columns in a tab. The settings can vary depending on the WGMS Organization you are in. To find out which columns can be searched, check with the Root level Administrator for your WGMS Organization. Alternatively, you can determine which columns can be searched by entering a keyword that you know exists in a column. If that column can be searched, all records containing the keyword you entered will be listed.

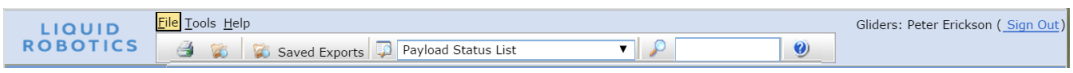
Payload Data Menu Toolbars

There are six tabs under the **Payload Data** menu:

- **Payload Packets**
- **Payload Status**
- **Weather Stations**
- **Weather Records**
- **AISyG Records**
- **AISyG Statuses**

All of these tabs have the same toolbar with the exception of the Select View drop-down menu, which is specific to the list that is associated with each tab.

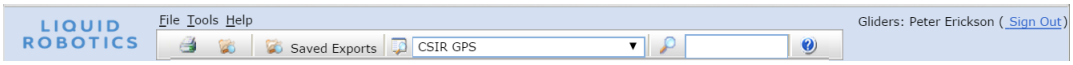
Figure 3.30. Payload Data Tabs Toolbar



Sensor Data Menu Toolbars

All of the **Sensor Data** tabs have the same toolbar. The Select View drop-down menu in the toolbar will display the type of sensor data that corresponds to the tab selected in the **Sensor Data** menu. By selecting a different data type in the Select View drop-down menu, the sensor data for that newly selected data type will be displayed.

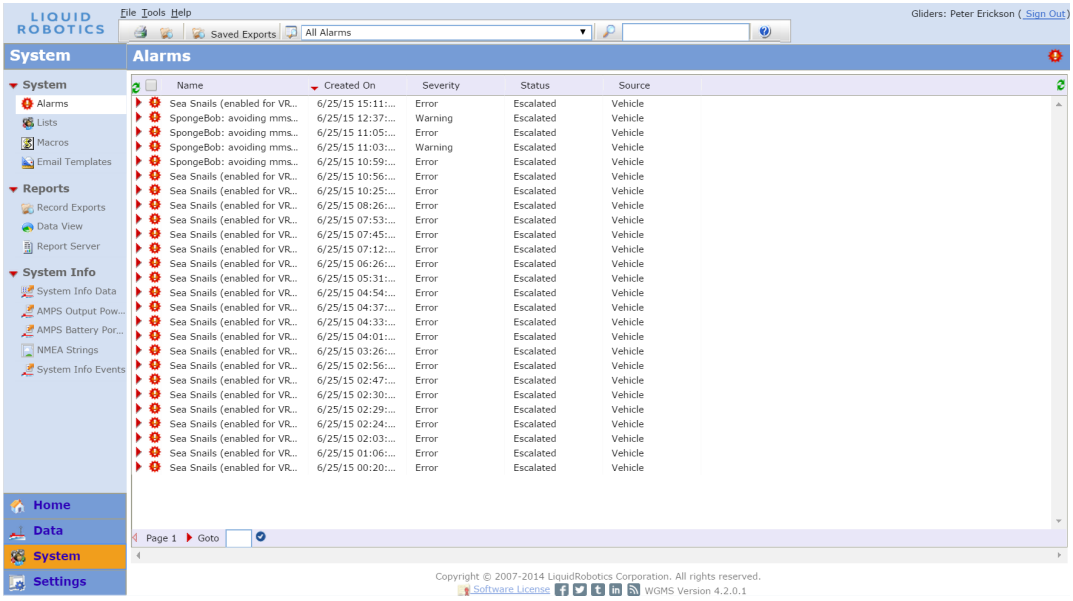
Figure 3.31. Sensor Data Tabs Toolbar



System Page

When you click on the **System** button in the WGMS **Home** page sidebar, the WGMS **System** page is displayed. The **System** page opens to the **Alarms** tab, flanked by the **System** page sidebar and toolbar. The **Alarms** tab lists system alarms in chronological order with links to detailed alarm records.

Figure 3.32. System Page

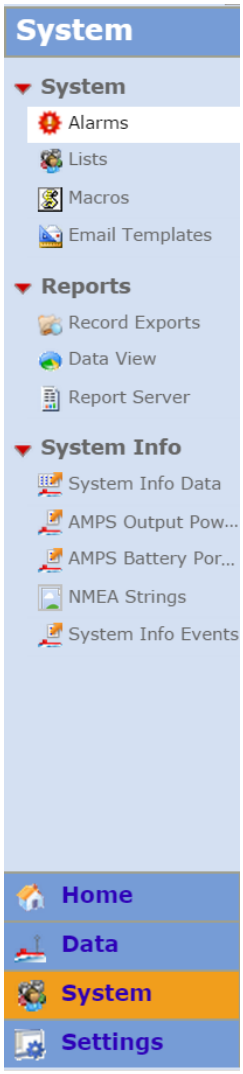


System Page Sidebar

The **System** page sidebar includes three menus.

- **System** menu
- **Reports** menu
- **System Info** menu

Figure 3.33. System Page Sidebar



Each tab under the **System**, **Reports**, and **System Info** menus is a list of records. Each record is preceded by an **arrow** and an **icon**.

When you click on the **arrow** , a window opens. If there is additional information associated with the record, it will appear in this window. This feature does not work well in all browsers, however, the same information is also available in the form that opens when you click on the **icon** associated with the record.

When you click on the **icon** associated with a record, a form opens containing the details for the associated record. Depending on your WGMS Role and the type of form you are viewing, you may have the ability to edit the record.

System Menu

The **System** menu includes 4 tabs:

- **Alarms Tab** - A chronological list of all system alarms with links to detailed alarm records.

- **Lists Tab** - A list of Escalation Lists or User Group Lists that have been created by the WGMS Administrator.
- **Macros Tab** - A list of macros that have been created by the WGMS Administrator to streamline specific tasks. The use of WGMS Macros is beyond the scope of this user guide. If you have questions about WGMS Macros, contact Liquid Robotics Customer Support - see "Contacting Liquid Robotics" (page 291).
- **Email Templates Tab** - A list of email templates created by the WGMS Administrator for notifications that are frequently sent.

Reports Menu

The **Reports** menu includes 2 tabs:

- **Record Exports** tab - A chronological list of records that have been exported.
- **Data View** tab - Takes you to a data viewing window where you can select a vehicle, a data type, and a time frame, and then display that data in a table, a graph, or a map. For more information see: "Data View Page - Custom Reports " (page 141)

System Info Menu

The **System Info** menu includes 1 tab:

System Page Toolbars

The System page displays different toolbars depending on which menu and which tab under that menu is selected.

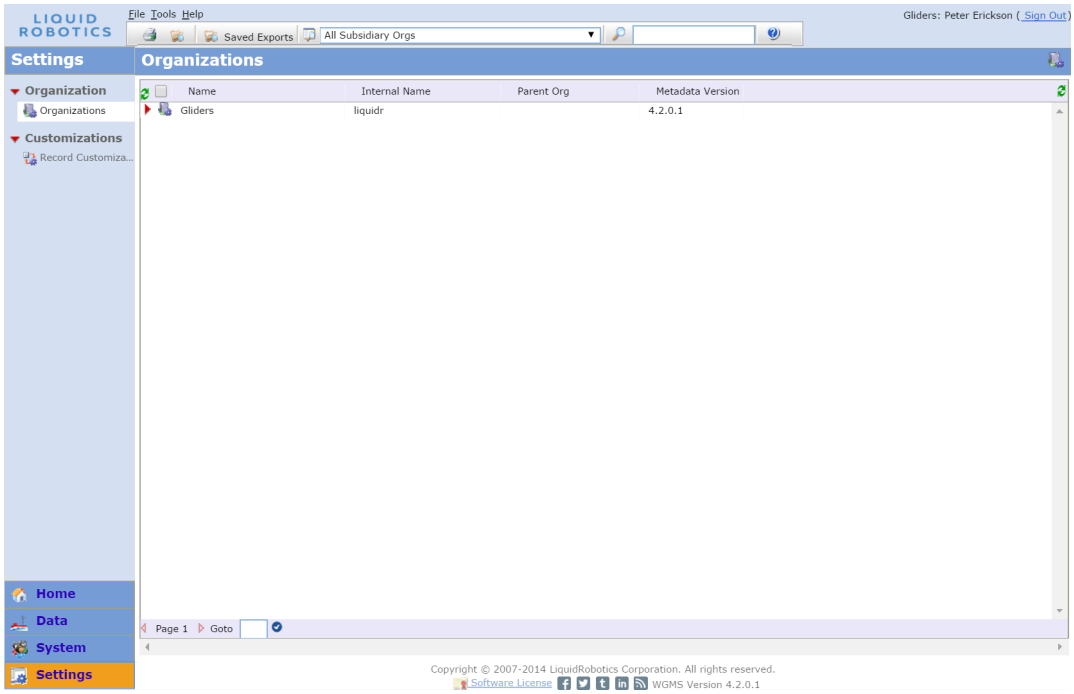
The Select View drop-down menu and the Search utility in each of these toolbars can be configured by an Administrator with a WGMS Root user Role. By default the Select View drop-down menu is set to display all of the records in a tab.

The Search utility is also configured by an Administrator with a WGMS Root user Role. It can search some, or all, of the columns in a tab. The settings can vary depending on the WGMS Organization you are in. To find out which columns can be searched, check with the Root level Administrator for your WGMS Organization. Alternatively, you can determine which columns can be searched by entering a keyword that you know exists in a column. If that column can be searched, all records containing the keyword you entered will be listed.

Settings Page

When you click on the **Settings** button in the WGMS **Home** page sidebar, the WGMS **Settings** page is displayed. The **Settings** page opens to the **Organizations** tab, flanked by the **Settings** page sidebar and toolbar. The **Organizations** tab lists all of the WGMS Organizations you are logged into with links to detailed Organization records.

Figure 3.34. Settings Page - Logged Into 1 Organization

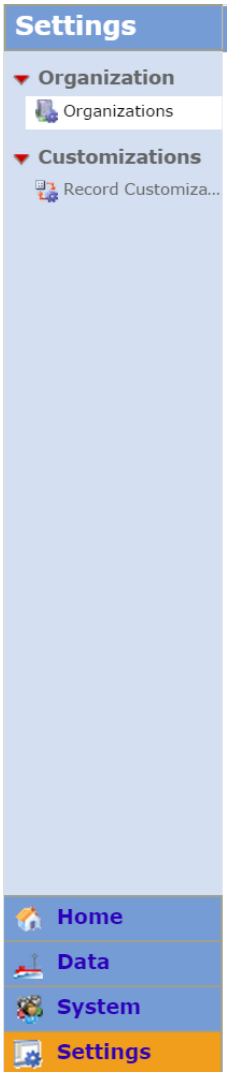


Settings Page Sidebar

The **Settings** page sidebar includes 2 menus:

- **Organization** menu
- **Customizations** menu

Figure 3.35. Settings Page Sidebar



Each tab under the **Organization** and **Customizations** menus is a list of records. Each record is preceded by an **arrow** and an **icon**.

When you click on the **arrow** , a window opens. If there is additional information associated with the record, it will appear in this window. This feature does not work well in all browsers, however, the same information is also available in the form that opens when you click on the icon associated with the record.

When you click on the **icon** associated with a record, a form opens containing the details for the associated record. Depending on your WGMS Role and the type of form you are viewing, you may have the ability to edit the record.

Organization Menu

The **Organization** menu includes one tab:

- **Organizations** tab - A list of records for WGMS Organizations you are logged into. Each Organization record is linked to an Organization Form where you can view Organization details, and an Organization Admin Form where Organization information can be edited by a WGMS Administrator.

Customizations Menu

The **Customizations** menu includes one tab:

- **Record Customization** tab - A list of records for WGMS UI entities. Each entity record is linked to a Metadata Tables form where entity display parameters can be edited by a WGMS Administrator.

Settings Page Toolbars

The toolbars associated with each tab under the Settings page menus are the same, except for the Select View drop-down menu, which varies depending on which tab is selected.

Figure 3.36. Organizations Tab Toolbar

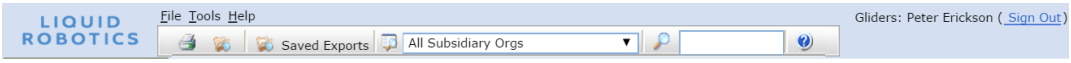
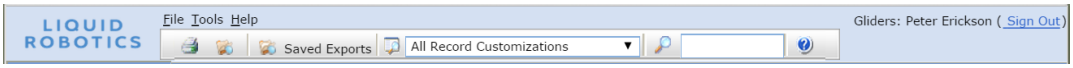


Figure 3.37. Record Customizations Tab Toolbar



With the **Organizations** tab, **All Subsidiary Orgs** is the default selection in the Select View drop-down menu.

With the **Record Customization** tab, **All Record Customizations** is the default selection in the Select View drop-down menu.

The Select View drop-down menu in each of these toolbars can be configured by an Administrator with a WGMS Root user Role. By default the Select View drop-down menu is set to display all of the records in a tab.

The Search utility in each of these toolbars can search some, or all, of the columns in a tab. It can be configured by an Administrator with a WGMS Root user Role. The settings can vary depending on the WGMS Organization you are in. To find out which columns can be searched, check with the Root level Administrator for your WGMS Organization. Alternatively, you can determine which columns can be searched by entering a keyword that you know exists in a column. If that column can be searched, all records containing the keyword you entered will be listed.

Chapter 4. Using the WGMS Interface

This chapter explains WGMS UI features typically used by individuals assigned a **Master**, **Data Analyst** or **Guest User** role.

Note

Pilots are assigned a **Master** role.

Toolbar Icons

Toolbar icons are located on the toolbars associated with the **Home**, **Data**, **System**, and **Settings** page menu options that appear when

is selected. Each menu option in the sidebar has a corresponding toolbar. Toolbar icons are small pictograms that behave like buttons, sometimes paired with a word indicating the icon type. Left-clicking on a toolbar icon initiates an action.

Figure 4.1. Example: Toolbar Icons

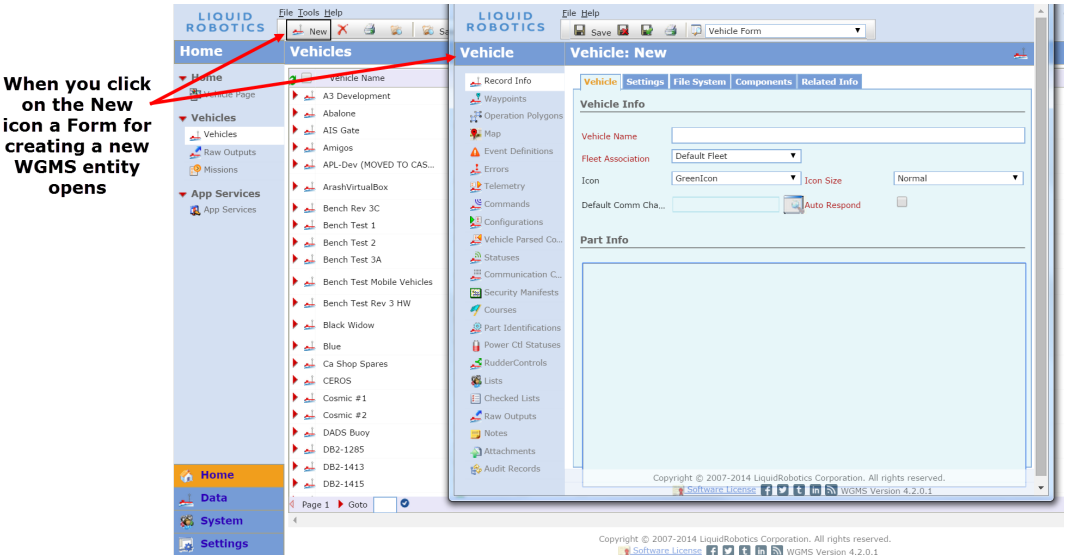
When you hover your cursor over a toolbar icon, a brief description will appear and a box with a black border will surround the icon and any text associated with it, making it look like a button.

Figure 4.2. Hover Cursor Over Toolbar Icon

The

icon is used to add a new entity to WGMS. When you click on it a form opens where you can create a new entity.

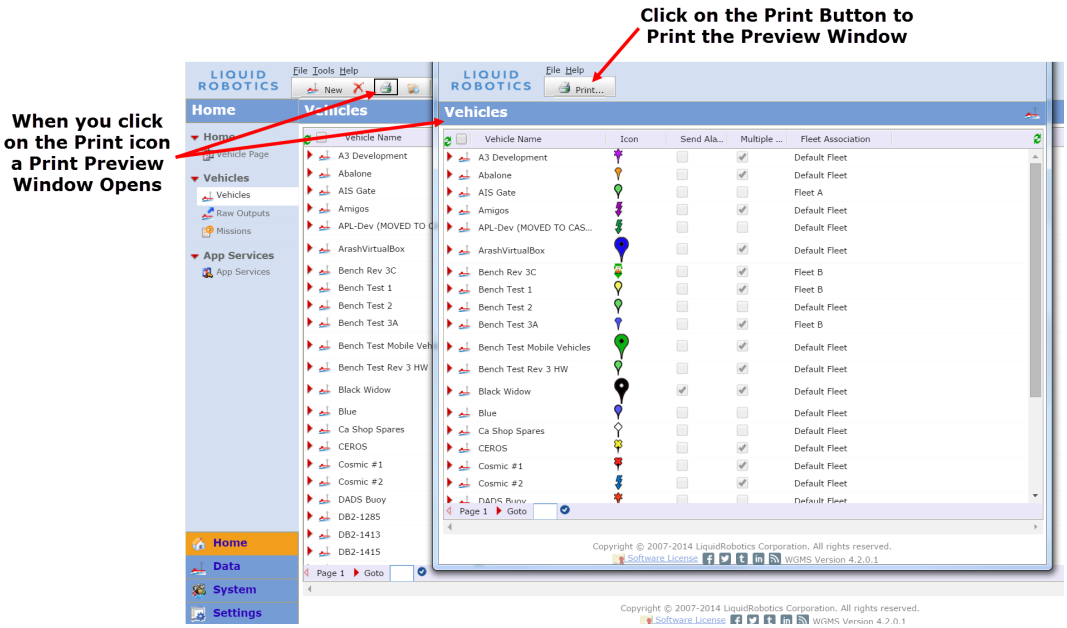
Figure 4.3. Example: New Icon



The icon deletes selected items.

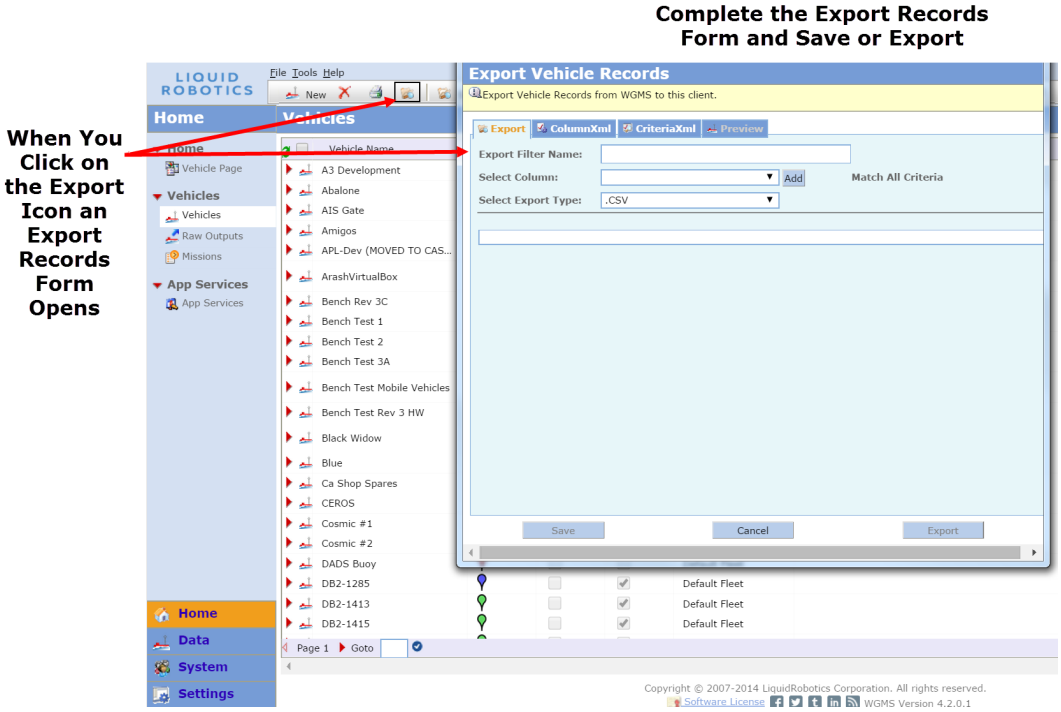
The icon opens a print preview window that displays the content you are viewing. Click on the **Print** button to send that information to a printer.

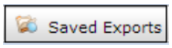
Figure 4.4. Example: Print Icon



The icon opens an Export Records form that you can use to export information.

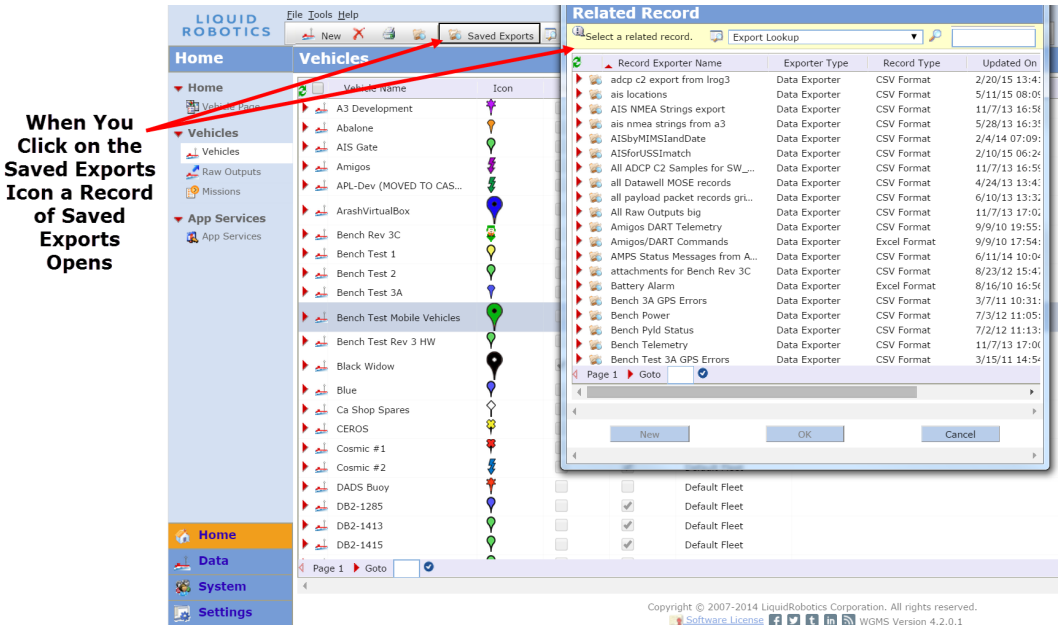
Figure 4.5. Example: Export Icon



The 

icon opens an Export Records form that you can use to export information.

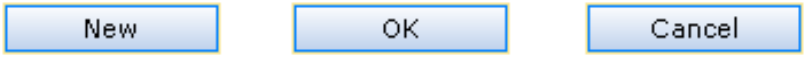
Figure 4.6. Example: Saved Exports Icon



Buttons

Buttons are similar to icons, in that they initiate an action, but buttons always include text describing their function. Typically, buttons are used in sets to select alternate actions. Figure 4.7 shows three WGMS buttons.

Figure 4.7. Example Buttons



Links

Links are references to other data displays. Links are displayed as blue, underlined text. Figure 4.8 shows a link that is commonly used on the WGMS **Dashboard**.

Figure 4.8. Example Link

Check Boxes

Check boxes are used to select or de-select items. Clicking in an empty box will put a check in the box (select the item) . Clicking a checked box will delete the check (de-select the item).

Figure 4.9. Example Checked and Unchecked Boxes

Single and Double Clicking

An action will be initiated when you hover your cursor over an icon, button, or link and single-click with the left mouse button. When you select an item from a column in a list, you typically have to double-click on the item name (text) with the left mouse button to call up a window (WGMS dialog box, form, or record) related to that item. The first click selects the item and the second click opens a dialog box, a form, or a record.

Figure 4.10. Example: Single Click on List Item

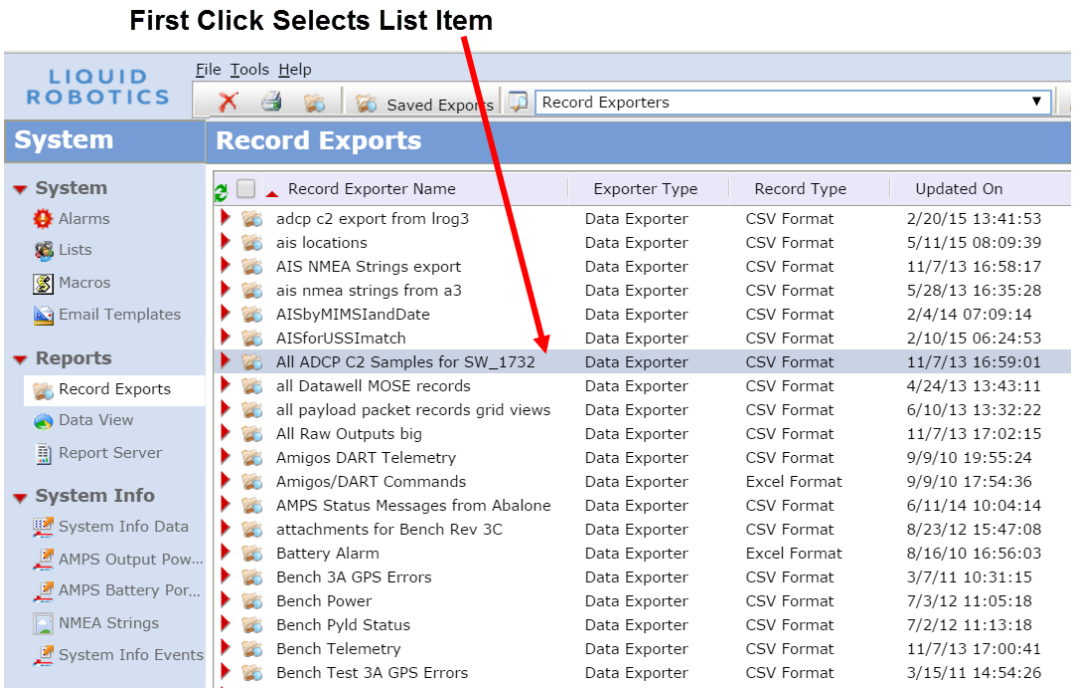
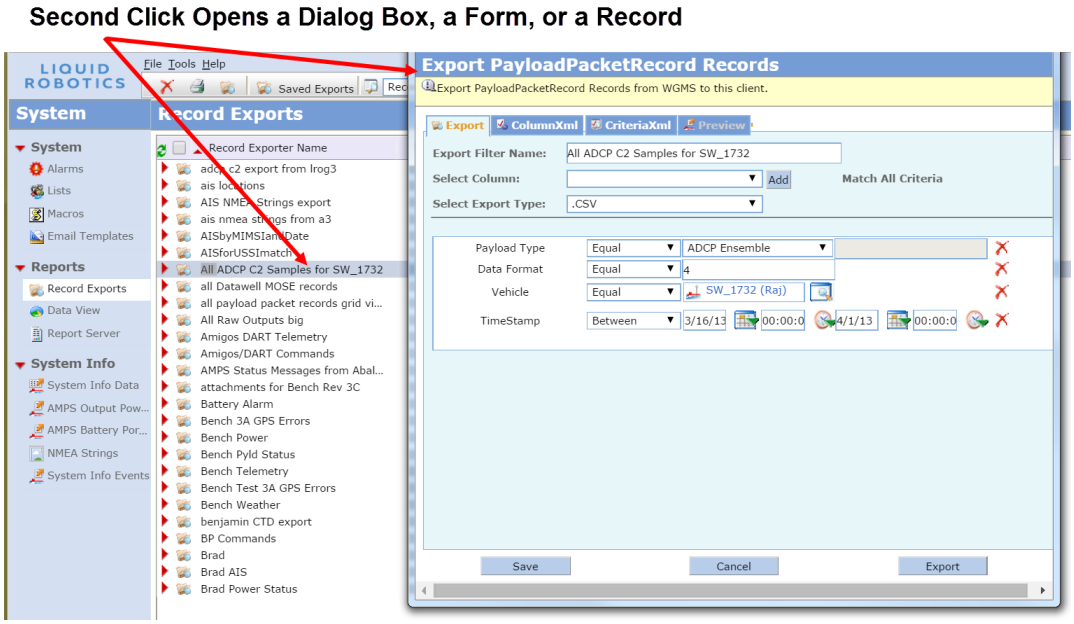


Figure 4.11. Example: Double Click on List Item



Text Input Boxes

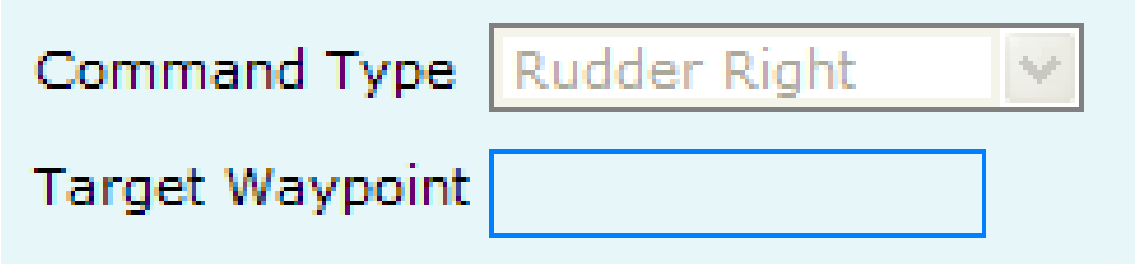
Text input boxes are used to enter text strings, including numbers. They are designed for direct text entry.

Click in the box, then enter the text. If the text is longer than the box, the text will continue out the left side of the box. Use the **Home** or **End** keys to move to the beginning or end of the text string. Figure 4.12 shows an Input Box for entering a telephone number.

Figure 4.12. Example: Text Input Box

Grayed-out text in the box indicates that the entry is predefined, and cannot be changed (Figure 4.13). A non-White box background indicates that the box is "closed" and no data can be entered.

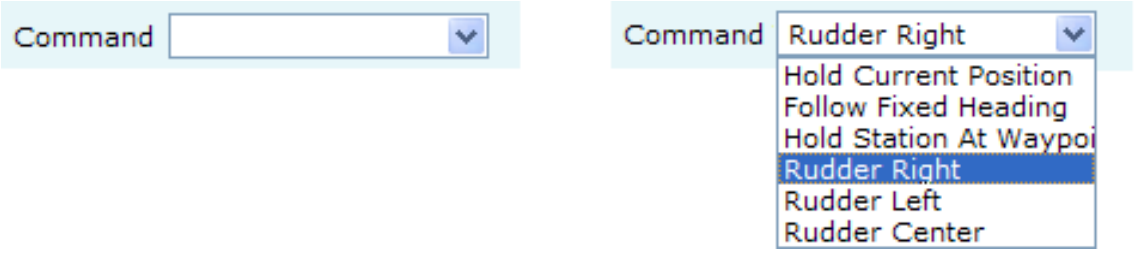
Figure 4.13. Example: Predefined and No-Entry Text Boxes



Drop-down Menus

Drop-down menus include a downward pointing arrow on the right side of a selection box. Text cannot be entered directly. Instead, click on the arrow and a menu will appear. Click on a menu item to make an entry into the box, as shown below (Figure 4.14).

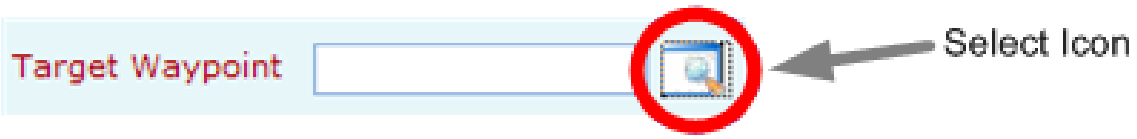
Figure 4.14. Example: Drop-down Menu



Icon Selection Boxes

Icon selection boxes have a Click to select... icon on the right side of the selection box (Figure 4.15). Click on the icon and a window will open with a list of items you can select from. Hover your cursor over an item, then click to select it. The window will close, and the item you selected will appear in the selection box.

Figure 4.15. Example: Icon Selection Box



Pages

All WGMS UI entities are HTML Web pages contained in browser windows. WGMS pages, for example, the WGMS Home page or the WGMS Dashboard are windows that open to completely fill the display, similar to what would be referred to as a "screen" in a desktop application. WGMS pages can be resized once they are opened. Each WGMS page has a toolbar, a sidebar and sections containing piloting tools or data. The WGMS UI has five primary pages:

- **Dashboard** - The piloting page - provides the largest map display.
- **Home Page** - Expands the Dashboard to include buttons to access the Data, System, and Settings pages and associated menus.
- **Data Page** - Display and edit information for all Vehicles and their payloads.
- **System Page** - Display and edit WGMS System information.
- **Settings Page** - Display and edit WGMS Settings information.

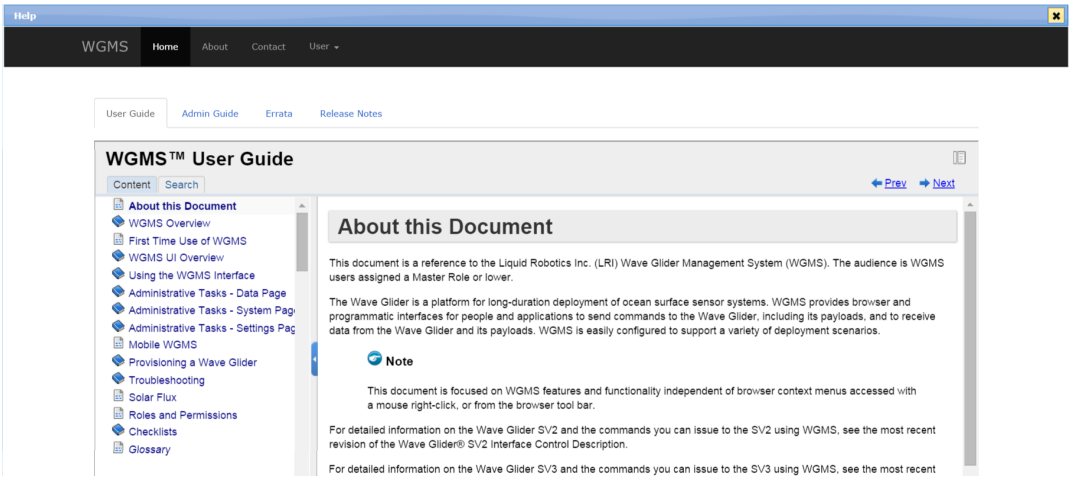
Some common usage features of WGMS pages are:

- The display can be re-sized by placing the cursor over any edge of the page. When an arrow appears, you can hold down the left mouse button to move the border to re-size the page.
- A green refresh icon can be clicked to re-display a page so new data or display settings will appear .

Help Icon

Click on the help icon located on the right side of the toolbar for each WGMS page or window, to access WGMS reference documentation.

Figure 4.16. Click Help: Access WGMS Documentation



Lists

WGMS lists contain data records. All Wave Glider Vehicle data, WGMS system data, and Wave Glider integrated sensor data, is displayed in lists where each row contains a data record.

A universal feature of all the lists is that they can be sorted by clicking on the column heading above the column you want to use for sorting. A small Red triangle will appear, indicating ascending (up-pointing) or descending (down-pointing) sorting. Single-click on the column heading to reverse the sorting direction.

Note that some lists have a default sorting order for one of the columns, such as **Local Time** in the following example.

Figure 4.17. List Sorting Example

Local Time	Last Speed(kt)	Target WP	Desired Heading(°)	Sub Heading(°)	Path Heading	Float Temp(°C)	Battery Total Power	ISS
5/4/2010 2:49 pm	2.586	13	196	196	193	26	521.09	5
5/4/2010 2:47 pm	2.214	13	195	193	194	26	520.79	4
5/4/2010 2:45 pm	2.168	13	193	194	193	26	520.49	3
5/4/2010 2:43 pm	2.006	13	194	194	194	26	520.16	0
5/4/2010 2:41 pm	2.245	13	199	199	199	26	519.84	5
5/4/2010 2:39 pm	2.819	13	209	209	209	26	519.58	3

Changing List Column Widths

On some lists, a column may be too narrow to display all of the heading text or the data. If you place your mouse cursor over any column separator bar in the header row, a column width adjustment tool will appear, but it will not allow you to adjust the column width. This is an unresolved bug.

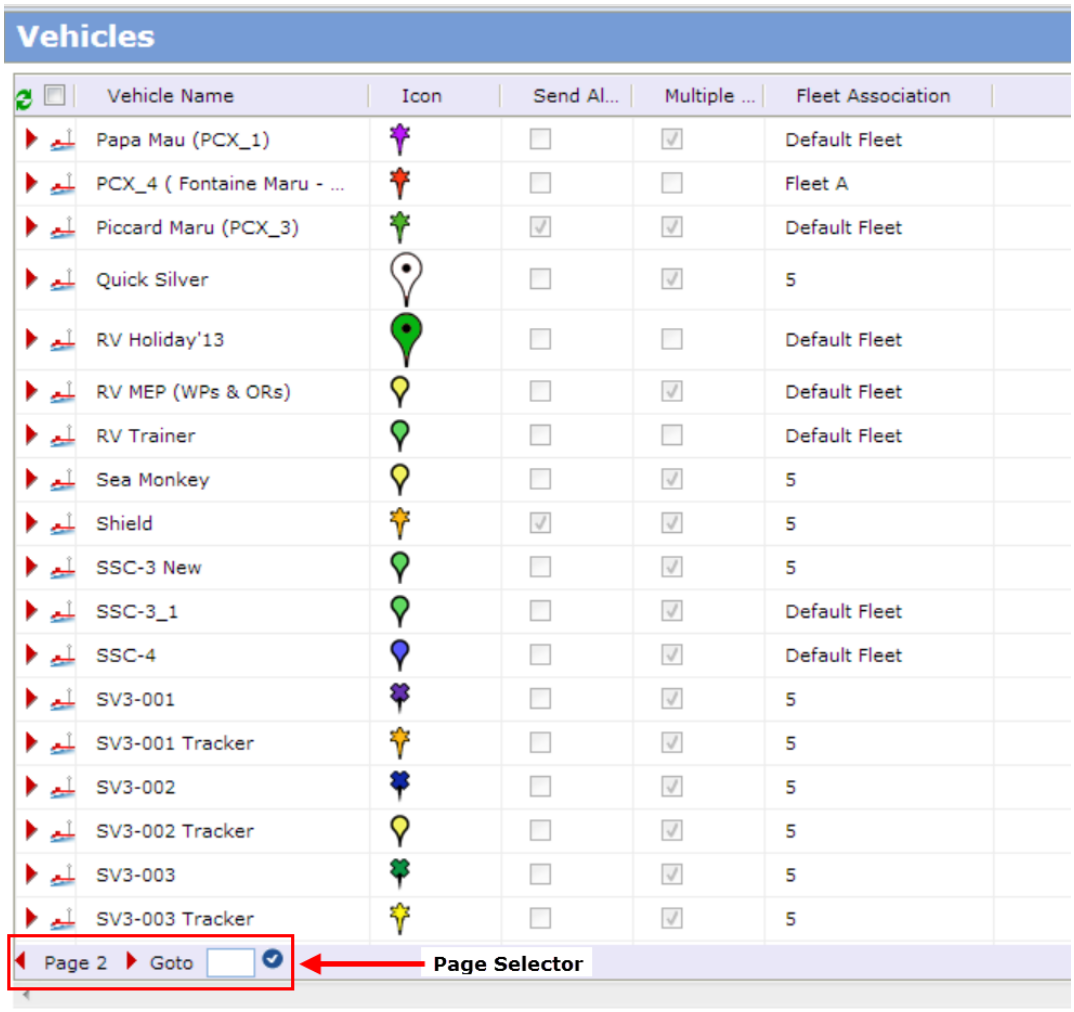
To view the full column header text, hover your cursor over the column heading cell and a tooltip will appear with the full name of the column heading.

To view all of the information contained in each column, click on the icon at the start of each row to open a record containing all of the information contained in the row.

List Page Selection

WGMS windows that display lists can contain lists that span multiple pages due to a limited number of line items that can be displayed on each list page. The default setting is 25 line items per list page, however, your WGMS System Administrator can change this setting. At the bottom left corner of each list page, the number of the page you are viewing is displayed with backward and forward pointers (triangles) on either side of it.

Figure 4.18. List Page Selector



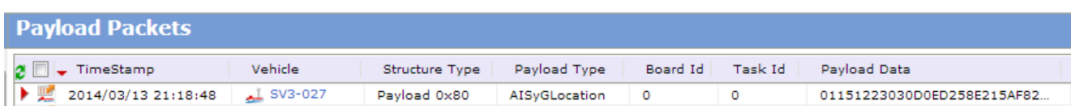
If the right triangle is solid (as in the example above), you can click on it to go forward to the next page. If the left triangle is solid, you can click it to go backward to the previous page.

You also have the option to enter the page number you want to display in the **Goto** text box, then click on the adjacent icon to go directly to that page.

Records

WGMS records are the line items that populate WGMS lists. A record provides some basic information about the data it represents, for example, the type of data and a time stamp. Each record is linked to a WGMS form where detailed information can be viewed and in some cases edited.

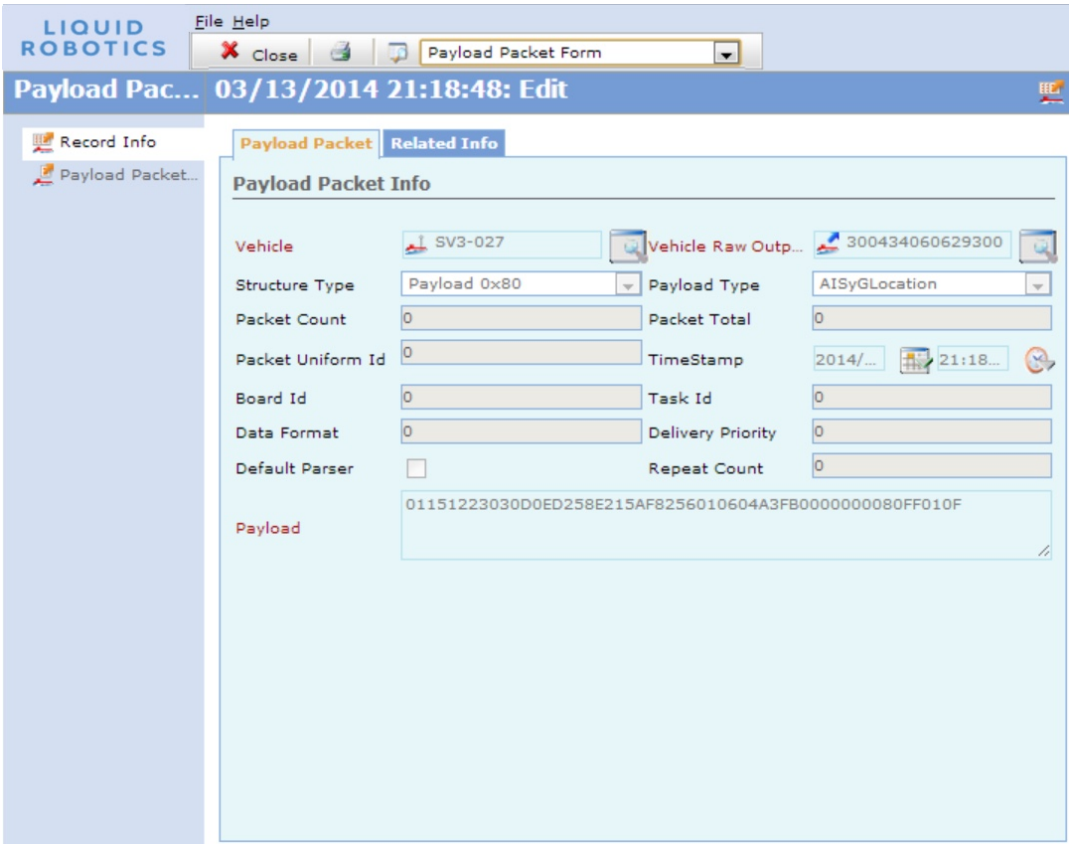
Figure 4.19. A Typical WGMS Record



Forms

WGMS Forms are used to create or edit data records. For example, click on the Record Info icon associated with each data record to open a form where you can view, and in some cases edit, the data.

Figure 4.20. A Typical WGMS Form

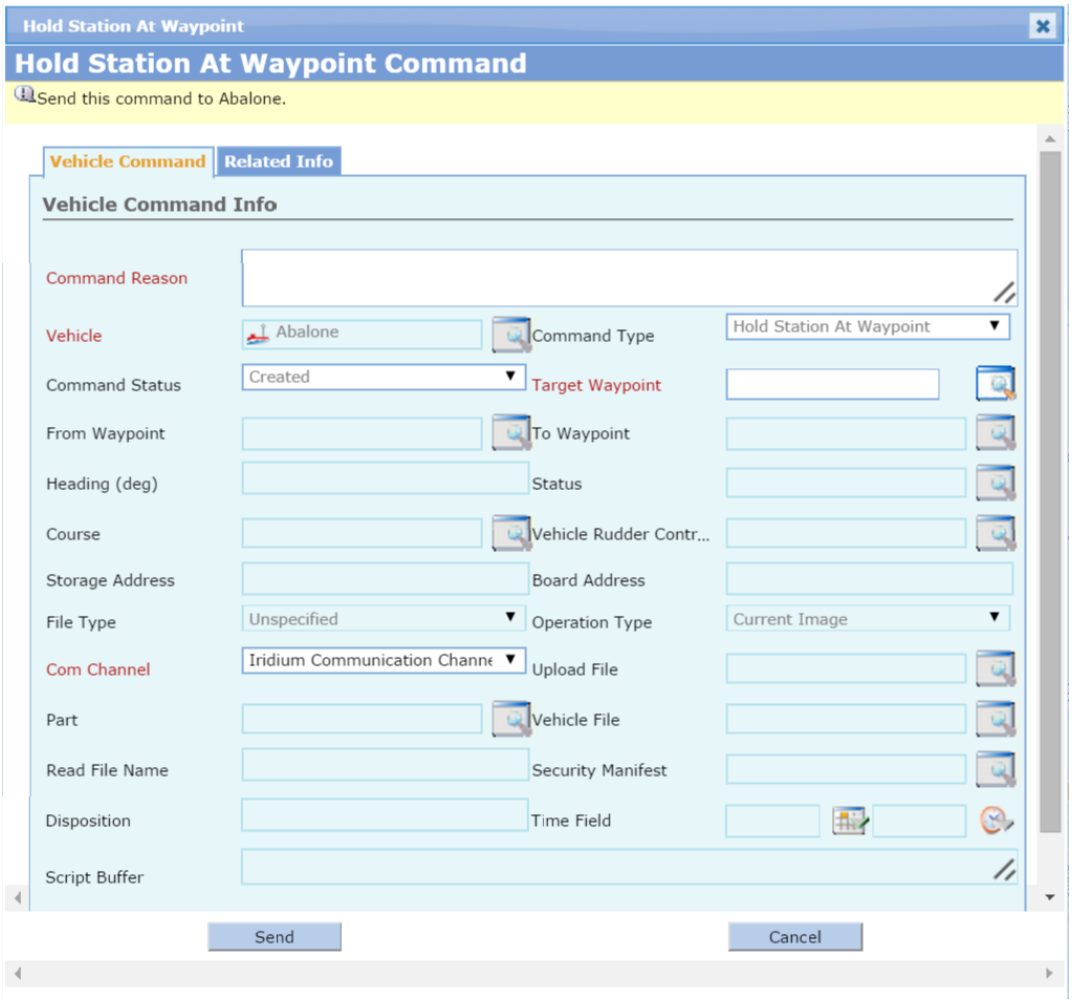


Dialog Boxes

Dialogs, or Dialog Boxes, are modal windows - they will not close, unless you take some action. Some dialogs are simple confirmation requests. For example: "Do you want to copy these 3 items?" Other dialogs can be quite complex, with multiple icons, entry boxes, check boxes and buttons.

Dialogs typically contain one or more buttons (such as **OK**, **Send**, **Save**, and **Cancel**) that are used to exit and close the box.

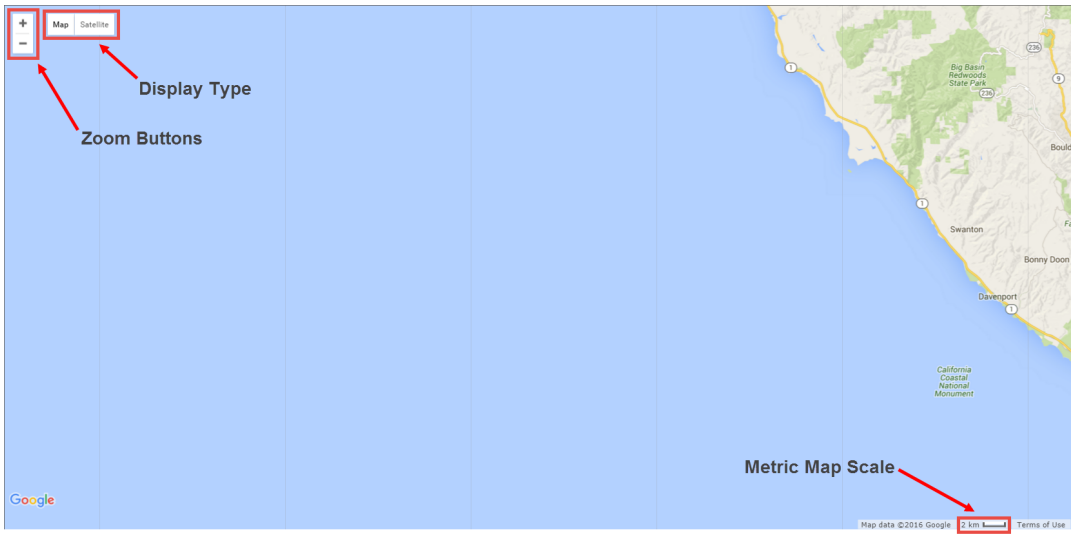
Figure 4.21. A Typical WGMS Dialog Box



Using the Position Map

The WGMS position map appears in the standard Google Map format and can be manipulated using the same methods. When you use the zoom and map/satelite view controls, there is no need to click the refresh icon - the display will refresh automatically. An annotated position map image is shown in Figure 4.22, followed by basic explanations of the map display features.

Figure 4.22. Position Map Display Features



- Reposition the map by placing the mouse cursor in the map image and holding down the left mouse button. When the cursor changes to a "clenched hand" symbol, keep the left mouse button pressed and "pull" the map around with the clenched hand.
- Zoom in or out by clicking on the **Zoom** buttons in the upper left corner of the position map. You can also Zoom in or out using your mouse scroll wheel.
- The metric scale of the map appears in meters or kilometers at the lower edge of the position map and automatically adjusts when you zoom in or out.
- The **Map** and **Satellite** buttons in the upper left corner of the position map are used to select different display types:
  - **Map**: The standard line-drawn map, as shown in Figure 4.22.
  - **Satellite**: Shows a photographic aerial view.
  - **Terrain**: When you click on the **Map** button, the **Terrain** check box appears. The **Terrain** option modifies the **Map** display. When **Terrain** is selected the position map will show the topography of any land that appears in the position map.

Figure 4.23. Terrain Option for the Map Display Type

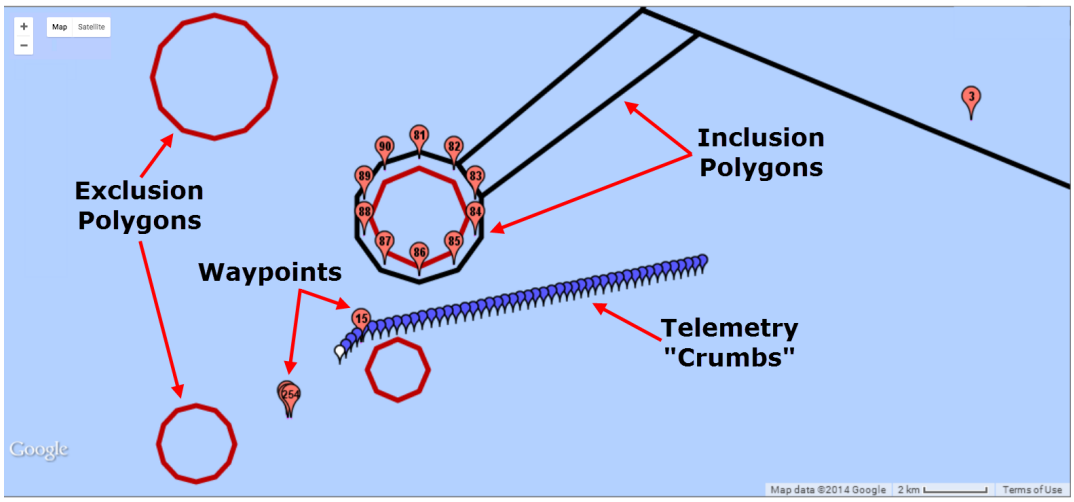
Note

Without a fast broadband connection, moving and scaling of the map can take several seconds. If you have a slow connection, move or scale the map in small increments, and then wait for it to re-paint.

Vehicle Symbols

As shown below, WGMS uses various icons and other markings to indicate properties associated with the Vehicles displayed on the map (Figure 4.24). There is a setting accessible from the **Map Options** button in the Map Toolbar that determines which Vehicles (along with the icons and parameters configured on those Vehicles) will be displayed in the Position Map. For more information see “Map Options ” (page 77).

Figure 4.24. Position Map Vehicle Symbols



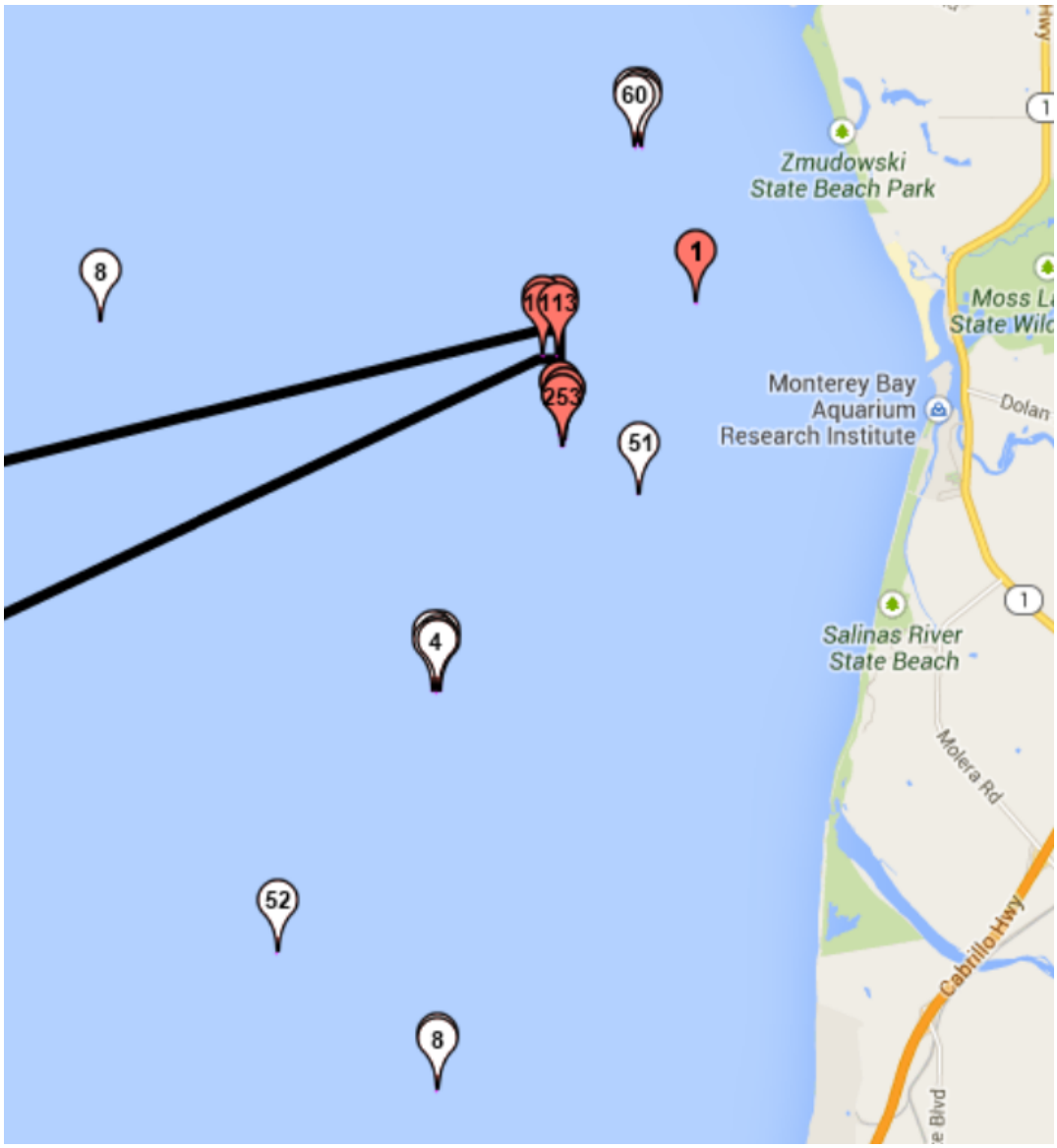
- **Inclusion Polygons**: Closed black Operation Polygons. If the Vehicle travels outside of this boundary, it will trigger an "Out of Bounds" alarm. For information on configuring Inclusion Polygons for a Vehicle see “ Adding Operation Polygons ” (page 250)
- **Exclusion Polygons**: Closed red Operation Polygons. If the Vehicle travels inside this boundary, it will trigger an alarm. For information on configuring Exclusion Polygons for a Vehicle see “ Adding Operation Polygons ” (page 250)
- **Waypoints**: Icons that are associated with GPS locations used to define the course a Vehicle will follow. For more information see “Waypoints” (page 58).
- **Telemetry Crumbs**: A series of Vehicle icons displayed on the Position Map indicating the position of the vehicle at each telemetry transmission as the Vehicle progresses along a course. Each Vehicle is assigned a Vehicle Icon as explained in Chapter 6: *Administrative Tasks - Data Page* . For more information see “Telemetry Crumbs” (page 61).

Waypoints

Waypoints are icons that are associated with GPS locations used to define the course a Vehicle will follow. Waypoint are:

- Configured for each Vehicle. When a course is defined for a Vehicle, it must be defined by the Waypoints that are configured for that Vehicle.
- The same Waypoint can be configured on multiple Vehicles.
- Each Waypoint is assigned a whole number value from 1 to a maximum of 254.
- Waypoints that are configured on the Vehicle you have selected in the Vehicles drop-down menu on the Dashboard are red on the Position Map display.
- If you set **Map Options** to display information on Vehicles other than the Vehicle you have selected in the Vehicles drop-down menu on the Dashboard, the Waypoints configured on those Vehicles will be white on the Position Map display.

Figure 4.25. Waypoints for Selected Vehicle (Red) and Other Vehicles (White)



- When you click on a Waypoint, a pop-up will display the Vehicle name, the Waypoint number and name, and the position (latitude and longitude) of that Waypoint. There is also a link to the Record where that Waypoint was created.

Figure 4.26. Waypoint Pop-Up

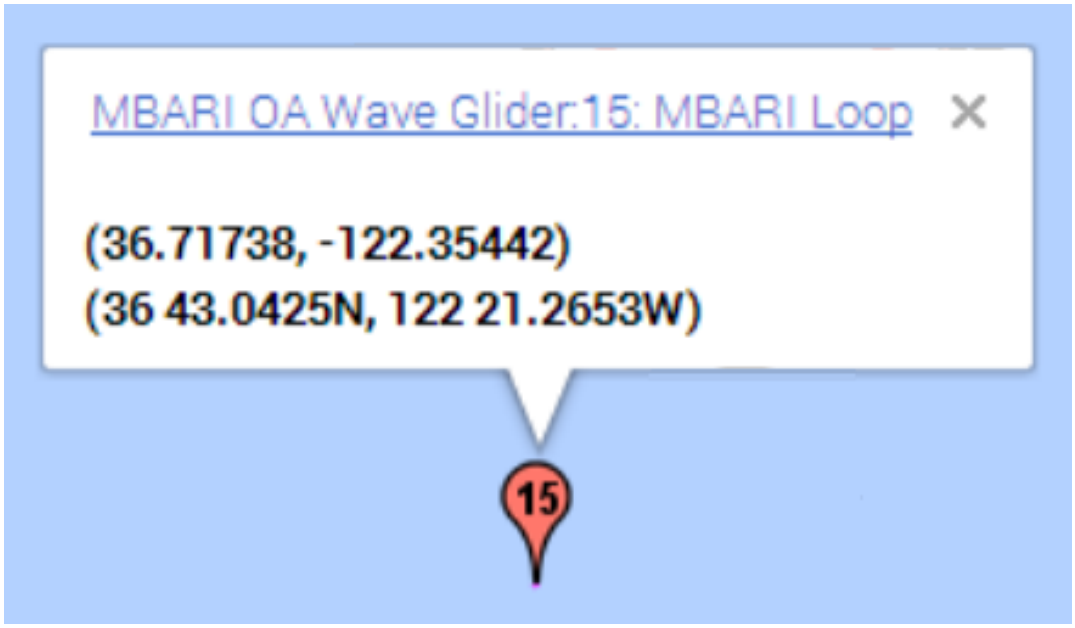
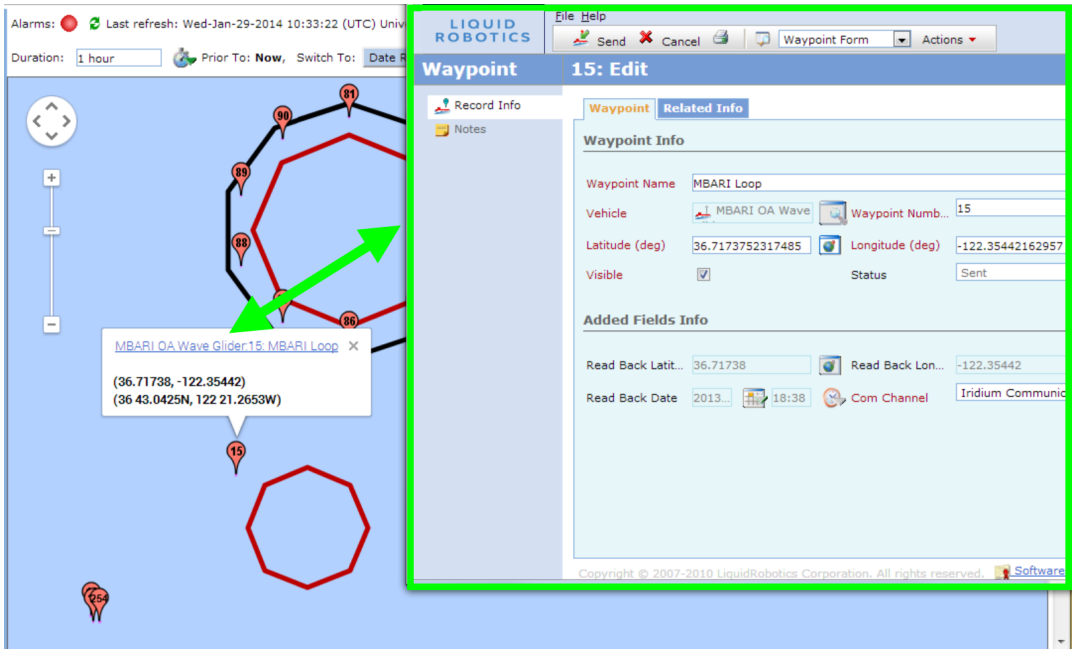


Figure 4.27. Click on Link to Open Waypoint Record

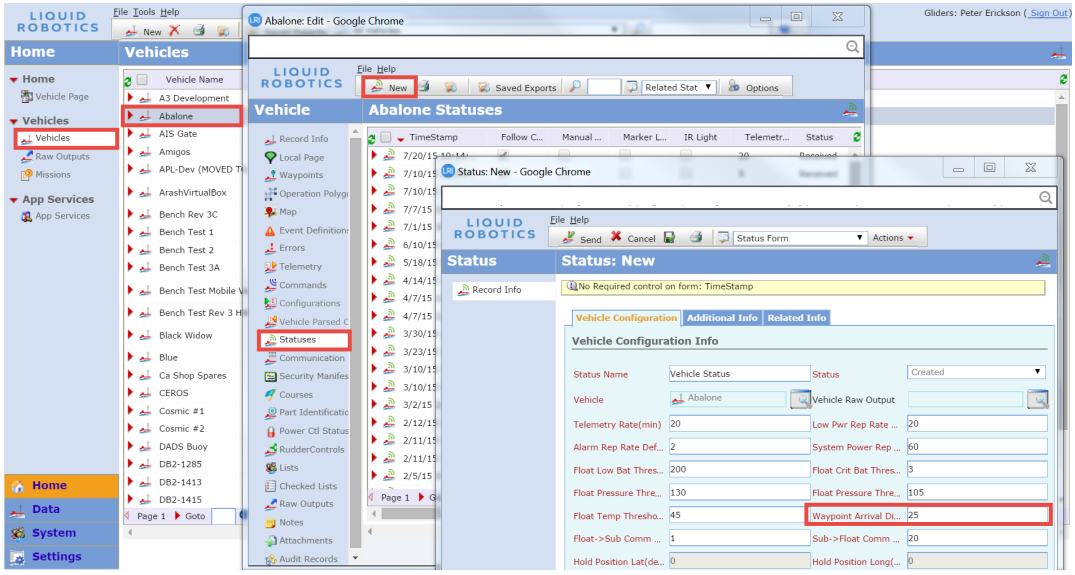


- There is a setting that determines how close a Vehicle needs to get to the precise coordinates of a Waypoint to satisfy the condition that it has arrived. This distance is called the **Arrival Distance** for the Waypoint.

Once a Vehicle is within the Arrival Distance of a Waypoint, programatically it has arrived at that Waypoint. The relative size of the Arrival Distance for a Waypoint appears as a purple circle at the tip of the Waypoint icon. You need to zoom in to see it.

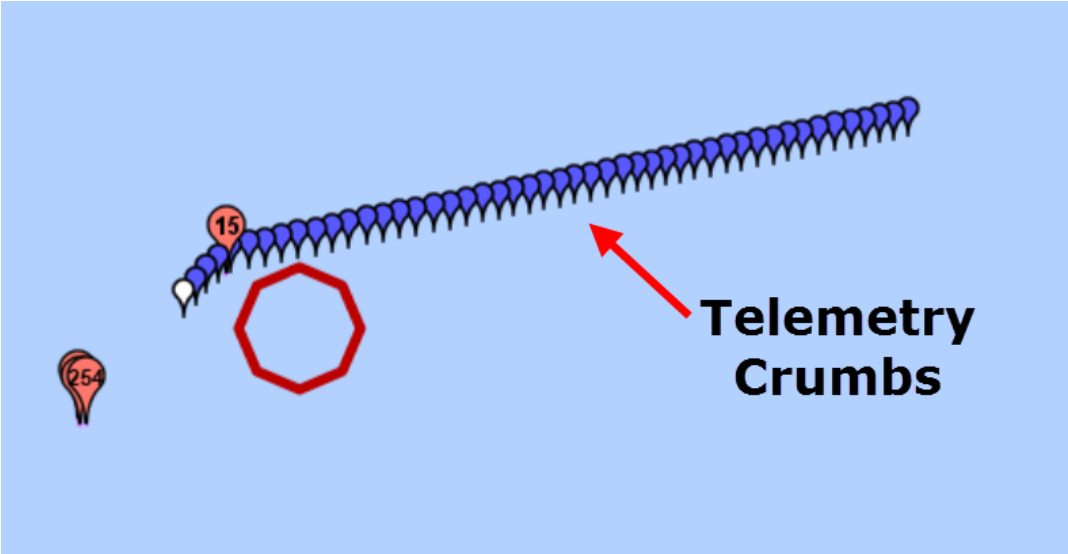
Figure 4.28. Arrival Distance Circle

Arrival Distance is set globally for all of the Waypoints configured for a Vehicle. The default Arrival Distance setting is 20 meters. You can change the Arrival Distance by clicking on the **Vehicles** side tab in the **Vehicles** menu on the System Menus **Home** page. Select a vehicle to open the menu for that vehicle, then select the Statuses side tab. Click on **New** in the toolbar and a dialog box will open where you can edit the **Waypoint_Arrival_Distance** field.



Telemetry Crumbs

Telemetry crumbs are a series of Vehicle icons displayed on the Position Map indicating the position of the vehicle at each telemetry transmission as the Vehicle progresses along a course. Telemetry crumbs are displayed for the time frame selected in the Duration settings on the Position Map toolbar. The default time frame is 1 hour. For more information on time frame settings see “ Using the Position Map Toolbar” (page 64).



When you click on a Telemetry Crumb (Vehicle icon), a pop-up will display:

- The Vehicle name.
- The Date and Time of the telemetry transmission.
- The speed and direction of the Vehicle.
- The battery power level.
- The target Waypoint number.
- The distance travelled since the previous telemetry transmission.
- The position of the Vehicle (latitude and longitude) when the telemetry transmission was initiated.

  There is also a link to the Record where the Vehicle was provisioned.

Figure 4.29. Telemetry Crumb (Vehicle Icon) Pop-Up

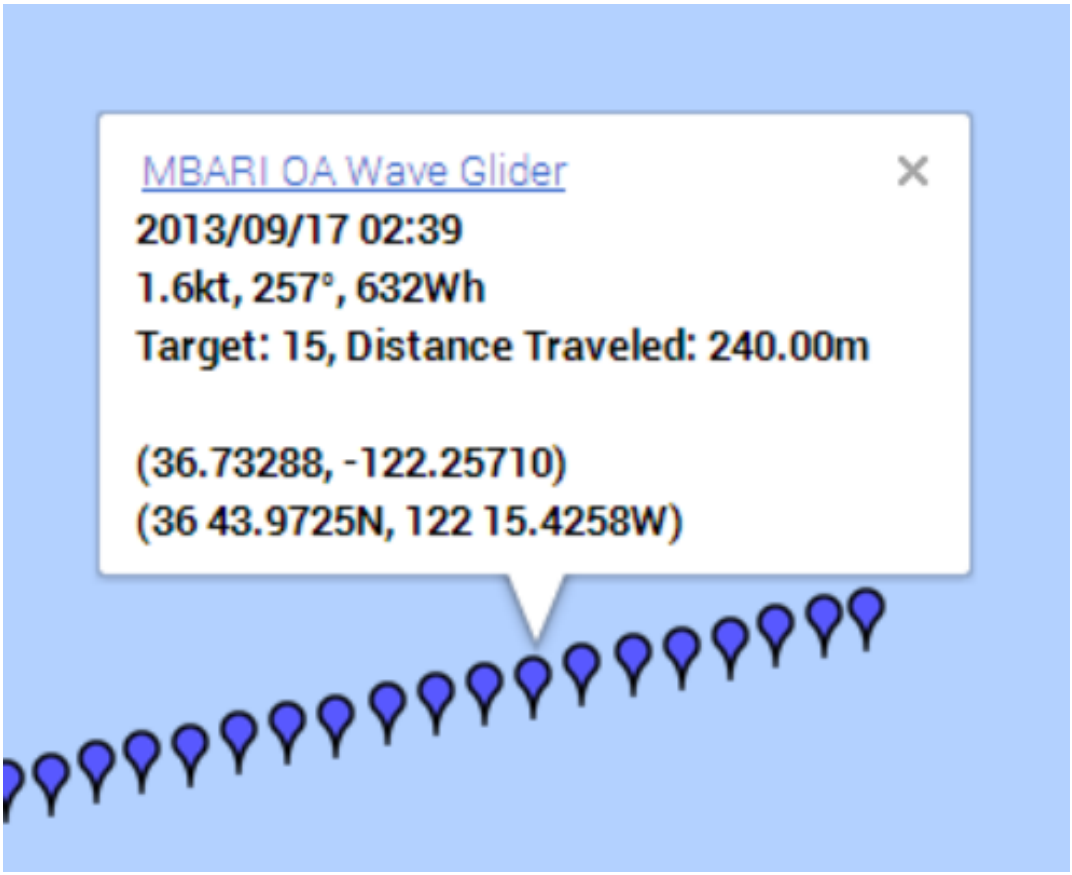
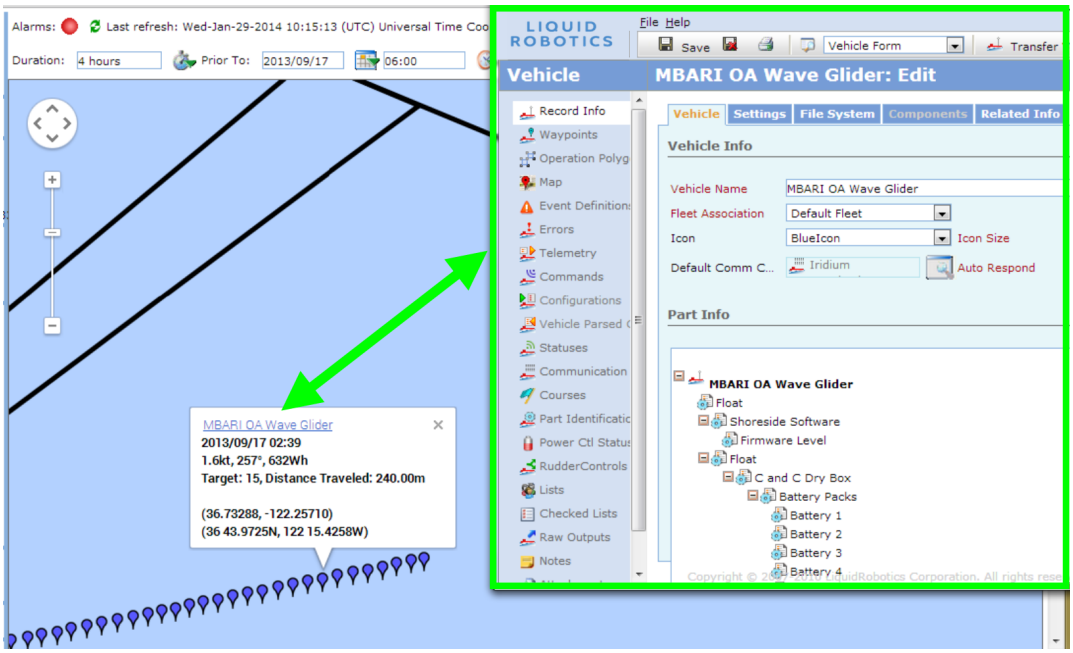


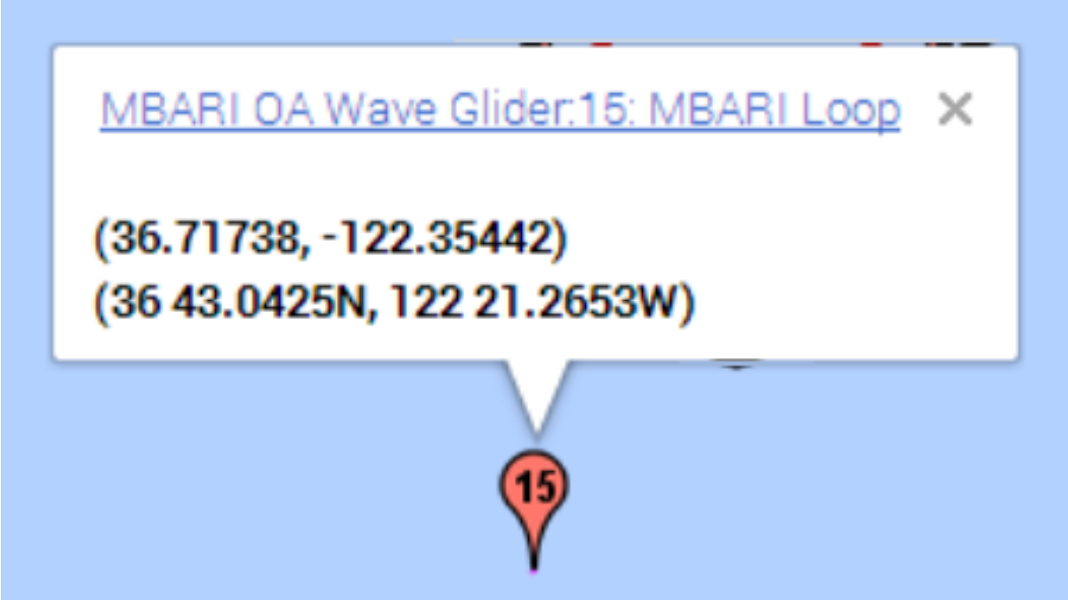
Figure 4.30. Click on Link to Open Vehicle Record



Latitude and Longitude Representation

WGMS displays latitude and longitude coordinates in the **Decimal Degrees Format** and in the **Decimal Minutes Format**.

Figure 4.31. Example: Latitude and Longitude Displayed in WGMS



- **In Decimal Degrees Format:**

Positive Latitude Values = North
Negative Latitude Values = South
Positive Longitude Values = East
Negative Longitude Values = West

  If WGMS Displays this → **(36.71738, -122.35442)**

  The Latitude and Longitude are → **36.71738 degrees North, 122.35442 degrees West**

- **In Degrees Minutes Format:**

  If WGMS Displays this → **(36 43.0425N, 122 21.2653W)**

  The Latitude and Longitude are → **36 degrees, 43.0425 minutes North, 122 degrees, 21.2653 minutes West**

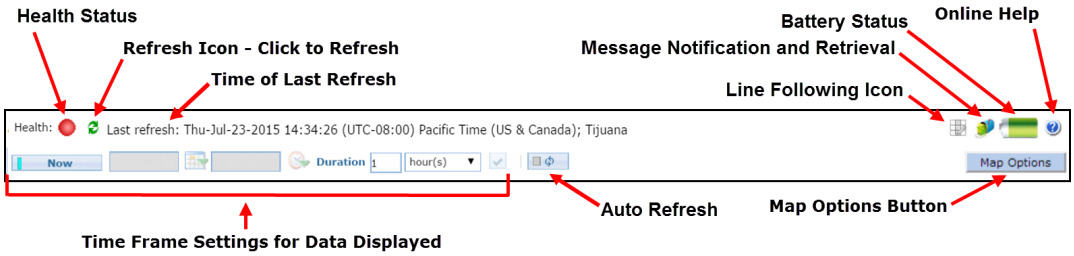
Using the Position Map Toolbar

The Position Map toolbar for an SV2 Vehicle is slightly different than the Position Map toolbar for an SV3 Vehicle.

SV2 Position Map Toolbar

The SV2 Position Map toolbar is located directly above the Position Map on the WGMS Dashboard.

Figure 4.32. SV2 Position Map Toolbar



The SV2 Position Map toolbar features include:

- Vehicle Health Status and Health Information Retrieval. For more information see: "Vehicle Health Status" (page 67)
- Manual Refresh - click the green manual refresh icon to manually refresh the Position Map. The last time that the Position Map was refreshed is displayed to the right of the manual refresh icon.
- Time Frame Settings for Vehicle data that is displayed in the Position Map. For more information on using the Time Frame Settings see "Specifying the Data Time Frame" (page 70)
- Auto Refresh - click the auto refresh button and the Position Map will automatically refresh every 5 minutes. When auto refresh is active, the dislpay looks like this 4m 59s, with the clock counting down from 5 minutes to zero for each automatic refresh cycle. Click the auto refresh button again to turn auto refresh OFF.
- Line Following icon - The Line Following icon is Gray when Line Following is OFF, and Multi-Colored when Line Following is ON. Line Following is turned ON or OFF by the *`Enable PID Navigation`* parameter of the SV2 **Set Parameters** command. *`Enable PID Navigation`* is a restricted parameter available only to WGMS users assigned the Root or Admin role.
- Message Notification and Retrieval. For more information see "Fast Mailbox Check (SV2 Only)" (page 72).
- Battery Power Level indicator. For more information see "Battery Status Indicator" (page 75).
- Access to online help.
- Access to Position Map options that determine what data is displayed, how data is displayed, piloting tools, and the ability to enable or disable the display of AIS data. Click on the **Map Options** button to access the Position Map display options. See "Map Options " (page 77) for more information.

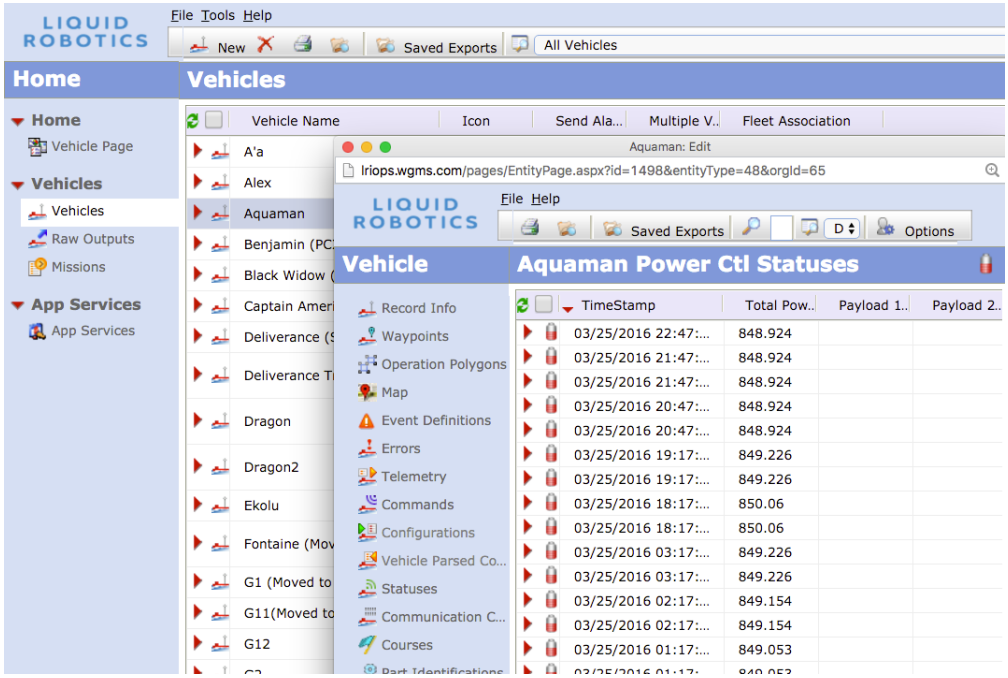
SV3 Position Map Toolbar

The SV3 Position Map toolbar is located directly above the Position Map on the WGMS Dashboard.

Figure 4.33. SV3 Position Map Toolbar

The SV3 Map toolbar features include:

- Health Status and Health Information Retrieval. For more information see "Vehicle Health Status" (page 67).
- Manual Refresh - click the green manual refresh icon to manually refresh the Position Map. The last time that the Position Map was refreshed is displayed to the right of the manual refresh icon.
- Time settings that determine the time frame for Vehicle data displayed in the Position Map. For more information on using the Time Frame Settings see "Specifying the Data Time Frame" (page 70).
- Auto Refresh - click the auto refresh button and the Position Map will automatically refresh every 5 minutes. When auto refresh is active, the dislpay looks like this 4m 59s, with the clock counting down from 5 minutes to zero for each automatic refresh cycle. Click the auto refresh button again to turn auto refresh OFF.
- Obstacle Avoidance ON/OFF icon that is Gray when Obstacle Avoidance is OFF and Green or Yellow when Obstacle Avoidance is ON. Obstacle Avoidance is turned ON or OFF using the SV3 **Avoid Obstacles** command. The **Avoid Obstacles** command is accessed from the **navigator** tab in the **Services** menu of the SV3 Commands Window. To be certain of the Obstacle Avoidance status, you should go to the **navigator** tab in the **Services** menu of the SV3 Commands Window and view the status of the **Avoid Obstacles** command.
- Thruster ON/OFF icon that is Gray when the Thruster is OFF and Green when the Thruster is ON. The Thruster is turned ON or OFF manually (or automatically) based on a group of SV3 commands that also set the Thruster speed and power consumption limitations. The Thruster commands are accessed from the **thruster** tab in the **Devices** menu of the SV3 Commands Window. To be certain of the Thruster status, you should go to the **thruster** tab in the **Devices** menu of the SV3 Commands Window and view the status of the Thruster commands.
- Line Following icon that is Gray when Line Following is OFF and Multi-Colored when Line Following is ON. Line Following is turned ON or OFF using the SV3 **Line Following** command. The **Line Following** command is accessed from the **navigator** tab in the **Services** menu of the SV3 Commands Window. To be certain of the Line Following status, you should go to the **navigator** tab in the **Services** menu of the SV3 Commands Window and view the status of the **Line Following** command.
- Battery Power Level indicator. To be certain of the battery power level, you should also go to the **Vehicles** side tab in the **Home** page **Vehicles** menu, then click on the icon adjacent to the **Vehicle Name** to open the **Vehicle** page. Click on the **Power Ctl Statuses** side tab on the **Vehicle page** to view chronological records of the vehicle power level.



- Access to online help.
- Access to Position Map options that determine what data is displayed, how data is displayed, piloting tools, and the ability enable or disable the display of AIS data. Click on the **Map Options** button to access the Position Map display options. See “Map Options ” (page 77) for more information.

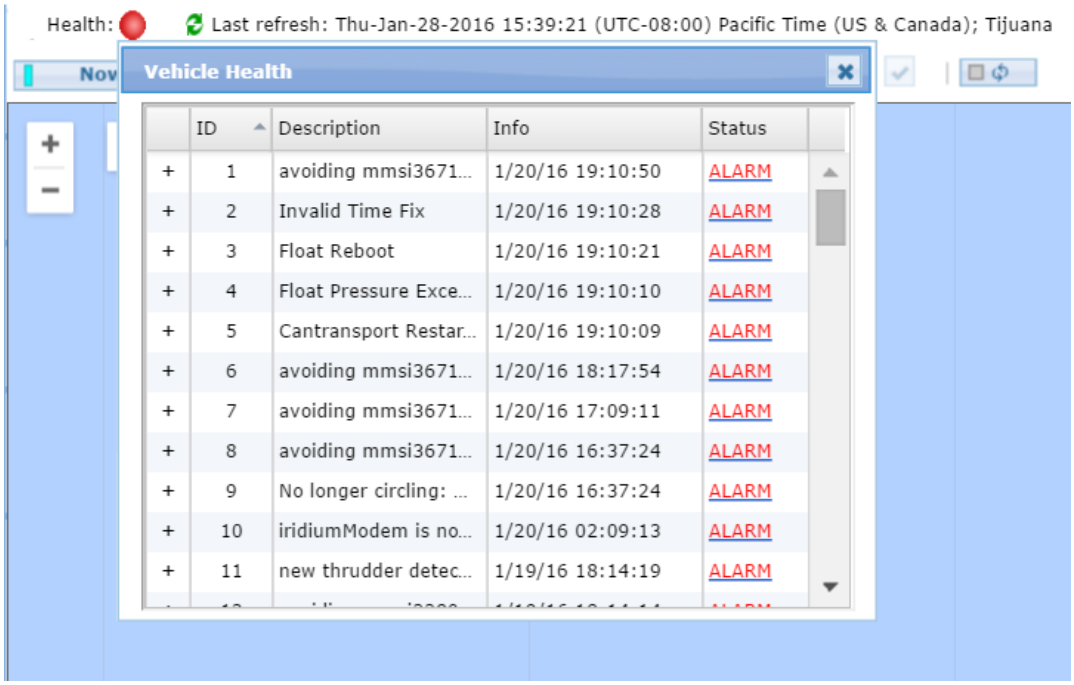
Vehicle Health Status

The circular Health icon in the Position Map toolbar indicates the health status of the Vehicle:

- A Red health icon in the Position Map toolbar indicates that there are one or more active alarms.
- A Yellow health icon in the Position Map toolbar indicates that there were one or more active alarms, but they have been self corrected by the Vehicle.
- A Green health icon in the Position Map toolbar indicates that there are no active alarms on the system.

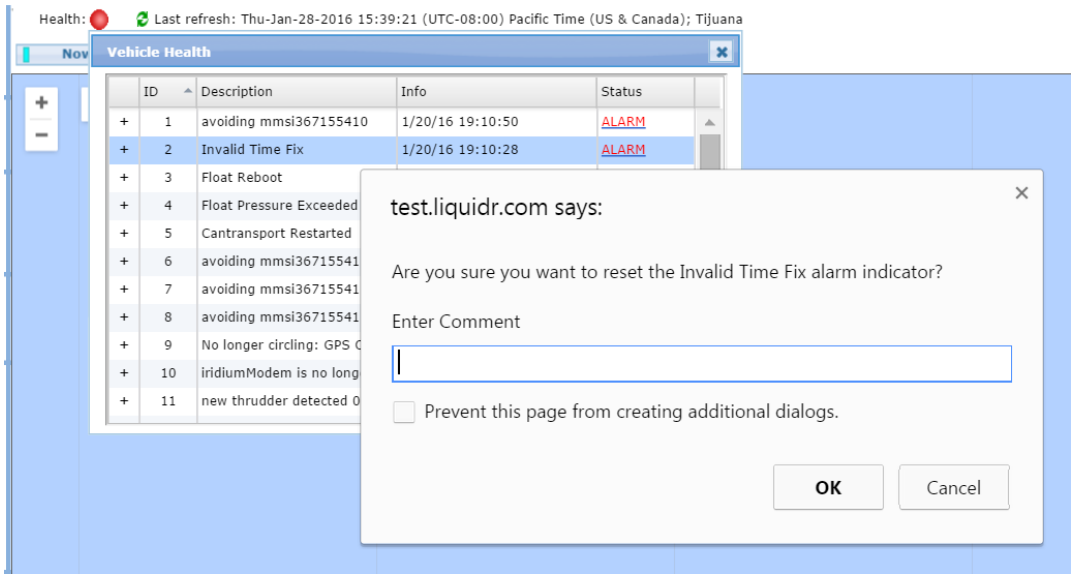
When you click on a Red **Health** icon in the Position Map toolbar, a **Vehicle Health** window opens listinging all active alarms. The status of these alarms will be: ALARM.

Figure 4.34. Example: Vehicle Health Window - ALARM



To reset an alarm, click on ALARM in the Status column of the active alarms window to open an alarm reset dialog box where you must enter a comment, before clicking OK to reset the alarm. Resetting an alarm will remove it from the alarm list, but a record of the alarm will remain in the WGMS database.

Figure 4.35. Alarm Reset Dialog Box

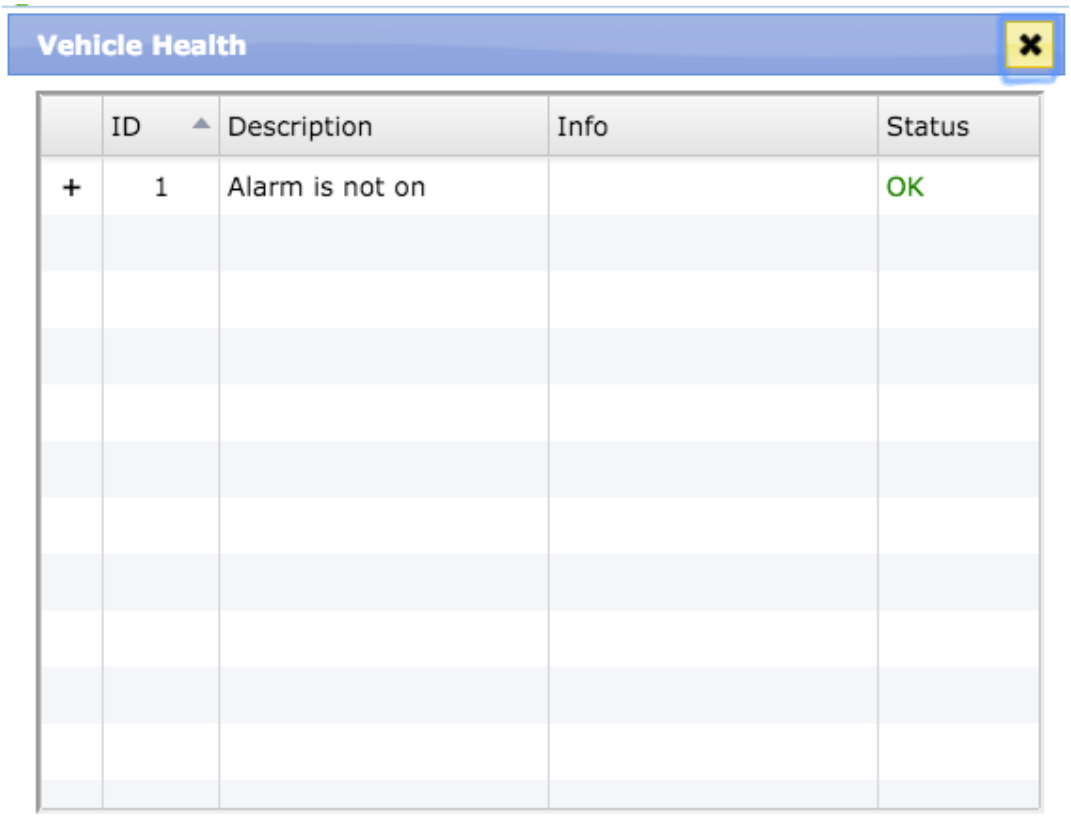


When you click on a Yellow **Health** icon in the Position Map toolbar, a **Vehicle Health** window opens listinging alarms that have been self corrected by the vehicle. The status of these alarms will be: SELFCORR.

Figure 4.36. Example: Vehicle Health Window - SELFCORR

When you click on a Green **Health** icon in the Position Map toolbar, a **Vehicle Health** window will open announcing that an "**Alarm is not on**", followed by a status of: OK.

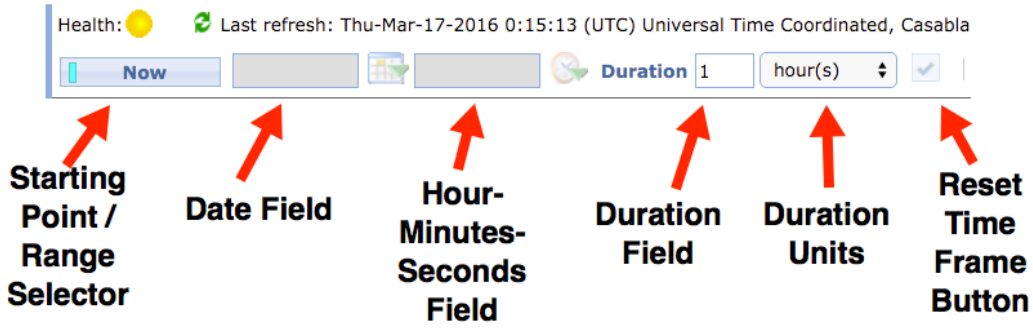
Figure 4.37. Example: Vehicle Health Window - OK



Specifying the Data Time Frame

All Vehicle data is stored in the WGMS database, but there are time frame settings on the Position Map toolbar that allow you to specify a start and end point for vehicle data that is displayed in the Position Map, including telemetry crumbs. The time frame settings on the Position Map toolbar also control the time frame for data that is displayed in the Communications log and the Commands log at the bottom of the WGMS Dashboard. **All time settings are in Universal Time Coordinated (UTC).**

Figure 4.38. Default Time Frame Settings in the Position Map Toolbar



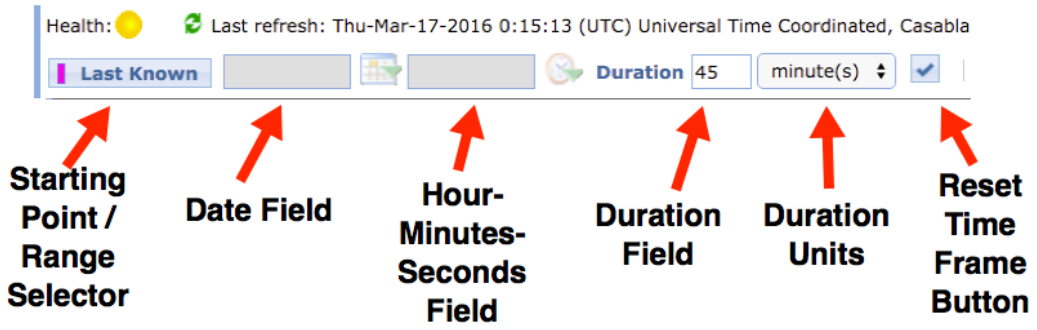
The default time frame for the data that is displayed in the Position Map is for 1 hour prior to the current time. Notice that the **Starting Point/Range** selector is set to **Now** and the **Duration** is set to 1 hour. The **Duration Units** can be set to minutes, hours or days.

Whenever you change the time frame settings, you need to click on the **Reset Time Frame** button to implement the new time frame settings on the Position Map.

In addition to **Now**, the **Starting Point/Range** selector has two other settings; **Last Known** and **Date Range**. Each time you click on the **Starting Point/Range** selector it will change to one of the other two setting options.

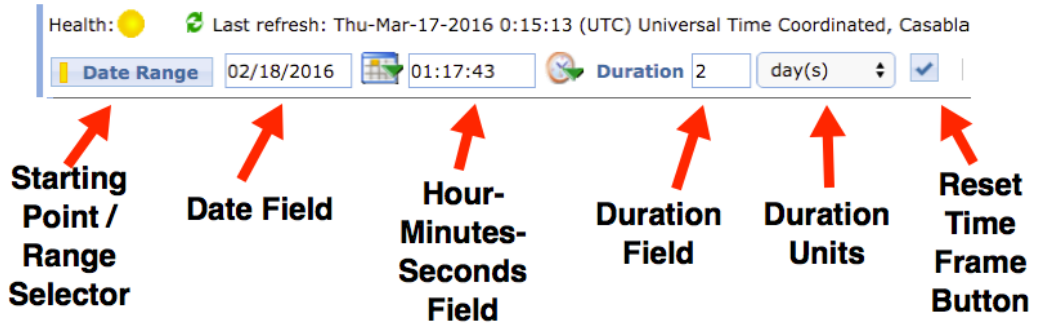
When the **Last Known** setting is selected, the data displayed on the Position Map will be for a time frame prior to the last time data was logged on the vehicle. The default time frame is 1 hour prior to the last time data was logged, but you can use the **Duration** and **Duration Units** settings to make that time frame shorter or longer.

Figure 4.39. Example: Display Data for 45 Minutes Prior to Last Known Data



When the **Date Range** setting is selected, the data displayed on the Position Map will be for a time frame prior to the date and time that is entered into the **Date** and **Hour-Minutes-Seconds** fields. These fields remain grayed out until **Date Range** is selected. Click on the calendar icon next to the **Date** field to select a date, then click on the clock icon next to the **Hour-Minutes-Seconds** field to select a time.The default time frame is 1 hour prior to the time that you set with the **Date** and **Hour-Minutes-Seconds** settings, but you can use the **Duration** and **Duration Units** settings to make that time frame shorter or longer.

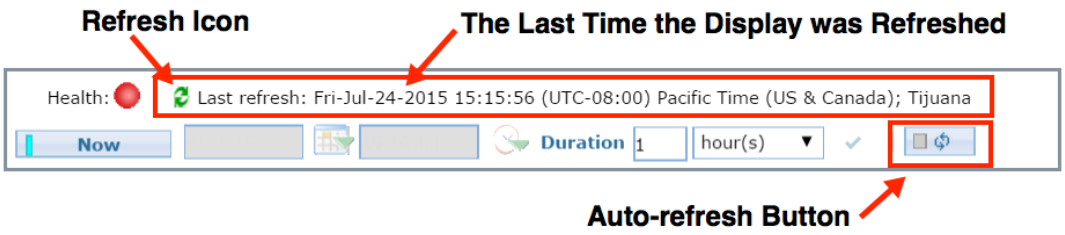
Figure 4.40. Example: Display Data for 2 Days Prior to 02/18/2016 at 01:17:43



Refresh and Auto-refresh

You have the option to refresh the Position Map manually, or automatically. **Last refresh:** indicates the time of the most recent refresh (manual or automatic).

Figure 4.41. Refresh Icon, Time of Last Refresh and Auto-refresh



- Click on the green refresh icon to manually refresh the Position Map.
- Click on the **Auto-refresh** button to initiate automatic refresh cycles. When you click on the **Auto-refresh** button, a digital timer begins counting down from 5 minutes to zero, at which point the Position Map is refreshed and a countdown to the next automatic refresh begins. When **Auto-refresh** is active, clicking on the **Auto-refresh** button will turn the automatic refresh cycle OFF.

Figure 4.42. Auto-refresh Cycle Countdown

Note

Even if the **Auto-refresh** button has been activated, you can still refresh the Position Map manually at any time by clicking on the **Refresh** icon - the automatic refresh cycle will be briefly interrupted, but it will resume when the manual refresh is completed.

Fast Mailbox Check (SV2 Only)

Note

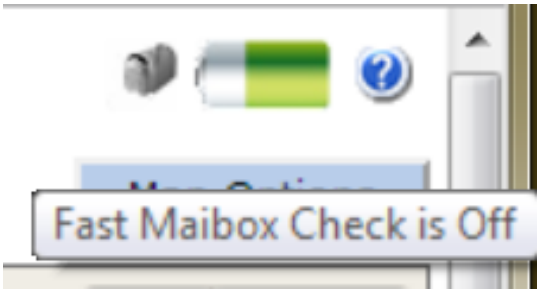
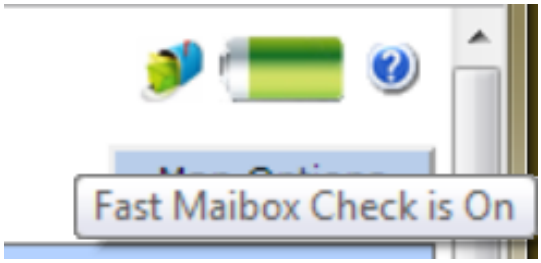
On SV3 vehicles there is no Fast Mailbox Check icon on the SV3 Map Toolbar. On SV3 vehicles the Fast Mailbox Check function is automated with respect to Obstacle Avoidance - it turns ON when Obstacle Avoidance is activated and it turns OFF when Obstacle Avoidance is deactivated.

The Fast Mailbox Check feature is typically used to accelerate the telemetry report rate when circumstances require commands to be issued and acknowledged at a faster pace. With the default telemetry configuration, the Vehicle downloads telemetry to the Iridium Satellite Network servers and uploads commands that are cached on the Iridium servers every 5 minutes. When Fast Mailbox Check is turned on, the telemetry report rate is shortened to 1 minute. The default telemetry report rate can be changed, but the Fast Mailbox Check allows you to quickly toggle between the default and fast telemetry cycles without changing the default setting.

The Fast Mailbox Check icon is gray when the Fast Mailbox Check feature is turned off.

The Fast Mailbox Check icon is blue with a large green package sticking out of it when Fast Mailbox Check is turned on.

Table 4.1. Fast Mailbox Check Icon: OFF and ON

When you click on the Fast Mailbox Check icon a **Set Parameter Command** dialog box opens (this is the same dialog box that opens when you click on the **Set Parameters** button in the Dashboard sidebar).

If Fast Mailbox Check is turned OFF, follow this procedure to turn it ON:

1. Click on the Fast Mailbox Check icon to open the **Set Parameters Command** dialog box.
2. Enter a reason for turning Fast Mailbox Check on in the **Enter Reason:** field of the **Set Parameters Command** dialog box.
3. Click once in a white area of the **Set Parameters Command** dialog box to activate the Send button.
4. Click Send to issue the command to turn on the Fast Mailbox Check feature.

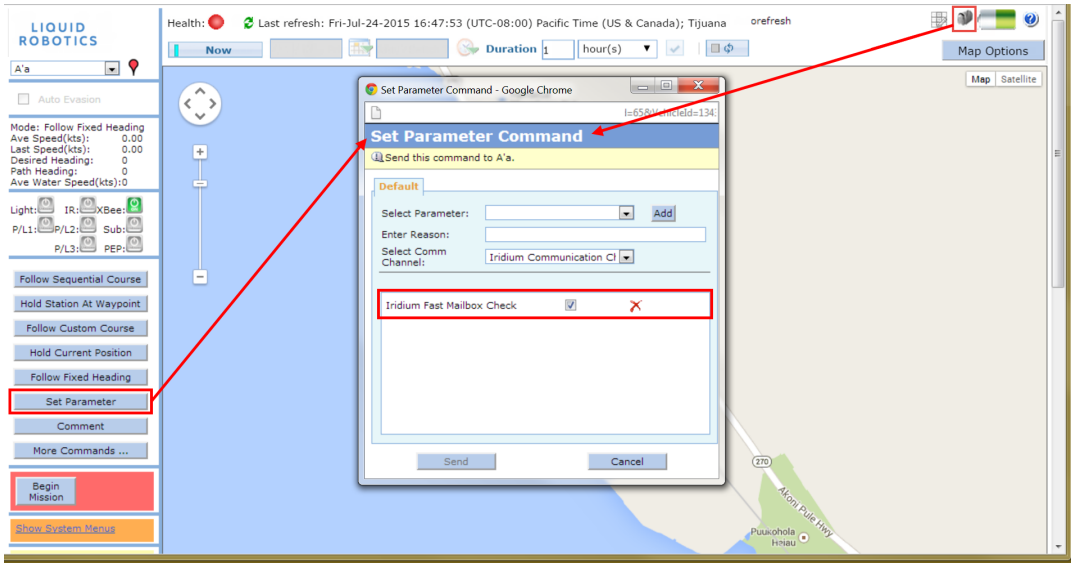
Note

Fast Mailbox Check turns on automatically when an AIS hit is detected, but it will remain turned ON until it is turned OFF manually.

Note

You do not need to add a check-mark in the Iridium Fast Mailbox Check check box - the **Set Parameters Command** dialog box opens with that check box checked.

Figure 4.43. Turn Fast Mailbox Check ON



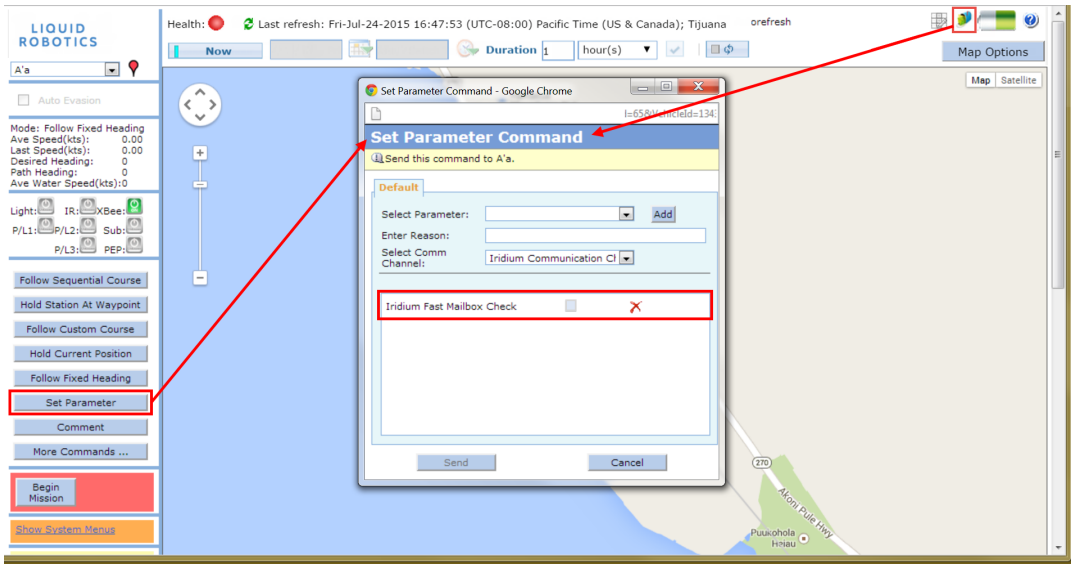
If Fast Mailbox Check is turned ON, follow this procedure to turn it OFF:

1. Click on the Fast Mailbox Check icon to open the **Set Parameters Command** dialog box.
2. Enter a reason for turning Fast Mailbox Check off in the **Enter Reason:** field of the **Set Parameters Command** dialog box.
3. Click once in a white area of the **Set Parameters Command** dialog box to activate the Send button.
4. Click Send to issue the command to turn on the Fast Mailbox Check feature.

Note

You do not need to remove the check-mark in the Iridium Fast Mailbox Check check box - the **Set Parameters Command** dialog box opens with that check box unchecked.

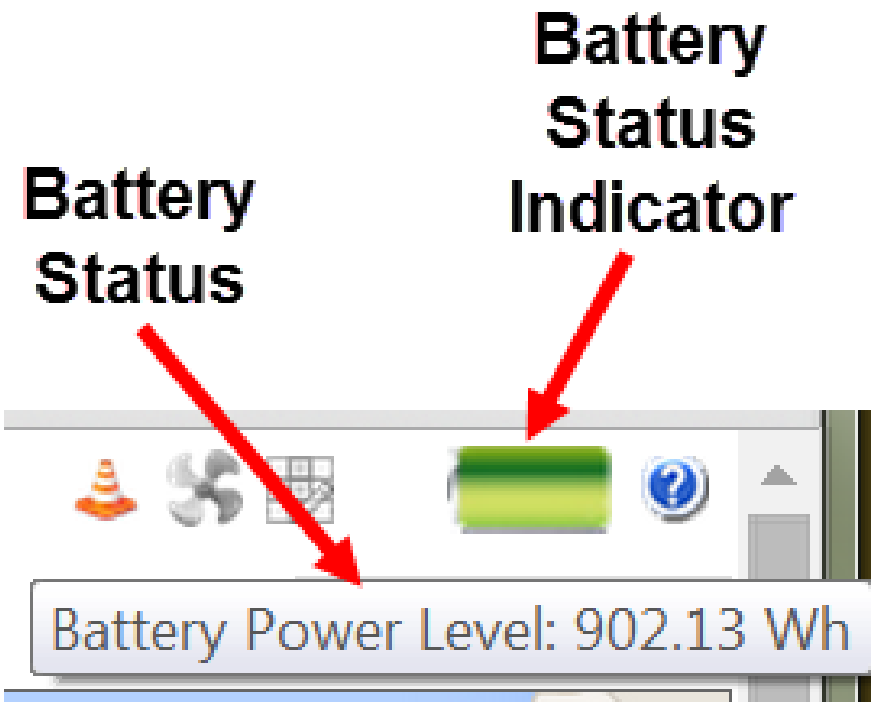
Figure 4.44. Turn Fast Mailbox Check OFF



Battery Status Indicator

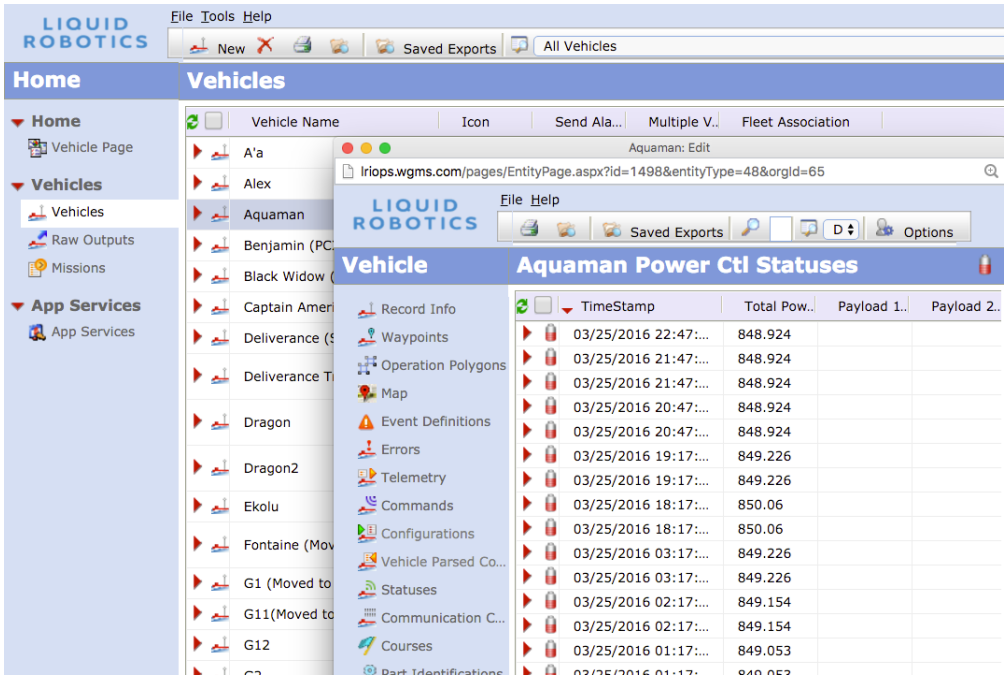
The Battery Status Indicator icon provides a quick visual check on the battery power level. You can get precise information on the battery power level by hovering your cursor over the Battery Status Indicator icon.

Figure 4.45. Click on Battery Status Indicator



To be certain of the battery power level, you should also go to the **Vehicles** side tab in the **Home** page **Vehicles** menu, then click on the icon adjacent to the **Vehicle Name** to open the **Vehicle**

page. Click on the **Power Ctl Statuses** side tab on the **Vehicle page** to view chronological records of the vehicle power level.



Online Help

Click on the **Help** icon to open a help menu with tabs for HTML versions of the WGMS User Guide, WGMS Admin Guide, WGMS Errata, and WGMS Release Notes.

Figure 4.46. Online Help Icon

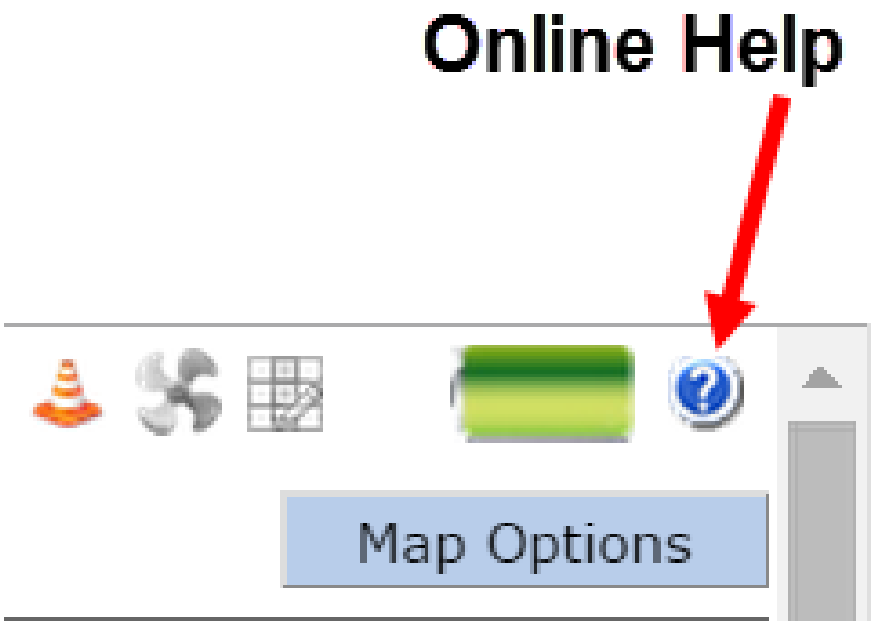
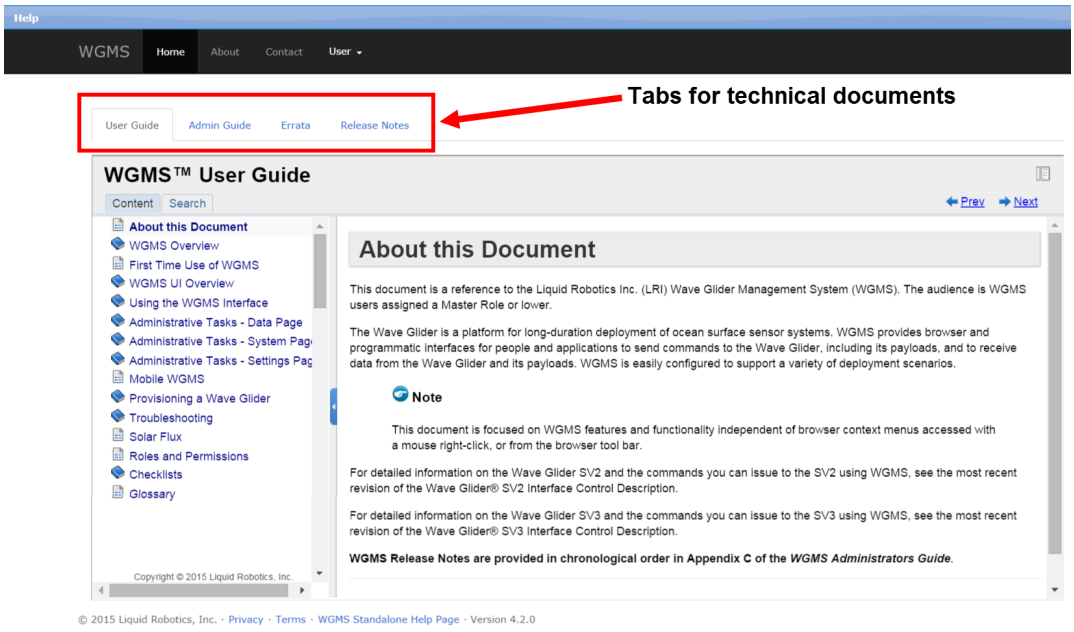


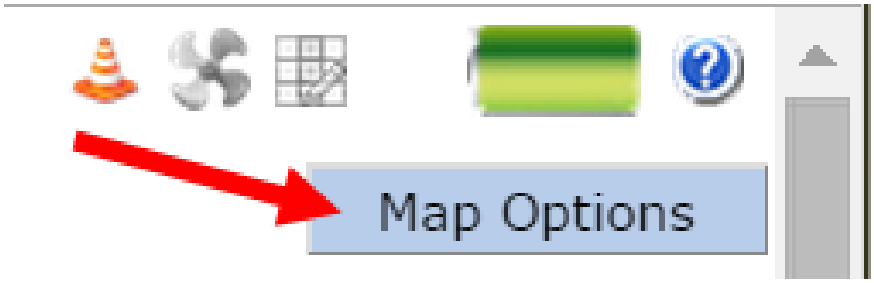
Figure 4.47. Online Help Menu



Map Options

The **Map Options** button is located just below the Battery Status icon in the Map toolbar.

Figure 4.48. Map Options Button



Click on the **Map Options** button to open the Map Options dialog box.

The **Map Options** dialog box includes three tabs where you can select a variety of Position Map display and tools options:

- **Map Options**
- **Tool Options**
- **AIS Options**

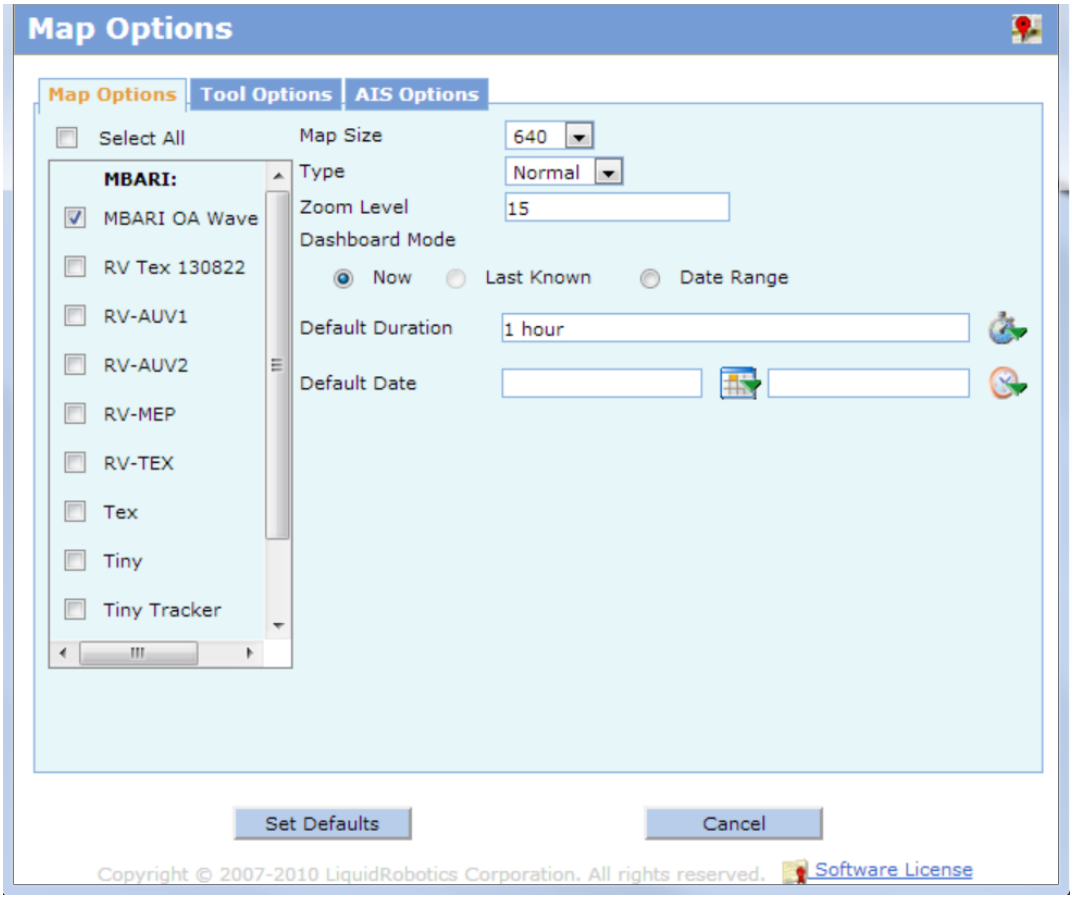
The **Map Options** dialog box opens to the **Map Options** tab by default.

The settings you make in the three tabs of the **Map Options** dialog box determine how the Position Map display in the WGMS Dashboard will appear when you log in to WGMS. When you make changes

in the **Map Options** dialog box, click the **Set Defaults** button to exit the dialog, then click the green refresh icon in the Map toolbar to display the changes on the Position Map.

To exit the **Map Options** dialog box without making any changes, click the **Cancel** button.

Figure 4.49. Map Options Dialog Box Open to the Map Options Tab

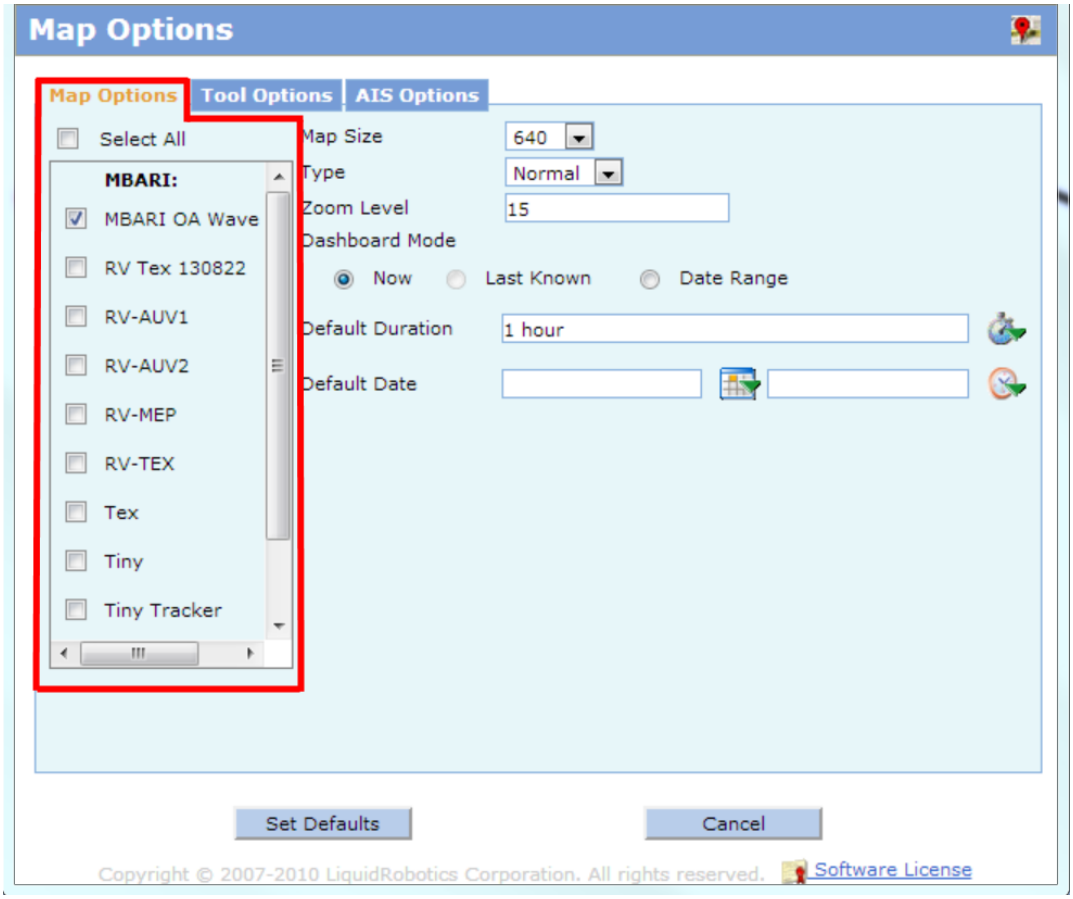


Map Options Tab

From the **Map Options** tab you can set the default Position Map display parameters.

The **Map Options** Vehicle menu allows you to select the Vehicle information you want displayed in the Position Map.

Figure 4.50. Map Options Vehicle Menu

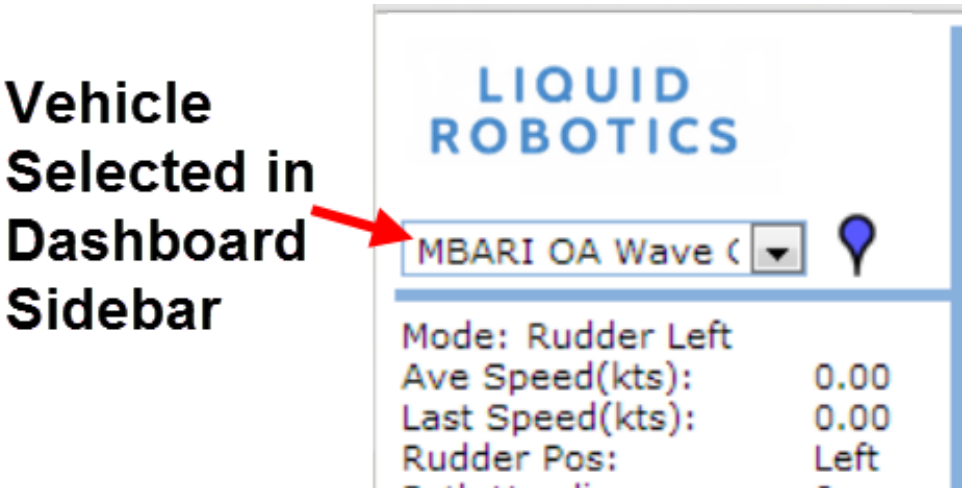


You can use the **Select All** check box to display data for all of the Vehicles in your WGMS organization, or you can select a few Vehicles for viewing using the check boxes.

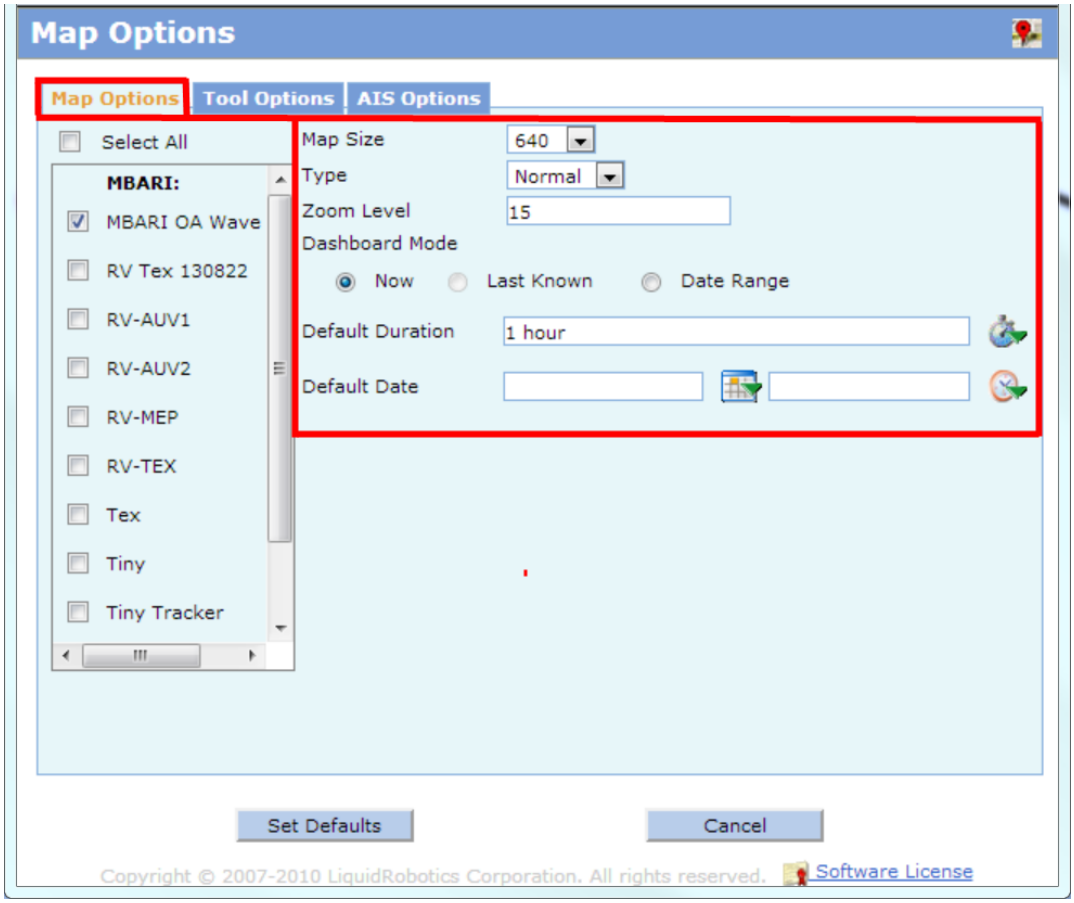
Note

By default, information for the Vehicle that is selected in the Dashboard sidebar will be displayed in the Position Map - even if you deselect that Vehicle in the **Map Options** menu.

Figure 4.51. Vehicle Selected in Dashboard Sidebar



The **Map Options** tab also allows you to set the Position Map size, type, zoom, and time frame display parameters.



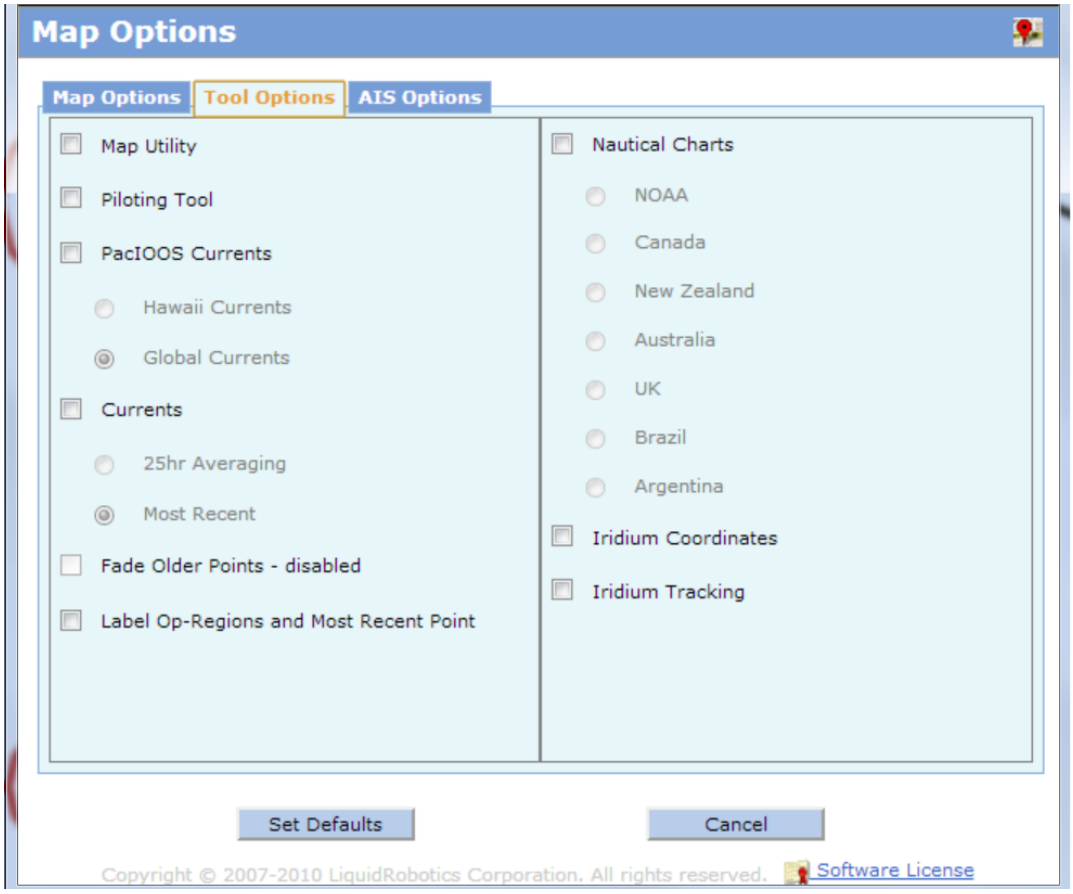
- **Map Size** - Use the drop-down menu to set the vertical dimension of the Position Map to 480, 640, 720, or 1080 pixels.

- **Type** - Use the drop-down menu to set the default Position Map type to Normal, Satellite, Hybrid, or Terrain.
- **Zoom Level** - Enter a whole number value ranging from 1 to 18 to set the default Position Map zoom level. Larger zoom numbers display smaller regions on the Position Map. The default zoom setting is 15.
- **Dashboard Mode** - Click on a radio button to select a time frame for the data displayed on the Position Map. There three options:
  - **Now** - Sets the Position Map to display the last hour of Vehicle data.
  - **Last Known** - This feature is under development and is available for Beta users only.
  - **Date Range** - Sets the Position Map to display Vehicle data for a time frame (**Default Duration**) prior to a specified date and time (**Default Date**). For more information on how to use these settings see "Specifying the Data Time Frame" (page 70).

Tool Options Tab

From the **Tool Options** tab you can click on check boxes and radio buttons to select a variety of Position Map piloting enhancements.

Figure 4.52. Tool Options Tab



- **Map Utility**

The **Map Utility** provides a way to quickly create waypoints, courses, and Operation Polygons for the Vehicle you have selected in the Vehicle drop-down menu in the Dashboard sidebar.

Detailed instructions on using the **Map Utility** are provided in "Using the Map Utility" (page 91).

- **Piloting Panel**

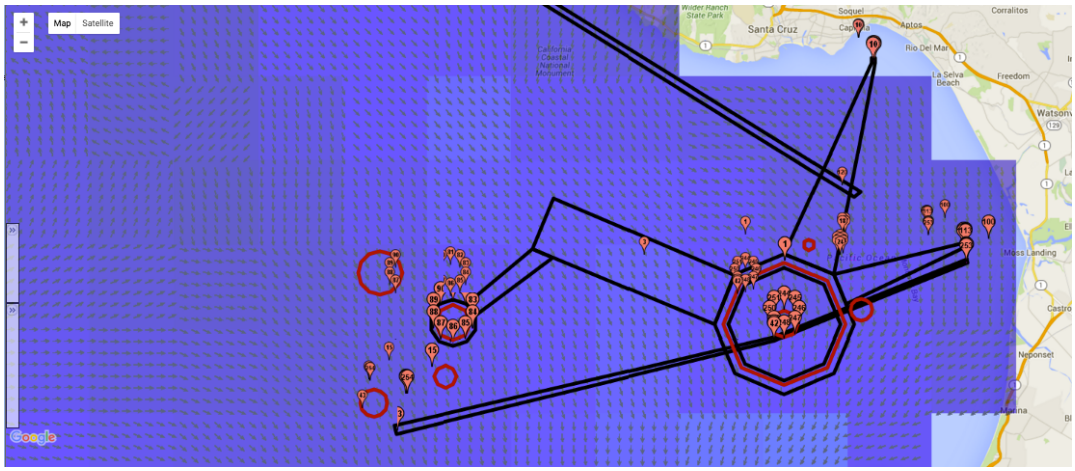
The **Piloting Panel** calculates headings that the selected Vehicle is capable of following and its expected path over ground (POG) and speed over ground (SOG), based on currents data and water speed calculations.

Detailed instructions on using the **Piloting Panel** are provided in "Using the Piloting Panel" (page 129).

- **PacIOOS Currents**

Select **PacIOOS Currents** to display Pacific Islands Ocean Observing System (PacIOOS) currents data on the Position Map. Use the radio buttons to select **Hawaii Currents** or **Global Currents** data. After selecting **PacIOOS Currents** data and refreshing the Position Map it may take several seconds for the data to appear in the display.

Figure 4.53. Select PacIOOS Currents Check Box - Global



- **Currents**

Select **Currents** to display currents data on the Position Map. Use the radio buttons to select **25hr Averaging** or **Most Recent** data. After selecting **Currents** data and refreshing the Position Map it may take several seconds for the data to appear in the display.

Figure 4.54. Select Currents Check Box 25 hr Averaging

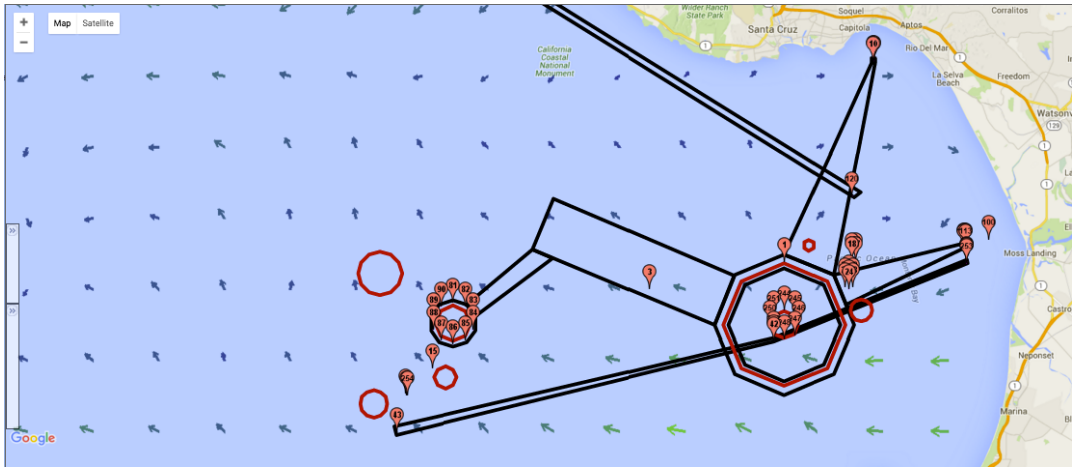
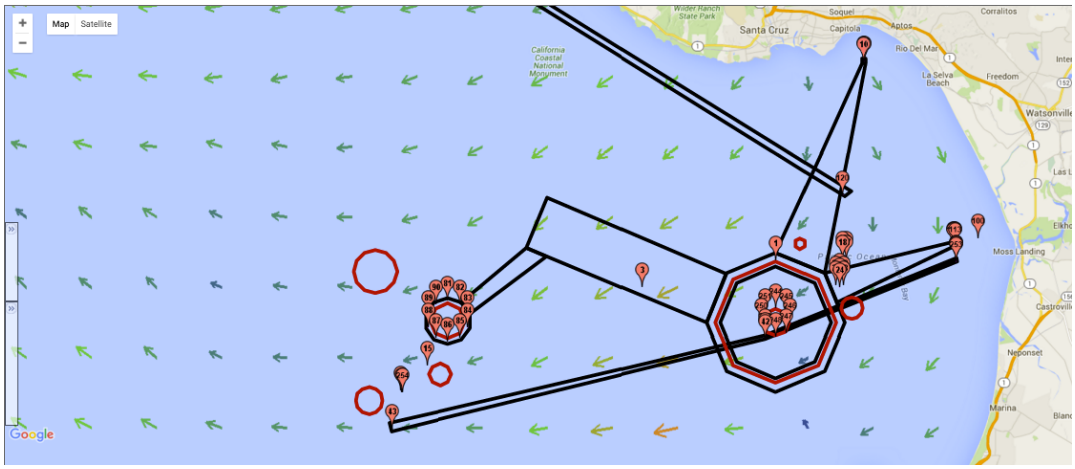


Figure 4.55. Select Currents Check Box Most Recent



- **Fade Older Points**

  This feature is no longer supported by Google Maps.

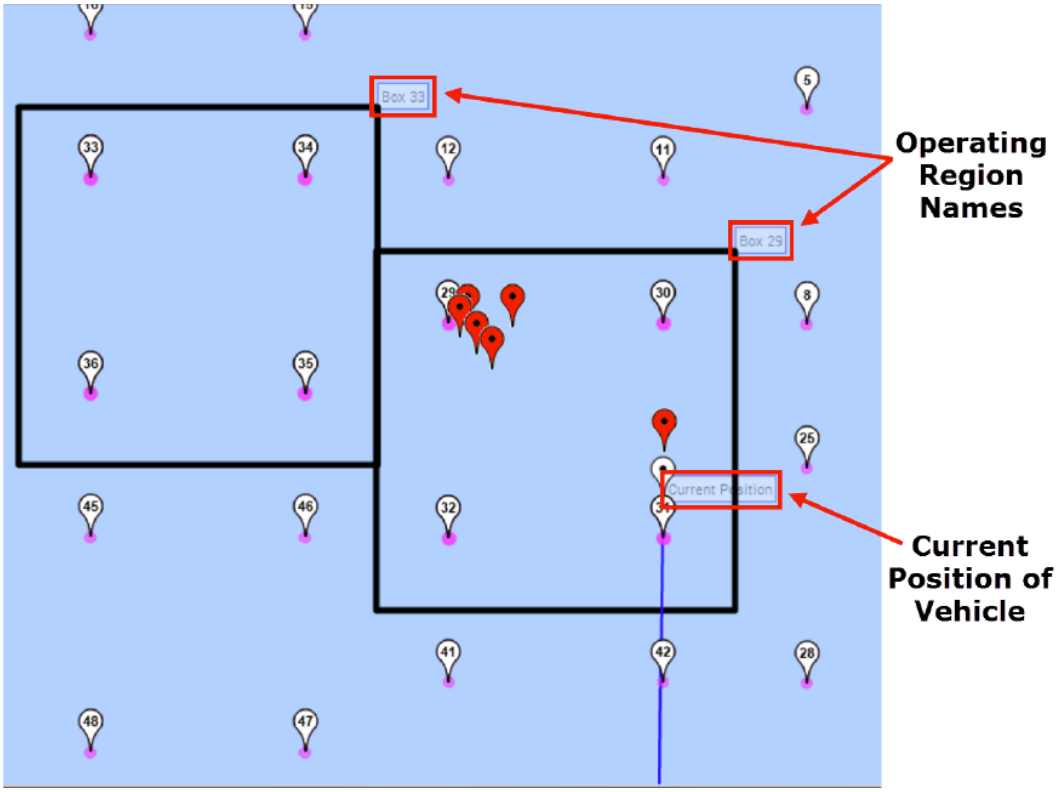
- **Label Op-Regions and Most Recent Point**

  Select **Label Op-Regions and Most Recent Point** to:

  – Display the names of Operation Polygons (Inclusion and Exclusion Polygons) on the Position Map.

  – Indicate on the Position Map the current position of the Vehicle selected in the Dashboard sidebar.

Figure 4.56. Select Label Op-Regions and Most Recent Point



- **Nautical Charts**

  Select the **Nautical Charts** check-box, then click on the radio button adjacent to the type of nautical chart you want to display in the Position Map. Only the chart types you are subscribed to will be active. If you are not subscribed, the radio button and chart name will be grayed-out.

Figure 4.57. Nautical Charts Check Box

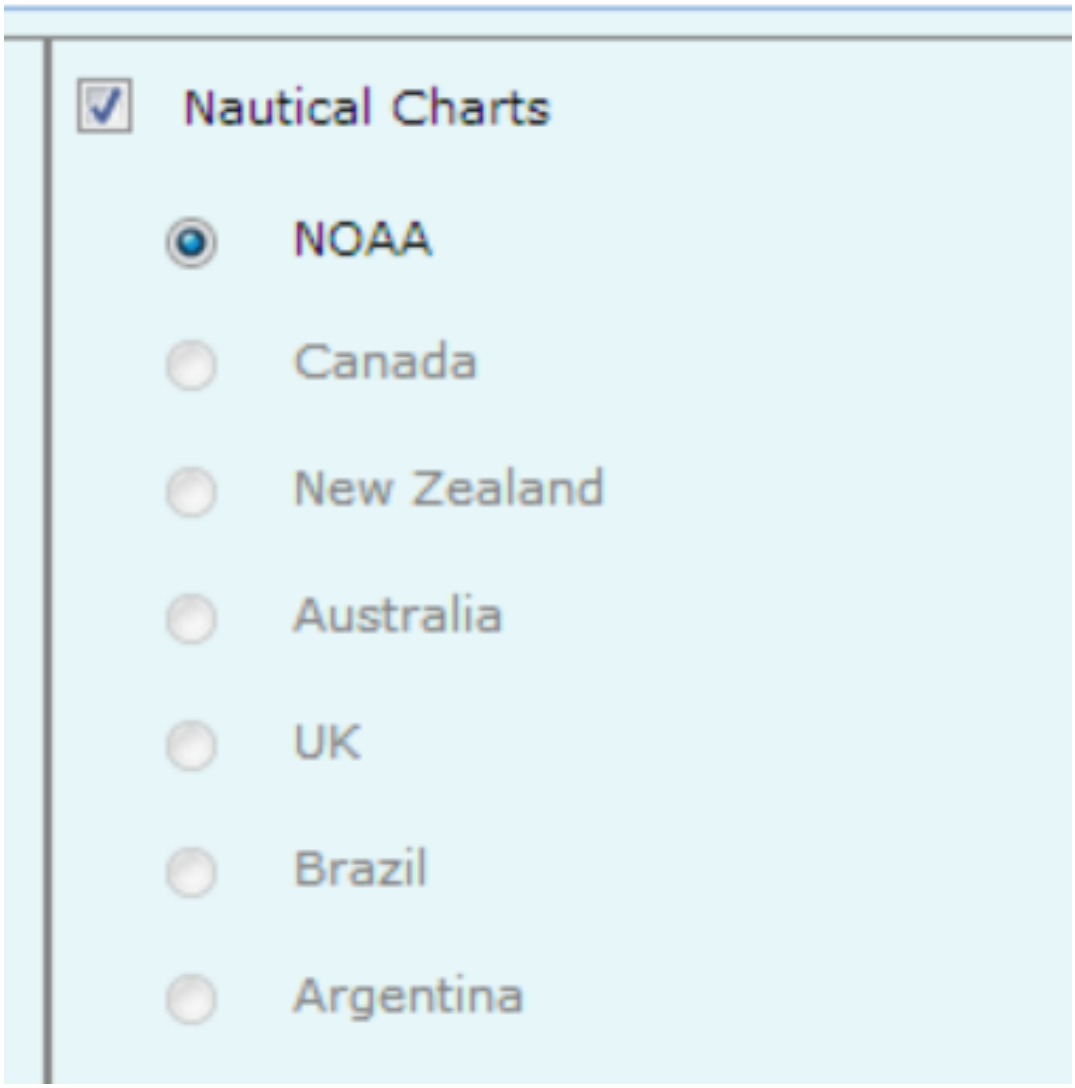
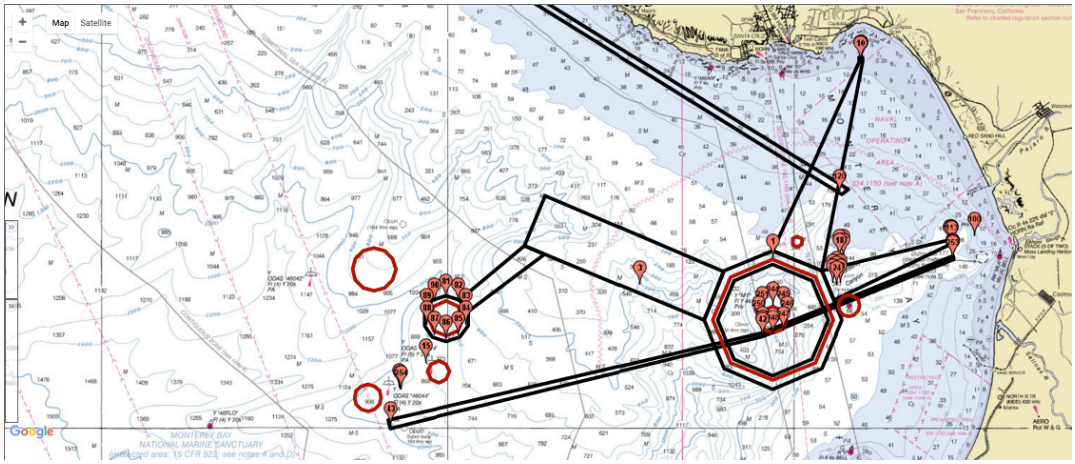


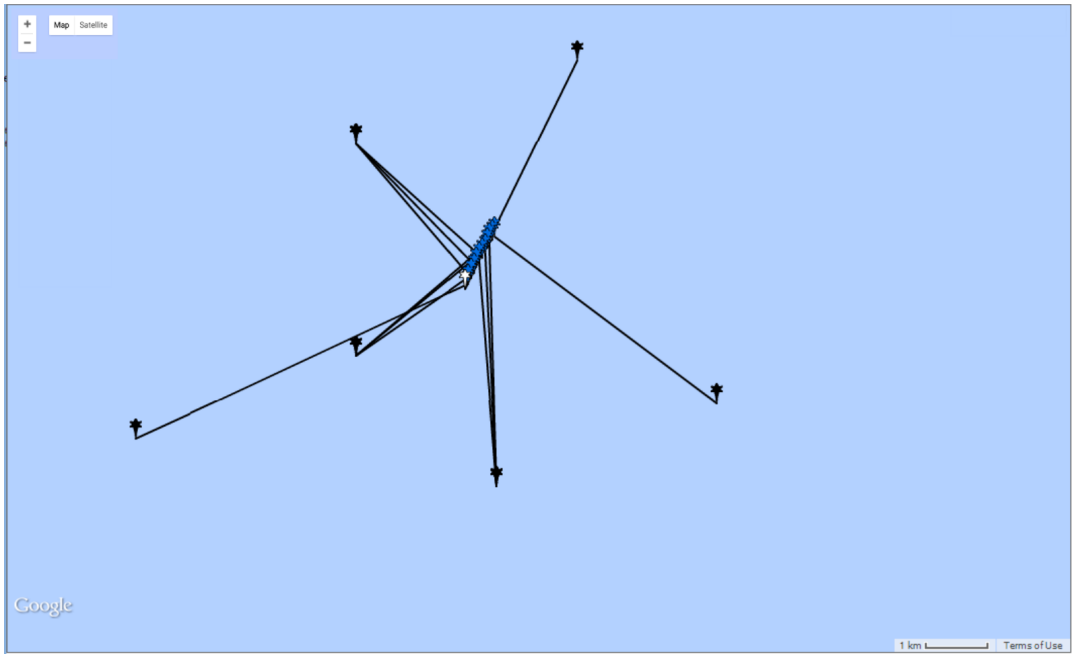
Figure 4.58. Example: NOAA Nautical Charts Display



- **Iridium Coordinates**

  This option was implemented to assist with tracking Wave Gliders if their on-board GPS receivers are malfunctioning. When **Iridium Coordinates** is selected, the Position Map will display black icons that represent how the Iridium satellite interprets the position of the Vehicle.

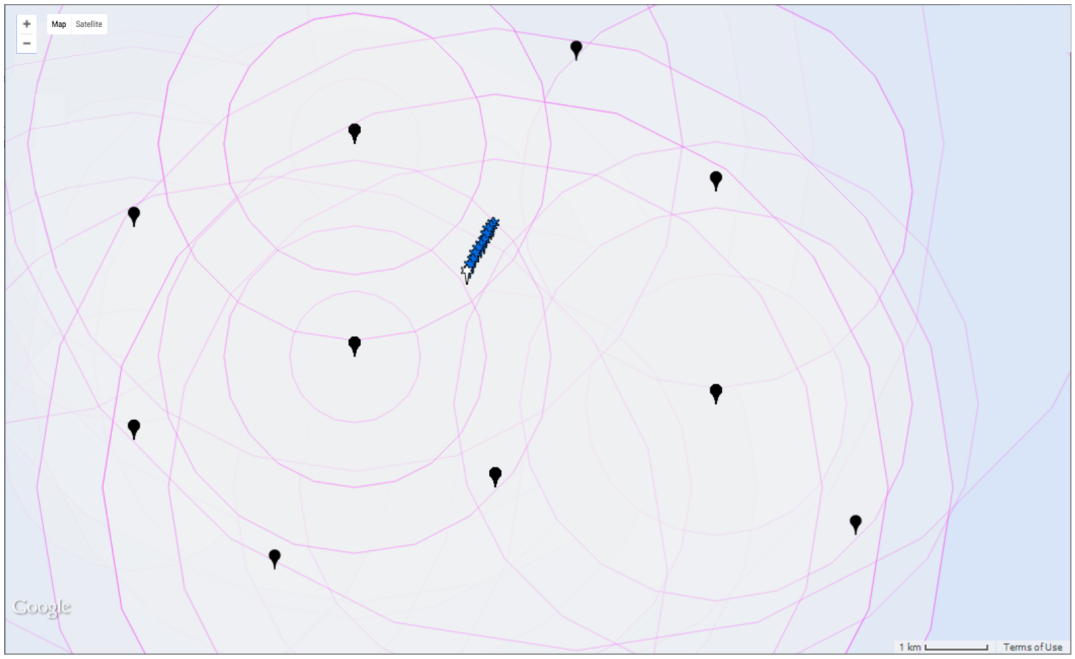
Figure 4.59. Iridium Coordinates Enabled



- **Iridium Tracking**

  This option was implemented to assist with tracking Wave Gliders if their on-board GPS receivers are malfunctioning. When **Iridium Tracking** is selected, a circle will appear on the Position Map surrounding the Iridium interpreted location of the Vehicle. The circle represents the radius of uncertainty as reported by Iridium.

Figure 4.60. Iridium Tracking Enabled

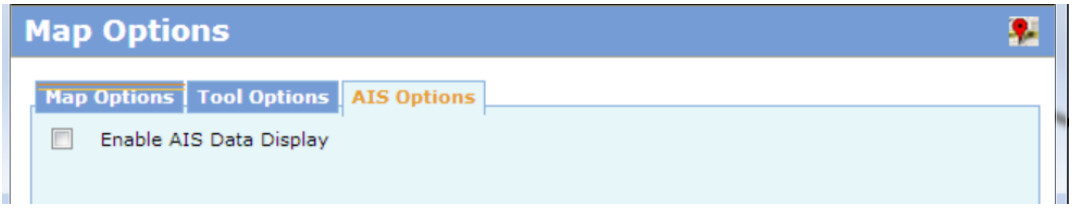


AIS Options Tab

You can view or edit the AIS settings that are enabled on the Position Map from the **AIS Options** tab.

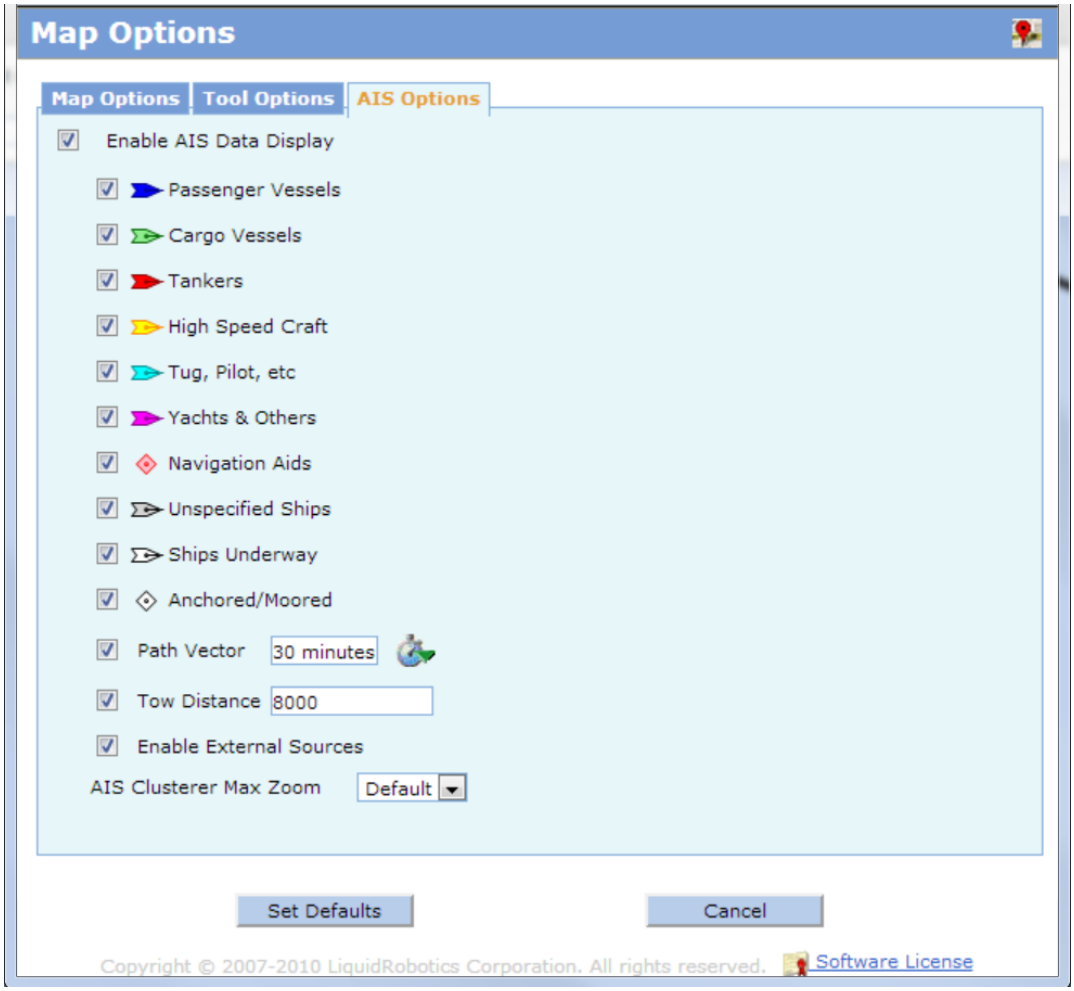
When you click on the **AIS Options** tab it displays the AIS settings that are currently enabled. If the **Enable AIS Data Display** check box is not selected, the **AIS Options** tab will look like Figure 4.61.

Figure 4.61. AIS Options Tab - AIS Data Display Disabled



When the **Enable AIS Data Display** check box is selected, the **AIS Options** tab will display the default AIS settings - see Figure 4.62.

Figure 4.62. AIS Options Tab - AIS Data Display Enabled



When the **Enable AIS Data Display** check box is selected:

- The default AIS settings include every category of vessel, including vessels that are anchored or moored. The icons next to the check-boxes are the same icons that appear in the Position Map when you zoom in. When you click an AIS icon in the Position Map, a window opens displaying information about the vessel (or navigational aid) represented by that icon.

- The default **Path Vector** is set to display the projected path (a red line) of a vessel extending 30 minutes into the future (for vessels that broadcast path vector data). LRI pilots recommend changing the default **Path Vector** to 1 hour.

- The default **Tow Distance** is set to 8000 meters. The Tow Distance setting is a navigational aid that displays a line of the specified Tow Distance trailing each vessel that broadcasts towing data.

- **Enable External Sources** is enabled by default. When Enable External Sources is selected, the Position Map will display all available AIS data. When Enable External Sources is disabled, the Position Map will only display AIS data within range of the Vehicle on-board AIS receiver.

- The **AIS Clusterer Max Zoom** is set to **Default** (which is the same as **12**) by default. You can select settings of 7, 8, 9, 10, 11, or 12 from the AIS Clusterer Max Zoom drop-down menu. The

higher the numerical setting, the less detailed the AIS data displayed on the Position Map will be. Higher AIS Clusterer Max Zoom settings group nearby vessels into clusters for navigational purposes.

You can edit the AIS settings by de-selecting vessel types that you do not want displayed on the Position Map. You can edit or de-select the **Path Vector**, **Tow Distance**, and **AIS Clusterer Max Zoom** settings to meet your piloting requirements. You can also de-select **Enable External Sources** if you do not want this data to be displayed.

Click the **Set Defaults** button to save the settings that appear in the **AIS Options** dialog box - they will become the default AIS data display settings after the Position Map is refreshed (by clicking the green refresh icon in the Position Map toolbar).

To change the default AIS data display options you must return to the **AIS Options** tab and either make edits or deselect the **Enable AIS Data Diaplay** check box - then click on the **Set Defaults** button to save your changes.

Click the **Cancel** button to close the Map Options dialog box without making any changes.

Figure 4.63. AIS Options Tab - Enable AIS Data Display Selected

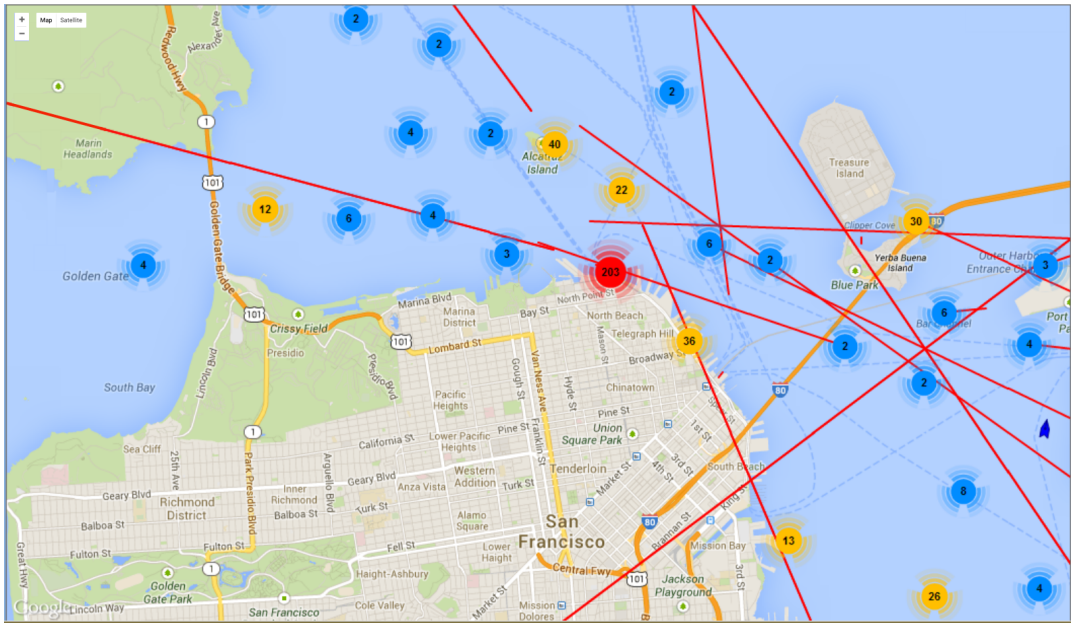


Figure 4.64. AIS Options Tab - Enable AIS Data Display Selected

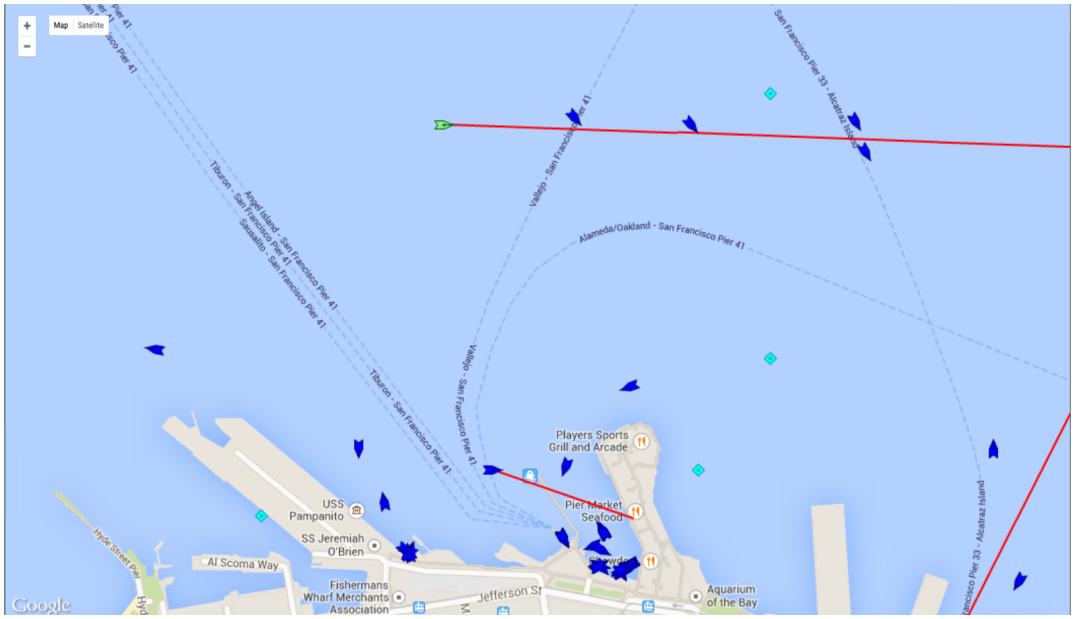
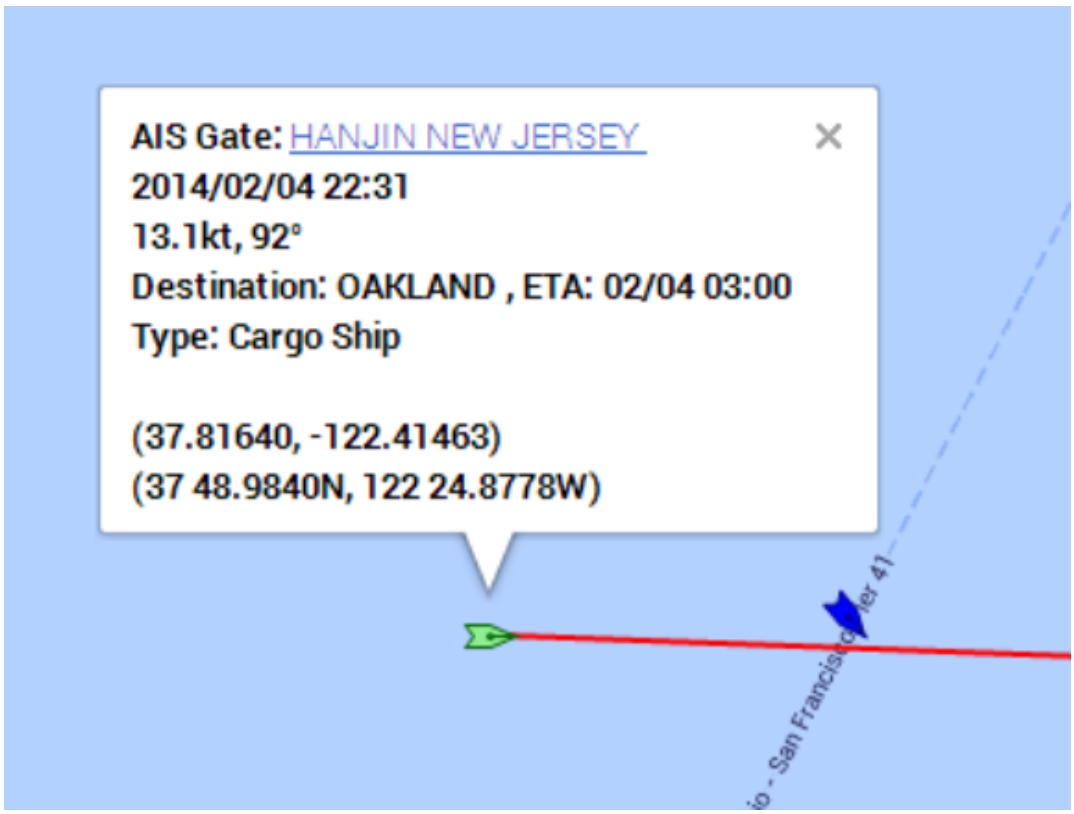


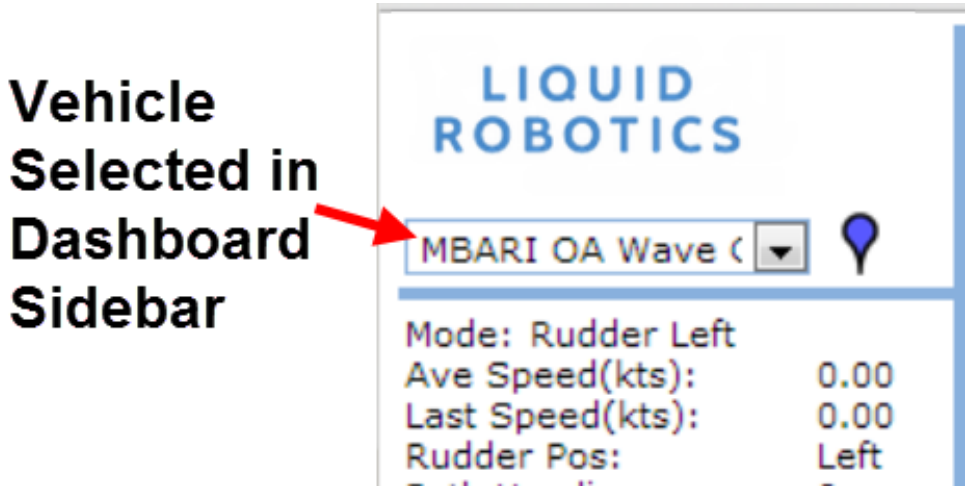
Figure 4.65. AIS Options Tab - Enable AIS Data Display Selected



Using the Map Utility

The **Map Utility** provides a way to quickly measure distances and create courses, or Operation Polygons, for the Vehicle selected in the Dashboard sidebar.

Figure 4.66. Vehicle Selected in Dashboard Sidebar

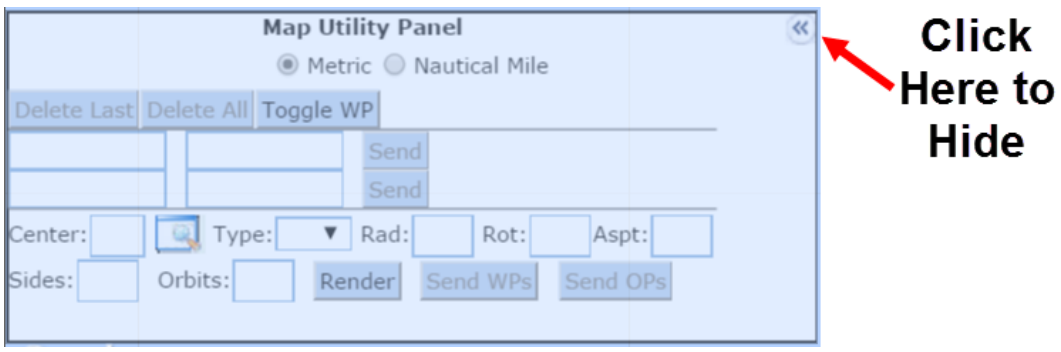


To enable the **Map Utility**:

1. Click the **Map Options** button in the **Position Map** toolbar to open the **Map Options** dialog box.
2. Click on the **Tool Options** tab.
3. Select the **Map Utility** check box.
4. Click on **Set Defaults**.
5. Refresh the Position Map (click the green refresh icon in the Position Map toolbar) to display the **Map Utility**.

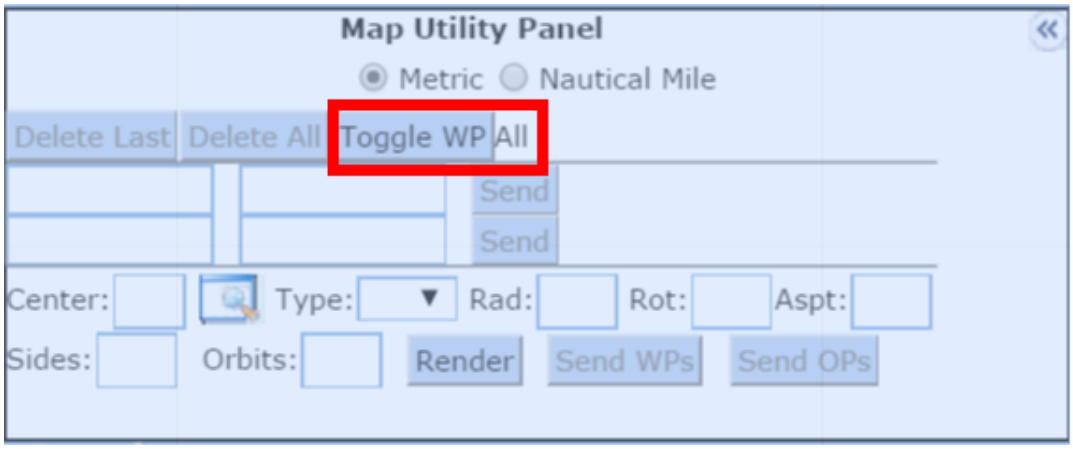
The **Map Utility** appears on the lower left side of the Position Map. You can hide the **Map Utility** by clicking on the « icon.

Figure 4.67. Map Utility Displayed on the Position Map

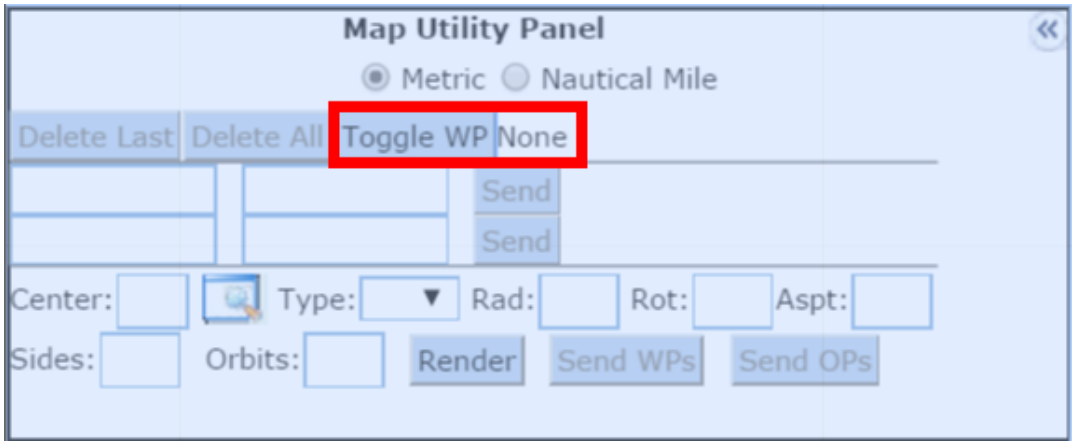


By clicking on the **Toggle WP** button in the **Map Utility** waypoints can be displayed in one of three modes:

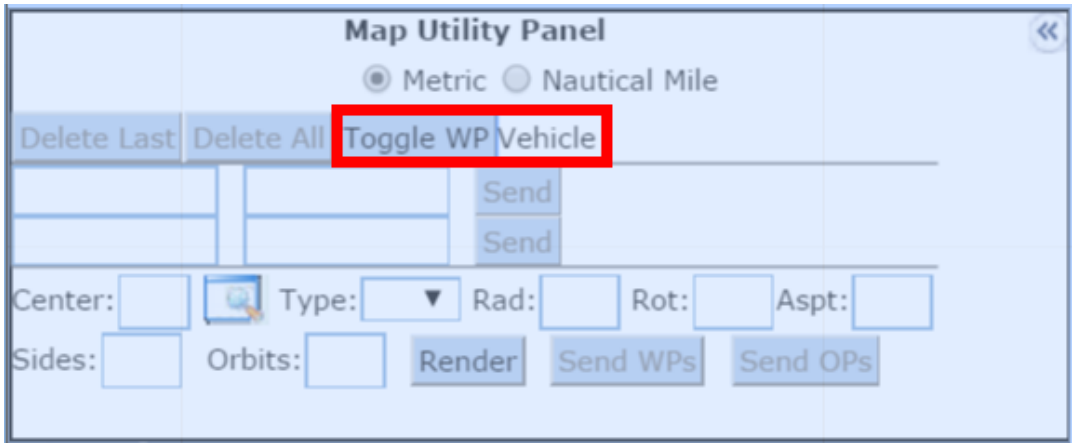
- **All** - displays all waypoints for all Vehicles displayed in the WGMS Dashboard.



- **None** - hides all waypoints for all Vehicles displayed in the WGMS Dashboard.



- **Vehicle** - displays only the waypoints for the Vehicle selected in the Vehicles drop-down menu.



Note

This feature is useful for improving visibility when you want to create new waypoints in a region that contains a lot of existing waypoints.

Important

Before using the **Map Utility**, select the **Metric** radio button or the **Nautical Mile** radio button to set the units of measure you want to work with.

The following sections show you how to use the **Map Utility** to:

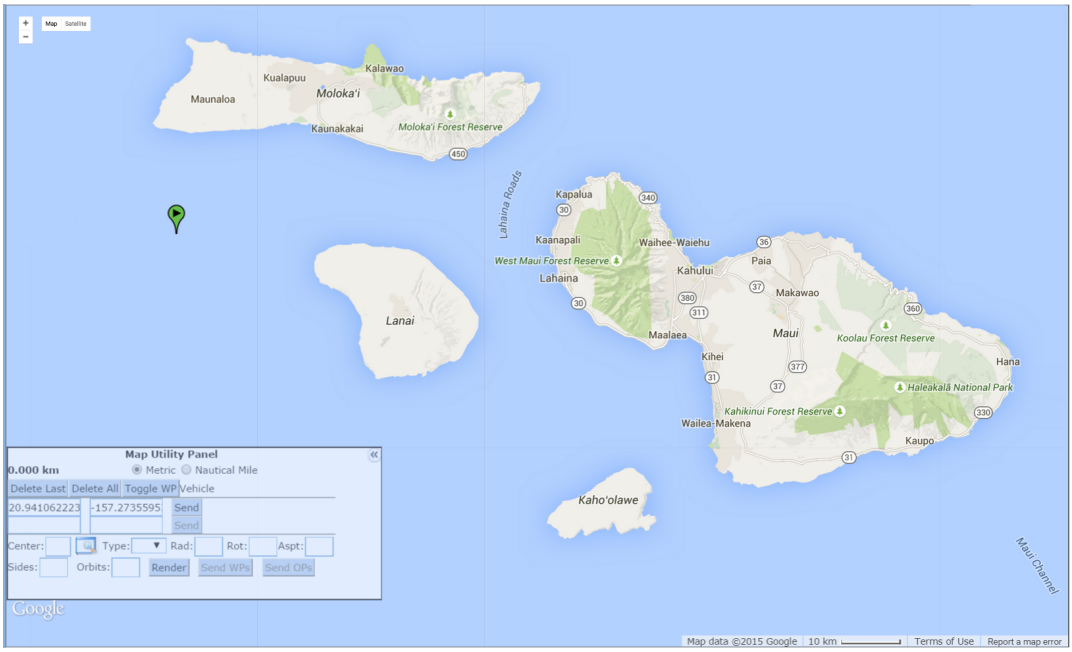
- "Measure a Distance on the Position Map" (page 93)
- "Create Waypoints " (page 96)
- "Create a Circular Course" (page 102)
- "Create a Circular Operation Polygon" (page 107)
- "Create a Square Course" (page 113)
- "Create a Square Operation Polygon" (page 118)
- "Create a Spiral Course" (page 124)

Measure a Distance on the Position Map

You can use the **Map Utility** to measure distances in metric units or nautical miles:

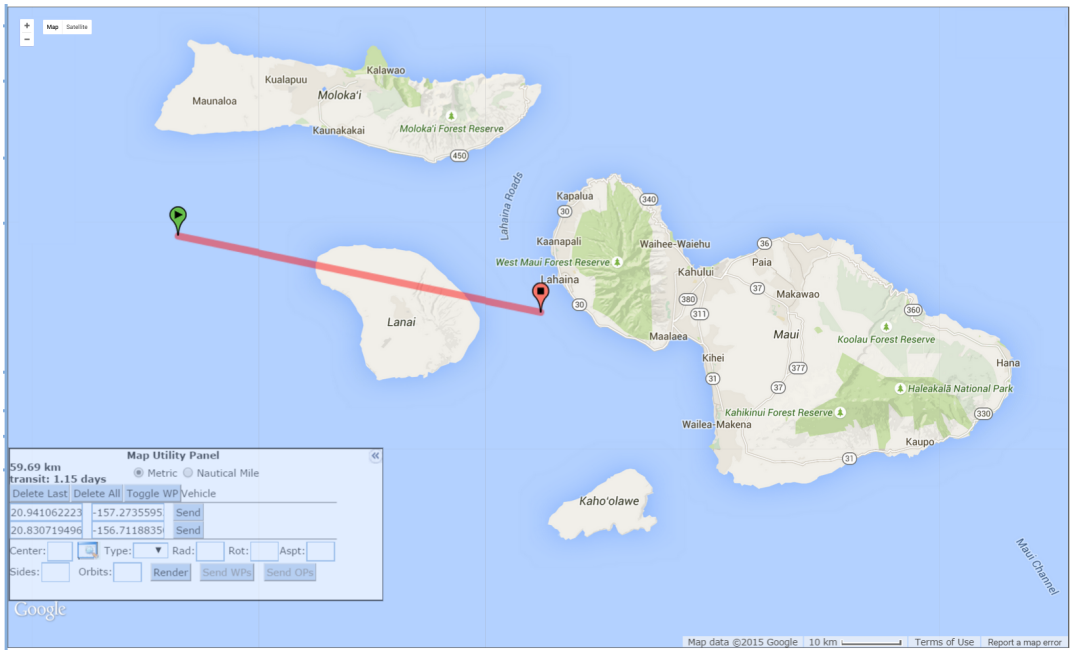
1. Select the **Metric** radio button or the **Nautical Mile** radio button to set the units of measure you want to work with.
2. Click once on the Position Map at the start of the distance you want to measure - a green starting point icon will appear and the **Map Utility** will display its coordinates.

Figure 4.68. Example: Set Starting Point for Distance Measurement



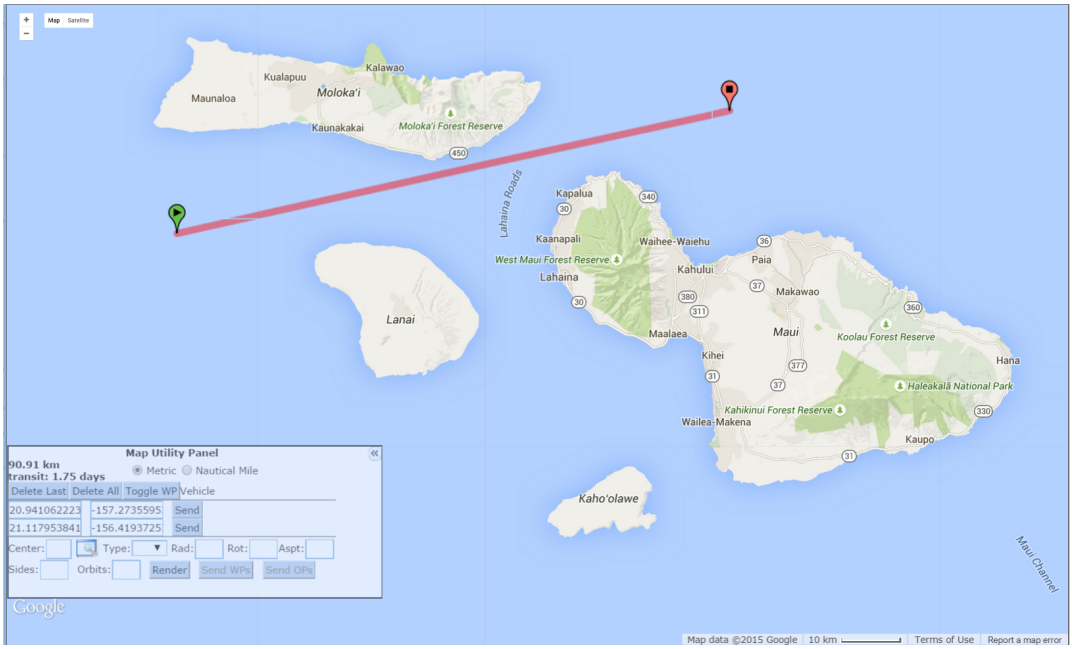
3. Click once on the Position Map at the end of the distance you want to measure and a red end point icon will appear with a red line connecting it to the green starting point icon. The distance between the red and green icons, and their coordinates, are displayed in the **Map Utility**.

Figure 4.69. Example: Set End Point for Distance Measurement



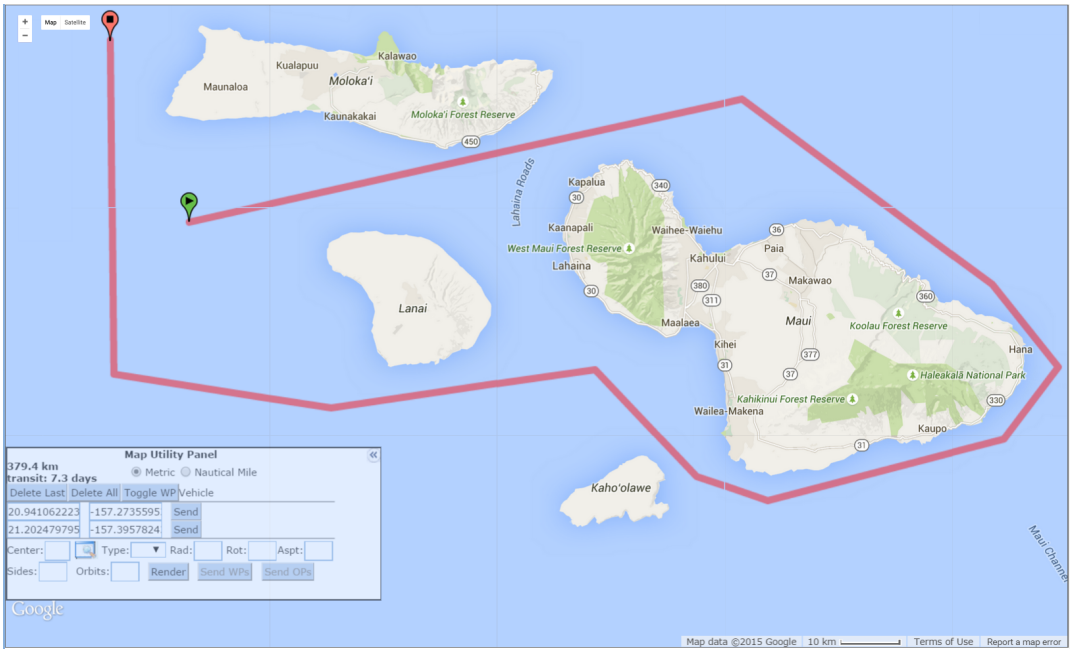
4. Click and drag either the green starting point icon or the red end point icon to change the distance being measured. For example, click and drag the red end point northward so the red line connecting it to the green icon does not come in contact with land.

Figure 4.70. Example: Move End Point



5. To include additional "legs" to the distance being measured, you can click on the Position Map to add more red end point icons. Each time you click a new red endpoint will appear on the Position Map and the red line will follow previous end points back to the green starting point icon. The cumulative distance for all of the "legs" and the coordinates for the green starting point icon and the red end point icon are displayed in the **Map Utility**.

Figure 4.71. Example: Add Legs to Distance Measurement

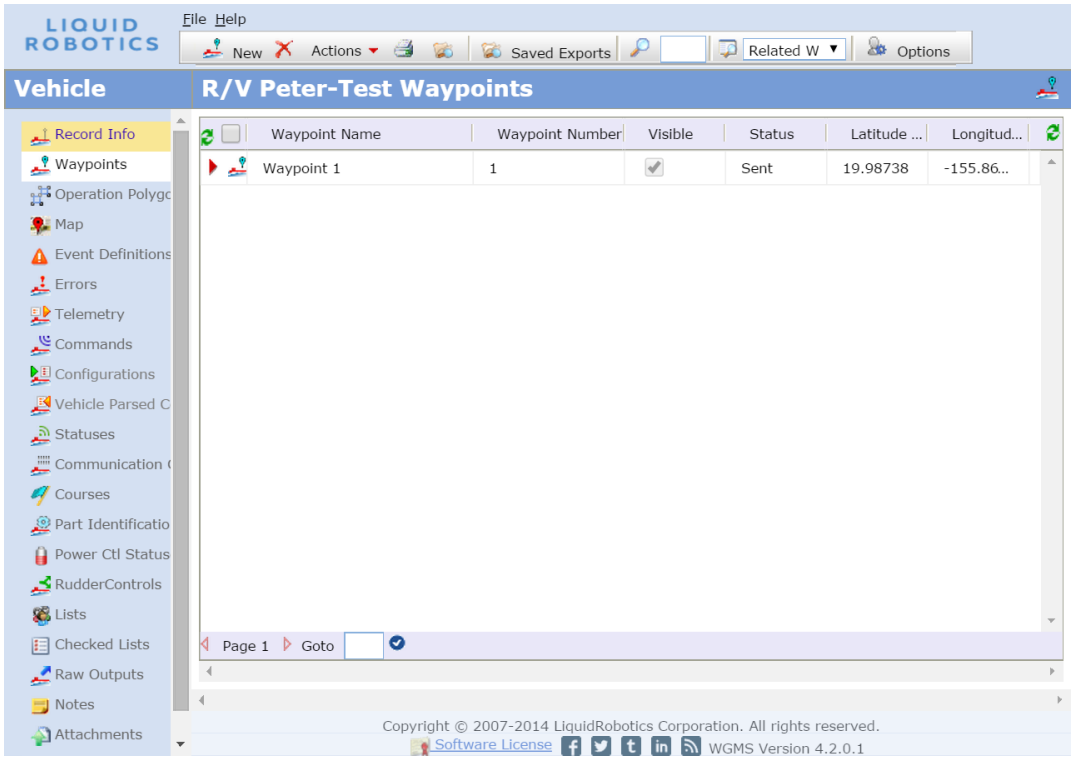


6. In the **Map Utility**, click **Delete Last** to remove the last red end point icon position, or click **Delete All** to remove all of the distance measurement icons.

Create Waypoints

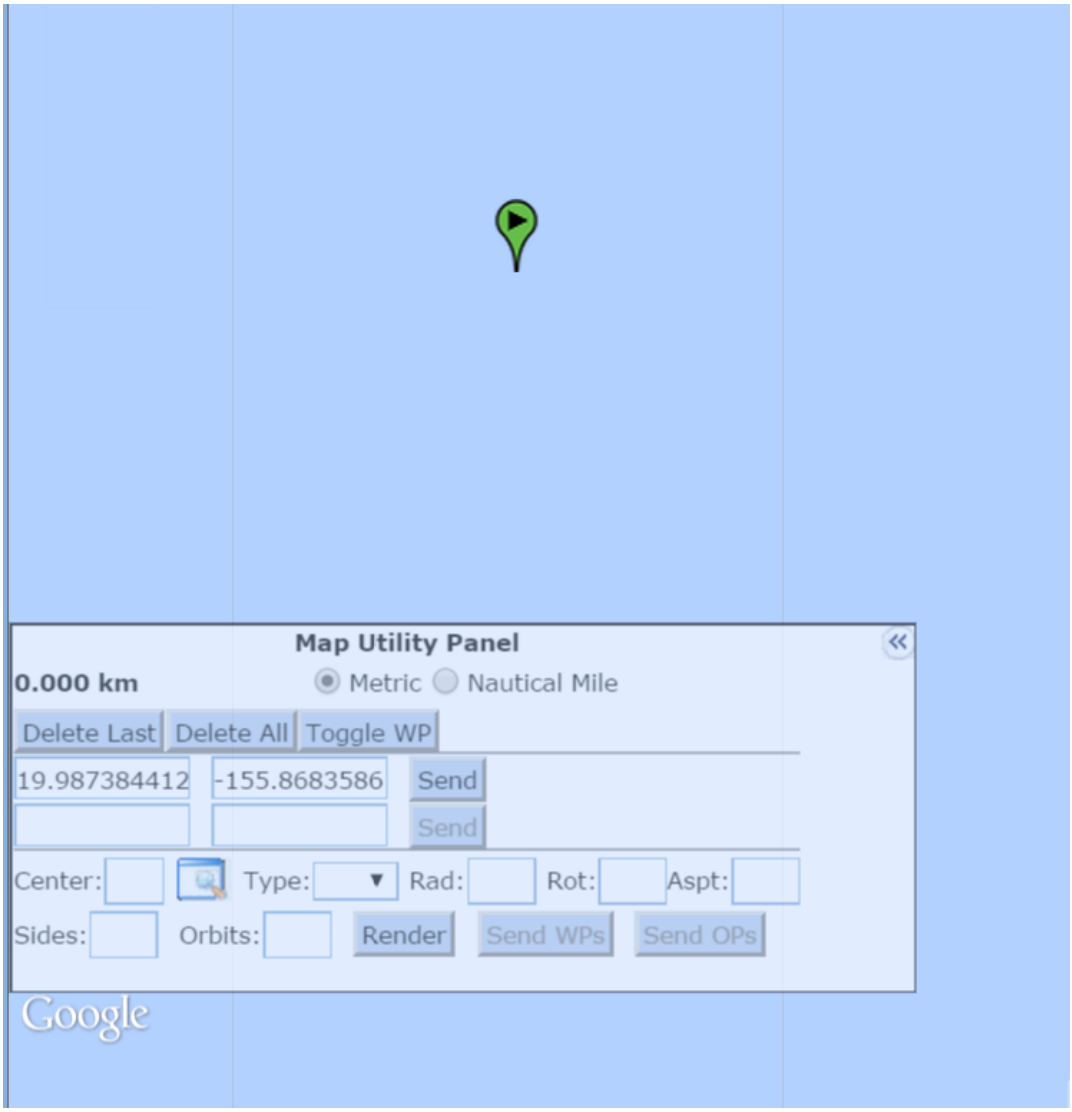
In this example, the **Metric** radio button is selected and no waypoints have yet been created for the Vehicle R/V Peter-Test - the waypoints list for R/V Peter-Test is empty. This procedure can be used to create waypoints, one at a time. You will need to repeat the procedure for each waypoint you want to create and save to a Vehicle.

Figure 4.72. No Waypoints Have Been Created for R/V Peter-Test



1. Click on the Position Map where you want to create a waypoint and a green waypoint icon will appear at that location.

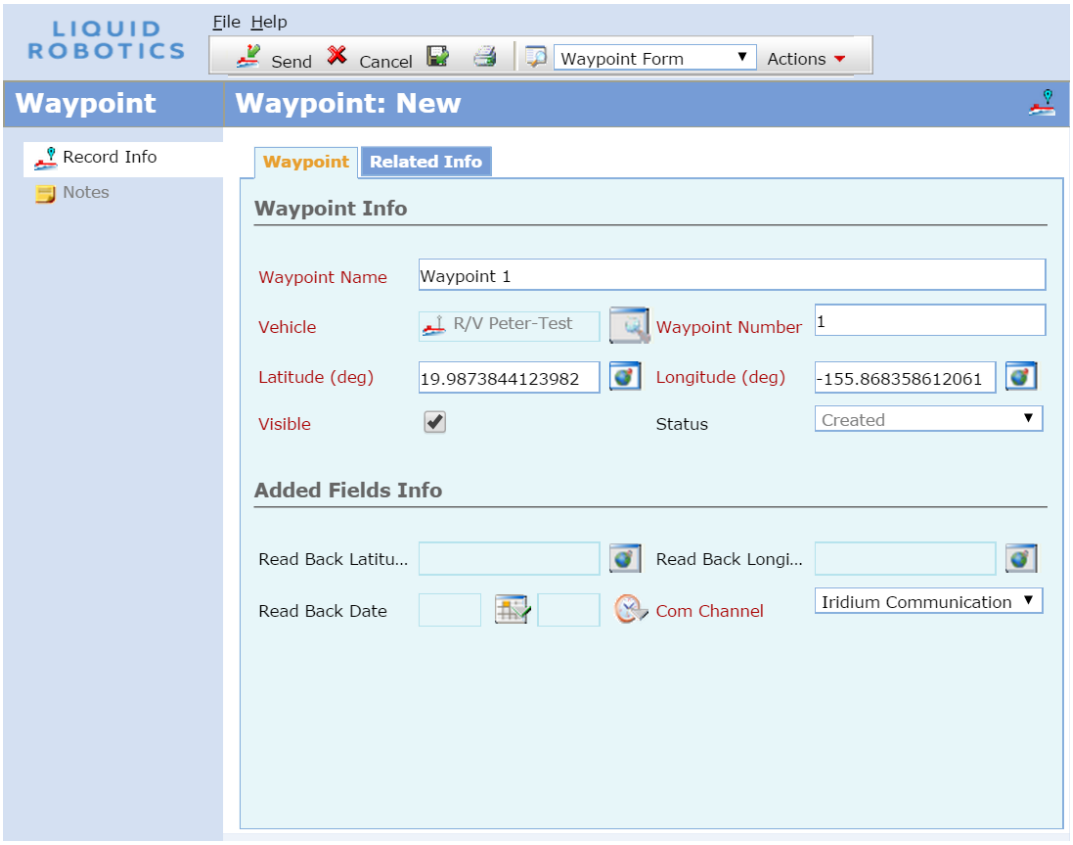
Figure 4.73. Click to Create a Waypoint on the Position Map



The coordinates for the waypoint you just created are displayed in the **Map Utility**. At this point the waypoint has been defined, but it has not been saved to the Vehicle R/V Peter-Test. If you do not want to save this waypoint, click **Delete Last** - the waypoint will be deleted and the green icon will be removed from the Position Map display.

2. If you want to save this waypoint to the Vehicle R/V Peter-Test, click the **Send** button in the **Map Utility** and a **Waypoint: New** form will open displaying the coordinates for the waypoint.

Figure 4.74. Waypoint: New Form

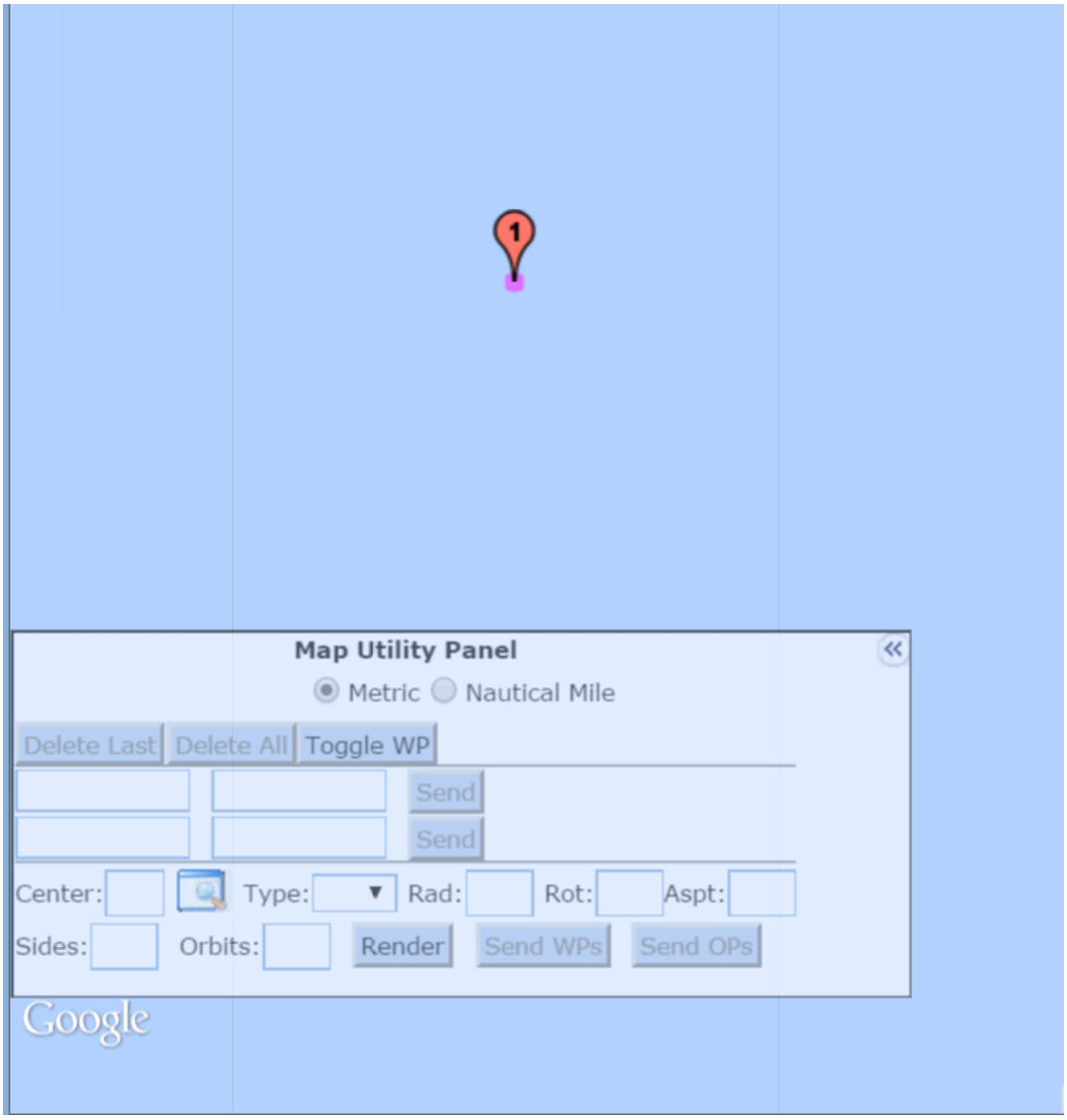


3. Click **Send** in the toolbar of the **Waypoint: New** form to save the waypoint to the waypoint list for R/V Peter-Test. You will notice that the green waypoint icon on the Position Map is now red and it has the number 1. Since this is the first waypoint created for R/V Peter-Test, it is automatically assigned the number 1. WGMS automatically assigns numbers to waypoints based on the order in which they are created, however, you have the option to edit the **Waypoint Name** and the **Waypoint Number** fields in the **Waypoint:New** form. It is important to be aware of waypoint numbers that are already in use, to avoid over-writing an existing waypoint with a new one that has different coordinates.

Note

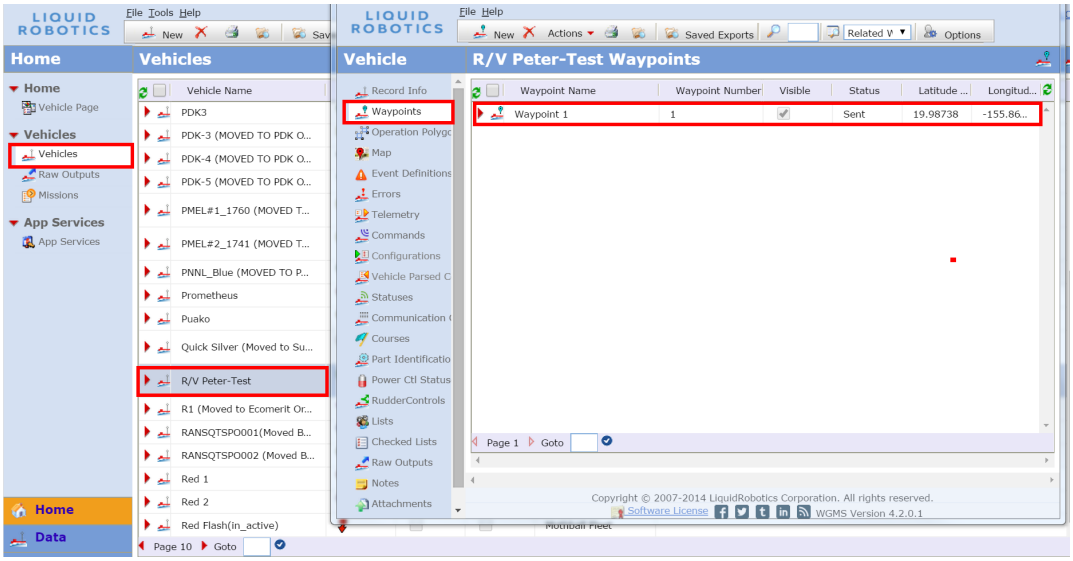
WGMS allows for a maximum of 254 waypoints to be defined for each Wave Glider vehicle.

Figure 4.75. Waypoint on the Position Map is Red and Numbered 1



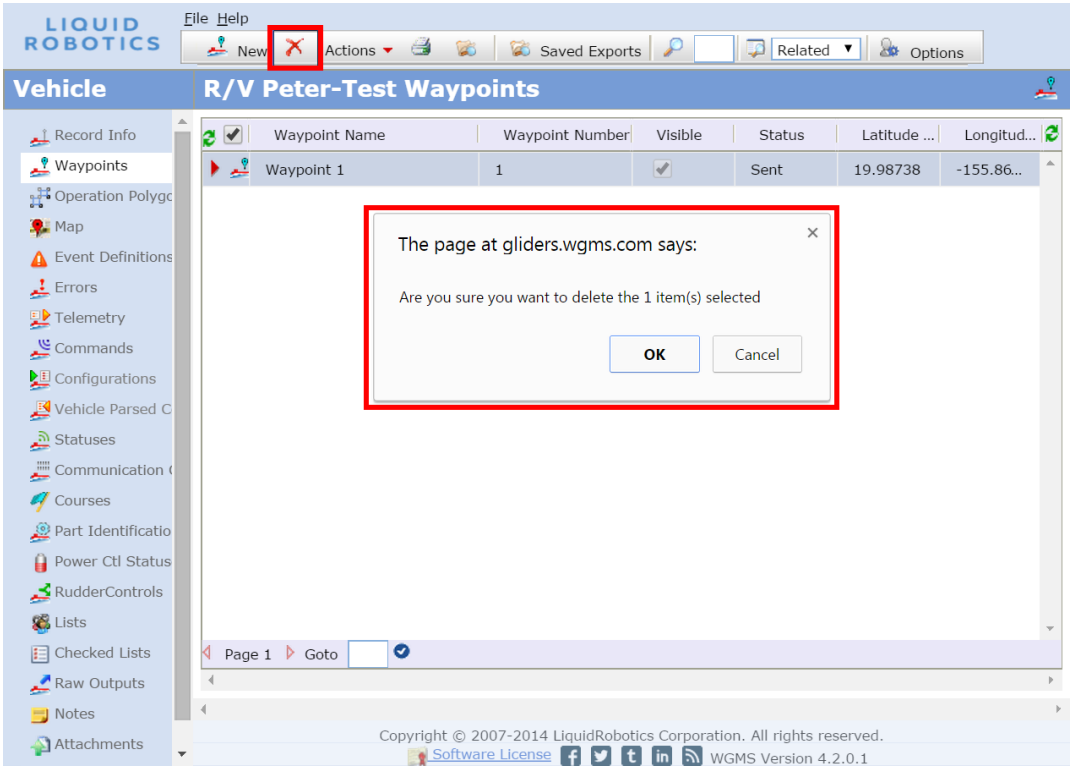
If you open the waypoint list for R/V Peter-Test by selecting the **Vehicles** side tab under the **Vehicles** menu, clicking on **R/V Peter-Test** and then clicking on the **Waypoints** side tab, you will see Waypoint 1 in the list.

Figure 4.76. New Waypoint Saved to the Vehicle Waypoint List



If you want to delete Waypoint 1, click in a white area of the Waypoint 1 row in the waypoint list for R/V Peter-Test to highlight that row, then click on the icon and a delete confirmation dialog box will appear. Click **OK** in the delete confirmation dialog box to complete the waypoint deletion.

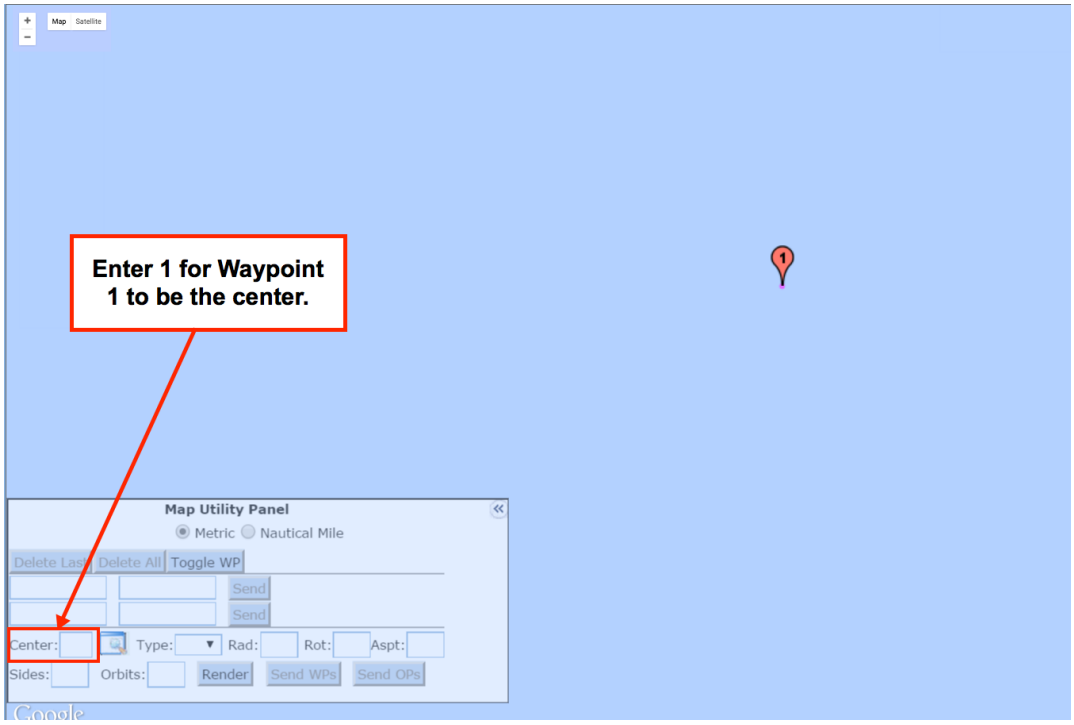
Figure 4.77. Delete the Waypoint from the Waypoint List



Create a Circular Course

In this example, the **Metric** radio button is selected and one waypoint (waypoint 1) has been created for the Vehicle R/V Peter-Test. To create a circular course, an existing waypoint must be defined as the center of the circle.

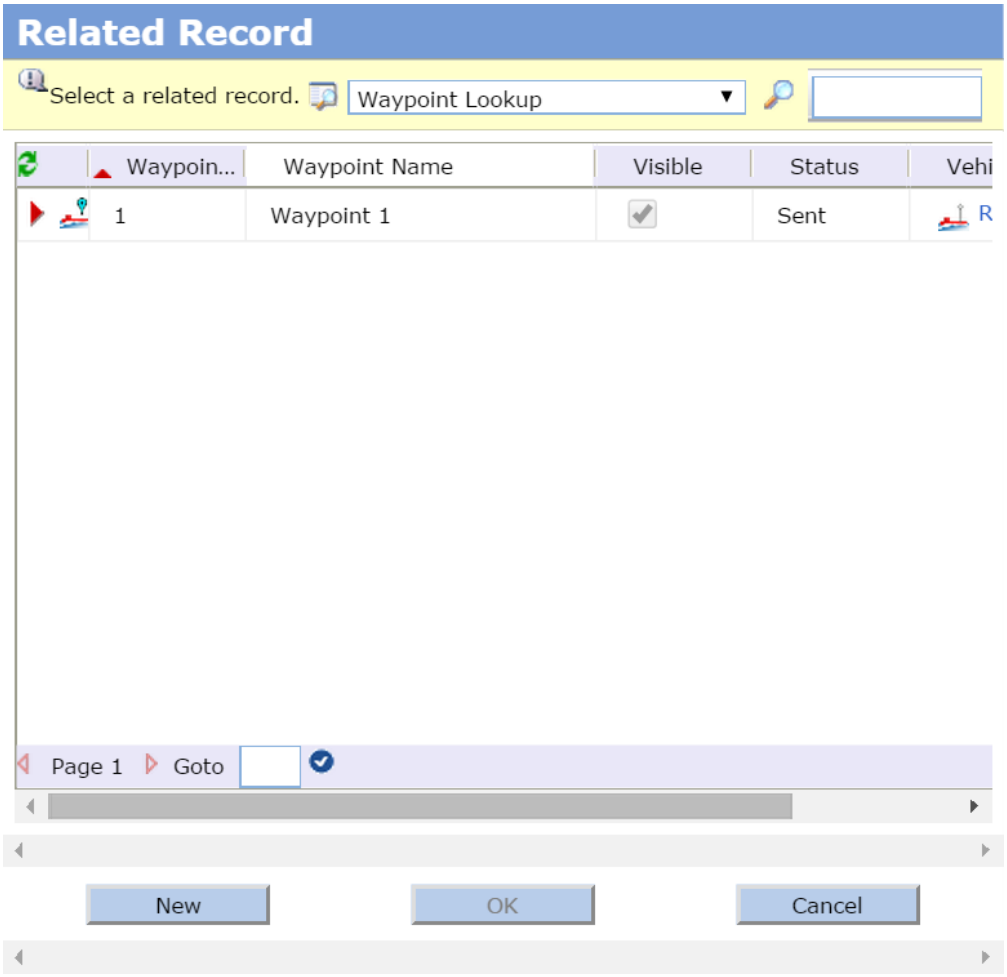
Figure 4.78. Creating a Circular Course with Waypoint 1 in the Center



1. In the **Map Utility**, enter **1** (for waypoint 1) in the **Center:** field. Waypoint 1 will be the center of the circular course.

Note

To view a list of the existing waypoints for the Vehicle, click on the icon next to the **Center:** field to open the **Waypoint Lookup** list for the Vehicle.



2. Select **Circle** in the **Type:** drop-down menu in the **Map Utility Panel**.

3. Enter 1000 in the **Rad:** field. This is the radius (in meters) of the circular course you are creating.

4. Enter **0** in the **Rot:**(Rotation) field. This setting determines the location of the first waypoint in the series of waypoints that make up the circular course. When **Rot:** is set to **0** the first (lowest numbered) waypoint that the **Map Utility** generates for the circular course (waypoint 2 in this example) will be located at the northernmost point on the perimeter of the circle. If you enter 150 in the **Rot:** field, waypoint 2 will be rotated 150 meters clockwise from the northernmost point on the perimeter of the circle.

5. Enter nothing in the **Aspt:** field. This setting determines the aspect ratio of the circle. By entering nothing, the result will be an aspect ratio of 1, which is the default. You will get the same result if you enter 1 in the **Aspt:** field. If you enter any number greater than 0 or 1, the circle will become increasingly eliptical, the larger the number.

6. Enter **10** in the **Sides:** field. When you create a circular course, it is made up of a series of straight lines between waypoints. The **Sides:** field determines how many waypoints will be connected to define the circular course.

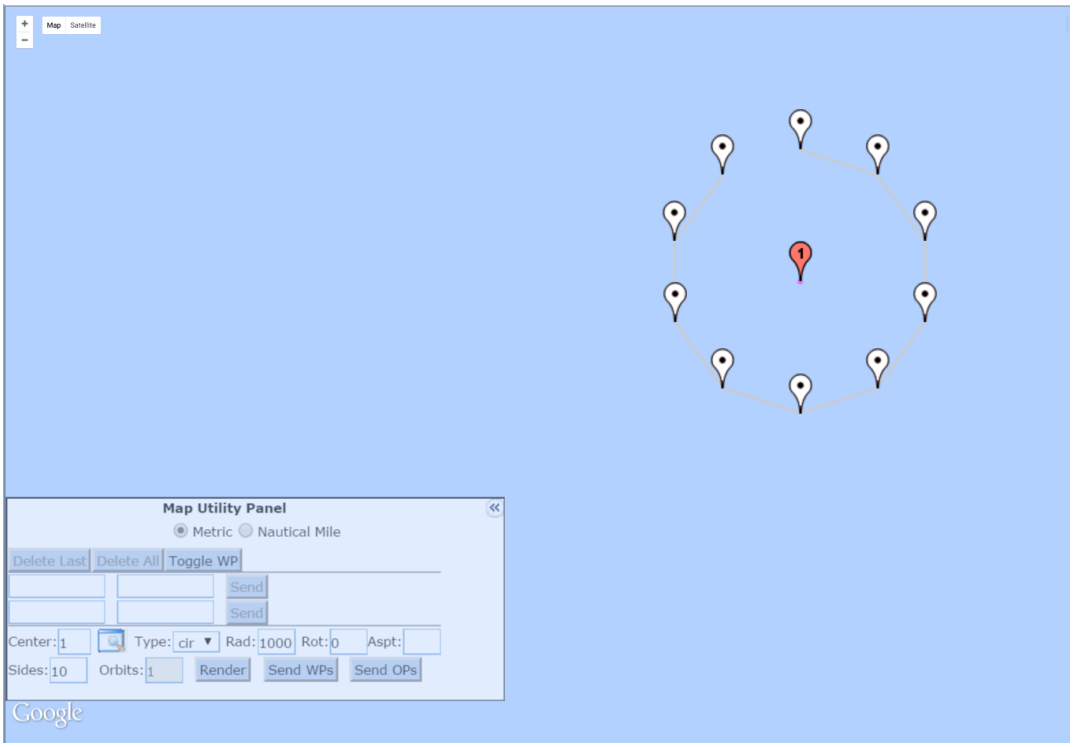
7. Click the **Render** button to display a preview of the circular course on the Position Map. At this point the waypoints for the circular course have been defined, but they have not been saved to the Vehicle R/V Peter-Test.

Note

If you want to make any changes, you can edit the parameters in the **Map Utility Tool** and click on **Render** again to display the changes on the Position Map.

If you do not want to edit or save these waypoints, click the **Delete All** button and they will all be removed from the Position Map.

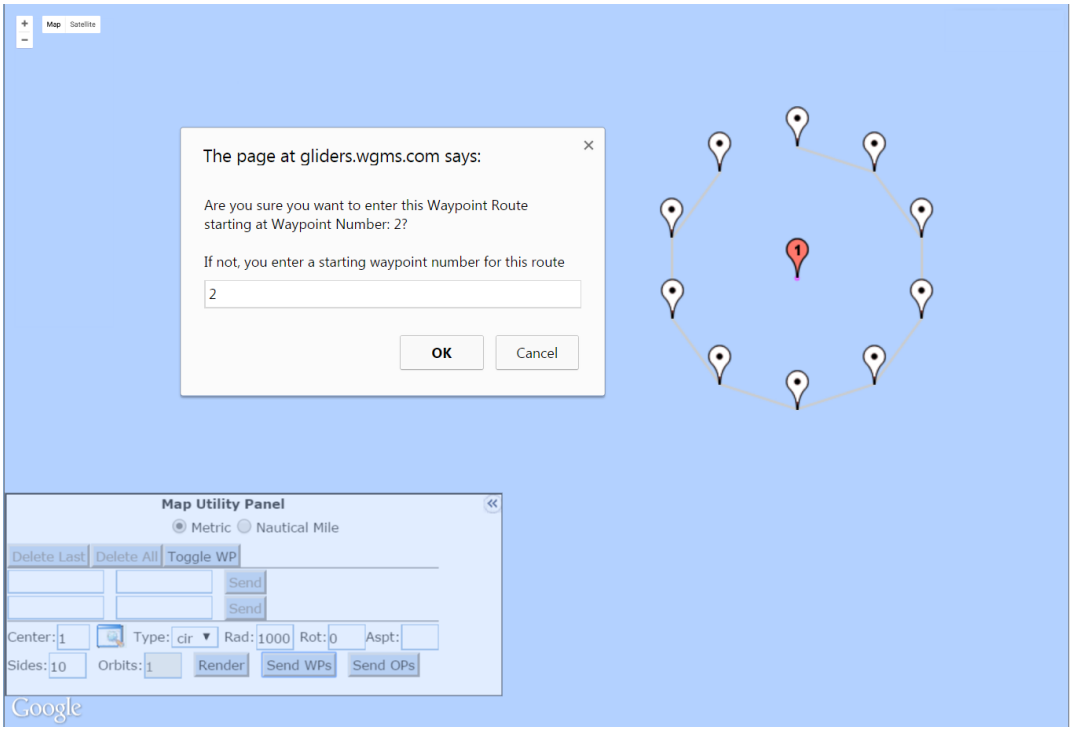
Figure 4.79. Example: Render a Circular Course



8. If you are ready to save the 10 new waypoints displayed in the preview as a circular course, click the **Send WPs** button.

When you click the **Send WPs** button, a dialog box will open providing you with an opportunity to change the starting waypoint for the circular course.

Figure 4.80. Click the Send WPs Button



9. Click **OK** to display the new red waypoints numbered 2 through 11 on the Position Map. They are also automatically added to the Waypoint list for the Vehicle.

Note

You have the option to change the starting waypoint number for the new course you are creating. To do this, enter the waypoint number you want to be the starting point for the course before you click **OK**. By changing the starting waypoint number, the waypoint numbers for the new course will begin at the number you enter and continue consecutively.

Figure 4.81. New Waypoints Sent to Vehicle and Displayed on Position Map

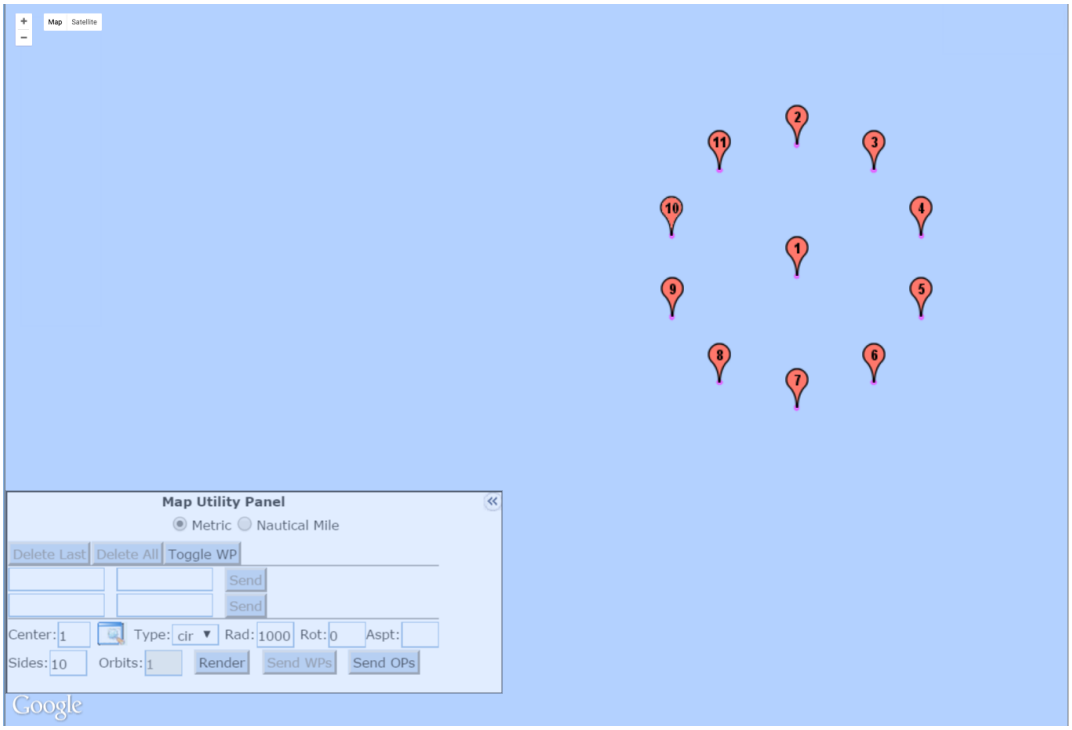
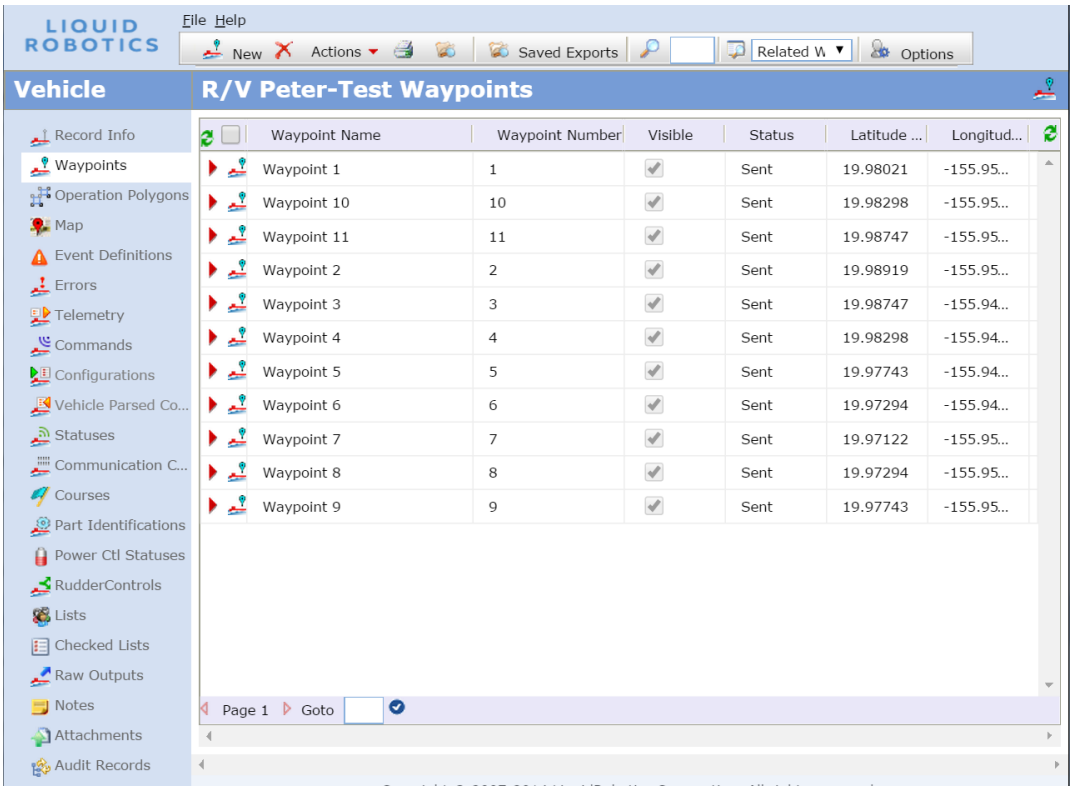


Figure 4.82. New Waypoints Saved to the Vehicle Waypoint List



If you want to delete waypoints from the Vehicle waypoint list, select the rows containing waypoints you want to delete (selected rows will be highlighted), then click on the icon and a delete confirmation dialog box will appear. Click OK in the delete confirmation dialog box to complete the waypoint deletion.

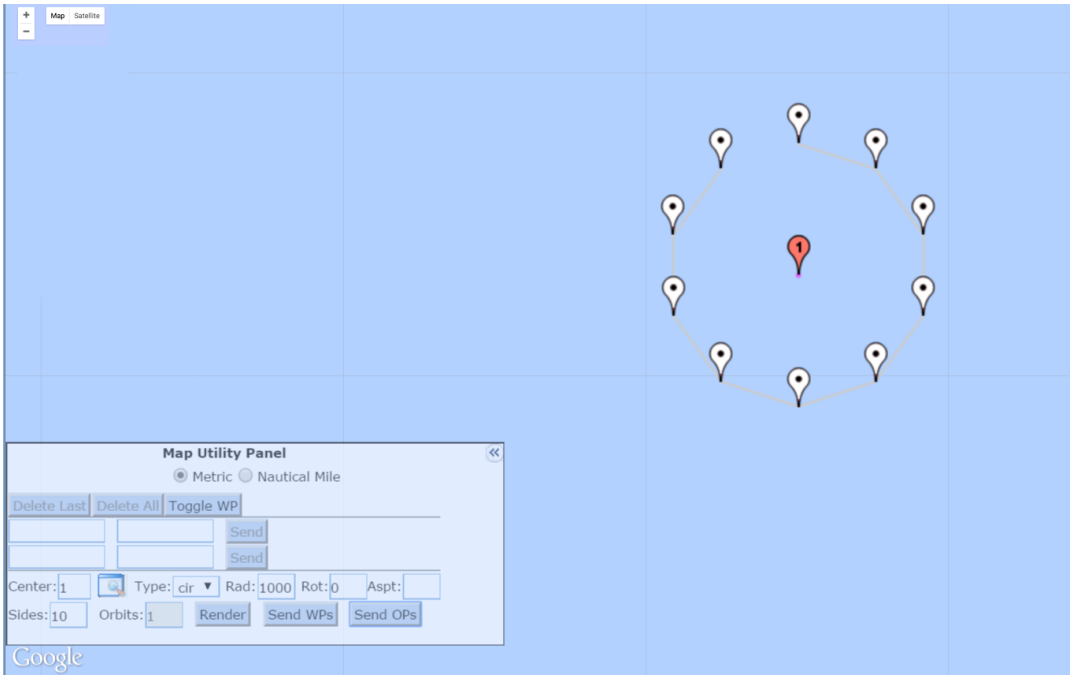
Create a Circular Operation Polygon

An Operation Polygon is a boundary on the Position Map. You can set alarms to be sent to WGMS and autonomous obstacle avoidance behavior to be enabled, when a Vehicle approaches an Operation Polygon boundary. Operation Polygons can be saved as Inclusion Zones, or Exclusion Zones. An Inclusion Zone defines a region that a Vehicle is allowed to operate in. An Exclusion Zone defines a region where a Vehicle is not allowed to operate. An Inclusion Zone is typically used to define an Operation Polygon where a Vehicle is gathering data, or performing test maneuvers. An Exclusion Zone is typically used to define an Operation Polygon where a Vehicle could run into rocks, shallow water, navigation aids, heavy marine shipping traffic, or other Wave Glider Vehicles on nearby missions.

To create a circular Operation Polygon:

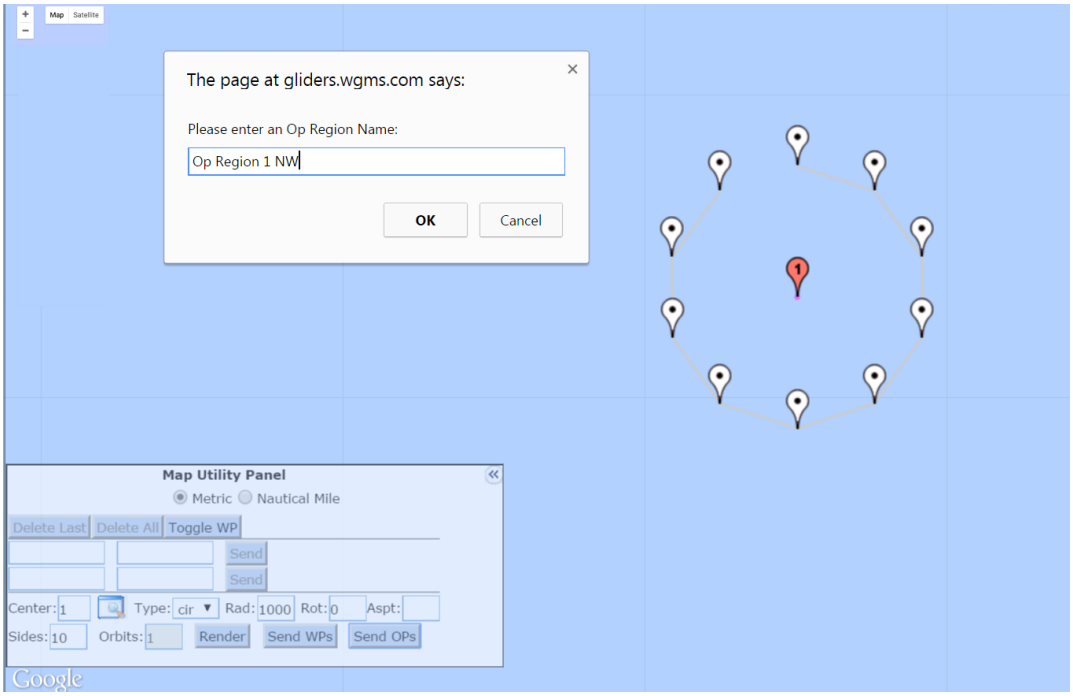
1. Follow Steps 1 - 8 in the "Create a Circular Course" (page 102) procedure to define the circular Operation Polygon boundaries.

Figure 4.83. Example: Render a Circular Operation Polygon



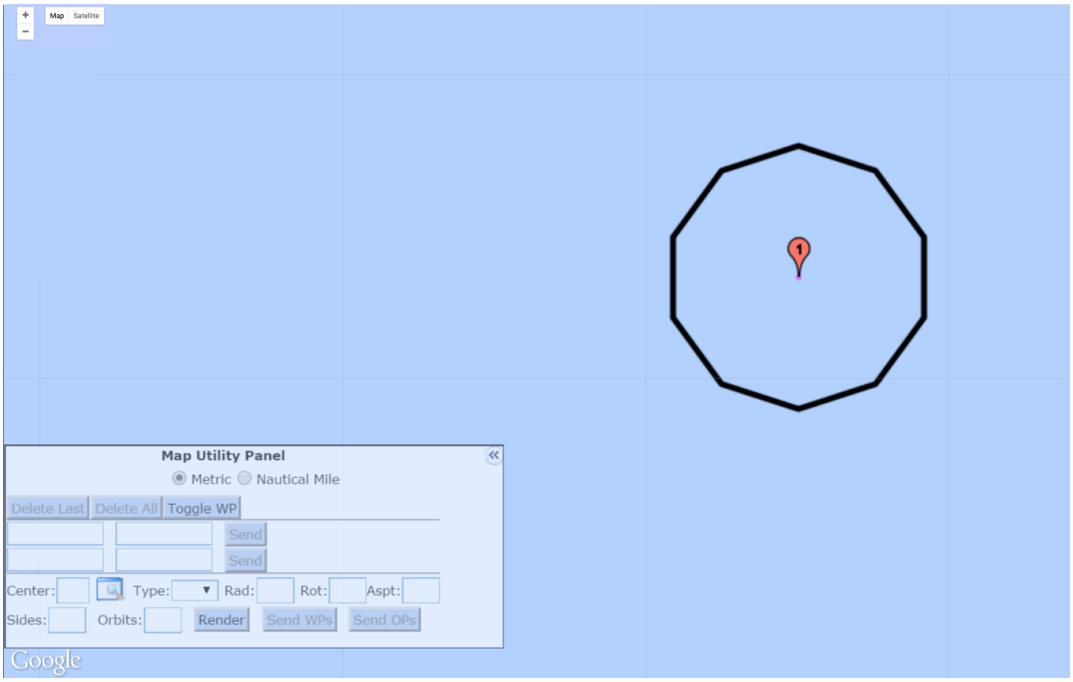
2. In Step 9, click on **Send OPs** (instead of clicking on **Send WPs**). A dialog box will appear asking you to enter an **Op Region Name**. Enter a unique name, or append a number to the default "Op Region" that is in the name field. The name must be different than any other Operation Polygon that has been saved for the Vehicle (for this example the name Op Region 1 NW was used).

Figure 4.84. Example: Click on Send OPs Button



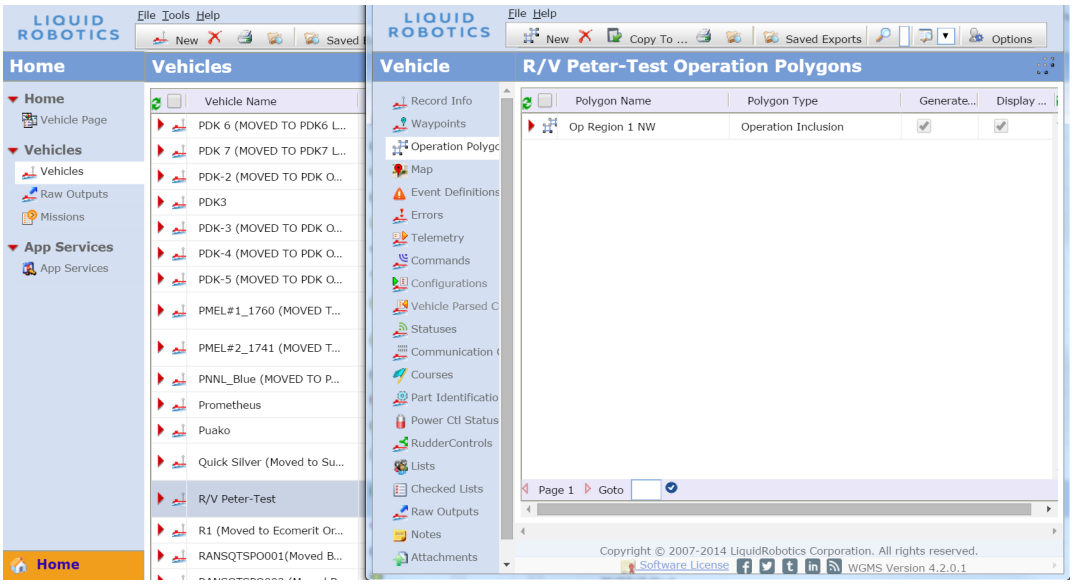
3. Click **OK**. The Operation Polygon you created will be saved to the Vehicle. It will appear as black lines on the Position Map, and it will also be included in the **Operation Polygons** list for the Vehicle.

Figure 4.85. Example: Operation Polygon Created



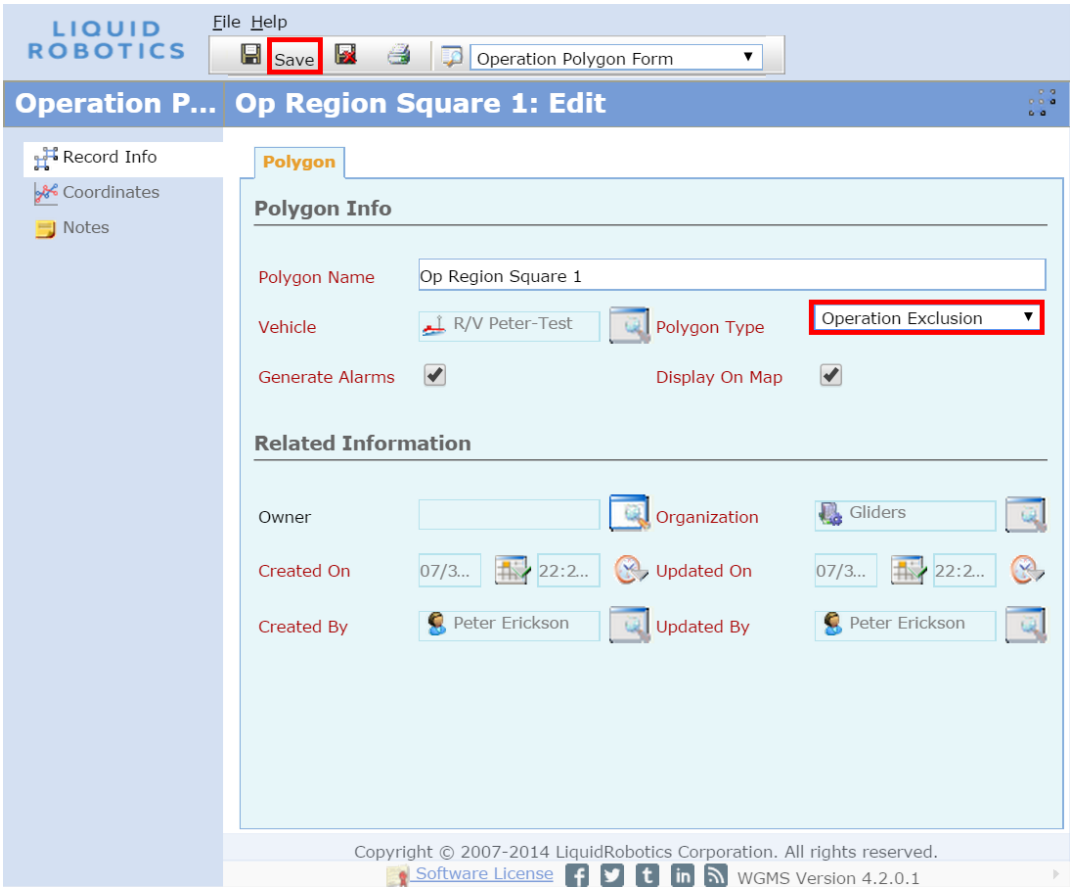
LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

Figure 4.86. Example: Operation Polygon Added to Vehicle Operation Polygons List



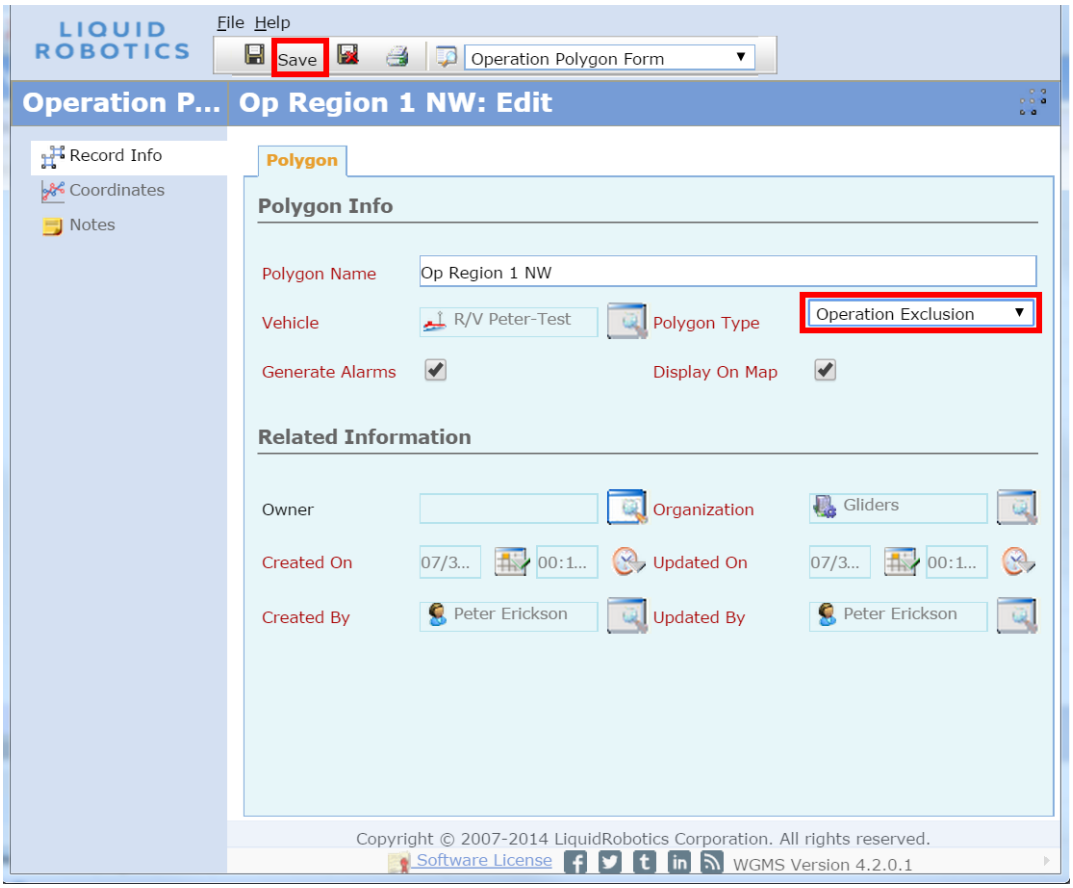
4. By default, Operation Polygons are saved as Inclusion Zones. If an Exclusion Zone is what you wanted, you can make edits from the Operation Polygons list for the Vehicle by clicking on the icon next to the Operation Polygon you want to edit - this action will open an edit form for that Operation Polygon.

Figure 4.87. Example: Operation Polygon Edit Form - Default Exclusion Zone



5. Select **Operation Exclusion** from the drop-down menu in the **Polygon Info** section of the **Op Region 1 NW: Edit** form. Then click **Save** in the toolbar.

Figure 4.88. Example: Operation Polygon Edit Form - Change to Inclusion Zone



6. The edited Operation Polygon will appear as an Exclusion Zone in the Vehicle Operations Polygons list, and the lines that define the Operation Polygon in the Position Map will be red.

Figure 4.89. Example: Operation Polygon Saved as Exclusion Zone

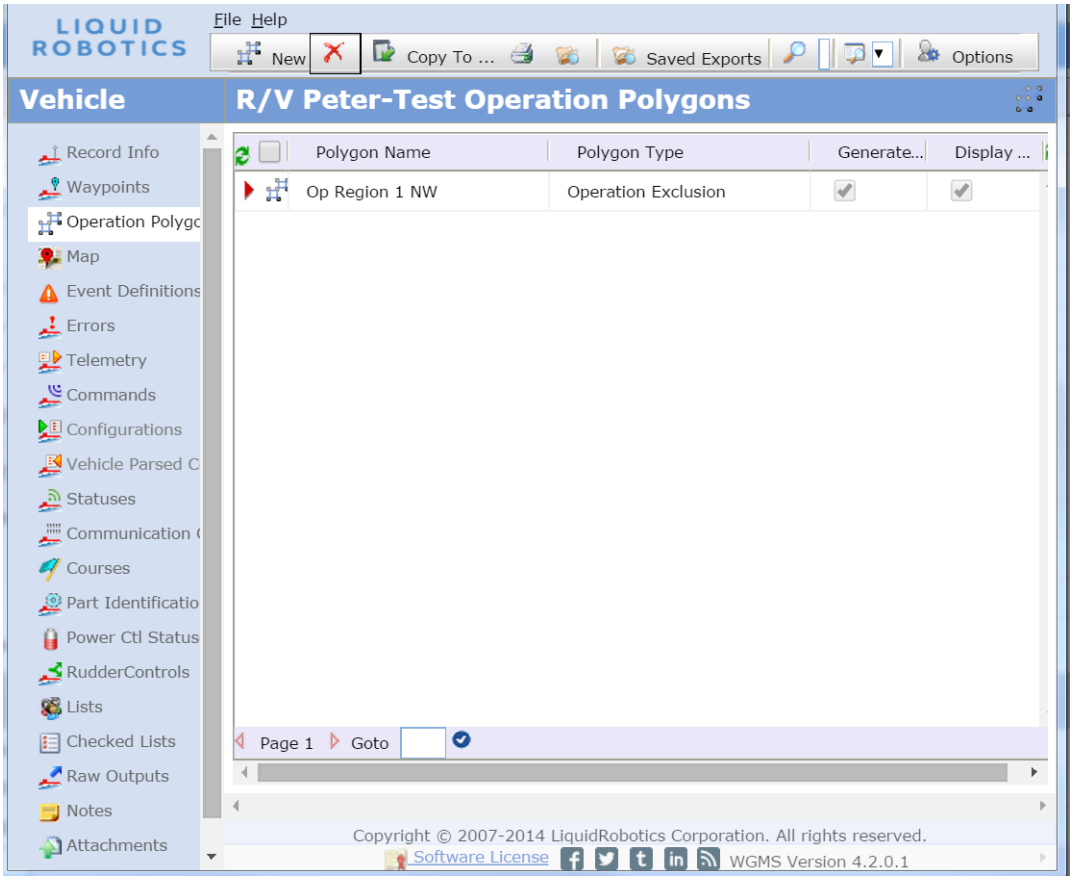
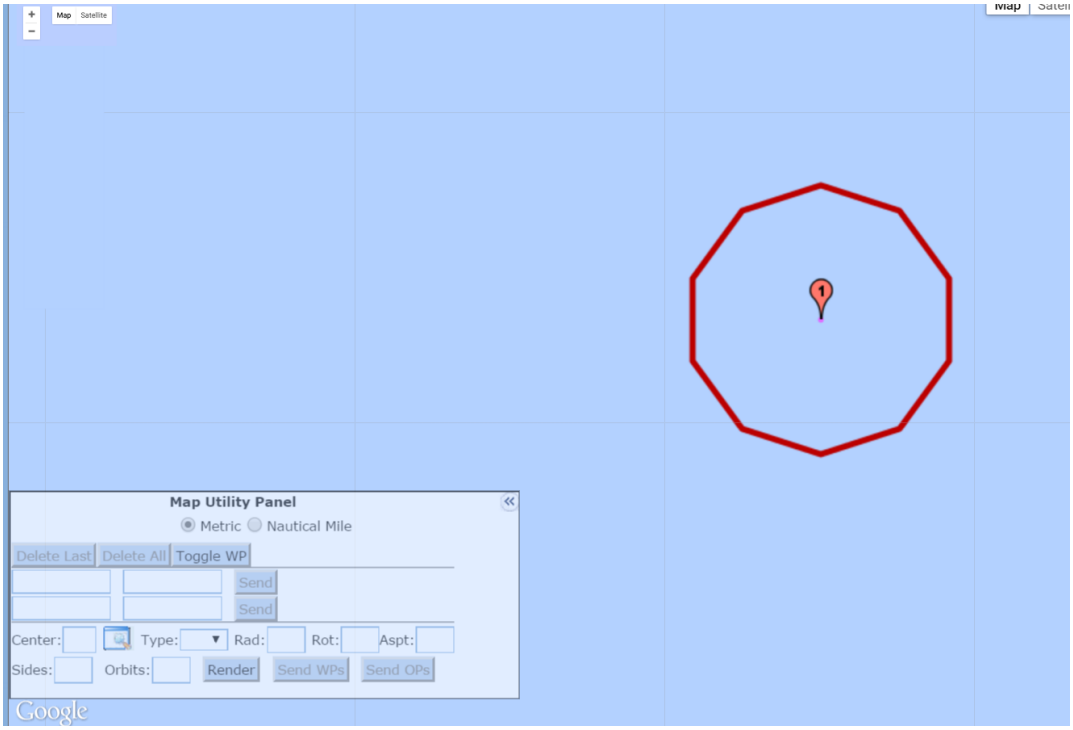


Figure 4.90. Example: Circular Exclusion Zone

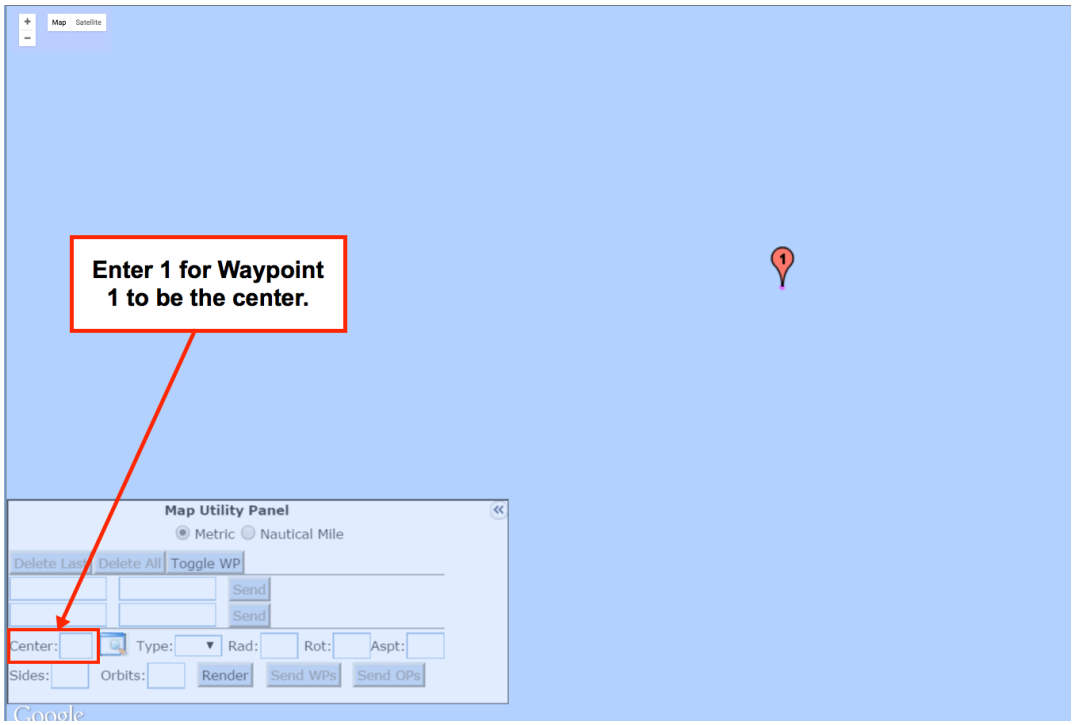


If you want to delete an Operation Polygon from the Vehicle Operation Polygons list, select the row containing Operation Polygon you want to delete (selected row will be highlighted), then click on the icon and a delete confirmation dialog box will appear. Click **OK** in the delete confirmation dialog box to complete the Operation Polygon deletion.

Create a Square Course

In this example, the **Metric** radio button is selected and one waypoint (waypoint 1) has been created for the Vehicle R/V Peter-Test. To create a square course, an existing waypoint must be defined as the center of the square.

Figure 4.91. Creating a Square Course with Waypoint 1 in the Center



1. In the **Map Utility**, enter **1** (for waypoint 1) in the **Center:** field. Waypoint 1 will be the center of the square course.

   ### Note

   To view a list of the existing waypoints for the Vehicle, click on the icon next to the **Center:** field to open the Waypoint Lookup list for the Vehicle.

2. Select **Square** in the **Type:** drop-down menu.

3. Enter **2000** in the **Width:** field. When you create a square course with the **Map Utility**, the "width" of the square is equal to the length of each side.

4. Enter **0** in the **Rot:**(Rotation) field. This setting determines the location of the first waypoint in the series of waypoints that make up the square course. When **Rot:** is set to **0** the northernmost side of the square course will be horizontal (running east to west) and the first (lowest numbered) waypoint that the **Map Utility** generates for the square course (in this case waypoint 2) will be located at the northeast corner of the square. If you enter 45 in the **Rot:** field, waypoint 2 will be rotated 45 degrees clockwise from the northeast corner of the square.

5. Enter nothing in the **Aspt:** field. This setting determines the aspect ratio of the square. By entering nothing, the result will be an aspect ratio of 1, which is the default. You will get the same result if you enter 1 in the **Aspt:** field. If you enter any number greater than 0 or 1, the square will become increasingly rectangular, the larger the number.

6. By default, **4** will be entered in the **Sides:** field. When you create a square course, it is made up of a series of straight lines between waypoints. The **Sides:** field that determines how many waypoints will be connected to define the course.

7. Ignore the **Orbits:** field, it is used for spiral courses only. For more information see "Create a Spiral Course" (page 124).

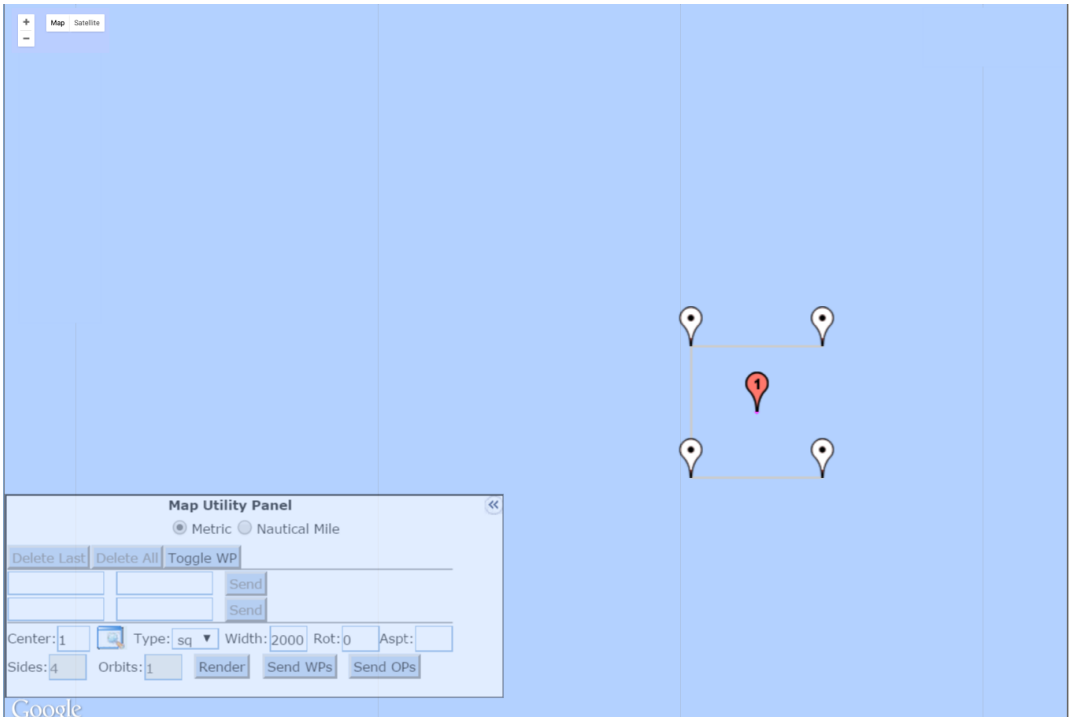
8. Click the **Render** button to display a preview of the square course on the Position Map. At this point the waypoints for the square course have been defined, but they have not been saved to the Vehicle R/V Peter-Test.

   ### Note

   If you want to make any changes, you can edit the parameters in the **Map Utility** and click on **Render** again to display the changes in the Position Map.

   If you do not want to edit or save these waypoints, click the **Delete All** button and they will all be removed from the Position Map.

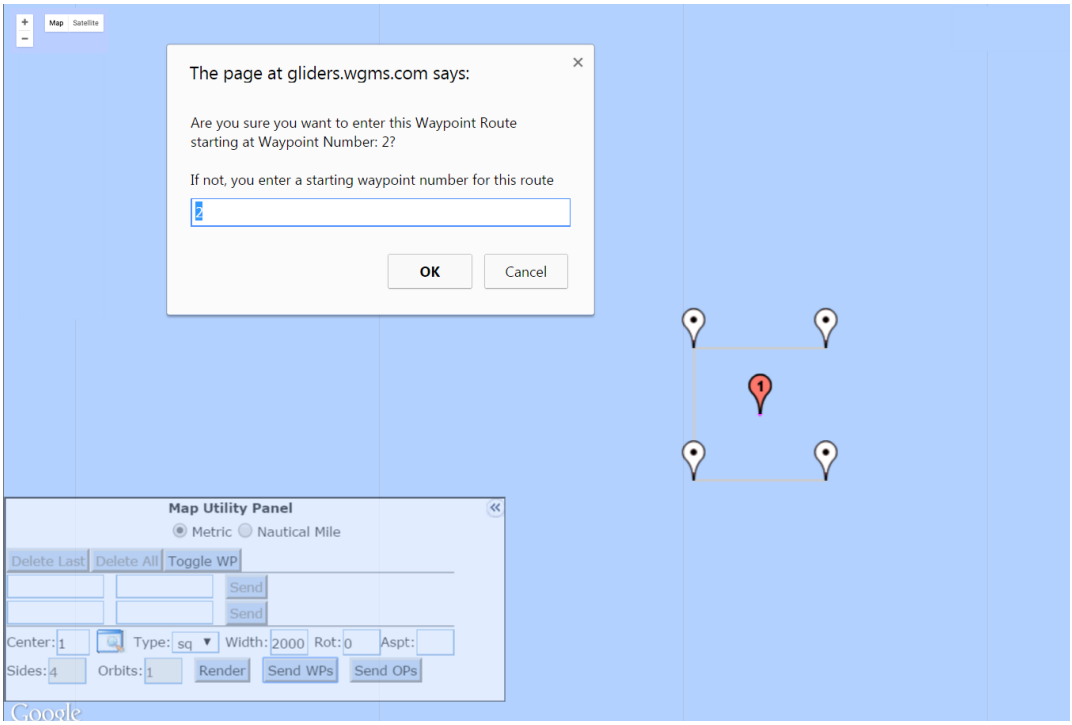
Figure 4.92. Example: Render a Square Course



9. If you are ready to save the 4 new waypoints displayed in the preview as a square course, click the **Send WPs** button.

   When you click the **Send WPs** button, a dialog box will open providing you with an opportunity to change the starting waypoint for the square course.

Figure 4.93. Click the Send WPs Button



10. Click **OK** to display the new red waypoints numbered 2 through 5 on the Position Map. They are also automatically added to the waypoint list for the Vehicle. After you click OK, if the waypoint numbers you entered are already in use, WGMS will ask you if you want to proceed. To avoid losing existing waypoints, always check existing waypoint numbers, before setting new waypoints. Also, a maximum of 254 waypoints can be defined on each Wave Glider Vehicle. Note: there is both a waypoint name and a waypoint number - both can be edited.

Note

You have the option to change the starting waypoint number for the new course you are creating. To do this, enter the waypoint number you want to be the starting point for the course before you click **OK**. By changing the starting waypoint number, the waypoint numbers for the new course will begin at the number you enter and continue consecutively.

Figure 4.94. New Waypoints Sent and Dispayed on Position Map

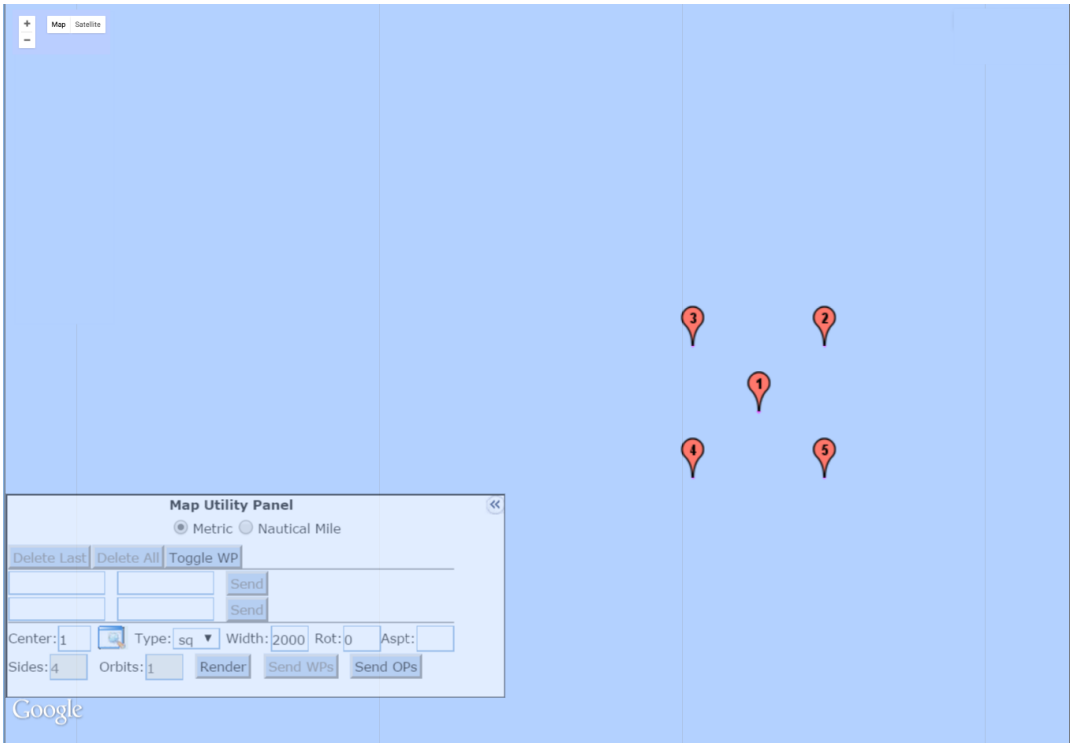
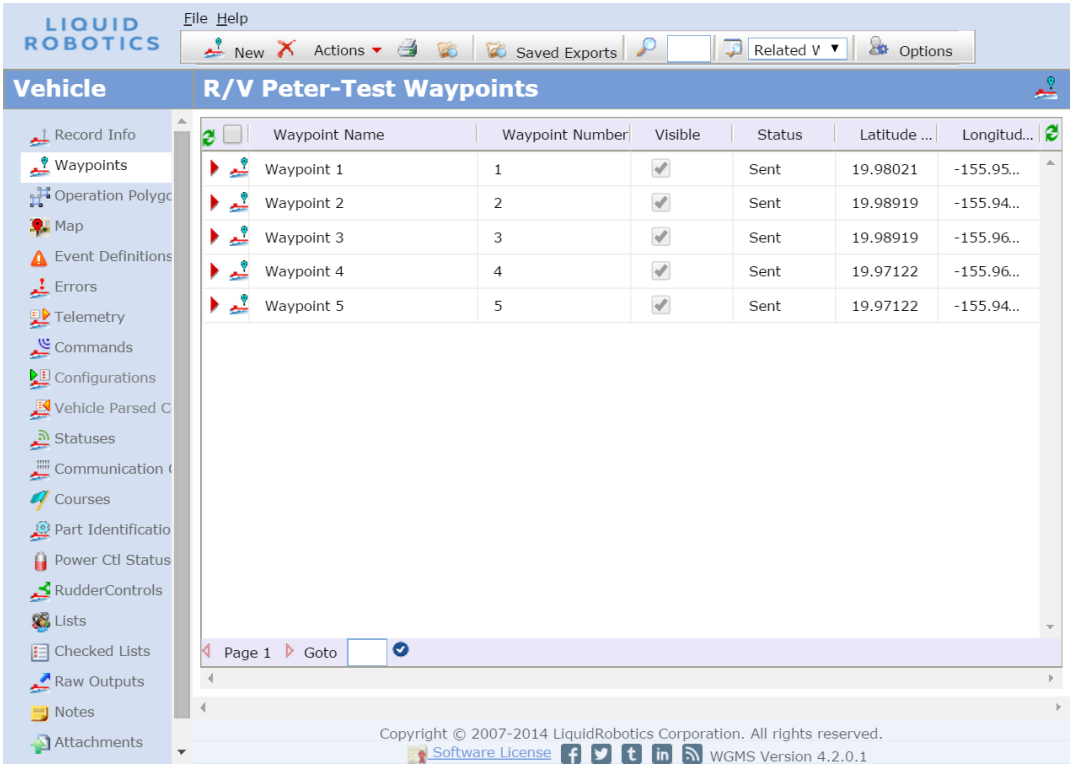


Figure 4.95. New Waypoints Saved to the Vehicle Waypoint List



If you want to delete waypoints from the Vehicle waypoint list, select the rows containing waypoints you want to delete (selected rows will be highlighted), then click on the icon in the toolbar and a delete confirmation dialog box will appear. Click **OK** in the delete confirmation dialog box to complete the waypoint deletion.

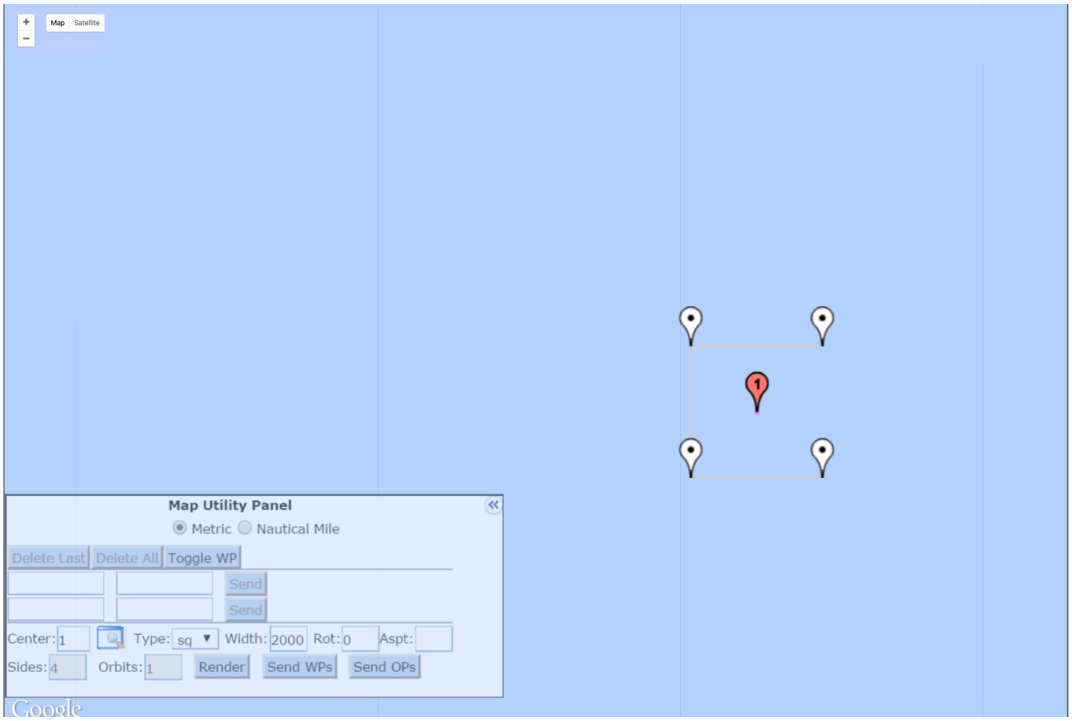
Create a Square Operation Polygon

An Operation Polygon is a boundary on the Position Map. You can set alarms to be sent to WGMS and autonomous obstacle avoidance behavior to be enabled, when a Vehicle approaches an Operation Polygon boundary. Operation Polygons can be saved as Inclusion Zones, or Exclusion Zones. An Inclusion Zone defines a region that a Vehicle is allowed to operate in. An Exclusion Zone defines a region where a Vehicle is not allowed to operate. An Inclusion Zone is typically used to define an Operation Polygon where a Vehicle is gathering data, or performing test maneuvers. An Exclusion Zone is typically used to define an Operation Polygon where a Vehicle could run into rocks, shallow water, navigation aids, heavy marine shipping traffic, or other Wave Glider Vehicles on nearby missions.

To create a square Operation Polygon:

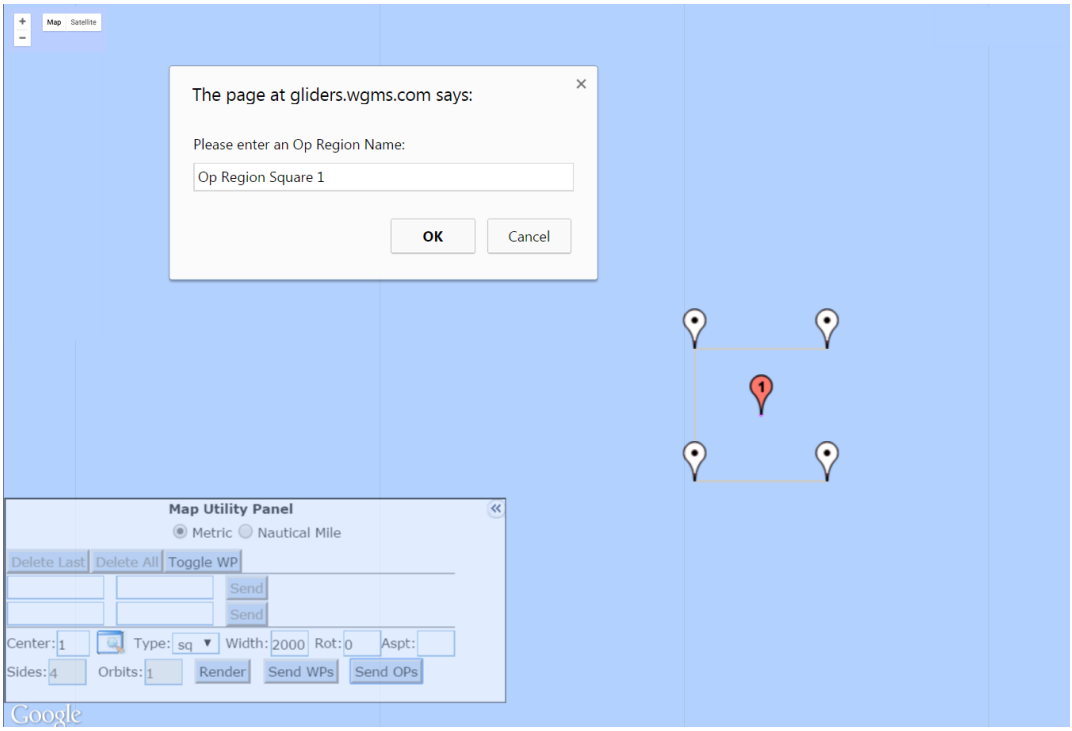
1. Follow Steps 1 - 8 in the "Create a Square Course" (page 113) procedure to define the square Operation Polygon boundaries.

Figure 4.96. Example: Render a Square Operation Polygon



2. In Step 8, click on **Send OPs** (instead of clicking on **Send WPs**). A dialog box will appear asking you to enter an **Op Region Name**. Enter a unique name, or append a number to the default "Op Region" that is in the name field. The name must be different than any other Operation Polygon that has been saved for the Vehicle.

Figure 4.97. Example: Click on Send OPs Button



3. Click **OK**. The Operation Polygon you created will be saved to the Vehicle. It will appear as black lines on the Position Map, and it will also be included in the **Operation Polygons** list for the Vehicle.

Figure 4.98. Example: Inclusion Zone

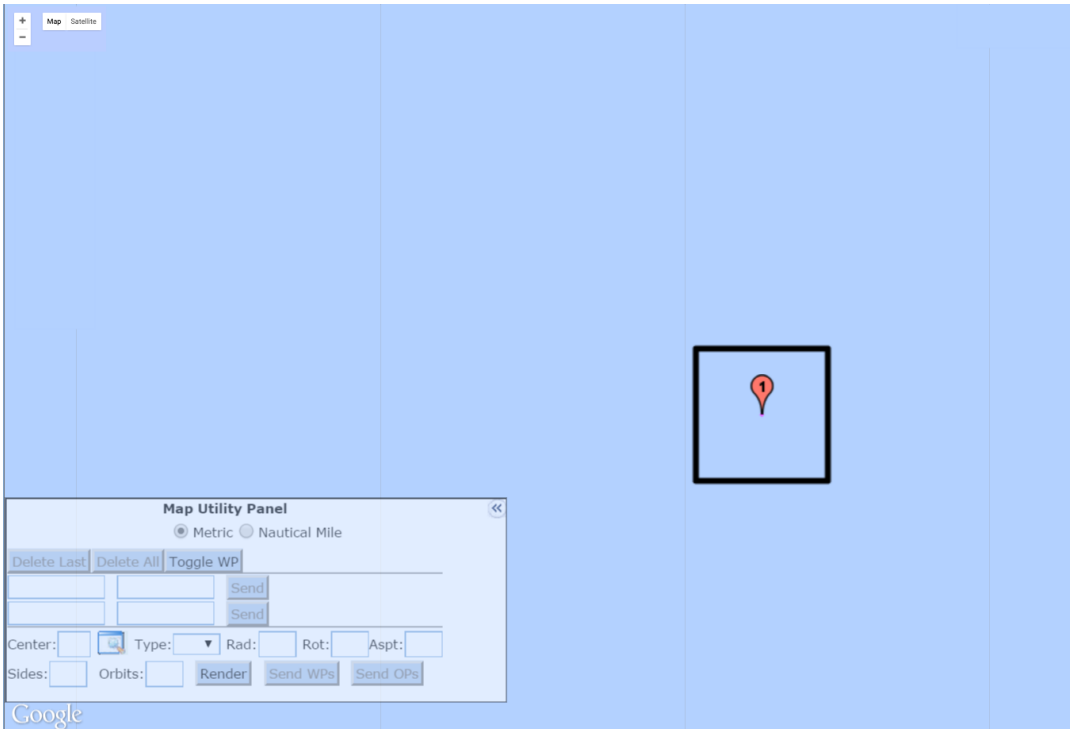
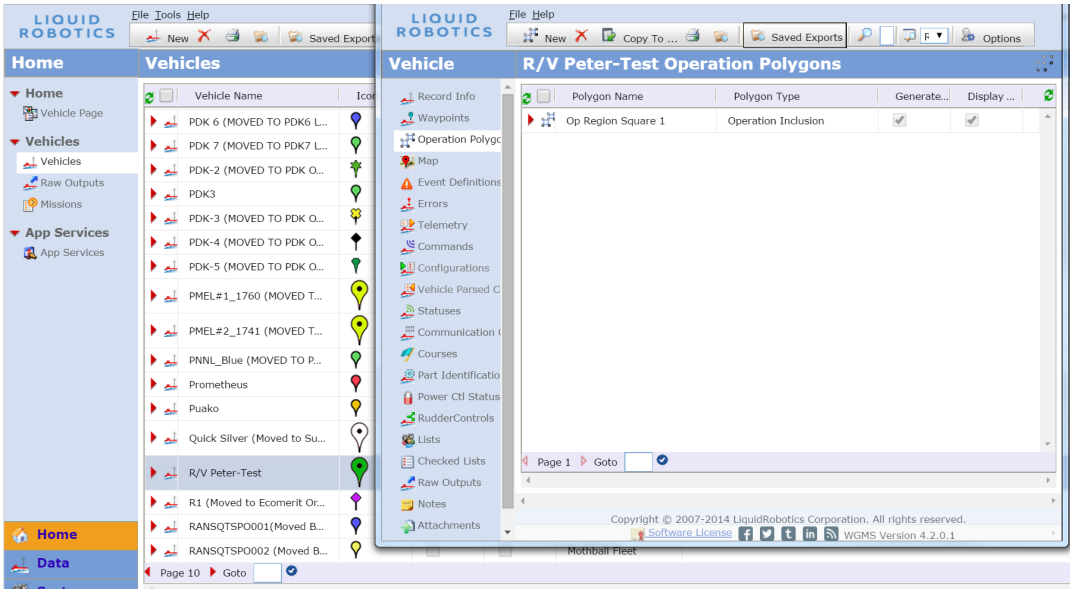
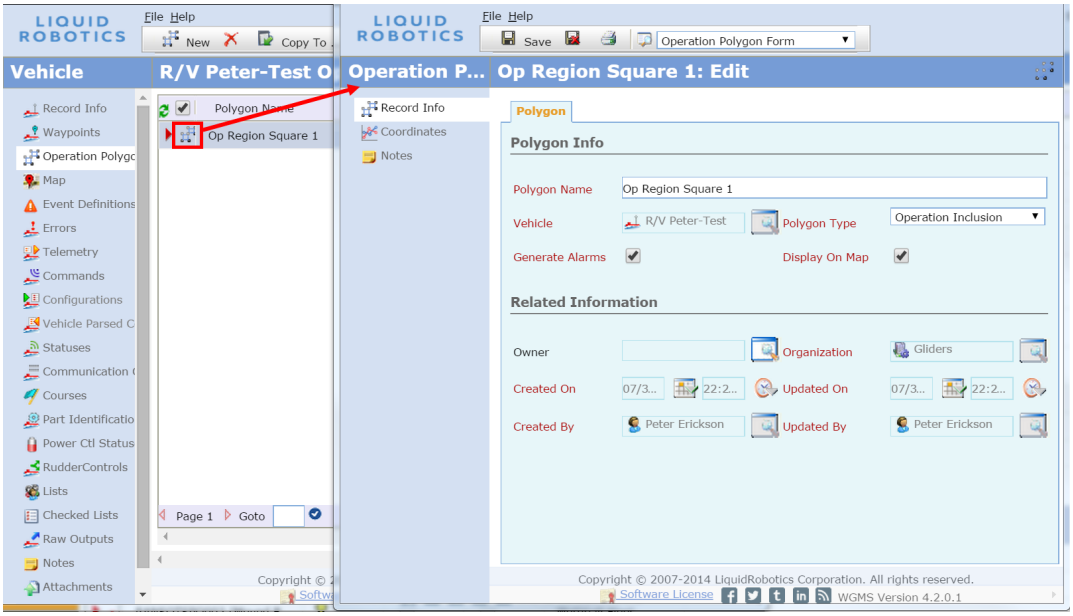


Figure 4.99. Example: Op Region 44 Added to Vehicle Operation Polygons List



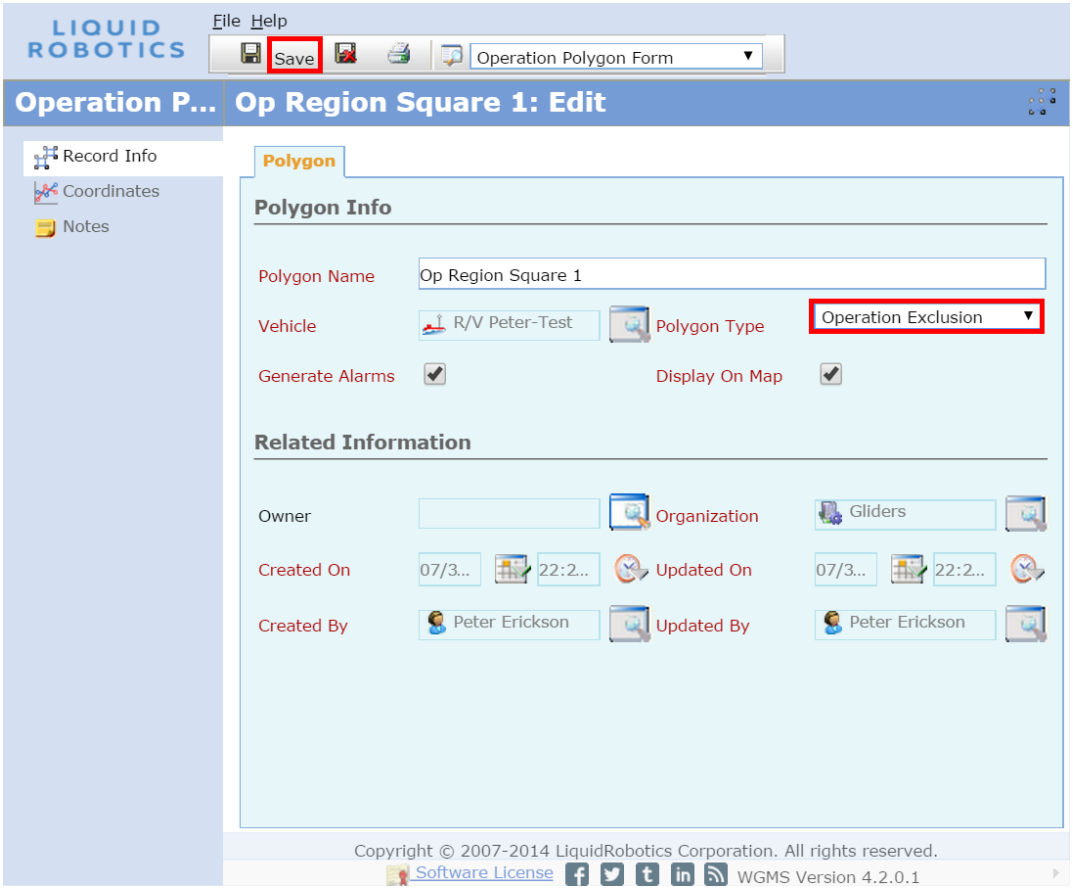
4. By default, Operation Polygons are saved as Inclusion Zones. If an Exclusion Zone is what you wanted, you can make edits from the Operation Polygons list for the Vehicle by clicking on the icon next to the Operation Polygon name to open the edit form for that Operation Polygon.

Figure 4.100. Example: Operation Polygon Edit Form - Default Inclusion Zone



5. Select **Operation Exclusion** from the drop-down menu in the **Polygon Info** section of the **Op Region: Edit** form. Then click **Save** in the toolbar. Note that Generate Alarms is not checked by default, and must be checked in order for the vehicle to generate alarms.

Figure 4.101. Example: Operation Polygon Edit Form - Change to Exclusion Zone



6. The edited Operation Polygon will appear as an Exclusion Zone in the Vehicle Operations Polygons list, and the lines that define the Operation Polygon in the Position Map will be red.

Figure 4.102. Example: Operation Polygon Saved as Exclusion Zone

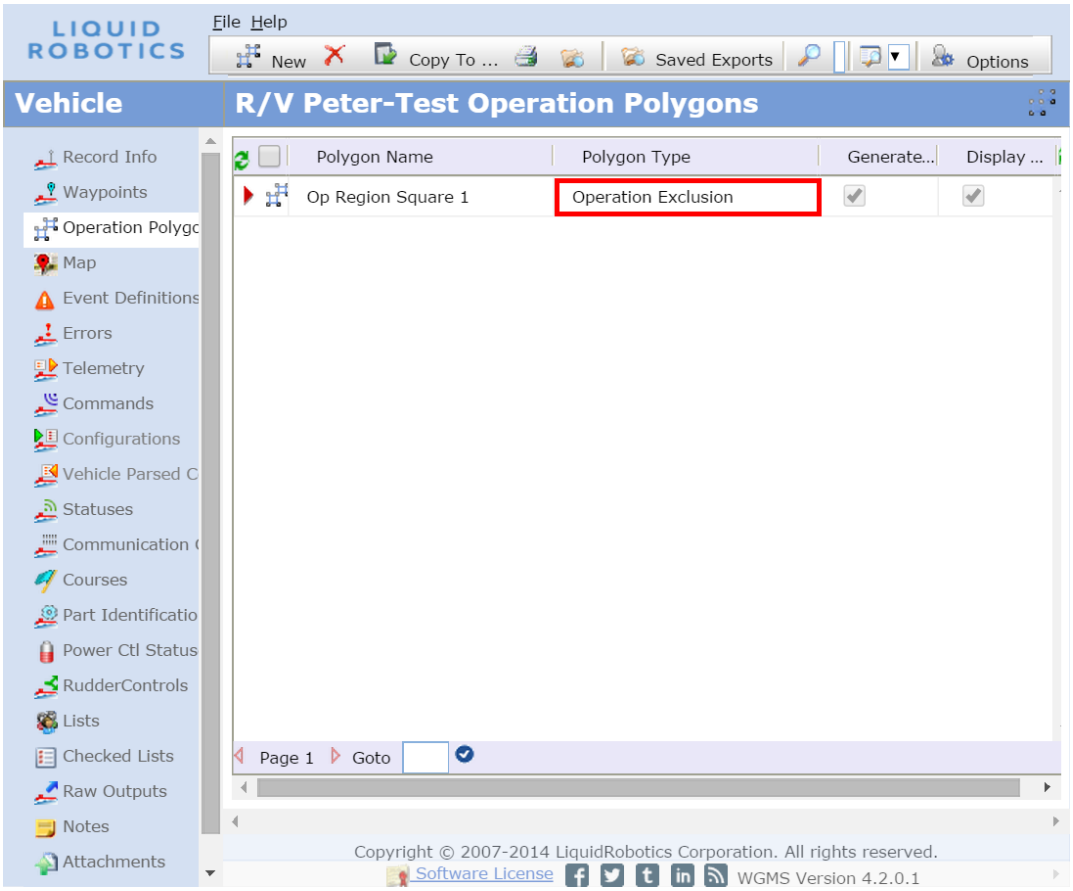
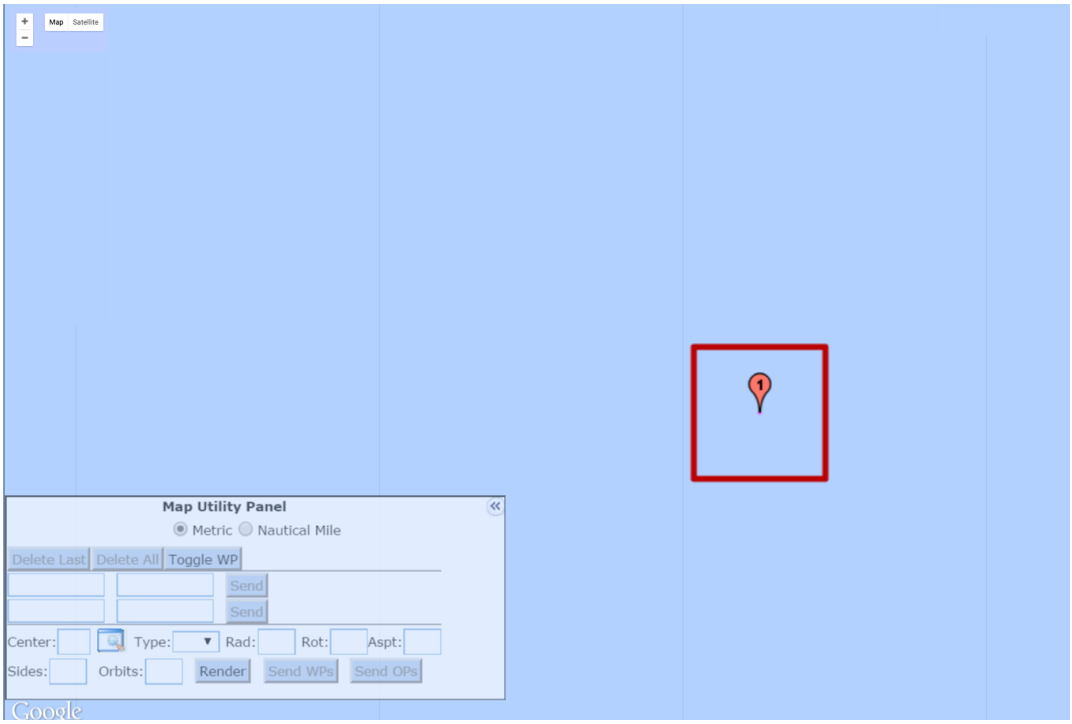


Figure 4.103. Example: Circular Exclusion Zone

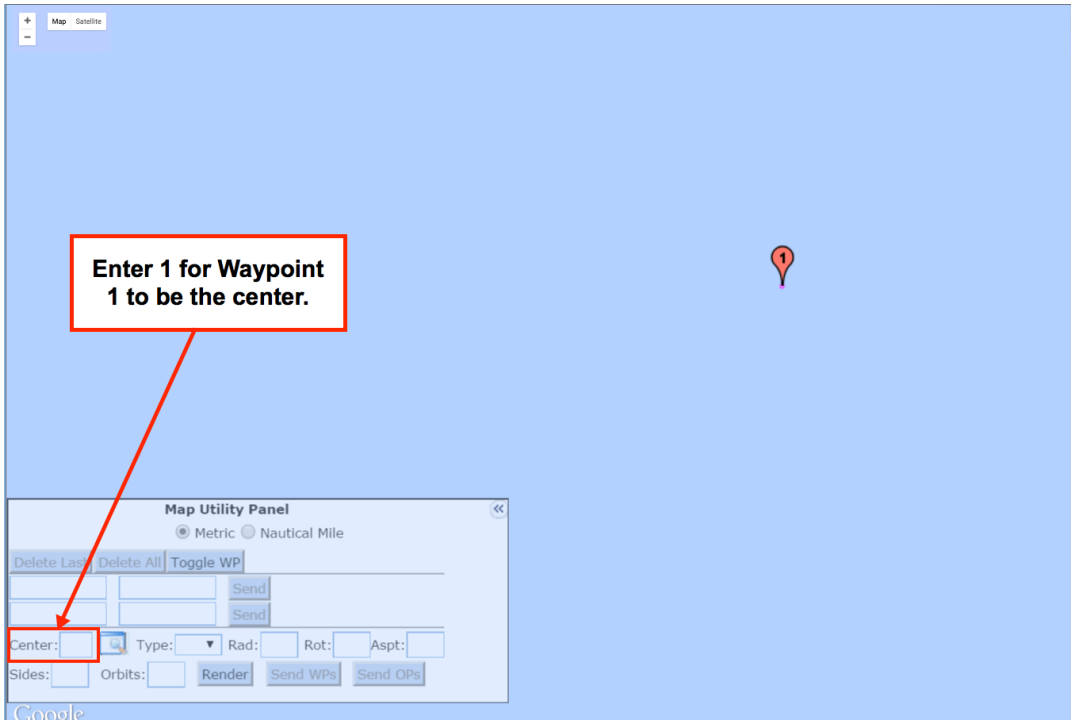


If you want to delete an Operation Polygon from the Vehicle Operation Polygons list, open the Op Region Edit form for the vehicle and select the row containing Operation Polygon you want to delete (selected row will be highlighted), then click on the icon. A delete confirmation dialog box will appear. Click **OK** in the delete confirmation dialog box to complete the Operation Polygon deletion.

Create a Spiral Course

In this example, the **Metric** radio button is selected and one waypoint (waypoint 1) has been created for the Vehicle R/V Peter-Test. To create a spiral course, an existing waypoint must be defined as the center of the spiral.

Figure 4.104. Creating a Spiral Course with Waypoint 1 in the Center



1. In the **Map Utility**, enter **1** (for waypoint 1) in the **Center:** field. Waypoint 1 will be the center of the spiral course.

   ### Note

   To view a list of the existing waypoints for the Vehicle, click on the icon next to the **Center:** field to open the Waypoint Lookup list for the Vehicle.

2. Select **Spiral** in the **Type:** drop-down menu.

3. Enter **500** in the **Rad:** field. In this example the radius is 500 meters. For a spiral course, the radius is the distance between the center waypoint (waypoint 1 in this example) and the starting waypoint for the spiral (waypoint 2 in this example).

4. Enter **600** in the **Width:** field. This setting determines the distance (800 meters) between each of the 5 coils.

5. Enter nothing in the **Aspt:** field. This setting determines the aspect ratio of the spiral. By entering nothing, the result will be an aspect ratio of 1, which is the default. You will get the same result if you enter 1 in the **Aspt:** field. If you enter any number greater than 0 or 1, the spiral will become increasingly eliptical, the larger the number.

6. Enter **60** in the **Sides:** field. When you create a spiral course, it is made up of a series of straight lines between waypoints. The **Sides:** field determines how many waypoints will be connected to define the spiral course.

7. Enter **5** in the **Coils:** field. This is the number of 360 degree circuits the Vehicle will make to complete the spiral course.

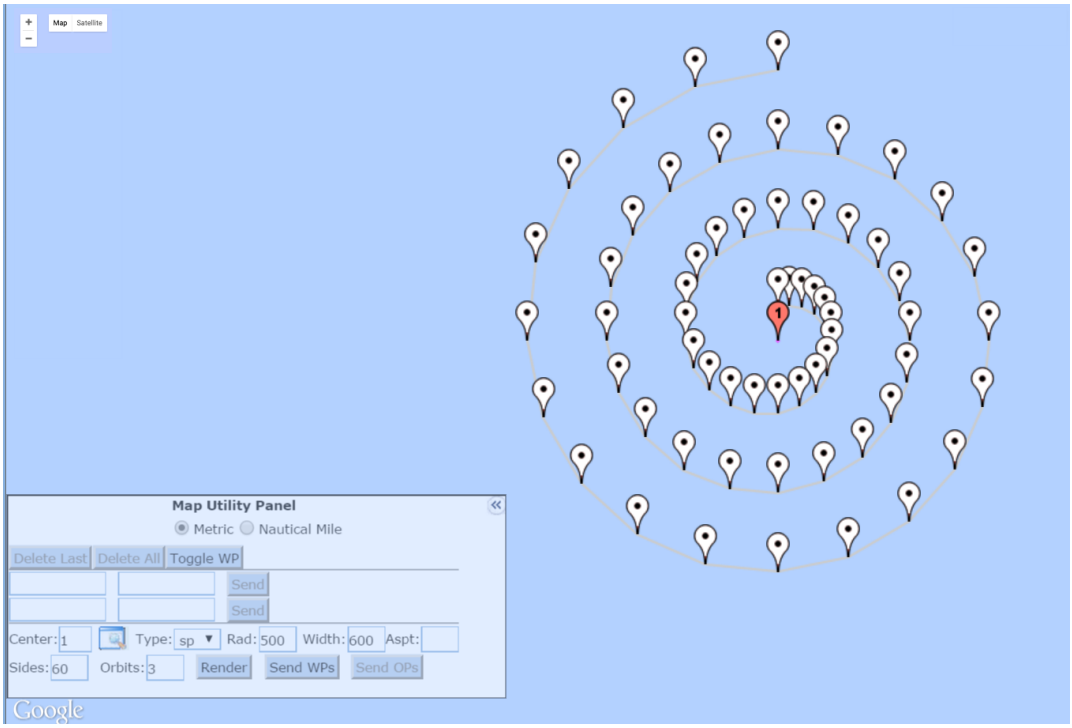
8. Click the **Render** button to display a preview of the spiral course on the Position Map. At this point the waypoints for the spiral course have been defined, but they have not been saved to the Vehicle R/V Peter-Test.

Note

If you want to make any changes, you can edit the parameters in the **Map Utility** and click on **Render** again to display the changes in the Position Map.

If you do not want to edit or save these waypoints, click the **Delete All** button and they will all be removed from the Position Map.

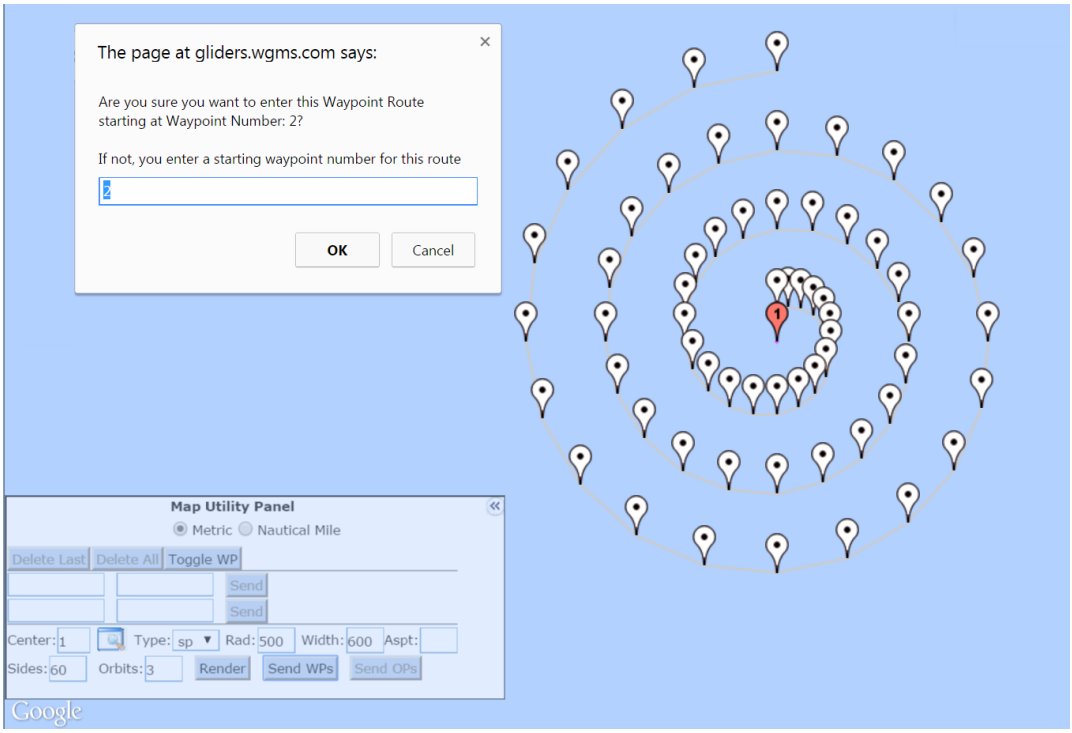
Figure 4.105. Example: Render a Spiral Course



9. If you are ready to save the 60 new waypoints displayed in the preview as a spiral course, click the **Send WPs** button.

When you click the **Send WPs** button, a dialog box will open providing you with an opportunity to change the starting waypoint for the spiral course.

Figure 4.106. Click the Send WPs Button



10. Click **OK** to display the new red waypoints numbered 2 through 62 on the Position Map. They are also automatically added to the Waypoint list for the Vehicle.

Note

You have the option to change the starting waypoint number for the new course you are creating. To do this, enter the waypoint number you want to be the starting point for the course before you click **OK**. By changing the starting waypoint number, the waypoint numbers for the new course will begin at the number you enter and continue consecutively.

Click **OK**, or change the starting waypoint number and click **OK**. The new red waypoints numbered 2 through 62 will be displayed on the Position Map and added to the Waypoint list for the Vehicle.

Figure 4.107. Click the Send WPs Button

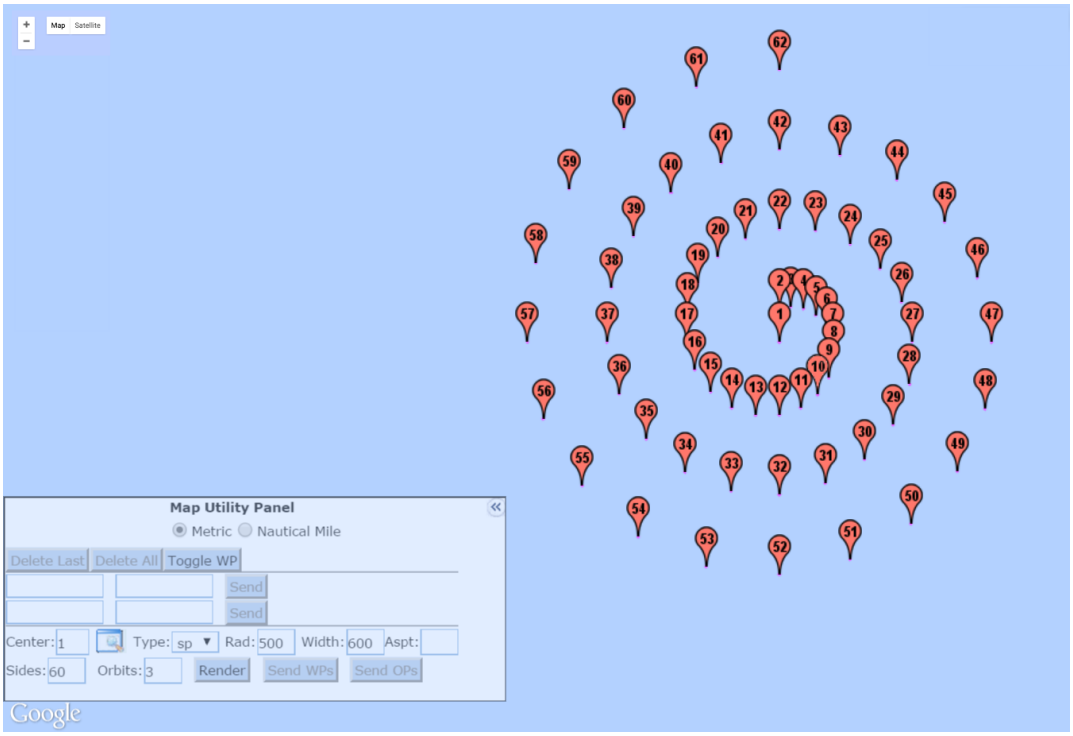
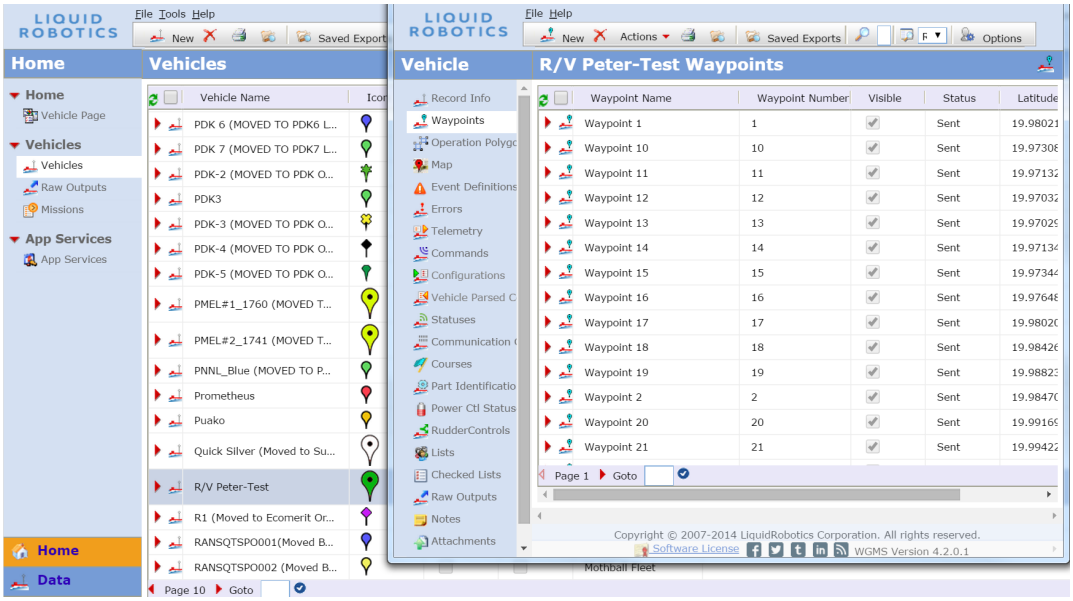


Figure 4.108. New Waypoints Saved to the Vehicle Waypoint List



If you want to delete waypoints from the Vehicle waypoint list, select the rows containing waypoints you want to delete (selected rows will be highlighted), then click on the icon and a delete confirmation dialog box will appear. Click OK in the delete confirmation dialog box to complete the waypoint deletion.

Using the Piloting Panel

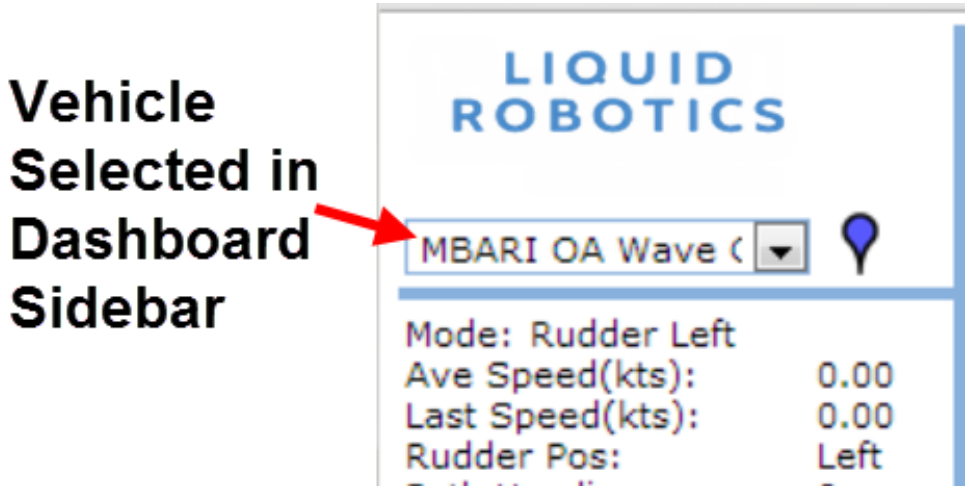
The **Piloting Panel** has two functions:

- Quickly calculates the headings that the selected Vehicle is capable of following and its expected speed over ground (SOG), based on currents data and water speed calculations.

> **Note**
>
> If the Vehicle water speed sensor is not functioning, the **Piloting Panel** will not be able to calculate headings.

- Quickly centers the Position Map on a specific waypoint, or on the most recent telemetry crumb indicating the selected Vehicle location.

Figure 4.109. The Selected Vehicle

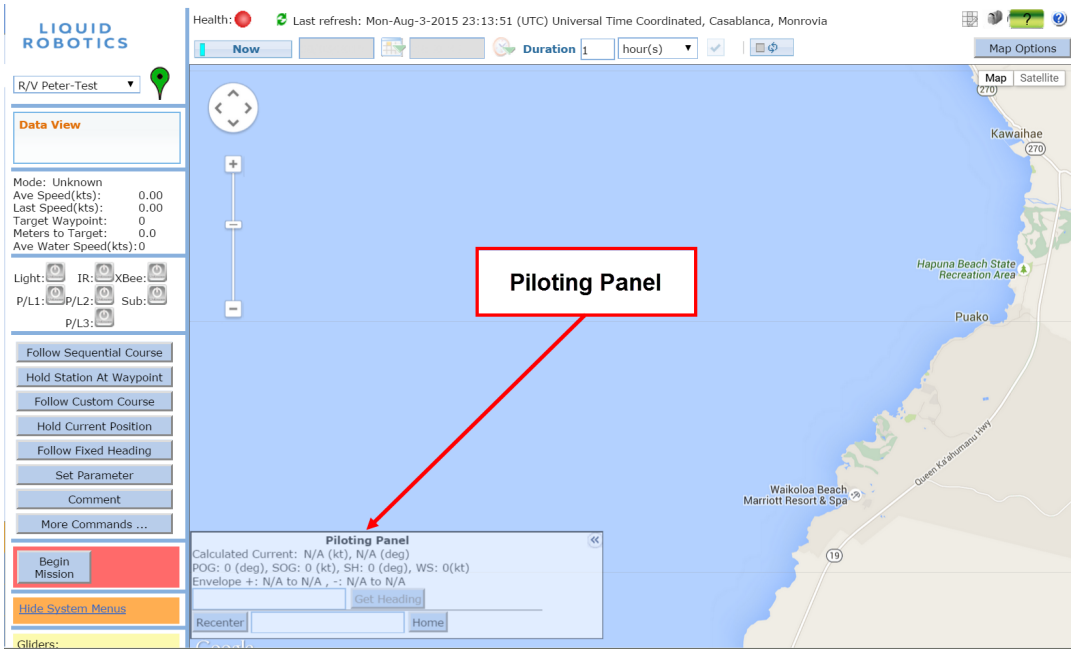


To display the **Piloting Panel**:

1. Click the **Map Options** button in the **Position Map** toolbar to open the **Map Options** dialog box.
2. Click on the **Tool Options** tab.
3. Select the **Piloting Panel** check box.
4. click on **Set Defaults**.
5. Refresh the Position Map (click the green refresh icon in the Position Map toolbar) to display the **Piloting Panel.**.

The **Piloting Panel** appears on the lower left side of the Position Map. You can hide the **Piloting Panel** by clicking on the « icon.

Figure 4.110. Piloting Panel Displayed on Position Map



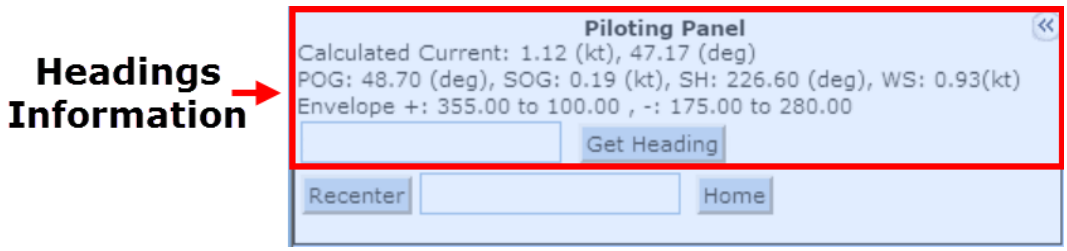
Using the Piloting Panel for Vehicle Headings Information

The **Piloting Panel** provides information on the range of headings that the selected Vehicle can follow based on ocean currents and water speed data.

Note

The Piloting Panel relies on the Water Speed Sensor to calculate currents. The Water Speed sensor must be turned ON and functioning properly for the piloting panel to work properly.

Figure 4.111. Piloting Panel - Headings Information



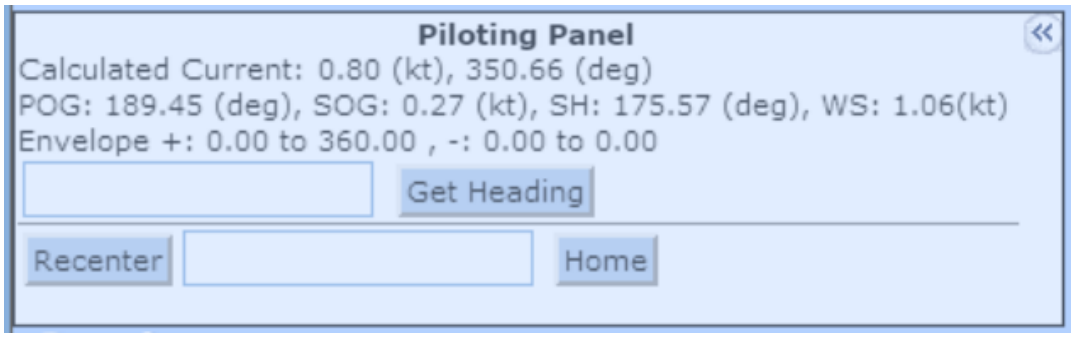
When the Vehicle speed sensor is operating, the **Piloting Panel** displays the following information:

- **Calculated Current** - the speed (knots) and direction (degrees) of the current where the Vehicle is located.
- **Path Over Ground (POG)** - the path over ground that the vehicle is following (in degrees).
- **Speed Over Ground (SOG)** - the Vehicle speed over ground (in knots).

- **Sub Heading (SH)** - the heading that the Sub component of the Vehicle is following (in degrees). The POG and the SH are not necessarily the same.
- **Water Speed (WS)** - the Vehicle speed over water (in knots).
- **Envelope** - the range of headings that the **Piloting Panel** is able to predict Vehicle performance for (in degrees).

In Figure 4.112, the **Envelope** calculated by the **Piloting Panel** is **+: 0.00 to 360.00, -: 0.00 to 0.00** indicating that the Vehicle will be able to make positive speed over ground on any heading between 0 and 360 degrees.

Figure 4.112. Example: Piloting Panel Envelope 360 Degrees Positive

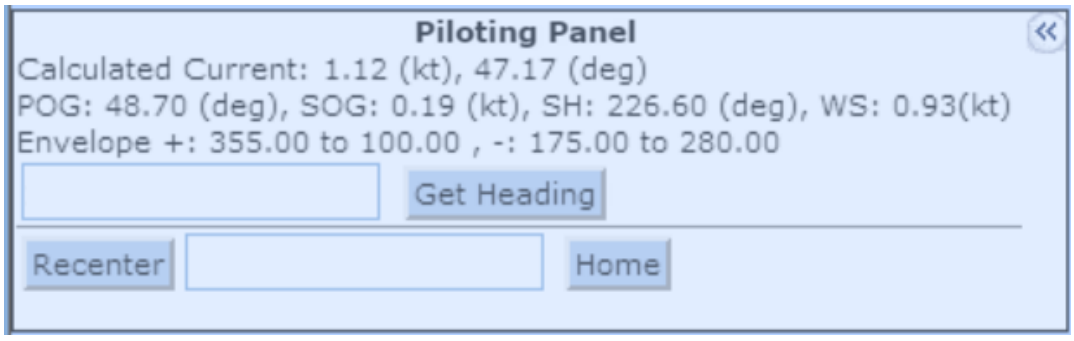


In Figure 4.113, the **Envelope** calculated by the **Piloting Panel** is **+: 355.00 to 100.00, -: 175.00 to 280.00**.

The **+: 355.00 to 100.00** indicates that the Vehicle will be able to make positive speed over ground on any heading between 355 and 100 degrees.

The **-: 175.00 to 280.00** indicates that the Vehicle will not be able to overcome the current, resulting in a negative speed over ground on any heading between 175 and 280 degrees.

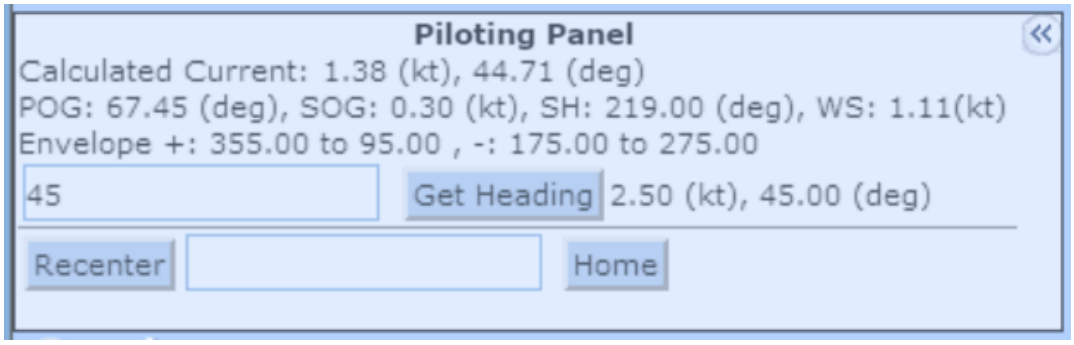
Figure 4.113. Example: Piloting Panel Envelope Positive and Negative



If you enter a heading between 355 and 100 degrees in the **Get Heading** field and click the **Get Heading** button, the **Piloting Panel** will display the heading the Vehicle needs to be follow to actually achieve the heading you entered, taking the current and other variables into account. The **Piloting Panel** will also display the calculated speed over water for the Vehicle on that heading.

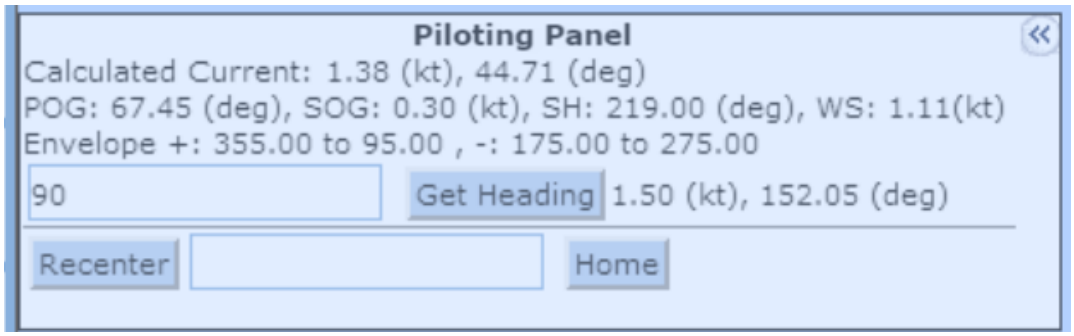
For example, when a heading of 45 degrees is entered, the **Piloting Panel** calculates that the Vehicle will follow a 45 degree heading when it is commanded to follow a 45 degree heading and it will do so at a speed over water of 2.5 knots. In this example, the Vehicle is taking advantage of the current.

Figure 4.114. Example: Get Heading For 45 Degrees



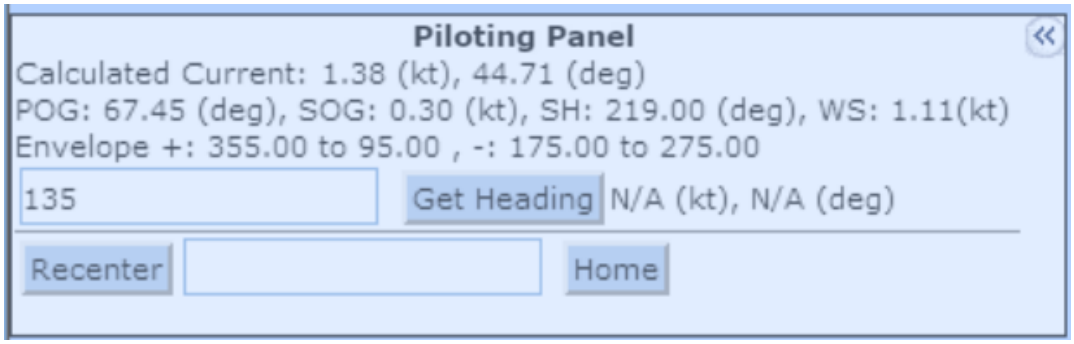
When a heading of 90 degrees is entered, the **Piloting Panel** calculates that the Vehicle will follow a 90 degree heading when it is commanded to follow a 152.05 degree heading, and it will do so at a speed over water of 1.5 knots. In this example the Vehicle is impacted by the current.

Figure 4.115. Example: Get Heading For 90 Degrees



When a heading of 135 degrees is entered, the **Piloting Panel** indicates that a calculated heading and speed over water is not available (N/A). This is expected, because 135 degrees is not a heading that is included in the calculated **Envelope**. A close examination of the calculated **Envelope** shows that headings between 95 and 175 degrees, as well as headings in the range between 275 and 355 degrees, are not included. This means WGMS did not have sufficient data to predict Vehicle behavior on these headings.

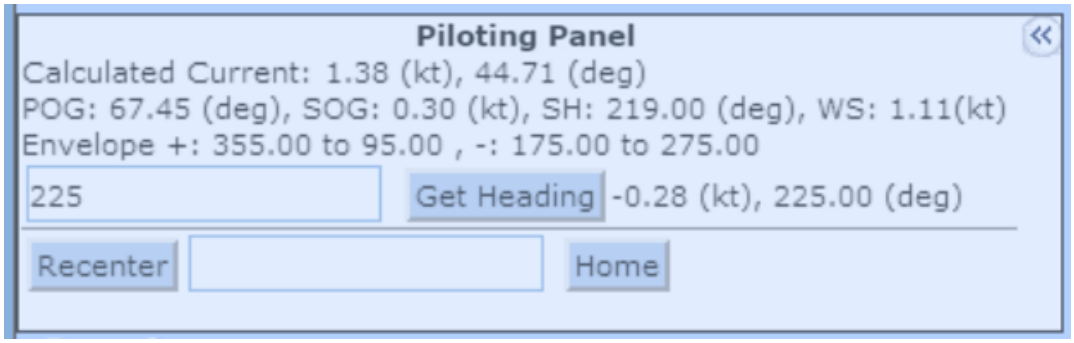
Figure 4.116. Example: Get Heading For 135 Degrees



When a heading of 225 degrees is entered, the **Piloting Panel** calculates that the Vehicle will follow a 255 degree heading when it is commanded to follow a 225 degree heading, but it will do so at a speed

over water of -0.28 knots (negative 0.28 knots). In this example, the Vehicle is able to maintain a 225 degree heading, but it is not able to overtake the current.

Figure 4.117. Example: Get Heading For 225 Degrees



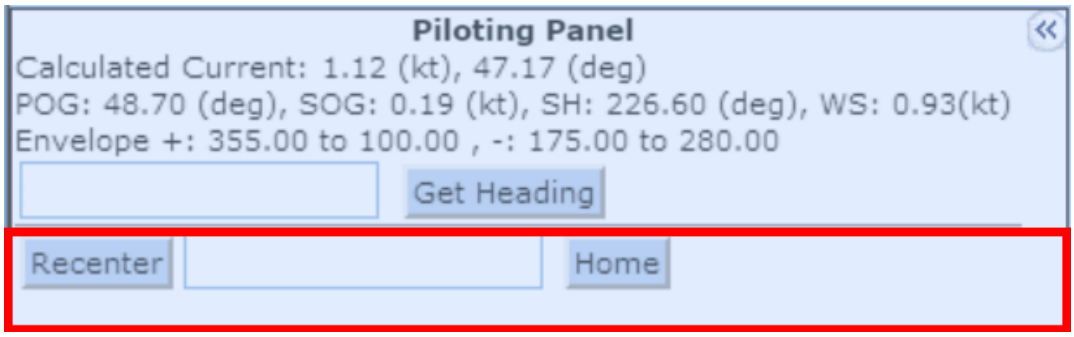
Note

If the Vehicle speed sensor is not functioning, the **Get Heading** button on the **Piloting Panel** will be grayed-out. The **Piloting Panel** cannot provide headings information unless the Vehicle speed sensor is operating.

Using the Piloting Panel to Center the Position Map

The **Piloting Panel** can quickly center the Position Map on a specific waypoint, or on the most recent telemetry crumb indicating the selected Vehicle location.

Figure 4.118. Piloting Panel Displayed on Position Map



To recenter the Position Map on a specific waypoint: Enter the waypoint number in the **Recenter** field and click **Recenter**.

For example, when you enter waypoint number 251 and click on **Recenter** the display shifts to place waypoint 251 in the center of the Position Map.

Figure 4.119. Enter Waypoint 251 in the Recenter Field

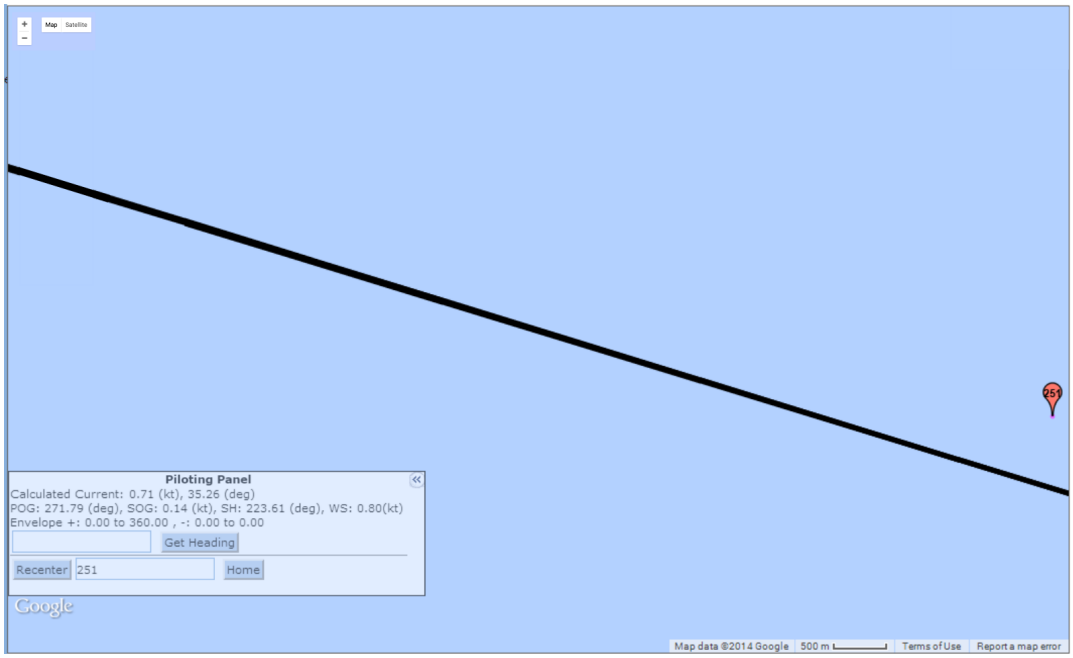
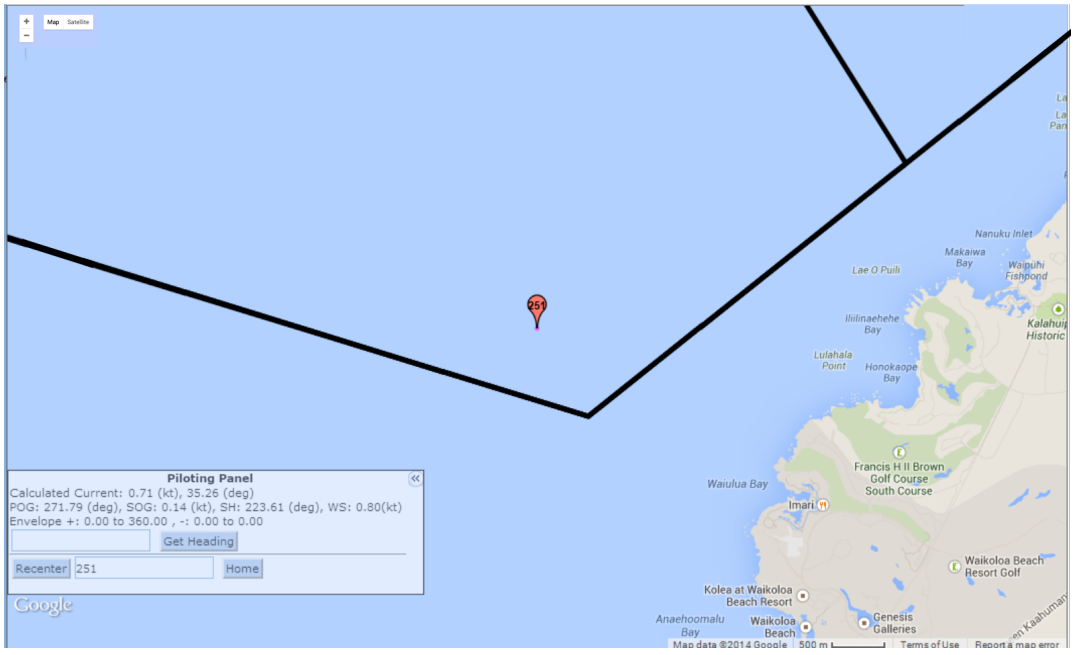


Figure 4.120. Click Recenter to Center the Position Map



To center the Position Map on the most recent telemetry crumb indicating the current location of the selected Vehicle: Click the **Home** button.

For example, with Captain America as the selected Vehicle, when you click on the **Home** button the display shifts to place the most recent Captain America telemetry crumb in the center of the Position Map.

Figure 4.121. Click Home to Center the Position Map

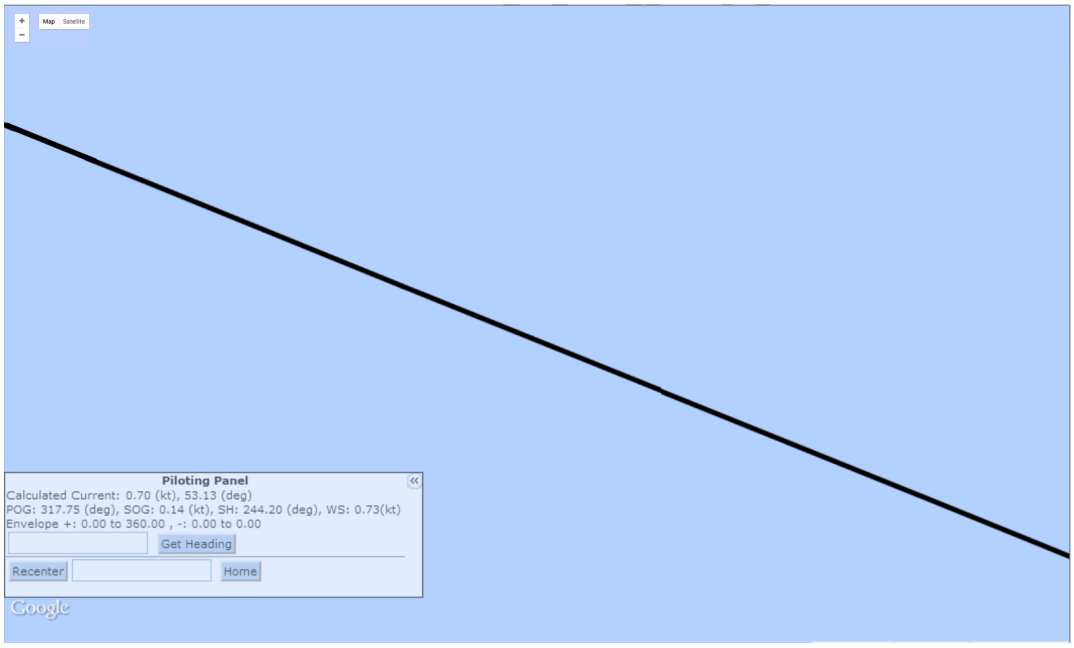
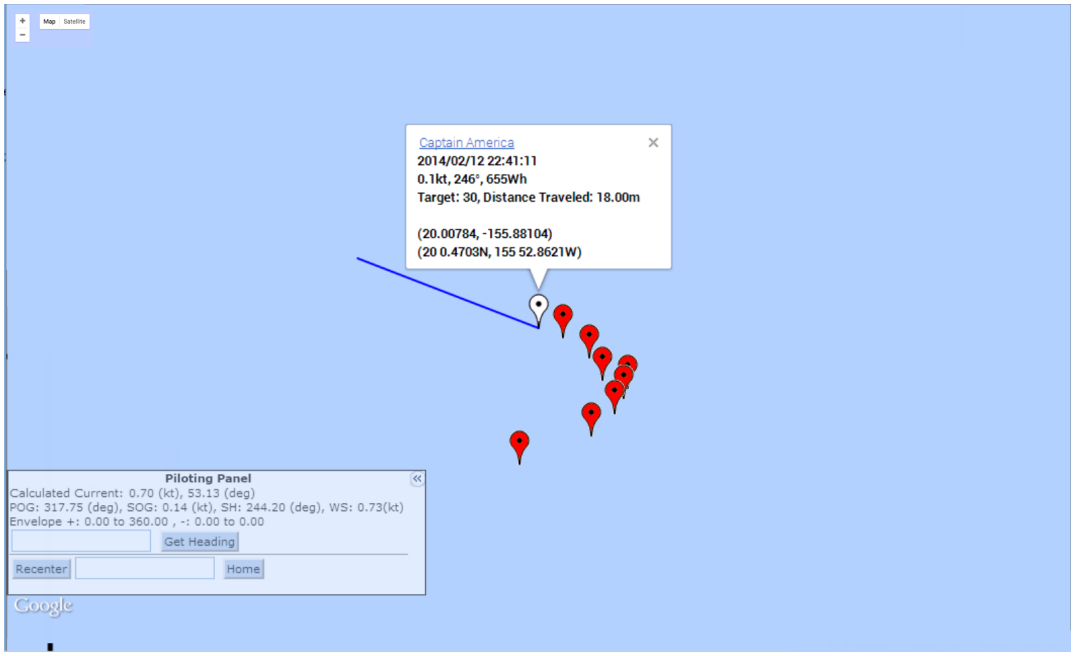


Figure 4.122. Position Map Centered on the Most Recent Location of the Selected Vehicle



Using the Dashboard Sidebar

The Dashboard sidebar provides easy access to frequently used piloting information and commands. The primary difference between the SV3 and SV2 Dashboard sidebars is the SV3 Commands button, which is available on SV3 vehicles only, and the default Vehicle Statistics that are displayed.

Figure 4.123. WGMS SV3 Dashboard Side-Bar

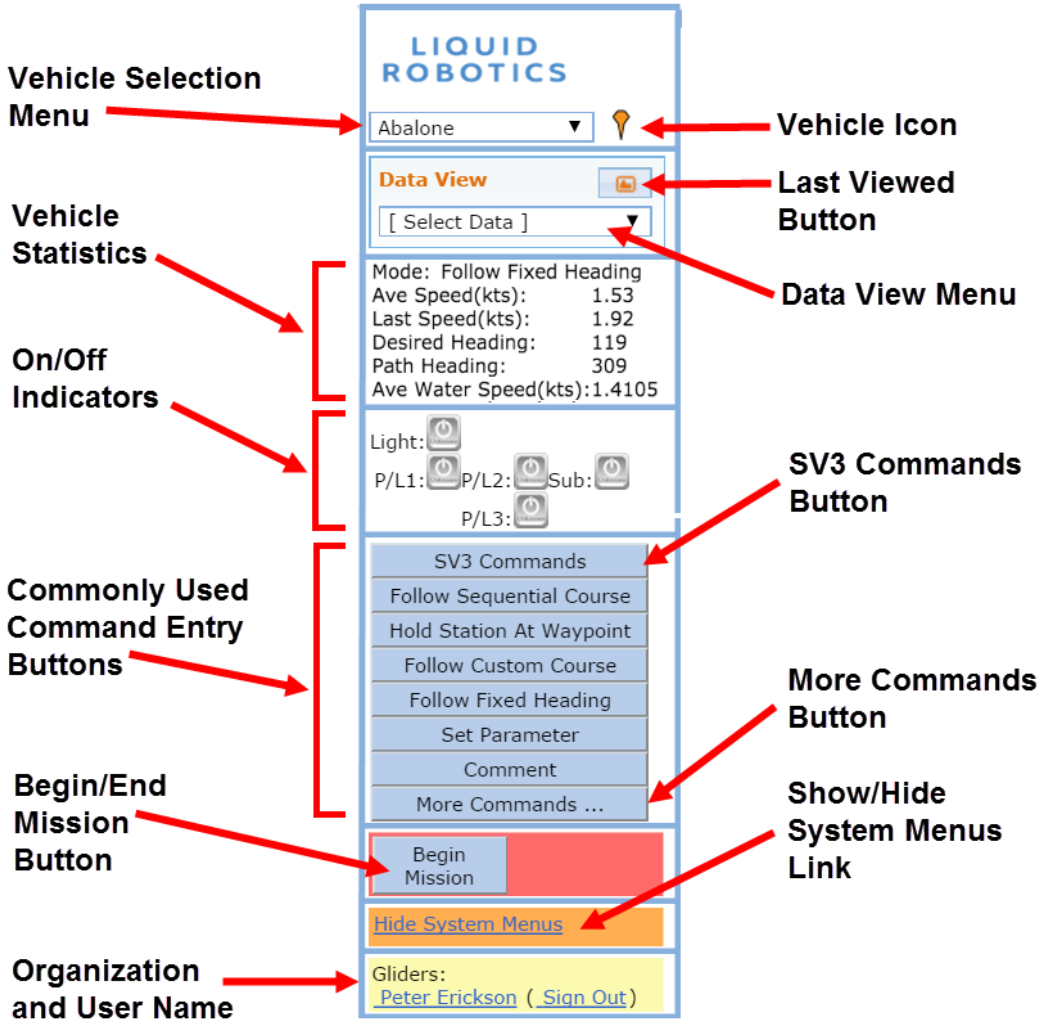
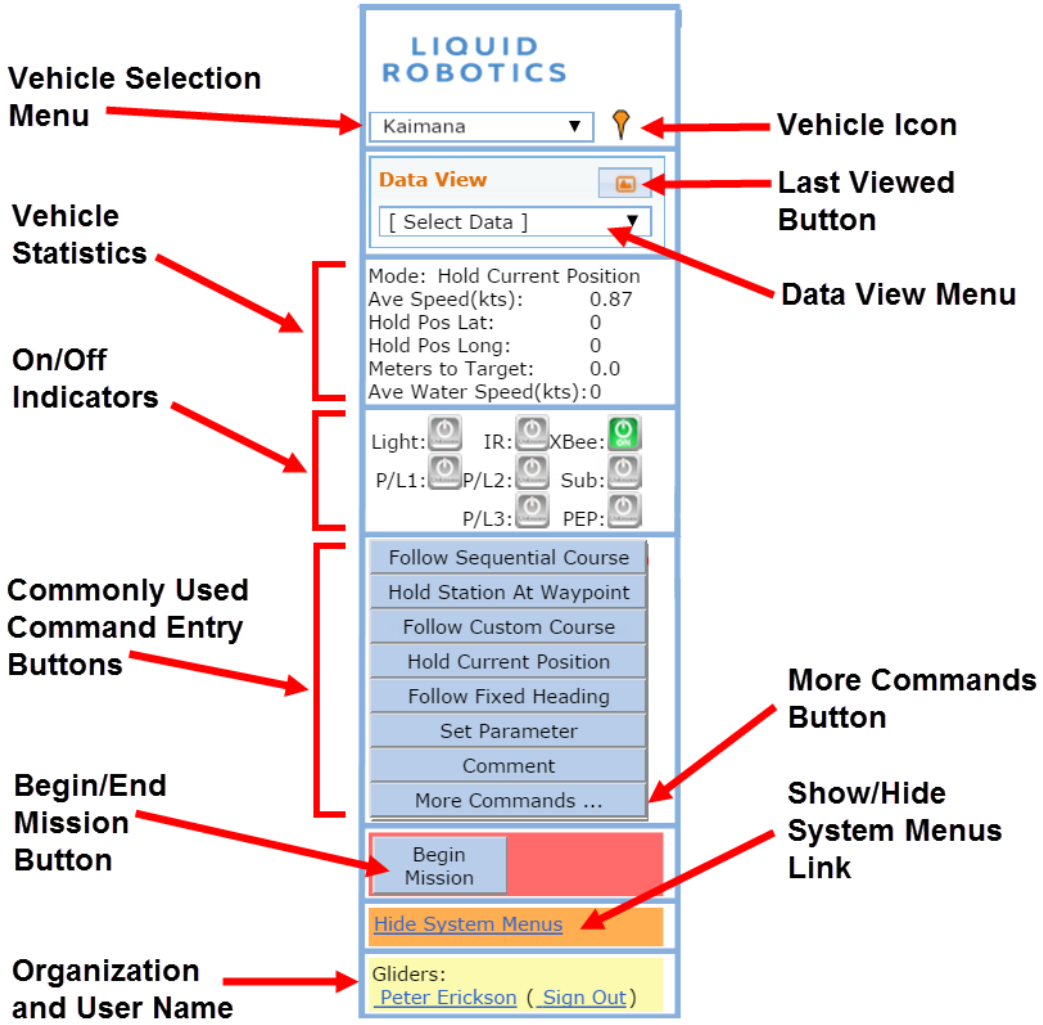


Figure 4.124. WGMS SV2 Dashboard Side-Bar



- **Vehicle Selection Menu** - This is where you select the vehicle that you want to issue commands to, or display and export data from.
- **Vehicle Icon** - The icon associated with the selected vehicle is displayed here - if you click on it, the Vehicle page for the selected vehicle will open.
- **Last Viewed Button** - Click on this button to open a Custom Report for the data type most recently viewed. For more information see: “Data View Page - Custom Reports ” (page 141)
- **Data View Menu** - Use this drop-down menu to open a Custom Report for the selected data type. For more information see: “Data View Page - Custom Reports ” (page 141)
- **Vehicle Statistics** - A list of statistics for the selected vehicle that are frequently used by Pilots when making navigation decisions.
  - **Mode** - The last command that was issued to the selected vehicle.
  - **Ave Speed(kts)** - The selected vehicle's average speed over ground (in knots).

  - **Last Speed(kts)** - The selected vehicle's speed over ground reported in the last telemetry broadcast (in knots).
  - **Target Waypoint** - The next waypoint in the selected vehicle's course. Unless you issue any navigation command other than Follow Sequential Course, a target waypoint of 255 will be displayed.
  - **Meters to Target** - The distance in meters in a straight line between the selected vehicle and the next waypoint in the course (at the time of the most recent telemetry broadcast).
  - **Ave Water Speed(kts)** - The selected vehicle's speed over water (in knots). The water speed sensor must be turned ON. If it is turned off, a water speed of 0 will be displayed.

- **On/Off Indicators** - Indicate if devices are powered on (green icon), or off (grey icon). The icons that appear in the Dashboard sidebar depend on the selected vehicle and its configuration. The following list includes all possible icons:
  - Light: Indicates if the marker light on the weather station mast is turned on.
  - IR: Indicates if the Iridium modem is powered on (SV2 only).
  - XBee: Indicates if the XBee modem is powered on (SV2 only).
  - P/L1: Indicates if payload 1 is powered on.
  - P/L2: Indicates if payload 2 is powered on.
  - P/L3: Indicates if payload 3 is powered on.
  - PEP: Indicates if the Payload Extra Power port is in use (SV2 only).
  - Sub: Indicates if power is being supplied to the Sub payload (the rudder is always powered on).
- **Commonly Used Command Entry Buttons** - Each of these buttons brings up a pre-configured command dialog where you can issue the command named on the button to the vehicle selected in the Vehicle Selection Menu, with a minimum of mouse clicks and key strokes.
- **SV3 Commands Button** - Opens a window that includes commands associated with SV3 services, devices, and payloads. This button appears only when an SV3 Vehicle is selected in the Vehicle Selection Menu. For more information see “SV3 Commands Window” (page 161)
- **More Commands Button** - Opens a Command Form with a drop-down menu where you can select and issue any command that is not an "SV3 only" command. To issue commands that are available to SV3 vehicles only, click on the SV3 Commands button.
- **Begin/End Mission Button** - Opens a dialog where you can select an existing (pre-configured) mission for the selected vehicle to join, or create a new mission for the selected vehicle.
- **Show/Hide System Menus Link** - Click on **Show System Menus** to open the full WGMS Home page, which includes the WGMS Dashboard. Click on **Hide System Menus** to display the WGMS dashboard only.
- **Organization and User Name** - Lists the name of the WGMS Organization you are logged into and the user name you logged in with. If you click on the user name, a User Form will open displaying information about the user. Your ability to edit fields in the User Form depends on the Role you are assigned in the WGMS Organization. You can click on **Sign Out** to log out.

Communications Log

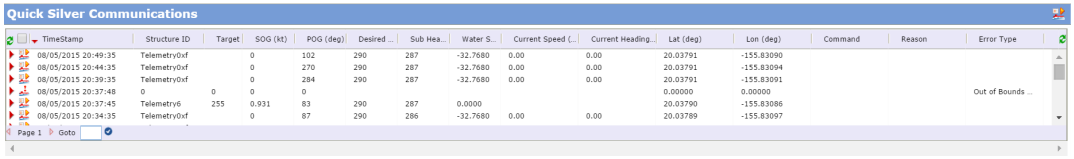
The Communications Log is located directly below the Position Map on the WGMS Dashboard. The Communications Log lists:

- All telemetry received from the selected Vehicle
- All commands sent to the selected Vehicle.
- All error messages received from the selected Vehicle

Note

The time frame for the data displayed in the Communications Log is based on the time frame settings in the **Position Map** toolbar. For information on changing the time frame see "Specifying the Data Time Frame" (page 70).

Figure 4.125. Communications Log



The following telemetry data received from the selected Vehicle is displayed in the Communications Log:

- **Time Stamp** - The time when the telemetry was received by WGMS. (If the row contains command information, this will be the time when the command was sent from WGMS. If the row contains error information, this will be the time when the error information was received by WGMS.)
- **Structure ID** - The type of communication protocol sturcture followed by its hex identifier, for example, Telemetry 0xf, or Telemetry 6.
- **Target** - The next waypoint in the course the selected Vehicle is following - this will be 255 if the vehicle is holding station, or on a custom course.
- **SOG (kt)** - The selected Vehicle's speed over ground in knots.
- **POG (deg)** - The actual heading (position over ground) of the selected Vehicle's Float in degrees.
- **Desired Heading (deg)** - The heading set in WGMS for the selected Vehicle (in degrees).
- **Sub Heading (deg) SH** - The actual heading of the selected Vehicle's Sub in degrees.
- **Water Speed (kt) WS** - The selected Vehicle's speed over water in knots - this will display 0, if the water speed sensor is turned OFF.
- **Current Speed (kt)** - The speed of the current impacting the selected Vehicle in knots - this will display 0, if the water speed sensor is turned OFF.
- **Current Heading (deg)** - The direction of the current impacting the selected Vehicle in degrees - this will display 0, if the water speed sensor is turned OFF.
- **Lat (deg)** - The GPS latitude coordinate for the selected Vehicle in decimal degrees.

- **Lon (deg)** - The GPS longitude coordinate for the selected Vehicle in degrees.
- **Command** - The type of command that was issued. The **Command** column in the Communications Log mirrors the **Command** column in the Commands Log.
- **Reason** - A comment associated with the command. Entered by the User when the command was issued (created). The **Reason** column in the Communications Log mirrors the**Command Reason** column in the Commands Log.
- **Error Type** - The type (name) of error that was reported.

Clicking on the red triangle icon at the left end of each row in the Communications Log brings up any additional data sent with the telemetry broadcast.

The icon at the left end of each row in the Communications Log indicates if the row contains telemetry or command data:

- The icon indicates telemetry data. If you click on the icon a Parsed Ouput Form containing additional information about the telemetry will open.
- The icon indicates command data. If you click on the icon, a Command Form containing additional information about the command will open.
- The icon indicates error data. If you click on the icon, an Error Form containing additional information about the error will open.

Commands Log

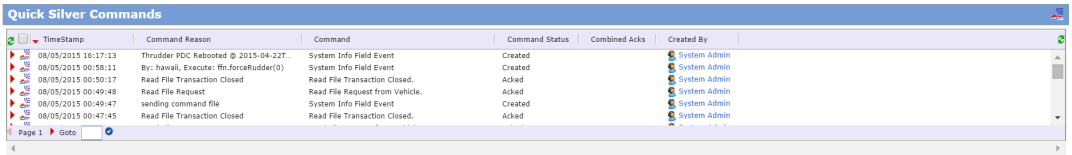
The Commands Log is located directly below the Communications Log on the WGMS Dashboard. The Commands Log lists:

- All commands that have been sent to the selected Vehicle
- The combined ACKs associated with each command - a combined ACK is a single ACK representing the result of all interim ACKs sent as responses to a command that was issued.
- The status of each command received from the selected Vehicle, over the time frame specified in the Position Map toolbar.

Note

The time frame for the data displayed in the Commands Log is based on the time frame settings in the **Position Map** toolbar. For information on changing the time frame see “Specifying the Data Time Frame” (page 70).

Figure 4.126. Commands Log



The following command data for the selected Vehicle is displayed in the Commands Log:

- **Time Stamp** - The time when a command was sent from WGMS, or the time when the status of a command was received from the selected Vehicle.
- **Command Reason** - A comment associated with the command. Entered by the User when the command was issued (created).
- **Command** - The type of command that was issued.
- **Combined Acks** displays a single ACK representing the result of all interim ACKs sent as responses to a command that was issued.
- **Created By** - The person who originated the command.

Clicking on the red triangle icon at the left end of each row in the Commands Log brings up any additional data associated with the command.

The icon at the left end of each row in the Communications Log indicates if the row contains command data. If you click on the icon, a Command Form containing additional information about the command will open.

Data View Page - Custom Reports

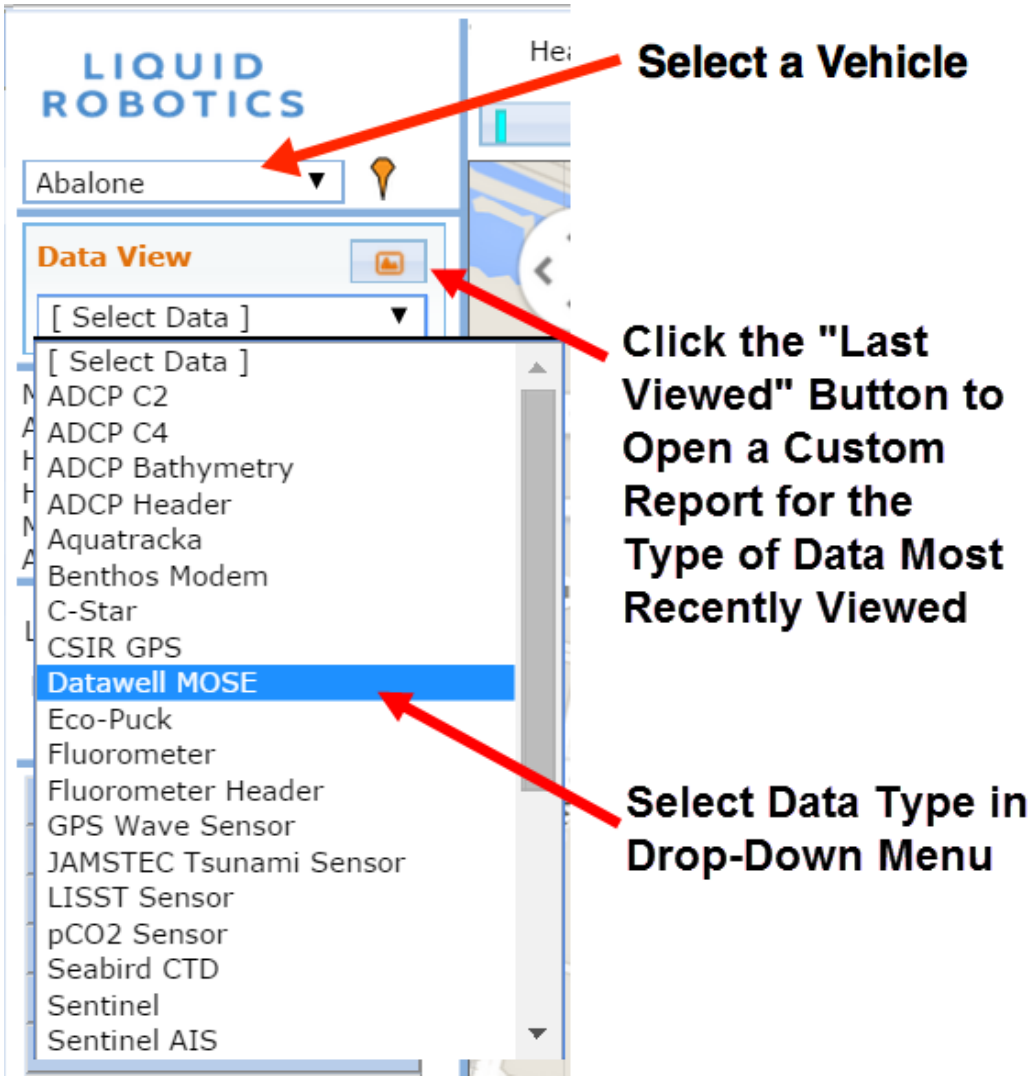
From the WGMS Data View page you can generate custom reports to display data from Wave Glider operations in tabular, graphical, and map formats. A custom report displays data from a specific sensor or payload on a specific vehicle.

The following browsers are supported for viewing custom reports that are generated on the WGMS Data View page:

Browser	Version	Platform	Display
Internet Explorer	11	Windows	Desktop
Firefox	20.0.1 (or later)	Windows, Linux	Desktop
Safari	6.0.4 (or later)	Mac	Desktop
Safari	(latest)	iPhone and iPad with iOS 7.1 only	Mobile (iOS 7.1 and later)
Chrome	26.0.1410.64 m (or later)	Windows, Linux	Desktop
Chrome	(latest)	Android (4.0 or later), iPhone and iPad with iOS 7.1 only	Mobile

To generate a custom report, select a vehicle in the **Vehicle** drop-down menu, then click on the type of data you want to view in the **Data View** drop-down menu located in the WGMS Dashboard sidebar.

Figure 4.127. Selecting a Vehicle and a Data Type



When you click on the data type in the **Data View** drop-down menu, the **Data View** page will open.

When the data type selected in the **Data View** drop-down menu is available for the selected vehicle, an animated loading icon appears temporarily while the data loads, then the **Data View** page displays the data in a tabular custom report format.

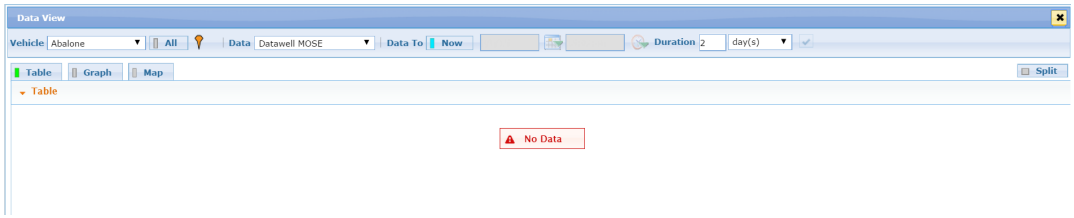
Figure 4.128. Data View Page

PayloadPacketRecordId	TimeStamp	Latitude	Longitude	Hs (m)	Tp (s)	Dp (deg)	Samples	Fs (Hz)	Sample Gaps
20966072	03/17/2016 22:30:00	19.9904	-155.8693	1.0258	8.6768	317.8242	7200	4.0006	0
20965986	03/17/2016 21:30:59	19.9895	-155.8621	1.0660	5.0686	0.5462	7200	4.0006	0
20965936	03/17/2016 21:00:59	19.9949	-155.8621	1.0767	5.7520	201.5117	7201	4.0006	0
20965884	03/17/2016 20:30:59	19.9937	-155.8692	1.0134	6.1678	31.4594	7200	4.0006	0
20965832	03/17/2016 20:00:58	19.9897	-155.8639	1.2611	5.3887	344.0866	7200	4.0006	0
20965780	03/17/2016 19:30:58	19.9964	-155.8640	1.0682	7.8759	219.1399	7201	4.0006	0
20965726	03/17/2016 19:00:58	19.9899	-155.8693	1.2134	5.3887	284.0953	7200	4.0006	0
20965709	03/17/2016 18:30:57	19.9931	-155.8621	1.2769	5.3887	286.2658	7200	4.0006	0
20965684	03/17/2016 18:00:57	19.9964	-155.8690	1.0167	8.6768	328.2786	7200	4.0006	0
20965670	03/17/2016 17:30:57	19.9897	-155.8649	1.1881	5.0686	330.8034	7200	4.0006	0
20965644	03/17/2016 17:00:57	19.9962	-155.8622	1.1320	6.6485	262.2353	7200	4.0006	0
20965616	03/17/2016 16:30:56	19.9927	-155.8692	1.0494	7.2103	241.3468	7200	4.0006	0
20965590	03/17/2016 16:00:56	19.9908	-155.8622	1.1832	3.9079	339.4609	7200	4.0006	0
20965569	03/17/2016 15:30:56	19.9965	-155.8646	1.1545	7.8759	29.1742	7200	4.0006	0
20965547	03/17/2016 15:00:56	19.9897	-155.8684	1.1157	7.8759	321.7948	7200	4.0006	0
20965524	03/17/2016 14:30:55	19.9928	-155.8621	1.0956	4.3019	306.3765	7200	4.0006	0
20965503	03/17/2016 14:00:55	19.9965	-155.8664	1.0711	7.8759	245.1245	7200	4.0006	0
20965484	03/17/2016 13:30:55	19.9897	-155.8672	1.0082	7.8759	305.6053	7200	4.0006	0
20965464	03/17/2016 13:00:55	19.9932	-155.8622	1.0385	4.3019	287.8408	7200	4.0006	0
20965443	03/17/2016 12:30:54	19.9964	-155.8670	1.0571	7.2103	296.0971	7201	4.0006	0

If you have used the **Data View** page previously, you can return to the custom report for the type of data you most recently viewed by clicking on the **Last Viewed** button adjacent to the **Data View** drop-down menu - the **Data View** page will open displaying the most recently viewed custom report for the selected vehicle.

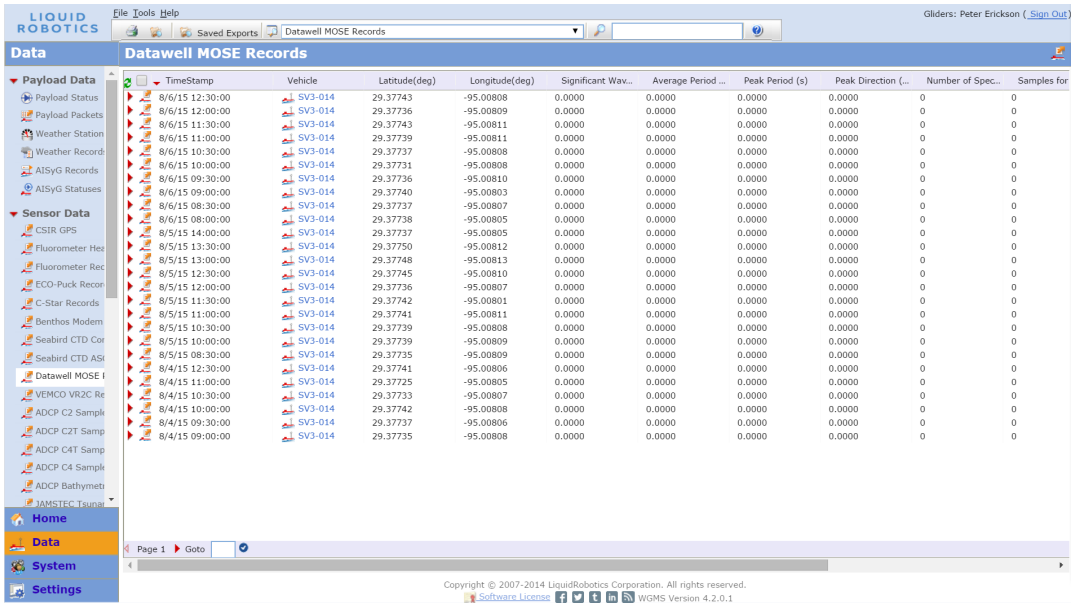
If the **Data View** page opens with a red **No Data** message on a blank page, it means that you have requested a data type that the selected vehicle does not produce, or that the type of data you selected was not generated by the vehicle during the time frame that is set on the **Data View** page toolbar. An explanation of how you can change the time frame settings on the **Data View** toolbar is provided later in this section.

Figure 4.129. Data View Page - No Data Available



If you do not know which vehicles in an Organization are capable of generating the type of data you want to view, open the **Data** page in the **System Menus** sidebar and select the type of data you want to view in the **Sensor Data** menu. If any vehicle in the Organization has generated that type of data, it will appear in the list of System Data records that are displayed. For example, in Figure 4.130 you can see that the vehicle named SV3-014 generated Datawell MOSE data.

Figure 4.130. Datawell MOSE Records

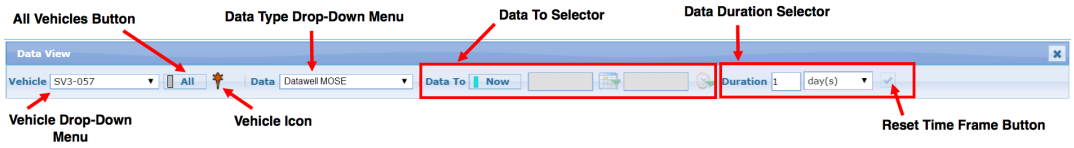


By looking at the data records in the **Sensor Data** menu, you can determine which vehicles in the Organization have generated which types of data, and when that data was generated. This information may make it easier for you to use the **Data View** page successfully.

The **Data View** page has a similar format for most types of data except for the ADCP C2, and the ADCP C4 data types. For information on viewing the ADCP C2 and C4 custom reports, see “ADCP C2 and ADCP C4 Data Display” (page 152).

The toolbar at the top of the **Data View** page includes buttons and menus that allow you to select vehicles, data types and time frames:

Figure 4.131. Data View Page Toolbar



- **Vehicle Drop-Down Menu** - This menu displays the name of the vehicle that generated the data currently displayed. It can also be used to display data from a different vehicle.
- **All** button - Displays the selected type of data from all of the vehicles in the WGMS Organization that generated that type of data within the selected time frame. A gray panel on the left side of the button indicates that it is **OFF**. A turquoise panel on the left side of the button indicates that it is **ON**. See **Data To Selector** (below in this list) for information on time frame settings.
- **Vehicle Icon** - This is the icon associated with the vehicle name that appears in the vehicle drop-down menu.
- **Data Type Drop-Down Menu** - This menu displays the type of data that you selected to be displayed. It can also be used to display a different data type.

- **Data To Selector** - Sets the most recent end of the data display time frame. Includes the **Now** button, a **Date Selector** and a **Time Selector**. The **Data To Selector** is used with the **Data Duration Selector** to determine the time frame for the data display.

  Note

  The time frame settings for the **Data View** page operate similarly to the time frame settings in the **Display Map** toolbar. For more information see "Specifying the Data Time Frame" (page 70).

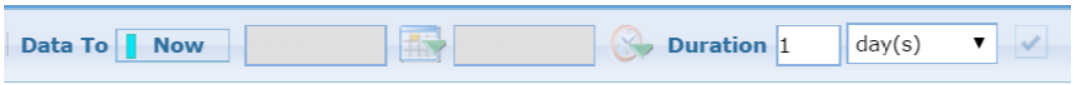
- **Data Duration Selector** - Determines the length of the data display time frame in minutes, hours, or days. The **Data Duration Selector** is used with the **Data To Selector** to determine the time frame for the data display.

  Note

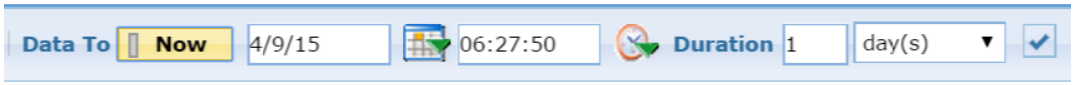
  The time frame settings for the **Data View** page operate similarly to the time frame settings in the **Display Map** toolbar. For more information see "Specifying the Data Time Frame" (page 70).

- **Reset Time Frame Button** - Click on this button to manually refresh the Web page after a change is made to time frame settings for the data display.

In the following example, the data that was generated over the last hour is displayed:



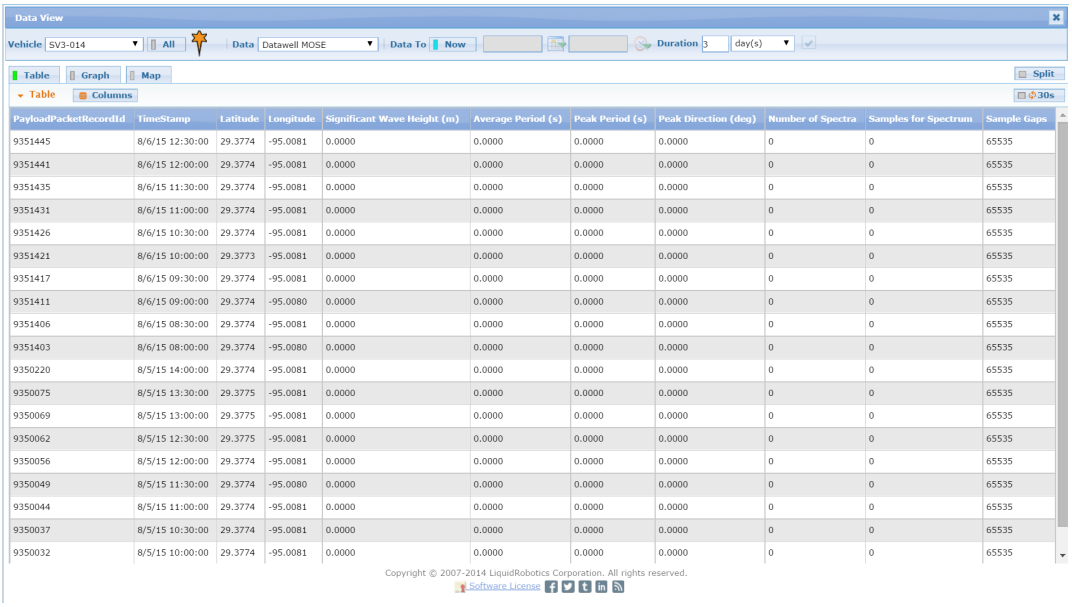
In the following example, the data that was generated over a one day time frame ending on 4/9/15 at 06:27:50 UTC is displayed:



Data View - Table Format

By default, the **Data View** page opens to the **Table** tab. If data is available, a tabular custom report will be generated.

Figure 4.132. Data View - Table Format



For some data types you will need to use the horizontal scroll bar to see all of the columns.

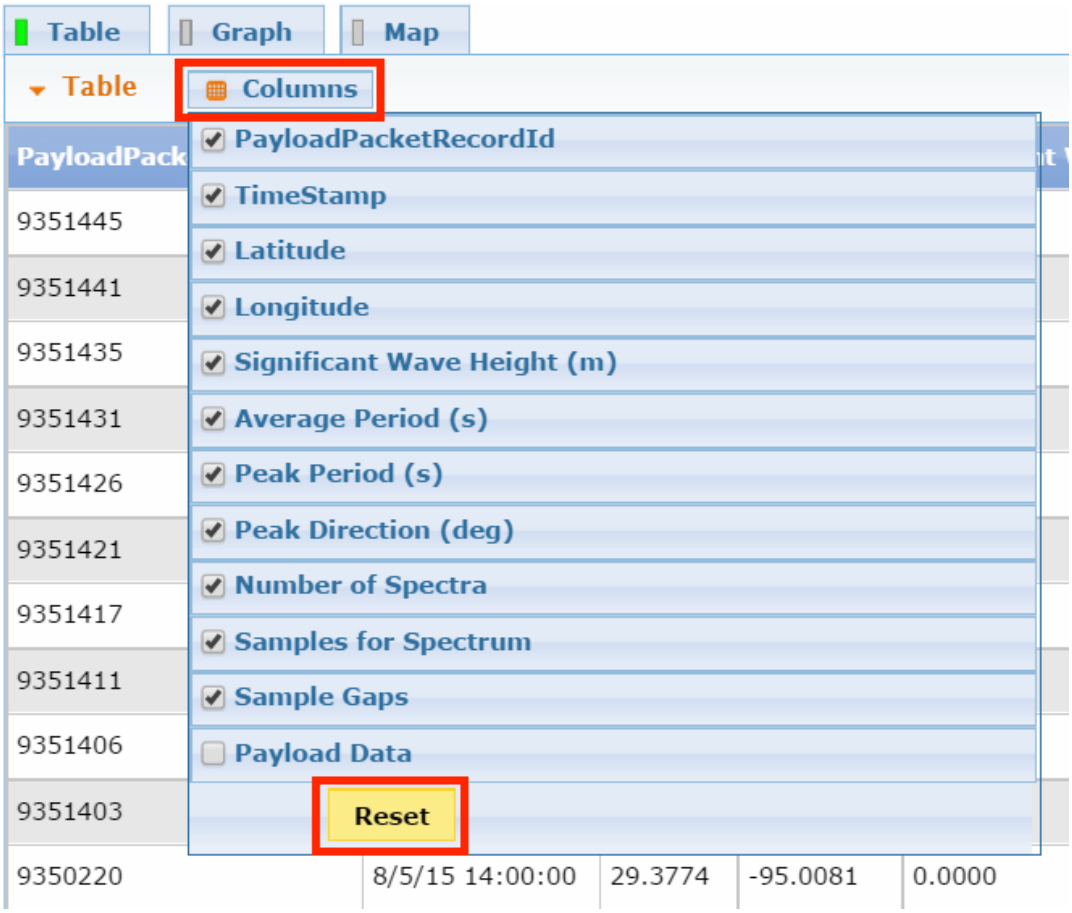
To limit the number of columns displayed:

1. Click on the **Columns** button - a drop-down menu listing the column names will appear with the default columns selected.

2. Un-check the check box next to each column name that you do not want displayed and that column will instantly be removed from the Custom Report.

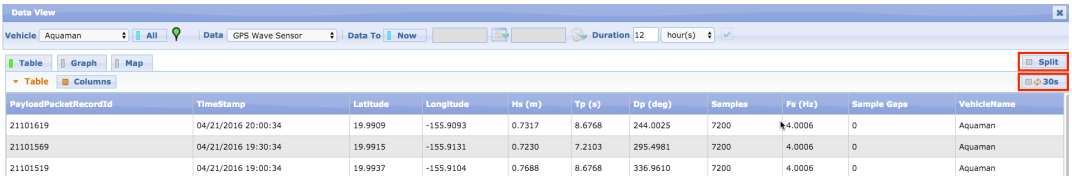
3. To restore the columns that are selected by default, click the **Reset** button.

Figure 4.133. Changing the Columns that are Displayed



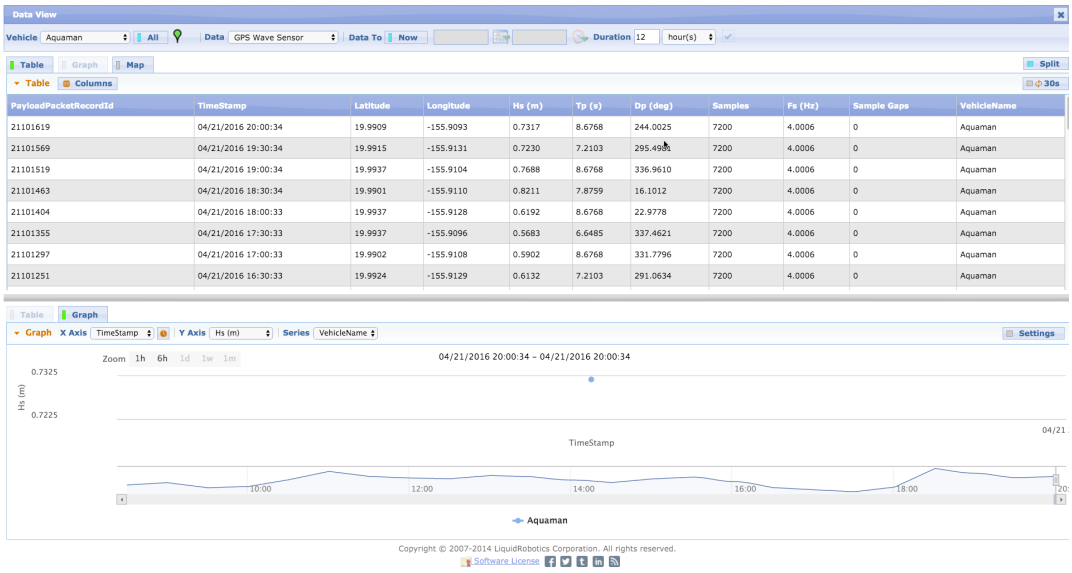
In the upper right-hand corner of there is a **Split** button and a **Reset** button.

Figure 4.134. Split Button and Reset Button



When you click on the **Split** button, the little box on the button turns turquoise blue and both the **Table** format and the **Graph** format of the selected data is displayed. By clicking on the **Split** button again, the little box on the button grays out and only the **Table** format is displayed. (See "Data View - Graph Format" (page 148) for more information on the Graph format.)

Figure 4.135. Split Display - Table and Graph



When you click on the **Reset** button, the little box on the button turns turquoise blue and the display resets, then the numbers on the button count down from 30s (thirty seconds) to zero, and the display resets again. The display will continue to reset every 30 seconds until you click on the **Reset** button again to stop the reset cycling. The little box on the button will gray out and the display will stop resetting.

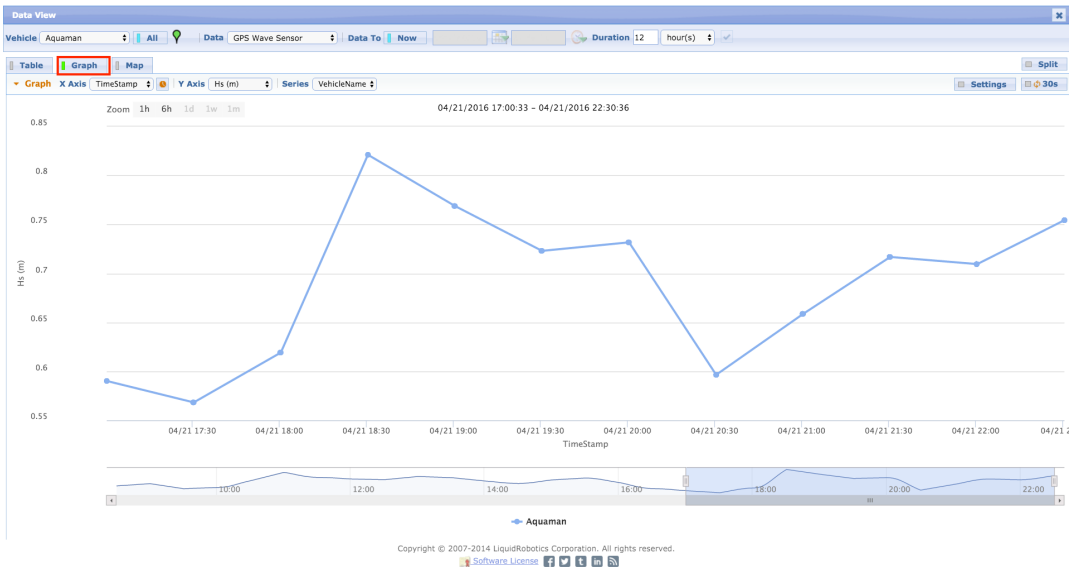
Note

The **Data View** page provides similar functionality on a tablet, but the navigation is slightly different. When using a tablet, allow extra time for custom reports to generate.

Data View - Graph Format

Click on the **Graph** tab to view the graphical data display for the selected vehicle, data type, and time frame.

Figure 4.136. Custom Reports Page - Graph Format

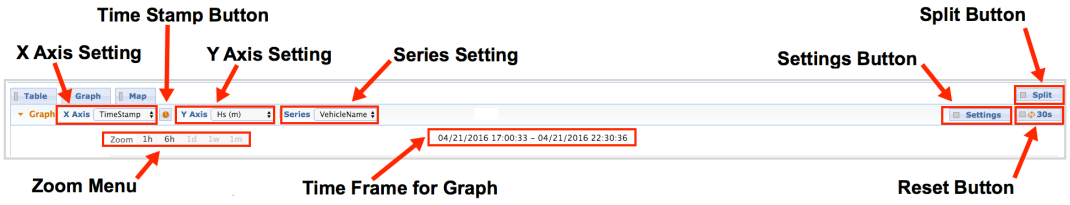


Note

If all data is not displayed, it is because the data set is too large to load all at one time. Scroll horizontally to the right to display more data.

In the **Graph** format toolbar, the selections made in the **X Axis** and **Y Axis** drop-down menus determine how the data is displayed. Displaying the ***TimeStamp*** on the X Axis with one of the other variables displayed on the Y Axis graphs the Y Axis data over time. This is the most widely used combination of X and Y Axis variables.

Figure 4.137. Graph Format toolbar



The **X Axis** drop-down menu lets you select from **Time Stamp**, **Hs (m)**, **Tp (s)**, **Dp (deg)**, **Samples**, **Fs (Hz)**, and **Sample Gaps** to be graphed along the X Axis.

The **Time Stamp** button adjacent to the **X Axis** drop-down menu can be used to set the X Axis to **TimeStamp** with a single click, if the X Axis is at some other setting.

The **Y Axis** drop-down menu lets you select from **Hs (m)**, **Tp (s)**, **Dp (deg)**, **Samples**, **Fs (Hz)**, and **Sample Gaps** to be graphed along the Y Axis.

Note

The options available in the **X Axis** and **Y Axis** drop-down menus may not always result in a useful or meaningful graph. Knowledge of the data being measured is necessary to choose X and Y Axis variables that make sense.

The **Series** drop-down menu lets you select from **Vehicle Name**, **Hs (m)**, **Tp (s)**, **Dp (deg)**, **Samples**, **Fs (Hz)**, and **Sample Gaps** for the data points that are displayed in the graph.

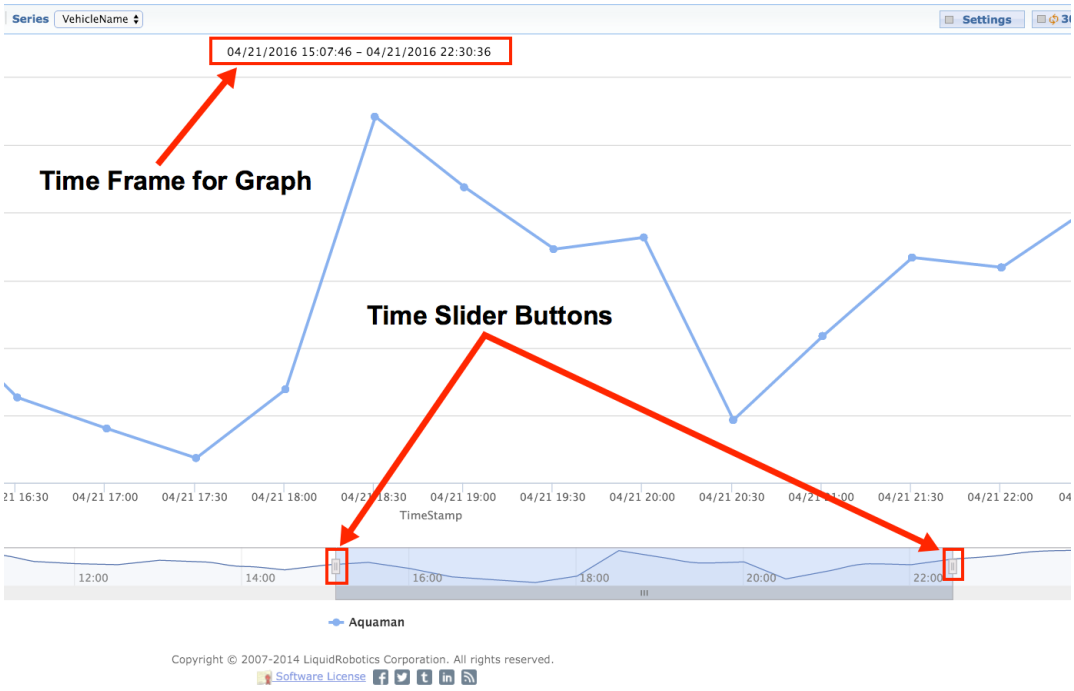
The **Settings** button opens the **Advanced** drop-down menu that is used to add or remove the line that connects the data points on the graph, and to change the time format.

The **Zoom** menu lets you quickly view the data over different time frames without changing the time frame settings for the Graph. Click on one of the selections in the **Zoom** menu to display data for the last hour, 6 hours, 1 day, 1 week, or 1 month. The **Time Slider** at the bottom of the display will adjust to indicate when the data display begins and ends.

The **Time Frame** for the graph reflects the location of the two **Time Slider** buttons.

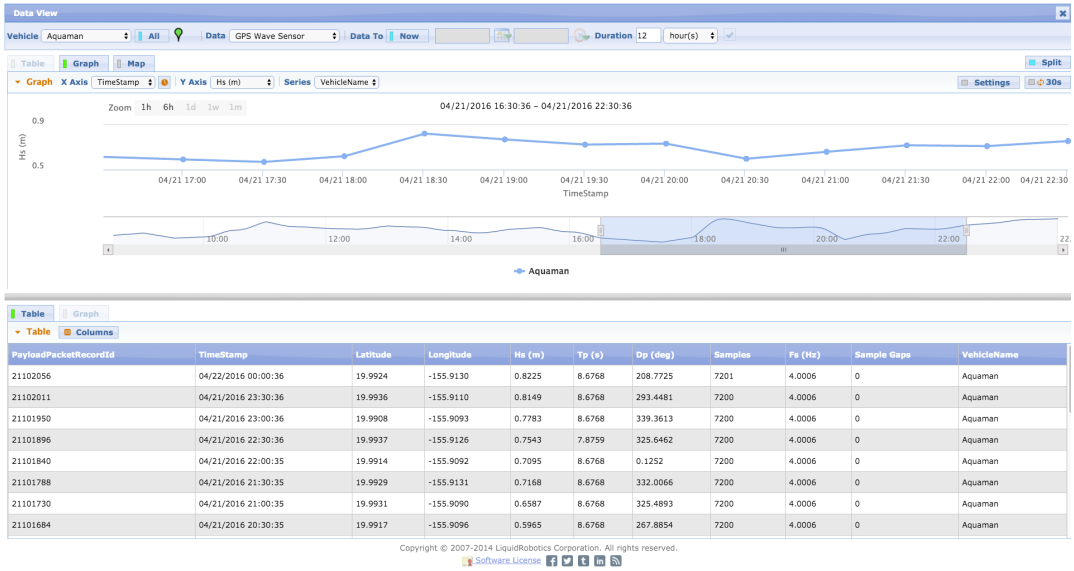
The **Time Slider** buttons in the time line at the bottom of the **Graph** display can also be used to adjust the time range for the data display by dragging them to the left or right.

Figure 4.138. Custom Reports Page - Graph Format Time Slider



The **Split** button lets you view both the **Graph** format and the **Table** format for the selected data in the same window. When you click on the **Split** button, the little box on the button turns turquoise blue and both the **Graph** format and the **Table** format for the selected data is displayed. By clicking on the **Split** button again, the little box on the button grays out and only the **Graph** format is displayed. (See "Data View - Table Format" (page 145) for more information on the **Table** format.)

Figure 4.139. Split Display - Graph and Table

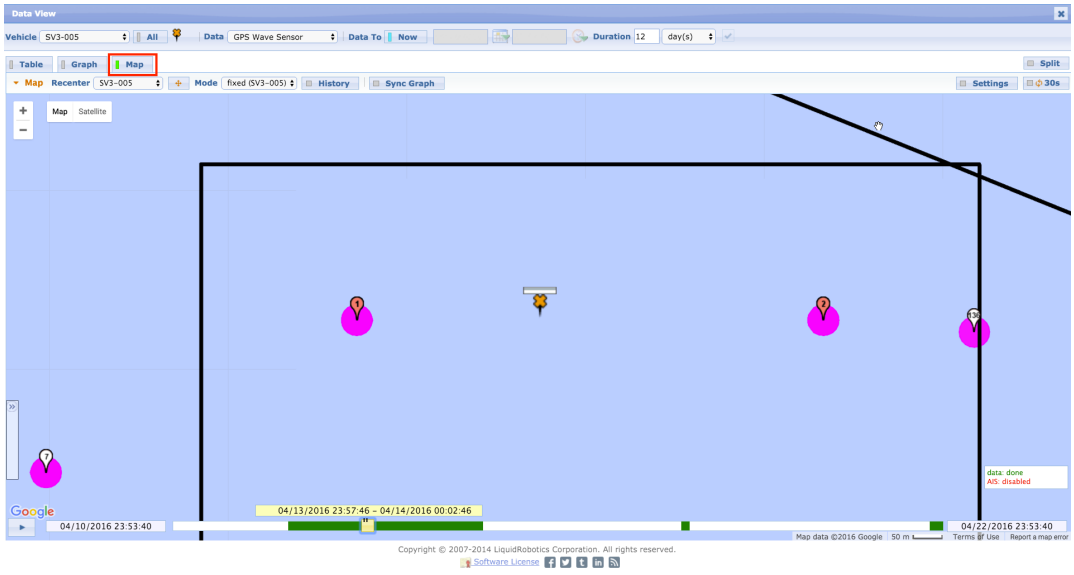


The **Reset** button controls when the disply will refresh. When you click on the **Reset** button, the little box on the button turns turquoise blue and the display resets, then the numbers on the button count down from 30s (thirty seconds) to zero, and the display resets again. The display will continue to reset every 30 seconds until you click on the **Reset** button again to stop the reset cycling. The little box on the button will gray out and the display will stop resetting.

Data View - Map Format

For information on the Data View Map Format contact the Liquid Robotics Support Organization.

Figure 4.140. Data View - Map Format



ADCP C2 and ADCP C4 Data Display

The WGMS Custom Report for the Wave Glider integrated Teledyne RD Instruments Workhorse Monitor ADCP displays C2 data in a Table format, a Graph format, and a Bin Map format. C4 data is displayed in Table and Graph formats only. The Table and Graph formats for ADCP C2 data are the same for ADCP C4 data. The WGMS Custom Report display for all other data types, including ADCP Bathymetry and ADCP Header data, is described in “Data View Page - Custom Reports ” (page 141)

The following browsers are supported:

Browser	Version	Platform	Display
Internet Explorer	11	Windows	Desktop
Firefox	20.0.1 (or later)	Windows, Linux	Desktop
Safari	6.0.4 (or later)	Mac	Desktop
Safari	(latest)	iPhone and iPad with iOS 7.1 only	Mobile (iOS 7.1 and later)
Chrome	26.0.1410.64 m (or later)	Windows, Linux	Desktop
Chrome	(latest)	Android (4.0 or later), iPhone and iPad with iOS 7.1 only	Mobile

This section explains the ADCP C2 and C4 **Table** format, **Graph** format, and **Bin Map** format displays. ADCP C2 and C4 custom reports are generated using the same procedure that is used to generate all other custom reports, for more information see: “Data View Page - Custom Reports ” (page 141)

ADCP C2 and C4 Table Format

The Custom Report for ADCP C2 and C4 data displays the **Table** format by default, as illustrated in Figure 4.141

Note

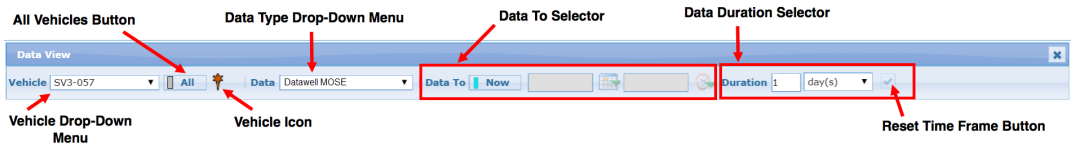
The Custom Report page provides similar functionality on a tablet, but the navigation is slightly different. When using a tablet, allow extra time for Custom Report pages to generate.

Figure 4.141. Custom Reports Page - ADCP Table Format

The ADCP Table format is a rotated table. The table header is the left column. Data is displayed in descending chronological order, from left-to-right. Scrolling to the right will automatically load more data. The table body also scrolls vertically to reveal all rows.

The toolbar at the top of the **Data View** page includes buttons and menus that allow you to select vehicles, data types and time frames:

Figure 4.142. Data View Page Toolbar



- **Vehicle Drop-Down Menu** - This menu displays the name of the vehicle that generated the data currently displayed. It can also be used to display data from a different vehicle.

- **All** button - Displays the selected type of data from all of the vehicles in the WGMS Organization that generated that type of data within the selected time frame. A gray panel on the left side of the button indicates that it is **OFF**. A turquoise panel on the left side of the button indicates that it is **ON**. See **Data To Selector** (below in this list) for information on time frame settings.

- **Vehicle Icon** - This is the icon associated with the vehicle name that appears in the vehicle drop-down menu.

- **Data Type Drop-Down Menu** - This menu displays the type of data that you selected to be displayed. It can also be used to display a different data type.

- **Data To Selector** - Sets the most recent end of the data display time frame. Includes the **Now** button, a **Date Selector** and a **Time Selector**. The **Data To Selector** is used with the **Data Duration Selector** to determine the time frame for the data display.

Note

The time frame settings for the **Data View** page operate similarly to the time frame settings in the **Display Map** toolbar. For more information see "Specifying the Data Time Frame" (page 70).

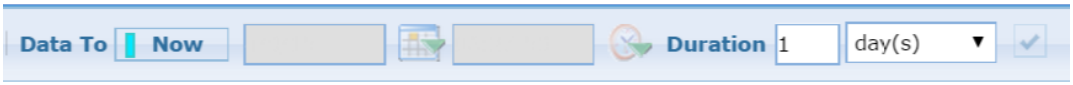
- **Data Duration Selector** - Determines the length of the data display time frame in minutes, hours, or days. The **Data Duration Selector** is used with the **Data To Selector** to determine the time frame for the data display.

Note

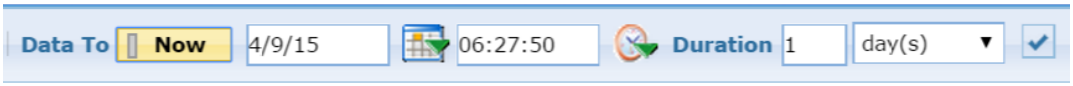
The time frame settings for the **Data View** page operate similarly to the time frame settings in the **Display Map** toolbar. For more information see "Specifying the Data Time Frame" (page 70).

- **Reset Time Frame Button** - Click on this button to manually refresh the Web page after a change is made to time frame settings for the data display.

In the following example, the data that was generated over the last hour is displayed:

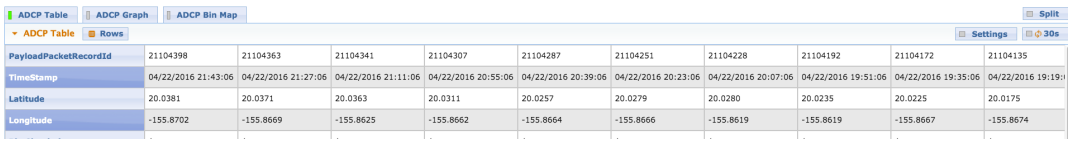


In the following example, the data that was generated over a one day time frame ending on 4/9/15 at 06:27:50 UTC is displayed:



The ADCP Table format toolbar located at the top of the table includes **Rows** and **Settings** menus that allow you to modify the data that will be displayed in the table.

Figure 4.143. ADCP C2 and C4 Table Format toolbar

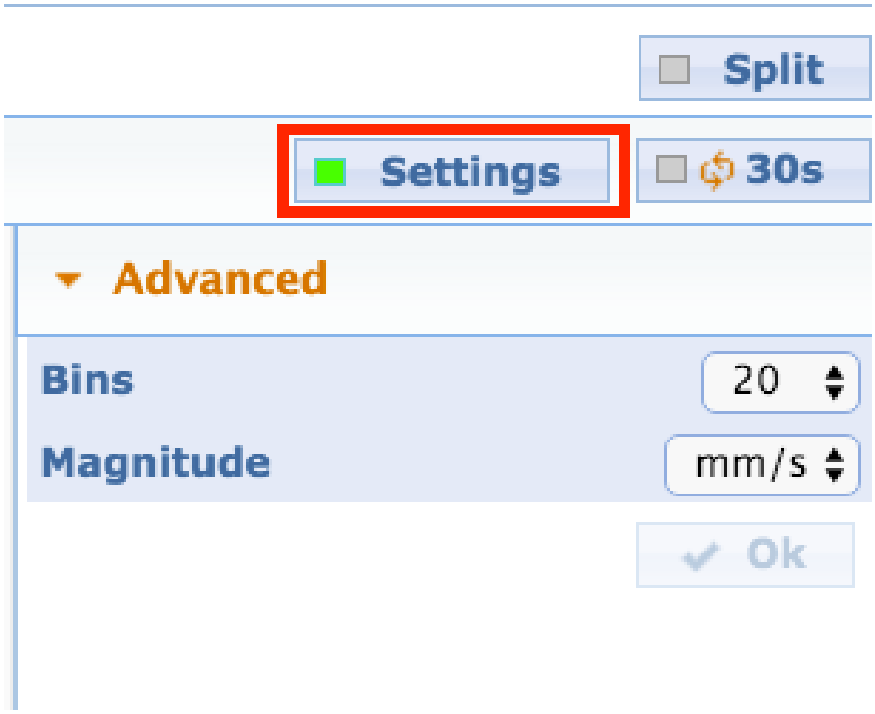


- Click on the Rows button to display a drop-down menu listing every row in the ADCP Table. Un-checking a row removes it from the display. Re-checking a row restores it to the display. Clicking on **Reset** at the bottom of the drop-down menu will restore all of the rows in the ADCP Table. Clicking anywhere outside of the drop-down menu will collapse it.

Figure 4.144. Rows Drop-Down Menu

- Click on the **Settings** button to access the **Bins** and **Magnitude** settings menus.

Figure 4.145. Settings: Bins and Magnitude Menus



Use the **Bins** menu to limit the number of Bins that are displayed in the ADCP Table.

Use the **Magnitude** menu to set the units for the **Bin Mag** rows in the ADCP Table. The options are **mm/s**, **m/s**, or **Knots**. When you change the **Magnitude** setting, the ADCP Table regenerates with the selected units of magnitude.

- The compass icons in the Bin Mag rows of the ADCP Table are accurate to within 10 degrees of the direction the red end of the icon is pointing toward.

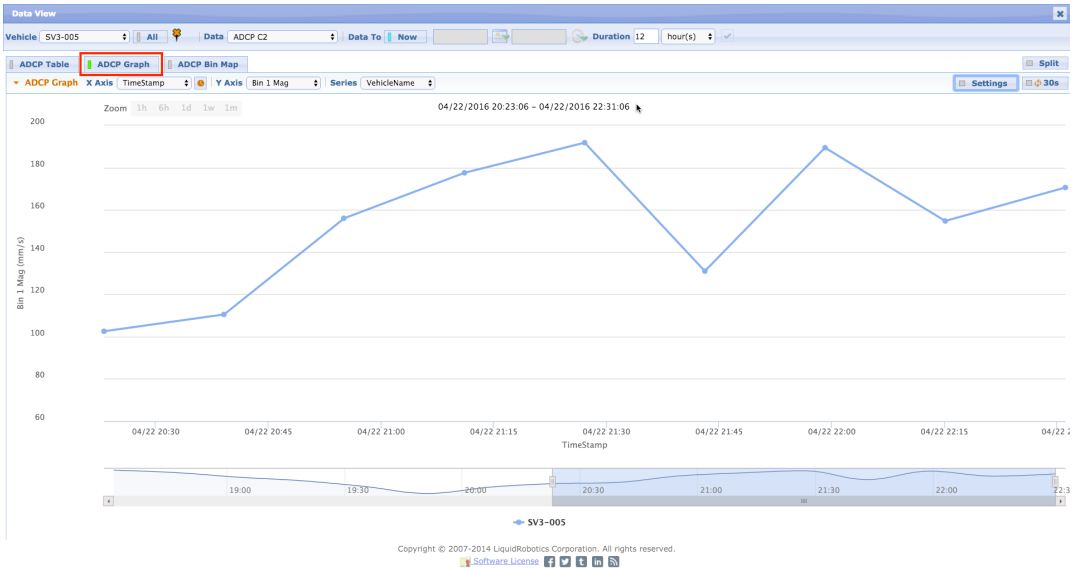
Figure 4.146. Compass Icons

Bin 1 Mag (mm/s)	21.0950	35.3553	36.0555	58.2151	12.0416
Bin 1 Dir (Degrees True)	148.5704	81.8699	199.4400	355.0729	228.3665
Bin 2 Depth	10.2400	10.2400	10.2400	10.2400	10.2400
Bin 2 Mag	217.5132	50.4777	135.2072	270.9336	374.9587

ADCP C2 and C4 Graph Format

Click on the **ADCP Graph** tab to view a graphical display of C2 or C4 data for the selected vehicle.

Figure 4.147. Data View - ADCP Graph Format

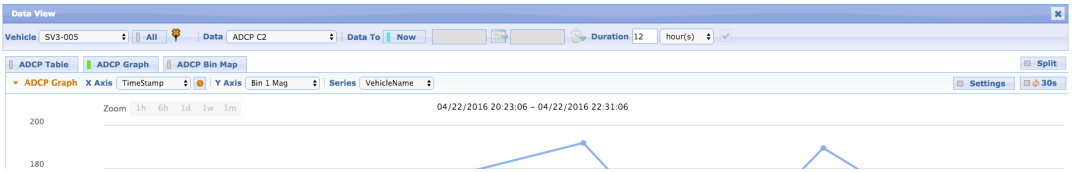


Note

If all data is not displayed, it is because the data set is too large to load all at one time. Scroll horizontally to the right to display more data.

The ADCP Graph format toolbar located at the top of the graph includes **X Axis**, **Y Axis** and **Series** drop-down menus and **Settings**, **Split**, and **Reset** buttons that allow you to modify the data display.

Figure 4.148. ADCP C2 and C4 Graph Format Toolbar



The buttons and menus in the ADCP Graph format toolbar operate the same as the buttons and menus in the Graph format toolbar for other data types. The difference is in the variables you can select in the **X Axis**, **Y Axis**, and **Series** menus, and in the settings you can modify when you use the **Settings** button to open the **Advanced** settings menu. For more information see "Data View - Graph Format" (page 148).

Note

The options available in the **X Axis** and **Y Axis** drop-down menus may not always result in a useful or meaningful graph. Knowledge of the data being measured is necessary to choose X and Y Axis variables that make sense.

ADCP C2 Bin Map Format

The Custom Report for ADCP C2 data includes a **Bin Map** option. Click on the **Bin Map** tab to view the ADCP C2 Bin Map display.

Figure 4.149. Data View - ADCP C2 Bin Map Format

The ADCP C2 Bin Map format has two modes: **All Bins** mode and **Map** mode. All Bins is the default mode when you select the ADCP Bin Map data format.

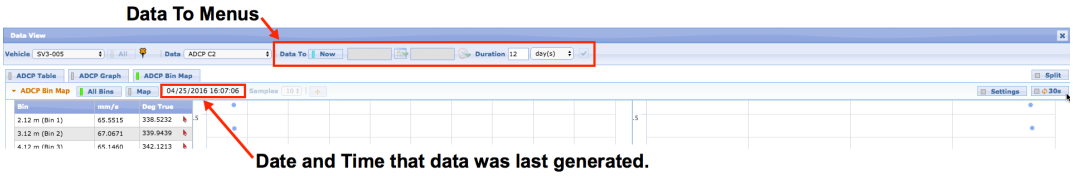
All Bins Mode

The ADCP Bin Map format opens with the **All Bins** mode selected for the date and time set in the **Data To** menus. It is automatically updated every 120 seconds and will redraw itself only if new data is found.

If no data was generated during the time frame displayed in the **Data To** menus, the display will be empty.

The date and time that data was last generated is displayed in the Bin Map toolbar.

Figure 4.150. Date and Time of Bin Map Data



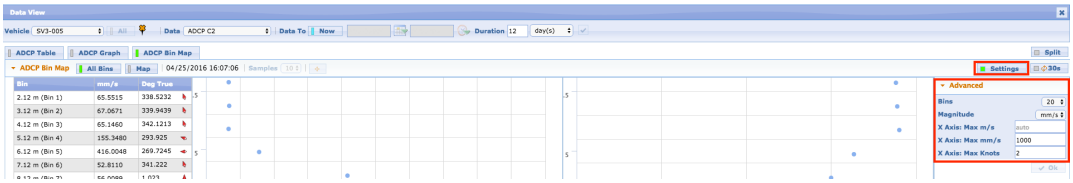
Entering a time frame in the **Data To** menus that includes the date and time that data was last generated (or some time frame when data is known to have been generated) will populate the Bin Map display with that data.

All Bins mode displays a Bin Depth table with two charts to the right of it. One chart displays bin depth relative to speed (in mm/s or Knots). The other chart displays bin depth relative to compass degrees true.

Figure 4.151. ADCP C2 Bin Map Format - All Bins Mode

The **Settings** button on the **All Bins** toolbar opens the **Advanced** window with drop-down menus where you can set the number of Bins and the Magnitude. Bins can be set to as few as 1, up to a maximum of 100. The default setting is 20. Magnitude sets the speed relative to Bin Depth to mm/s or Knots. The default setting is mm/s. There are also three settings to modify the X Axis.

Figure 4.152. Settings Button - All Bins Mode Toolbar

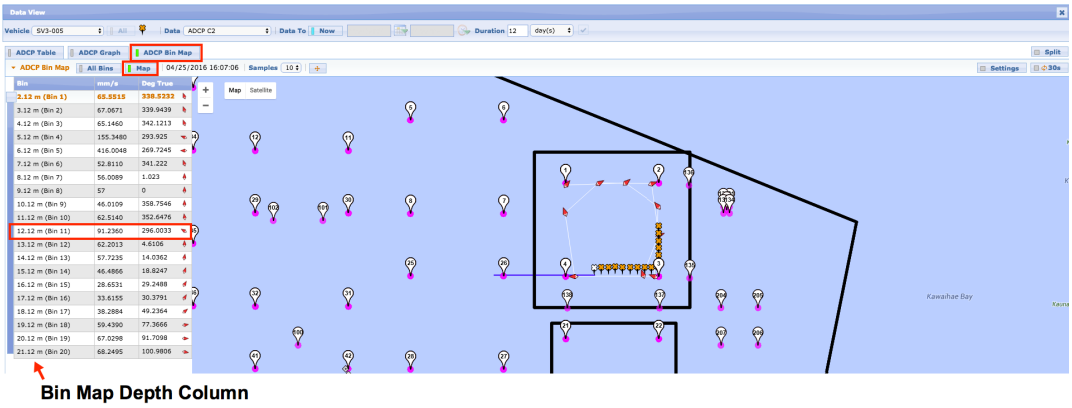


The **Split** and **Reset** buttons on the **All Bins** toolbar work similarly to the **Split** and **Reset** buttons for all other Data View formats. See “Data View - Table Format” (page 145) for more information.

Map Mode

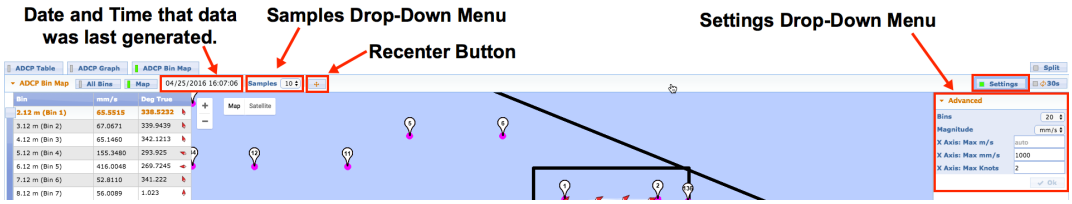
Click on the **Map** button to display the Map mode.

Figure 4.153. Data View - ADCP C2 Bin Map - Map Mode with Data



Map mode displays the same Bin depth column that appears in **All Bins** mode. When you click on a row in the Bin depth column, the compass icons locating the ADCP data points associated with that row appear on a world map in the adjacent Map panel. The number of data points displayed depends on the setting in the **Samples** drop-down menu in the **Map** mode toolbar. The default setting is 10. The range is from 1 to 20.

Figure 4.154. Map Mode Toolbar



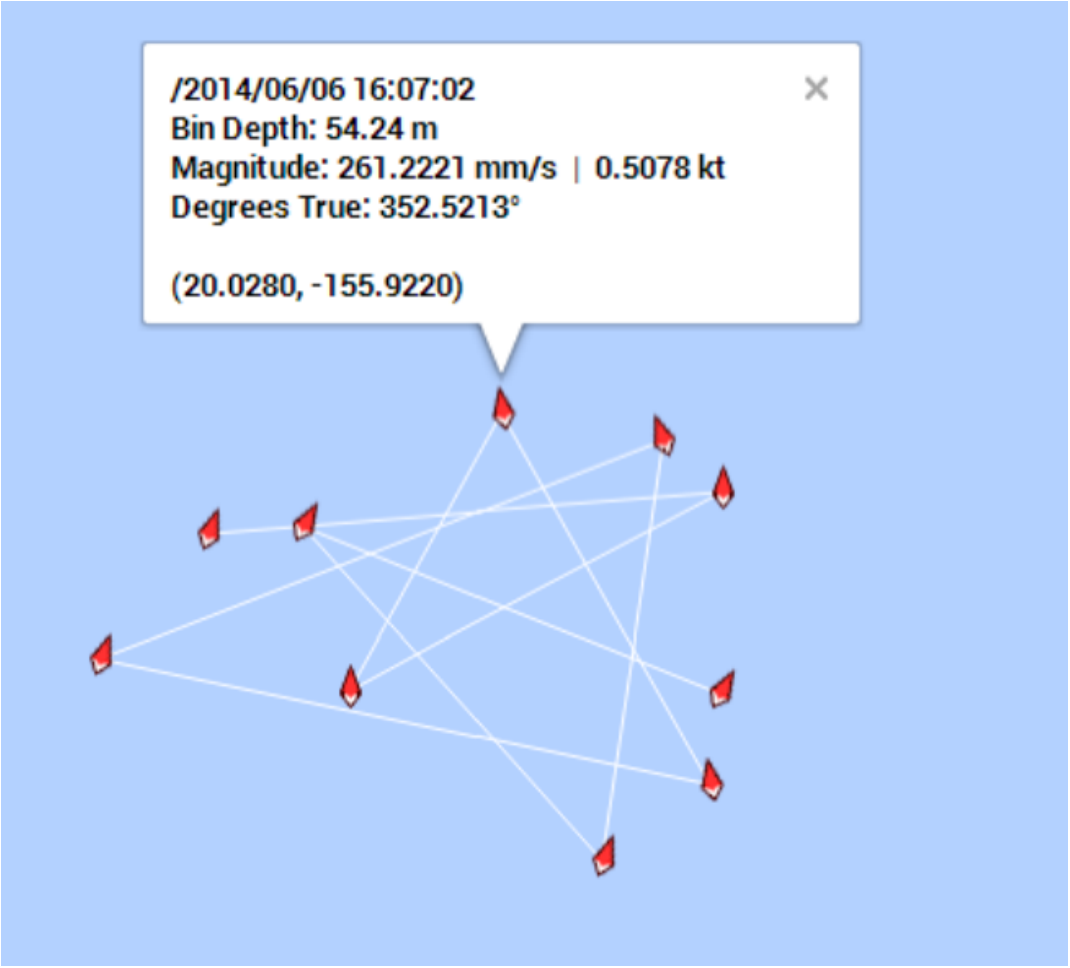
The date and time when data was last generated is displayed in the **Map** mode toolbar.

You can adjust the number of samples displayed by changing the setting in the **Samples** drop-down menu. The default setting is 10.

If you drag the map to a different position, or change the scale, you can use the **Recenter** button to center the map on the data points selected in the Bin depth column.

The **Settings** button on the **Map** toolbar opens a window with drop-down menus where you can set the number of Bins and the Magnitude. Bins can be set to as few as 1, up to a maximum of 100. The default setting is 20. Magnitude sets the speed relative to Bin Depth to mm/s or Knots. The default setting is mm/s.

The compass icons on the map are accurate to within 10 degrees of the direction the red end of the icon is pointing toward. Clicking on a compass icon will display all of the information associated with that data sample.



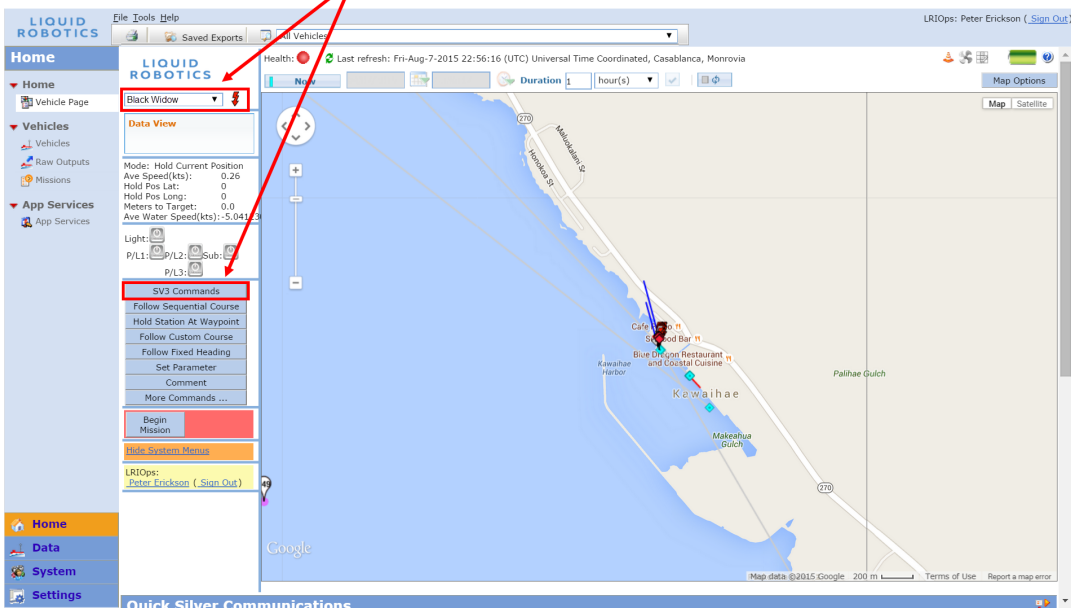
SV3 Commands Window

Note

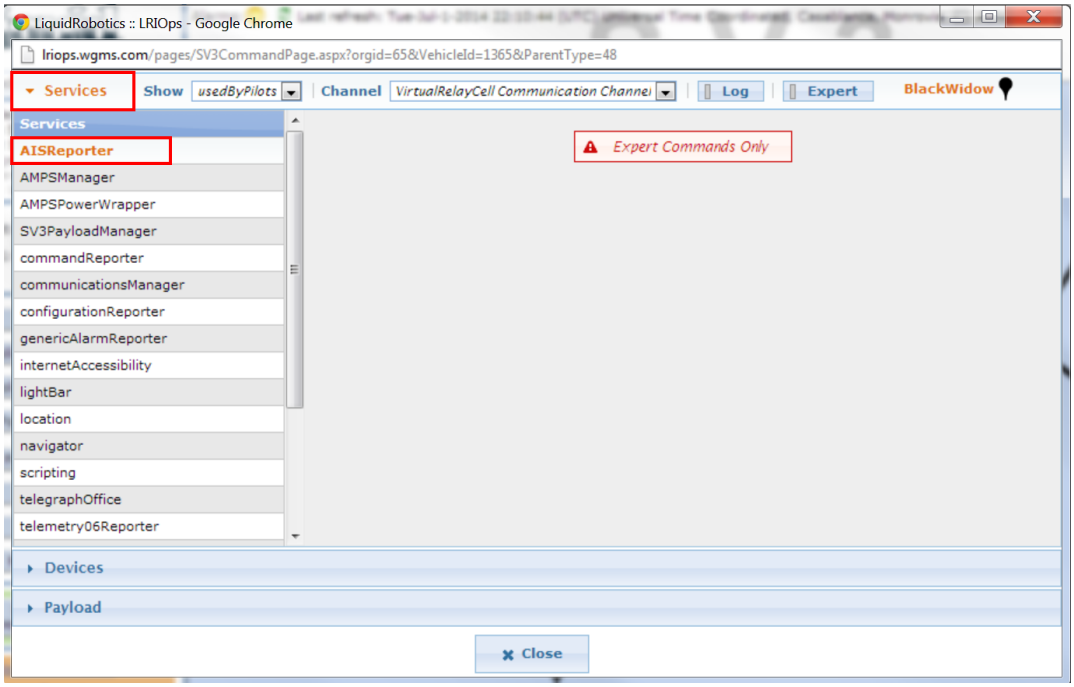
The **SV3 Commands Window** is populated dynamically based on the specific configuration of the Wave Glider SV3, the version of Regulus running, and the installed sensor suite software. On each SV3 Vehicle, Regulus generates a Configuration Manifest and a Commands Manifest. The manifests are parsed to populate the WGMS SV3 Commands Window. What you see on your system may not be identical to the information provided here. Depending on how the SV3 is configured you may see more, or fewer, command options. For more information on the manifests see *Chapter 11. Payload Development - Software Environment* in the *Wave Glider SV3 Interface Control Description*. If you have questions or concerns about any commands or features in the SV3 Commands Window, contact the Liquid Robotics Support organization - see "Contacting Liquid Robotics" (page 291).

When a Wave Glider SV3 vehicle is selected from the vehicle selection drop-down menu on the WGMS Dashboard, the **SV3 Commands** button appears in the Dashboard sidebar:

When an SV3 Vehicle is Selected, the SV3 Commands Button Appears in the Dashboard Sidebar.



Clicking on the **SV3 Commands** button opens the **SV3 Commands Window** where SV3 services, device management, and payload management commands can be executed. The **SV3 Commands Window** opens to the **Services** menu with the side tabs listed in alphabetical order. The first side tab in the **Services** menu is selected by default.

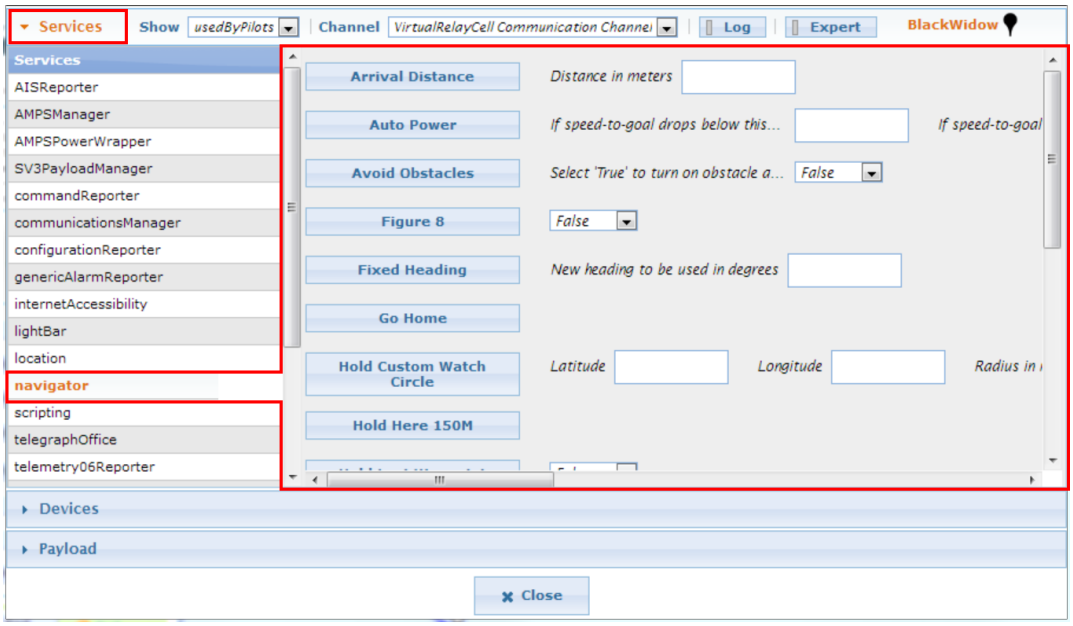


The Services menu includes tabs with piloting and management commands, as well as commands for LRI plug-ins that are installed on the Vehicle, for example the camera option.

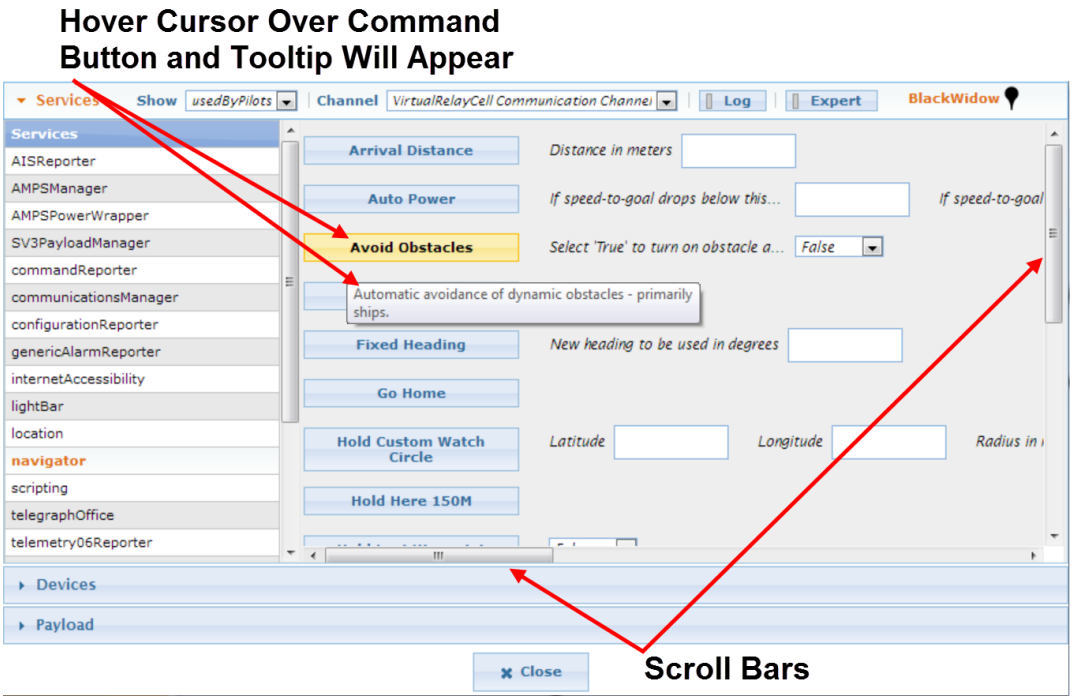
When you click on one of the **Services** menu side tabs, the command buttons and related information for the **Services** side tab you selected will appear in the **SV3 Commands Window**.

Note

Depending on the browser you are using, if the local browser zoom is not set at 100%, the command buttons may not appear when you click on a side tab.



When you move your cursor over a command button, the button will turn yellow and a tool tip for that command will appear. Depending on which command you are looking at, there may also be fields or drop-down menus for entering or selecting parameters.

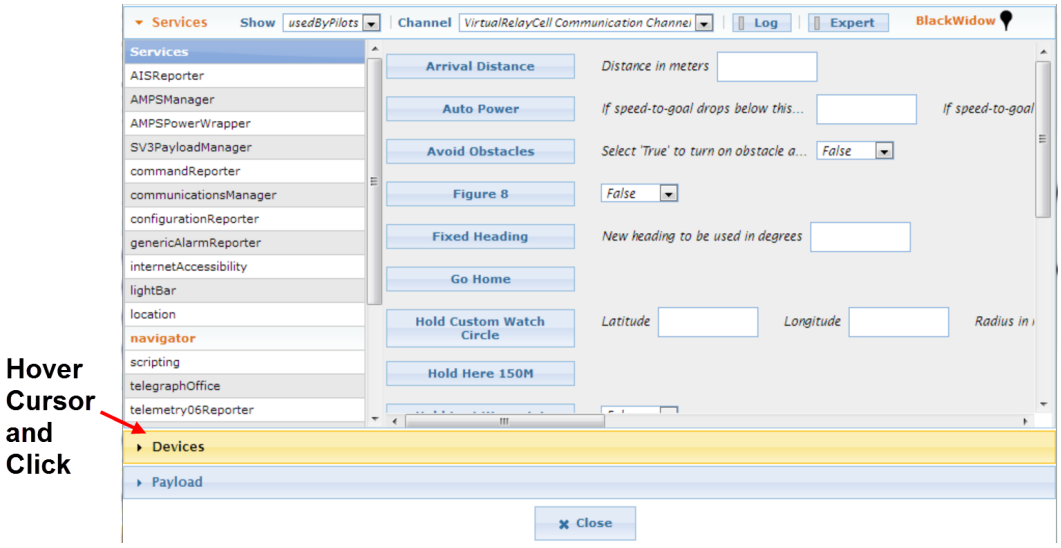


If the information in the side tab you select exceeds the length or width of the display, there will be vertical and horizontal scroll bars available so you can scroll to see all of the command information.

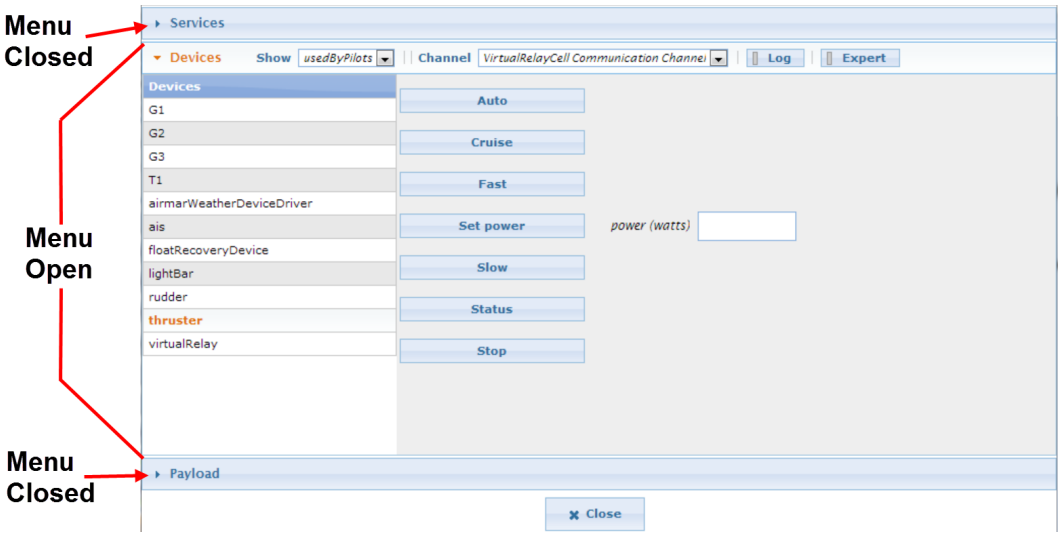
In addition to the **Services** menu, the **SV3 Commands Window** has two other menus that function similarly:

- **Devices** - This menu provides easy access to commands that are associated with SV3 devices that are registered with Regulus.
- **Payload** - This menu provides easy access to commands that are associated with SV3 payloads that are registered with Regulus.

To open a menu in the SV3 Commands Window, hover your cursor over the unopened menu bar to highlight it, then click.

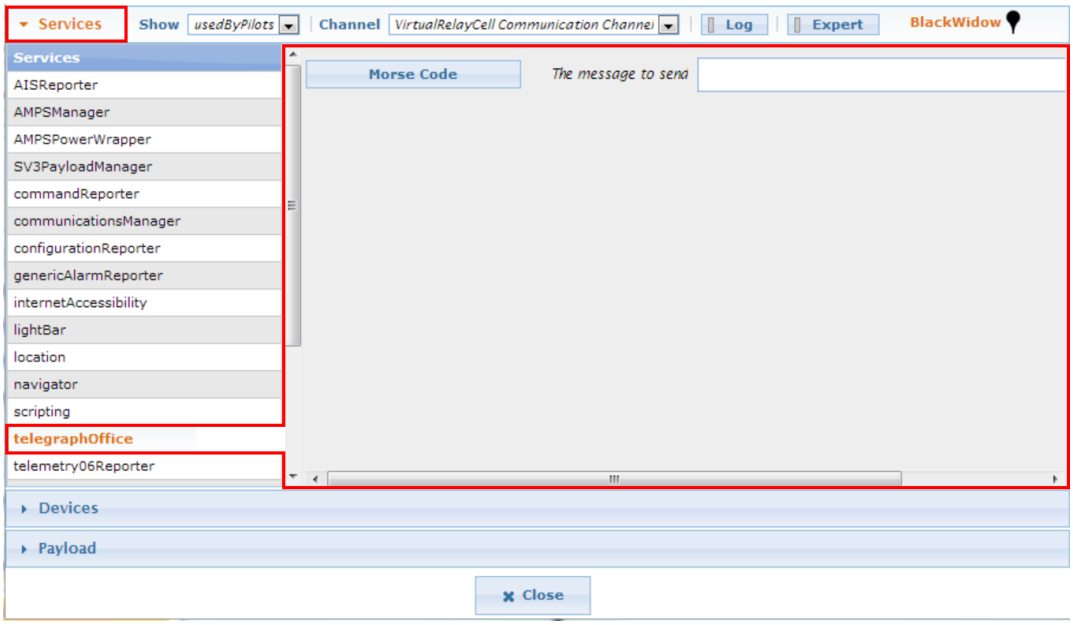


The selected menu will open and the other menus will be closed.



When you click on a side tab in any of the SV3 Command Window menus, the commands associated with that side tab will be displayed. For example, if you are viewing the **navigator** side tab in the

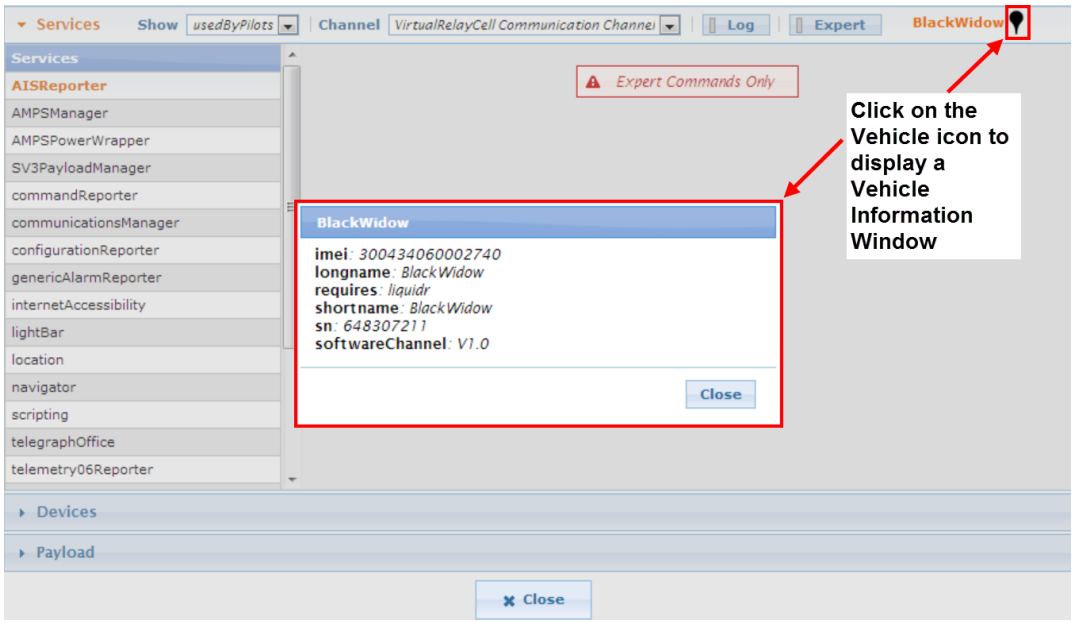
Services menu and you click on the **telegraphOffice** side tab, the commands associated with the **telegraphOffice** side tab will be displayed.



The **Services**, **Devices**, and **Payload** menus in the SV3 Commands Window all have the same toolbar:

The name of the menu that is currently open is displayed in orange lettering on the left side of the toolbar, and the name of the SV3 Vehicle you are interacting with is displayed in orange lettering on the right side of the toolbar, along with its icon.

Click on the Vehicle icon next to the Vehicle name to open a Vehicle Information window that displays the Vehicle IMEI and serial number along with other vehicle-specific information.

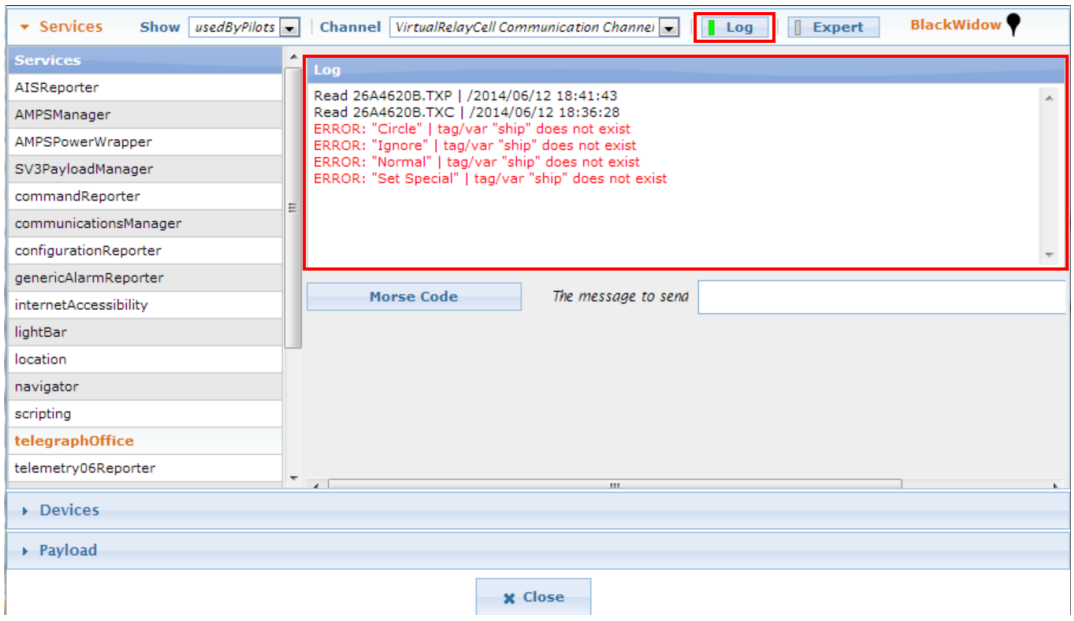


The **Show** drop-down menu allows you to select **usedByPilots** or **All**:

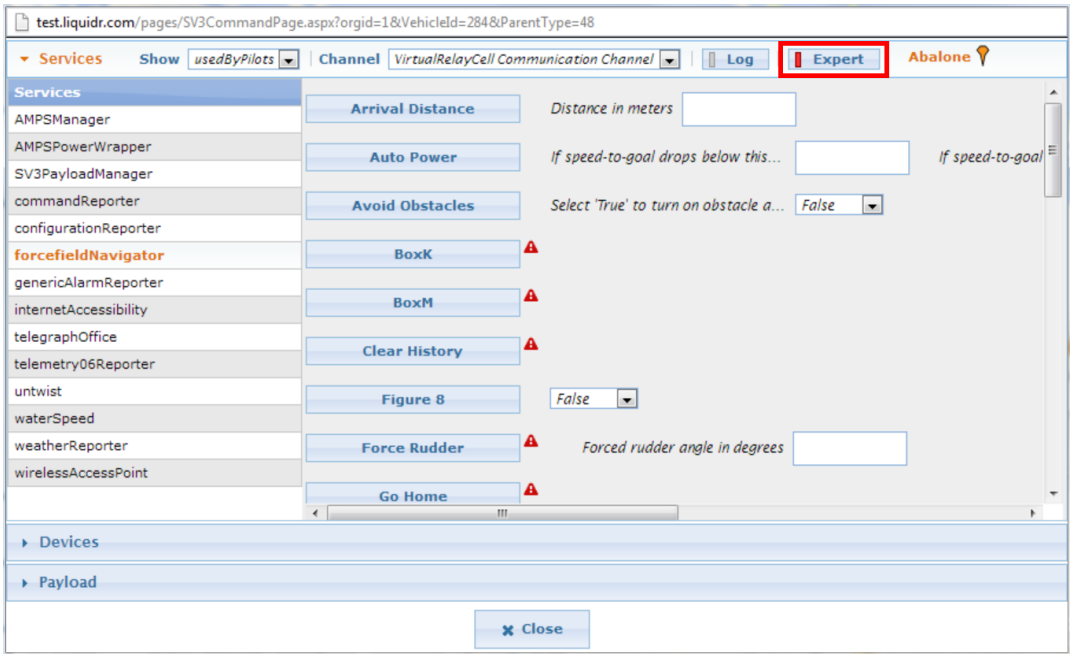
- When **usedByPilots** is selected, the side tabs that are typically used by Pilots are displayed.
- When **All** is selected, all available side tabs are displayed.

The **Channel** drop-down menu is used to select the communications channel you want to use to send commands and receive telemetry from the SV3 Vehicle.

The **Log** button can be toggled to display a log of all SV3 command activity, or to hide it. A vertical green bar appears on the **Log** button when the log is displayed. The vertical bar is grayed-out when the log is hidden. Use the log to verify command status.



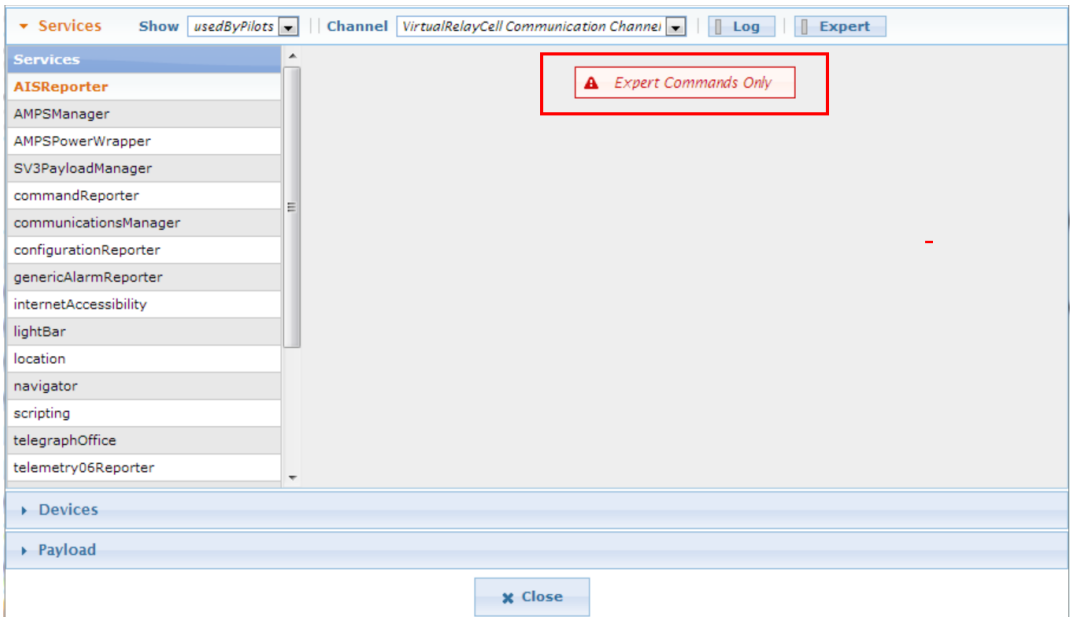
The **Expert** button can be toggled to display expert level commands in addition to standard commands:



Caution

Expert commands should not be issued without first learning about the possible outcomes, which could include putting the vehicle at risk. Contact the Liquid Robotics Support Organization for information on SV3 expert commands.

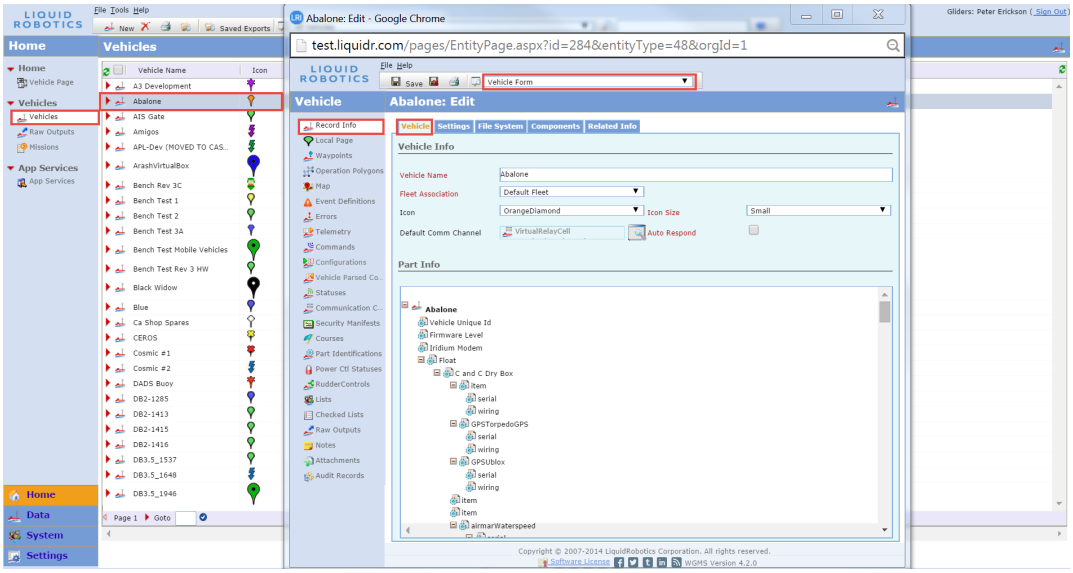
A vertical red bar appears on the **Expert** button when the expert commands are displayed and a red caution icon appears next to each expert command. The vertical bar is grayed-out when the expert commands are hidden. If a side tab includes only expert level commands and the **Expert** button is not activated (the vertical bar is grayed-out), an **Expert Commands Only** notice will appear in the SV3 Commands Window:



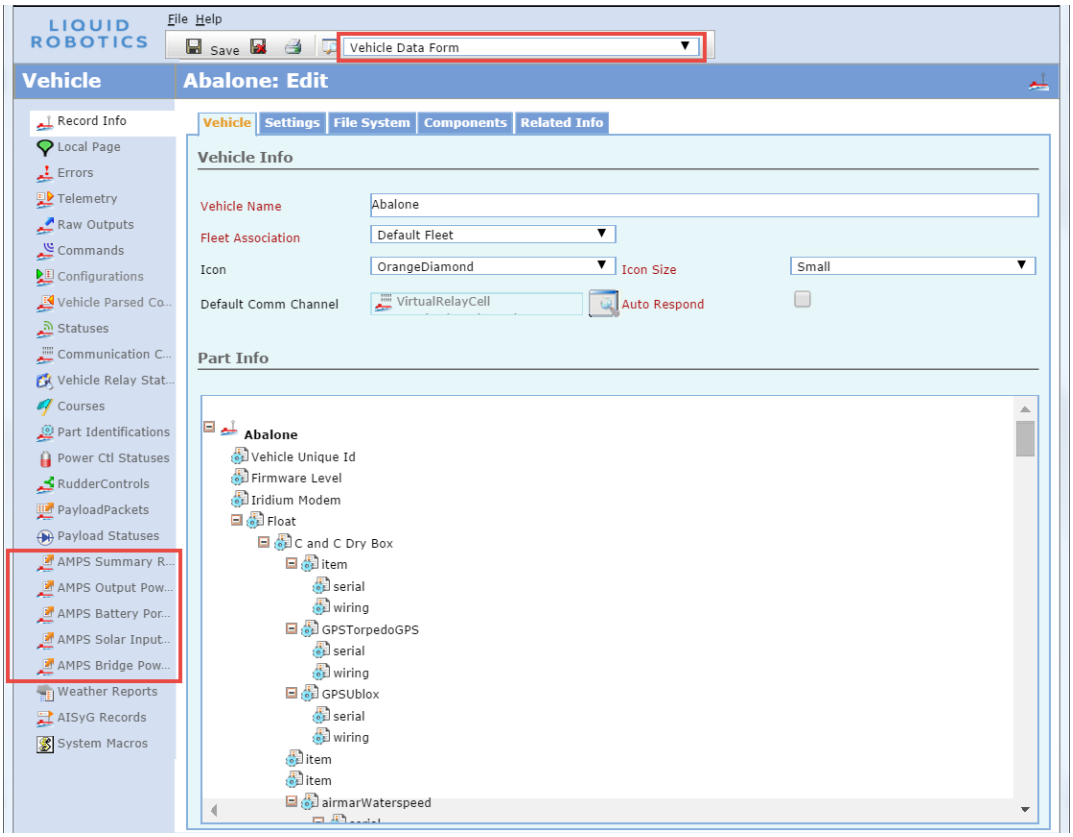
SV3 AMPS Modules Status Information

The status of the SV3 AMPS modules for each SV3 vehicle can be accessed when the Vehicle Data Form is selected:

1. From the **Vehicles** page, click on the icon adjacent to the vehicle name and the **Vehicle Form** will open to the **Record Info** side tab with the **Vehicle** tab selected by default:

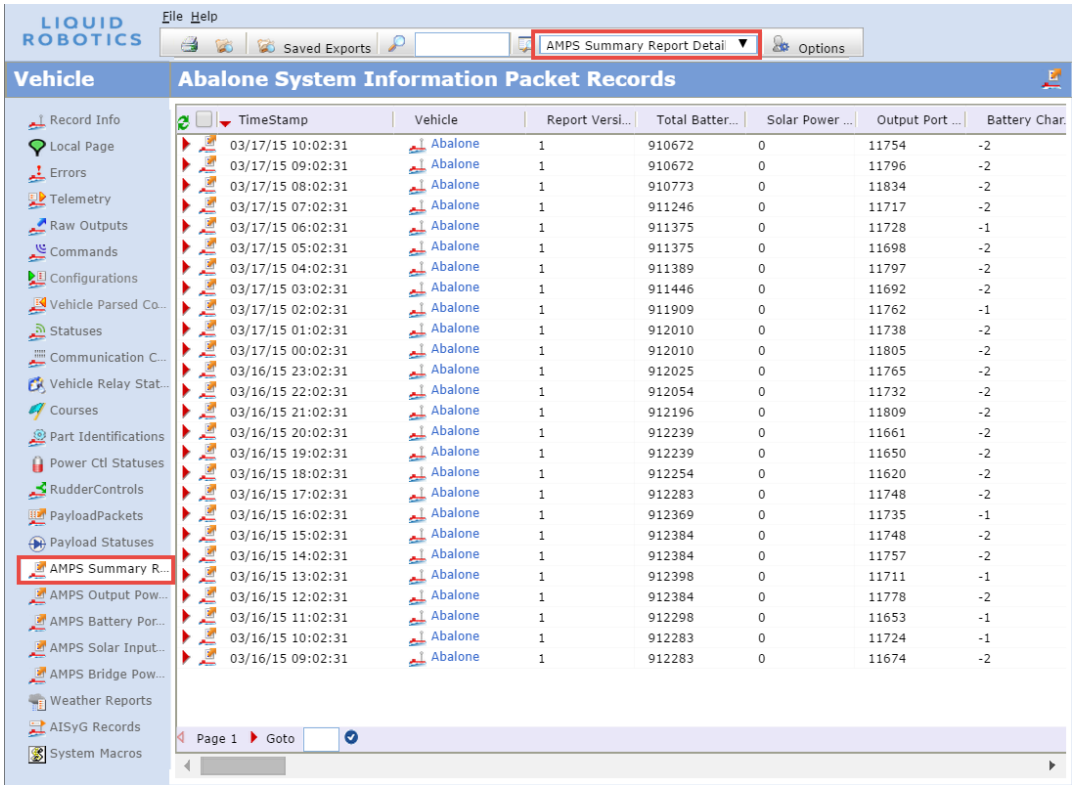


2. Select the **Vehicle Data Form** from the drop-down menu in the toolbar and side tabs to access AMPS status information will appear:

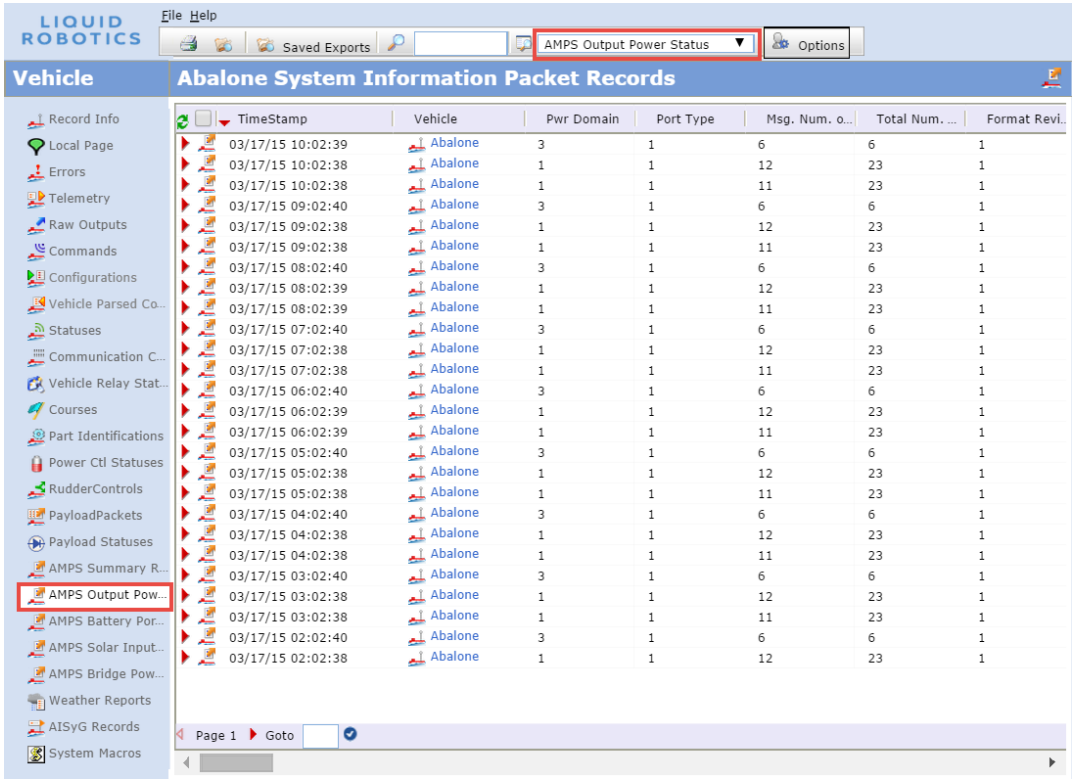


There are 5 AMPS status side tabs - when you select an AMPS status side tab, a window containing a chronological list of system information packet records will appear. AMPS system information is automatically updated on an hourly basis, or it can be updated manually by sending a **Retrieve Power Status** command using the More Commands button option on the WGMS dashboard.

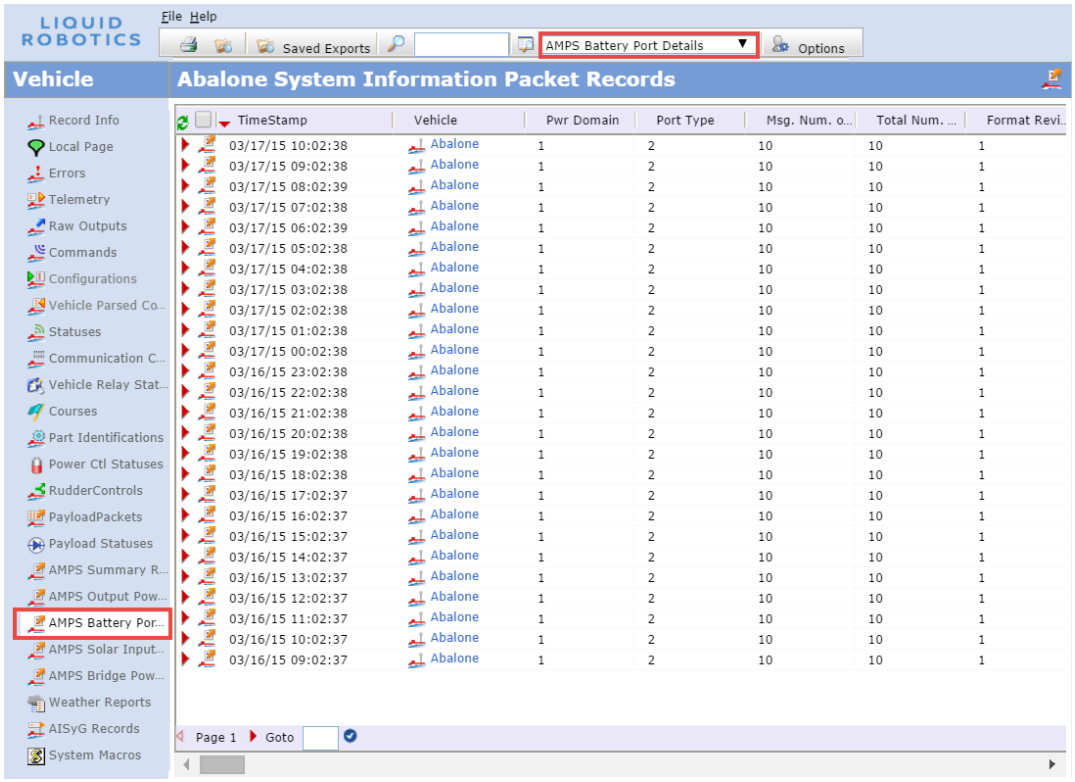
- **Figure 4.155. AMPS Summary Report**



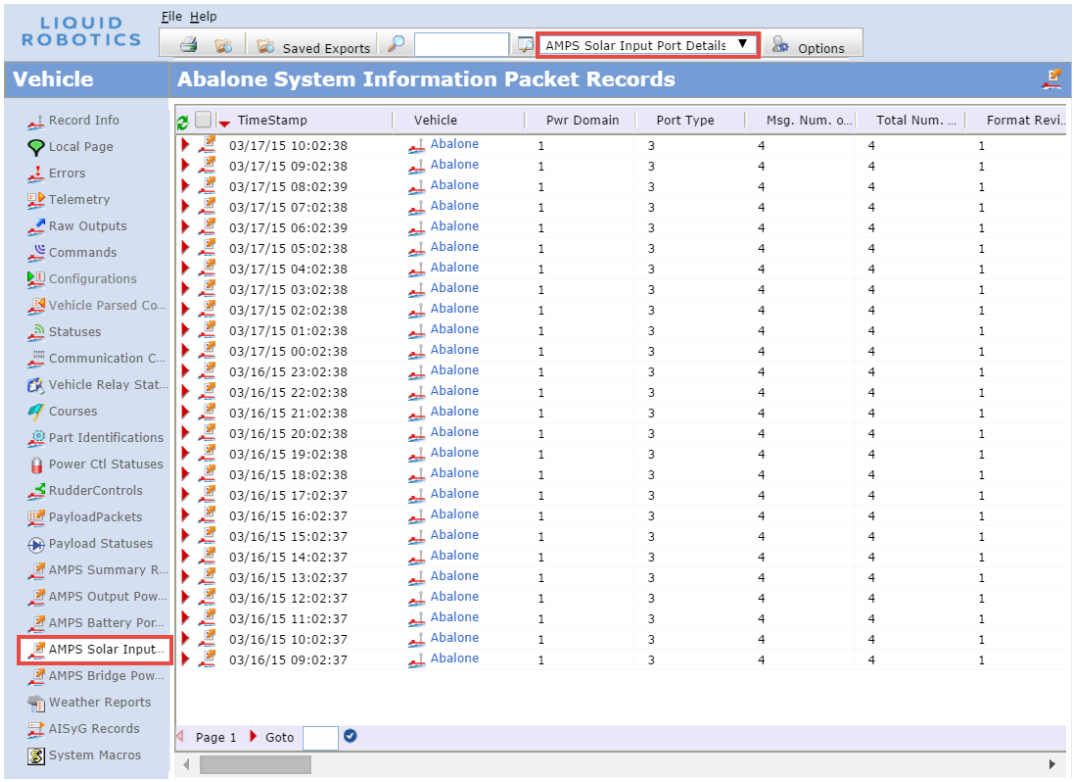
- **Figure 4.156. AMPS Output Power Report**



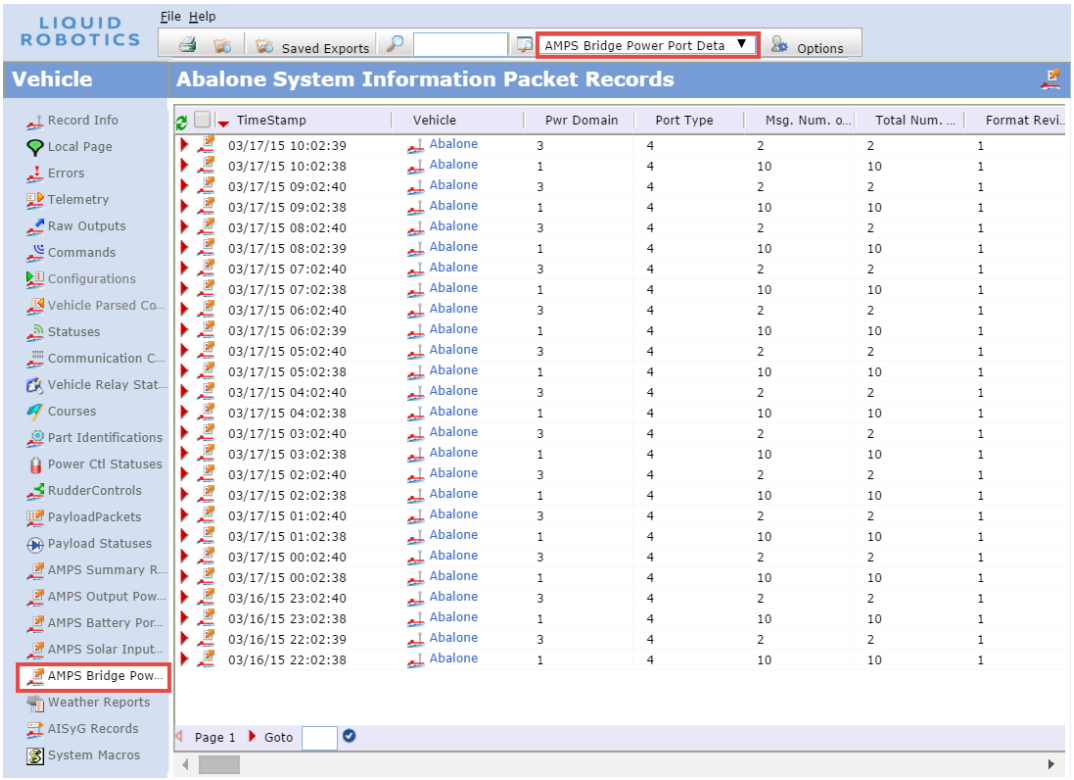
- **Figure 4.157. AMPS Battery Port Report**



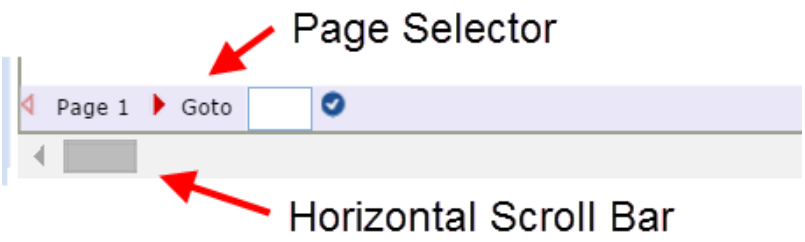
- **Figure 4.158. AMPS Solar Input Port Report**



- **Figure 4.159. AMPS Bridge Power Port Report**

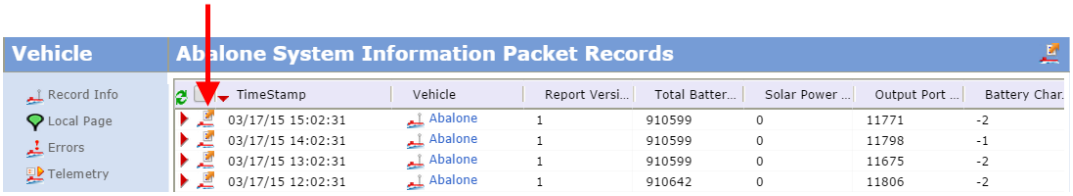


There is a page selector and a horizontal scroll bar at the bottom of each window:

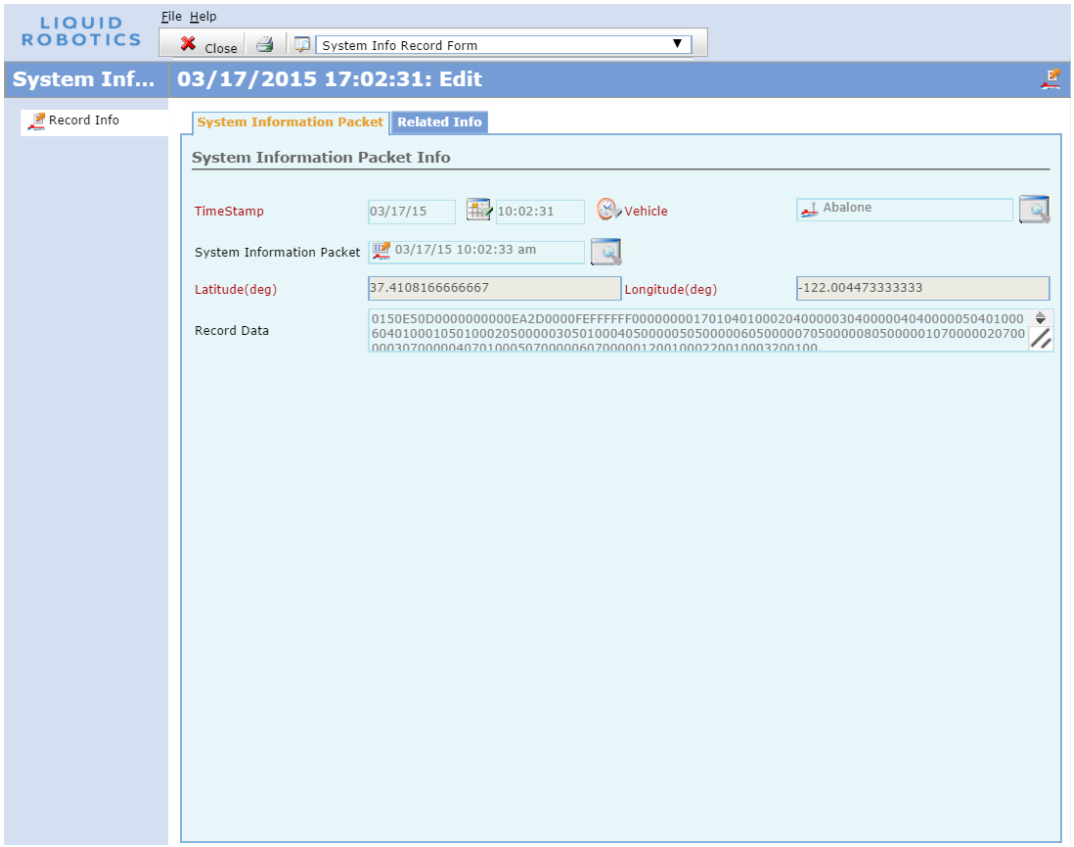


- **Use the page selector to view older records.**
- **Use the horizontal scroll bar to view the data columns that extend beyond the frame of the window.**

To view detailed information, click on the icon at the beginning of each system information packet record:



A window containing detailed information for that record will open, for example:



The **AMPS Output Power Report**, **AMPS Solar Input Port Report**, and the **AMPS Bridge Power Port Report** side tabs include system information packet records that contain information on functions that are frequently queried by pilots. These are functions that are available on every Wave Glider SV3 vehicle, as opposed to functions associated with custom payloads or optional equipment. The following table was developed to make it easier for Pilots to quickly locate information on these functions:

Function	WGMS Side-Tab	Power Domain	Module #	Port #
Weather Station	AMPS Output Power Report	1	4	1
Sensor Port 3 (S3)	AMPS Output Power Report	1	4	2
Light Bar	AMPS Output Power Report	1	4	3
Water Speed Sensor	AMPS Output Power Report	1	4	5
Cell Modem	AMPS Output Power Report	1	4	6
Radar Reflector	AMPS Output Power Report	1	5	1
Float Recovery Device	AMPS Output Power Report	1	5	2
Ethernet Switch	AMPS Output Power Report	1	5	3
High Voltage Port (HV)	AMPS Output Power Report	1	5	8
Sensor Port 2 (S2)	AMPS Output Power Report	1	7	1
Sensor Port 1 (S1)	AMPS Output Power Report	1	7	2

LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

AIS	AMPS Output Power Report	1	7	4
Iridium Modem	AMPS Output Power Report	1	32	1
Ublox GPS Module	AMPS Output Power Report	1	32	2
Vehicle Management Computer	AMPS Output Power Report	1	32	3
Thruster	AMPS Output Power Report	2	1	1
Expansion Port 1 (G1), [Vcons, Vprod]	AMPS Bridge Power Port Report	1	11	1,2
Expansion Port 2 (G2), [Vcons, Vprod]	AMPS Bridge Power Port Report	1	12	1,2
Expansion Port 3 (G3), [Vcons, Vprod]	AMPS Bridge Power Port Report	1	8	1,2
Umbilical Expansion Port (U1), Vcons	AMPS Bridge Power Port Report	1	15	1
Debug Expansion Port (D1) [Vcons, Vprod]	AMPS Bridge Power Port Report	1	14	1,2
Sub Expansion Port, Vcons	AMPS Bridge Power Port Report	2	0	5
Fore Solar Panel	AMPS Solar Input Port Report	1	9	1
Mid Solar Panel	AMPS Solar Input Port Report	1	10	1
Aft Solar Panel	AMPS Solar Input Port Report	1	10	2

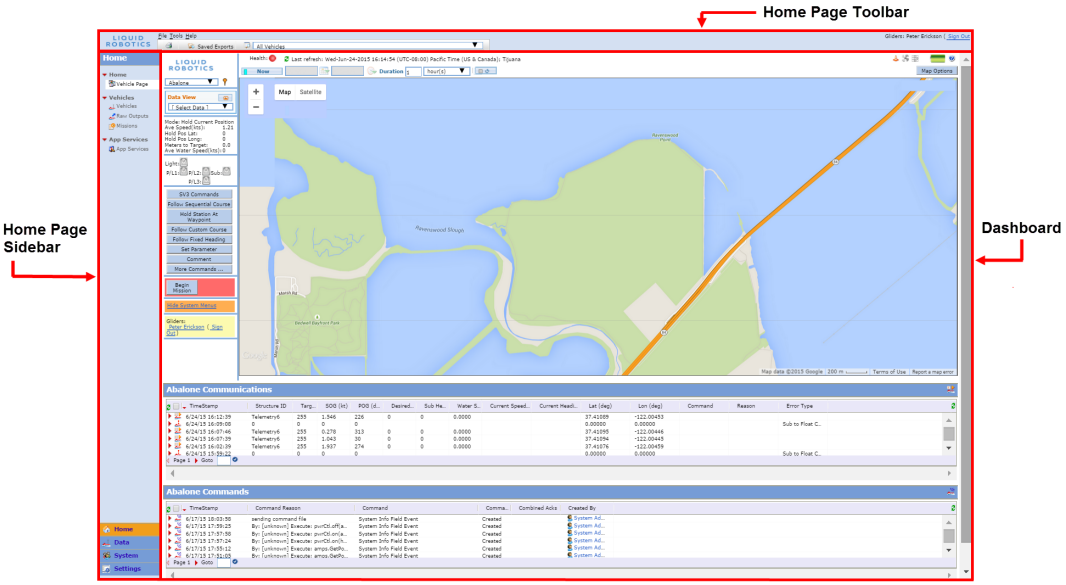
Note

There may be more than 2 AMPS domains. Also, the table configuration on WGMS may require scrolling through the columns of the different AMPS pages to isolate the desired Domain-Module-Port.

Chapter 5. Administrative Tasks - Home Page

When you select **Show System Menus** on the WGMS **Dashboard**, the **Home** page sidebar appears with the **Vehical Page** side tab selected. The **Vehical Page** side tab is actually the WGMS **Dashboard** - they are identical. The WGMS **Dashboard** with the **Home** page side bar open is referred to as the **Home** page.

Figure 5.1. WGMS Home Page



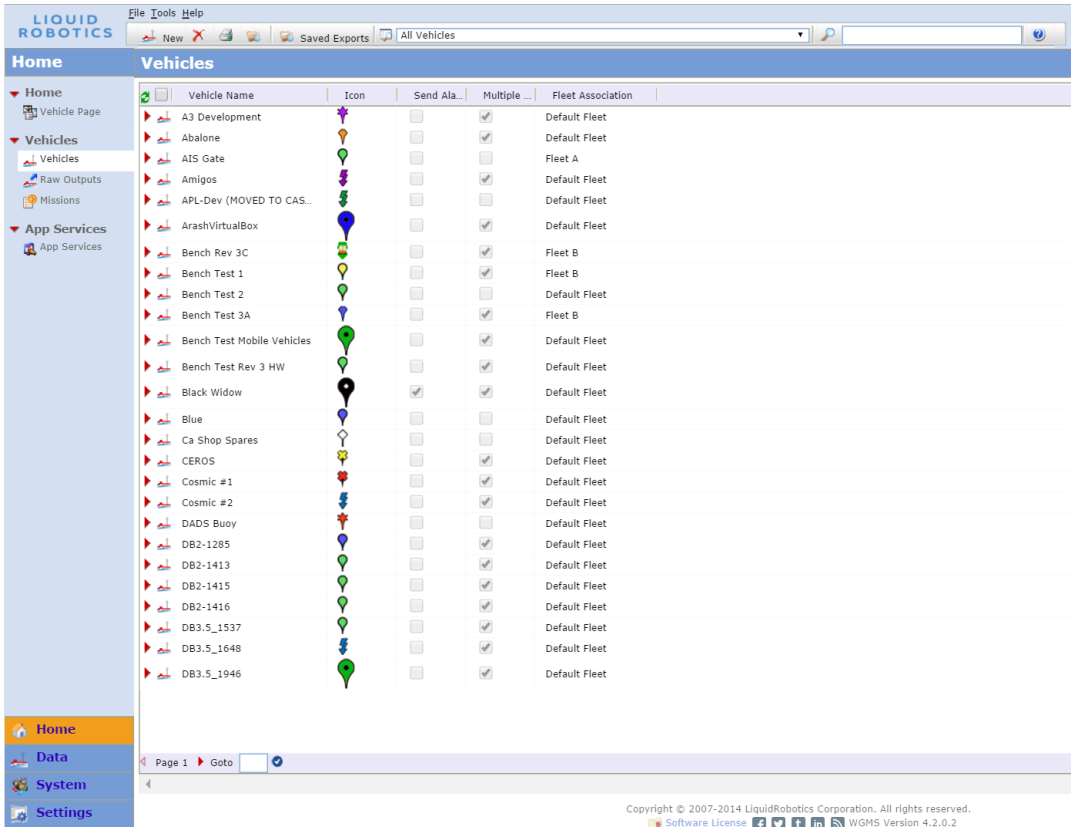
This chapter is focused on tasks that can be performed from the menus in the **Home** page by System Administrators and by Users who do not have Admin Role permissions. Vehicle-specific data is typically accessed from the **Home** page by Users who are assigned a Master Role. From the menus on the **Home** page you can view and edit information on individual vehicle configurations, raw outputs, missions, and app services. For an overview of the **Home** page UI, see "WGMS Home Page" (page 26).

View or Edit Vehicle Data

Select **Show System Menus** on the WGMS **Dashboard**, to open the **Home** page sidebar.

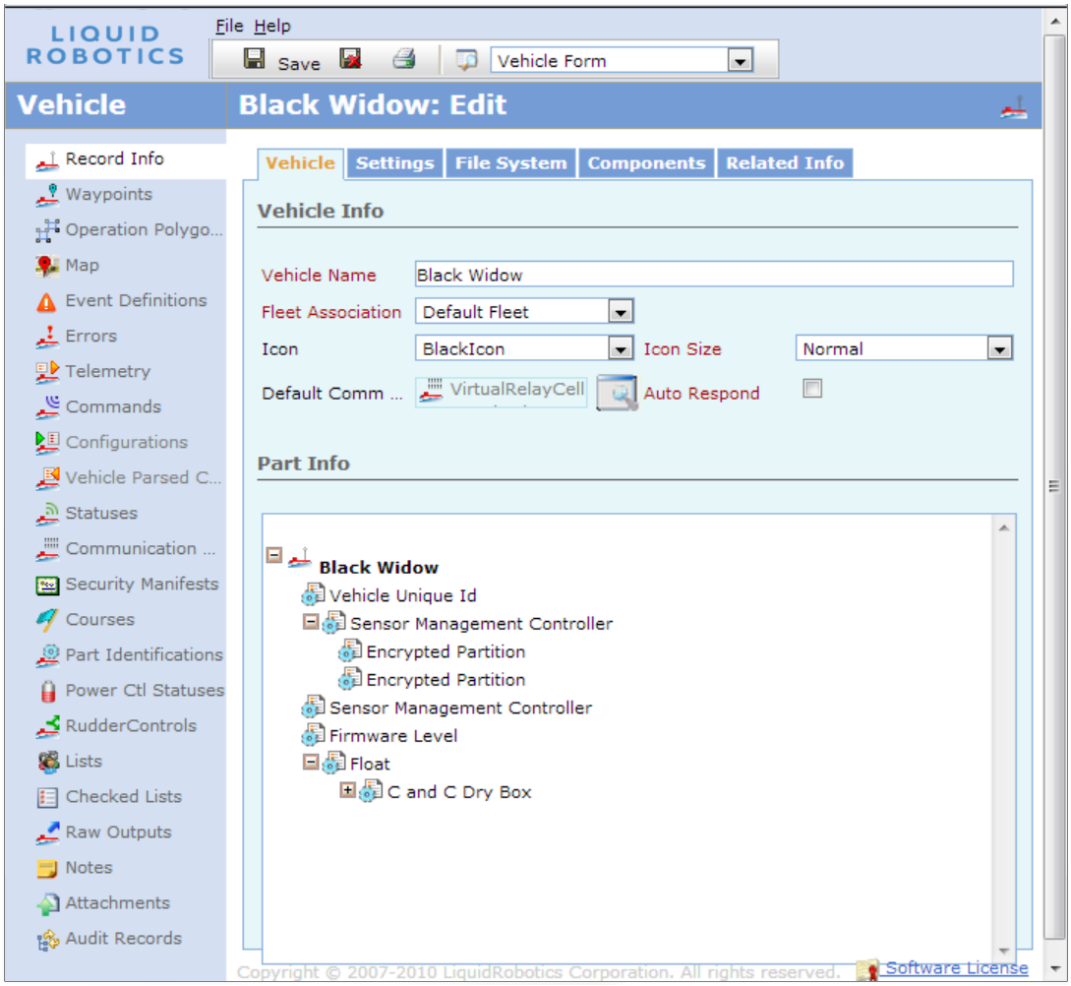
In the **Home** page side bar, under the **Vehicles** menu, click on the **Vehicles** side tab to open the **Vehicles** window containing a list of all of the vehicles in the WGMS Organization you are logged in to:

Figure 5.2. Vehcles Window



In the **Vehicles** list, double-clicking on a vehicle name in the **Vehicle Name** column, or single-clicking on the icon next to the vehicle name, will display a **Vehicle Form** for that vehicle. For example, selecting **Black Widow** will bring up the following **Vehicle Form**:

Figure 5.3. Example - Vehicle Form



The side tabs for the Vehicle Form include:

Record Info: Basic info on the Vehicle, and the parts definition tree. This information can be edited.

Waypoints: Lists all the Waypoints assigned to the Vehicle. This information can be edited.

Operation Polygons: Lists all the Operation Polygons assigned to the Vehicle. This information can be edited.

Map: Displays a Position Map of the Vehicle location. Identical to the Dashboard map.

Event Definitions: Definitions of Alarm types and parameters. This information can be edited.

Errors: Latest error messages received from the Vehicle.

Telemetry: Latest telemetry data received from the Vehicle.

Commands: Latest commands sent to the Vehicle.

Configurations: Legacy option, pre-Model 08 Wave Gliders.

Vehicle Parsed Configurations: Legacy option, pre-Model 08 Wave Gliders.

Statuses: Latest Status data received from the Vehicle.

Communication Channels: A list containing a record for each communication channel that has been enabled on the Vehicle.

Security Manifests: A list of Mobile WGMS Security Manifest records for Mobile WGMS enabled Vehicles.

Courses: Lists Courses assigned to Vehicle. This information can be edited.

Part Identifications: Lists Hardware/Software version numbers.

Power Ctl Statuses: Latest Power Control Status data received from the Vehicle.

Rudder Controls: Latest rudder-control commands sent to the Vehicle.

Lists: Alarm Escalation and User Group lists. This information can be edited.

Checked Lists:

Raw Outputs: Latest raw data packets received from the Vehicle.

Note

Raw outputs from **all** of the vehicles in the WGMS organization you are logged in to can be viewed in chronological order by clicking on the **Raw Outputs** side tab under the **Home** page **Vehicles** menu.

Notes: User-entered text notes for the Vehicle. This information can be edited.

Attachments: User-entered links to files associated with the Vehicle. This information can be edited.

Audit Records: Changes or updates made to the Vehicle and/or its parts.

Viewing Vehicle Parts Information

A Wave Glider's parts information is initially entered by someone with a Root Role. A System Administrator is permitted to view vehicle parts information, but not to change it.

Select **Show System Menus** on the WGMS **Dashboard**, to open the **Home** page sidebar.

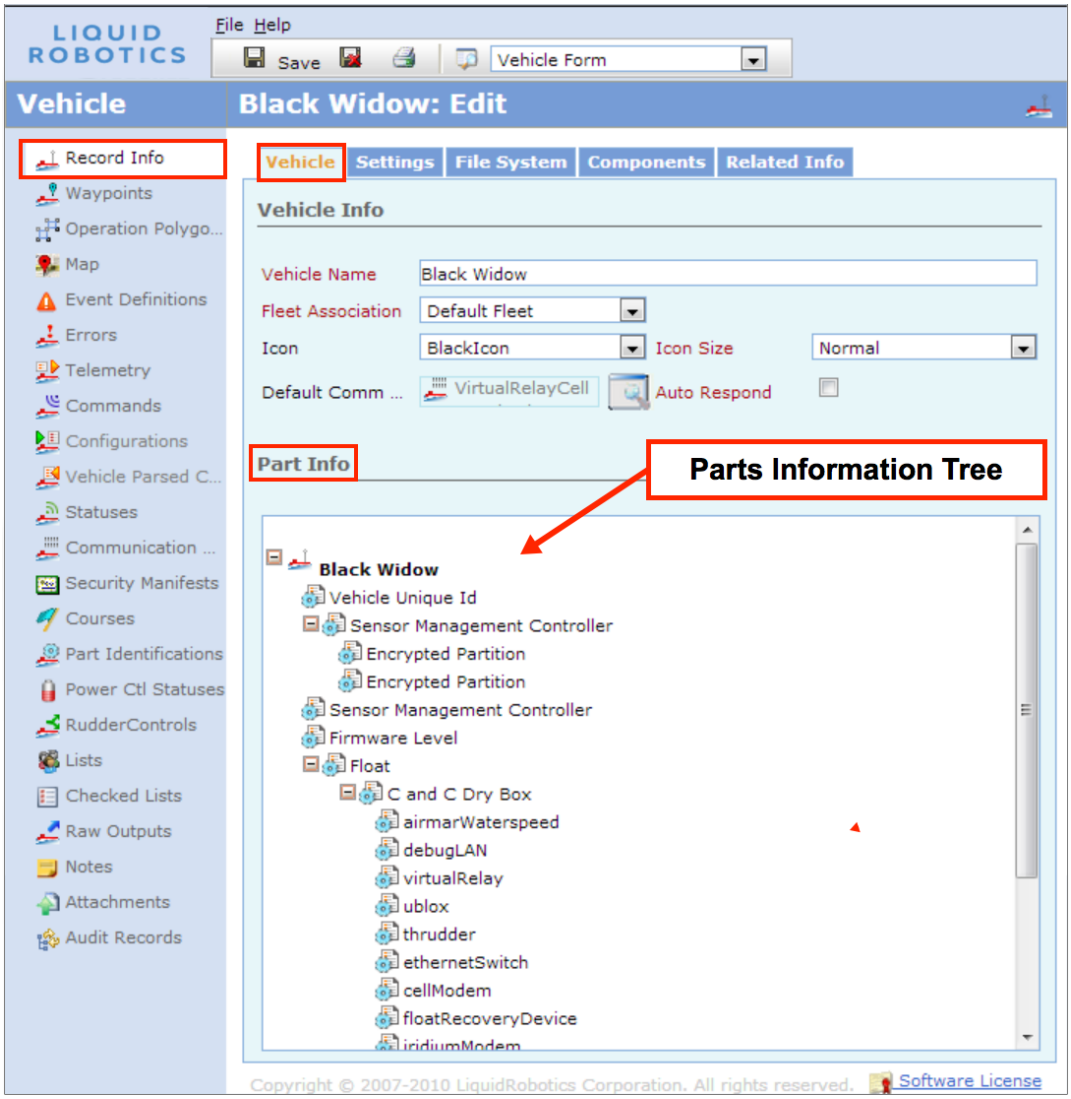
To view parts information for a vehicle:

1. In the **Home** page side bar, under the **Vehicles** menu, click on the **Vehicles** side tab to open the **Vehicles** window containing a list of all of the vehicles in the WGMS Organization you are logged in to.

2. Select a vehicle from the **Vehicles** list by double-clicking on the vehicle name, or clicking on the vehicle icon. The **Vehicle Form** for that vehicle will appear with the **Record Info** side tab open.

3. The parts information tree is in the **Part Info** section at the bottom of the **Vehicle** tab window.

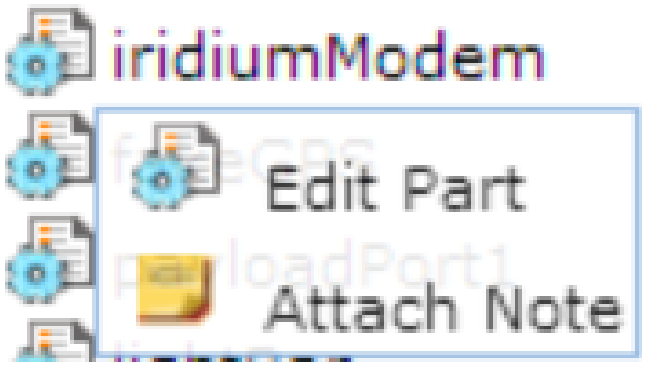
Figure 5.4. Example Expanded Part Info Tree



To view data on any of the items in the parts list:

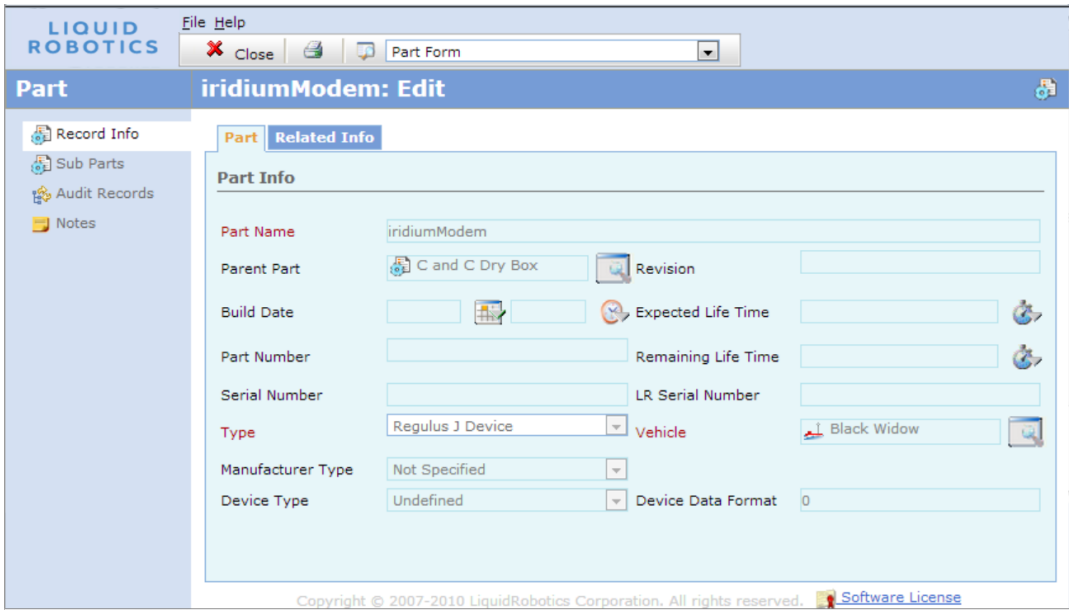
1. Click on the part name and a small dialog box will appear with two options - **Edit Part** or **Attach Note** (the Attach Note option opens a form where you can add notes about the part).

Figure 5.5. Edit Part or Attach Note



2. Click **Edit Part** and the **Part Form** with the part information will appear.

Figure 5.6. Part Form for the Iridium Modem



Adding or Changing Vehicle Alarm Thresholds

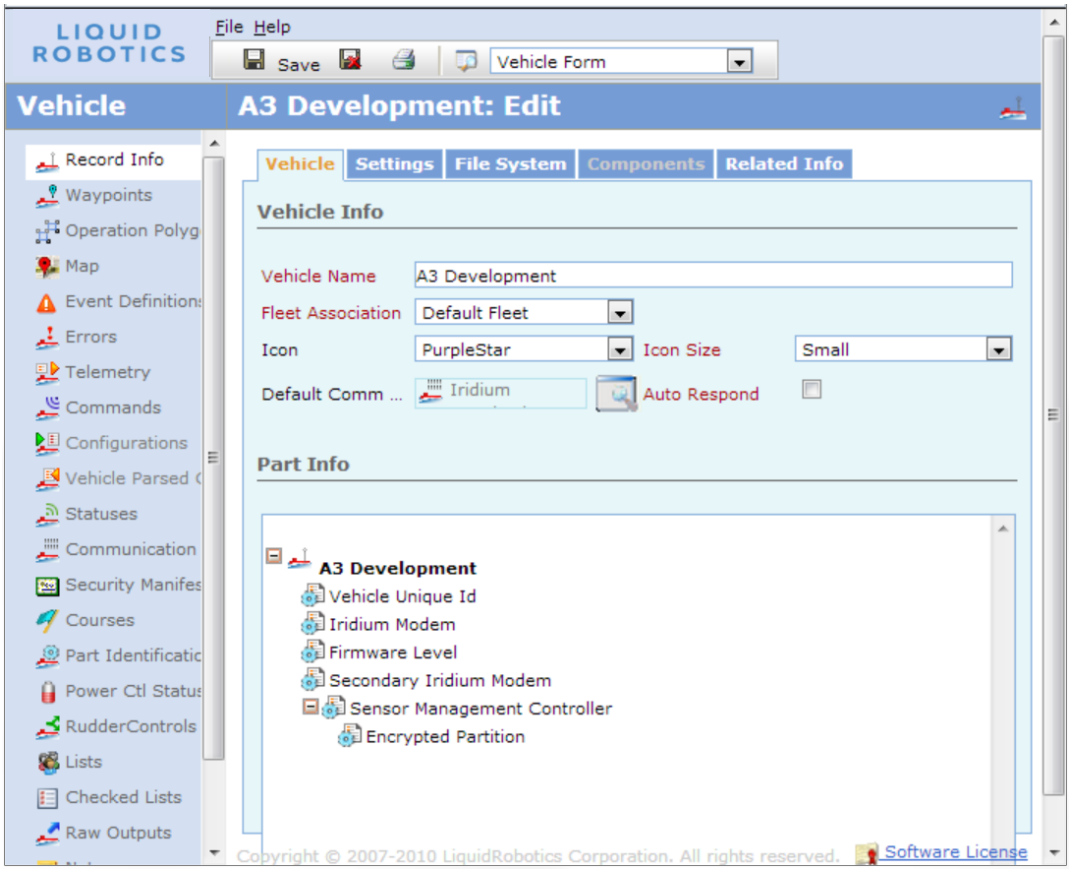
Select **Show System Menus** on the WGMS **Dashboard**, to open the **Home** page sidebar.

To add or change alarm thresholds for a vehicle:

1. In the **Home** page side bar, under the **Vehicles** menu, click on the **Vehicles** side tab to open the **Vehicles** window containing a list of all of the vehicles in the WGMS Organization you are logged in to:

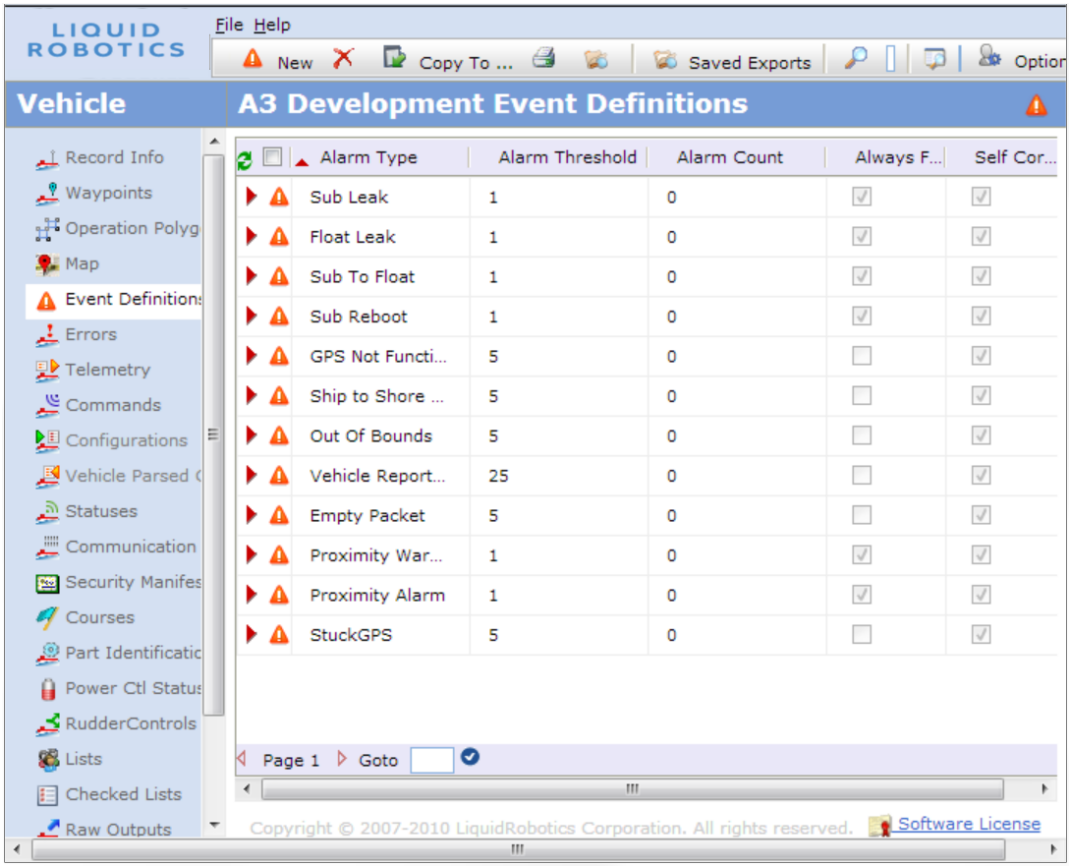
2. Select a vehicle from the **Vehicles** list by double-clicking on the vehicle name, or clicking on the vehicle icon. The **Vehicle Form** for that vehicle will appear with the **Record Info** side tab selected and the **Vehicle** tab open.

Figure 5.7. Vehicle Form



3. Click on the **Event Definitions** side tab and the **Event Definitions** list will appear.

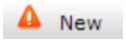
Figure 5.8. Event Definitions List



There are a minimum of nine Alarm Types that must be specified for each Vehicle. These alarm types and their default Alarm Threshold values are:

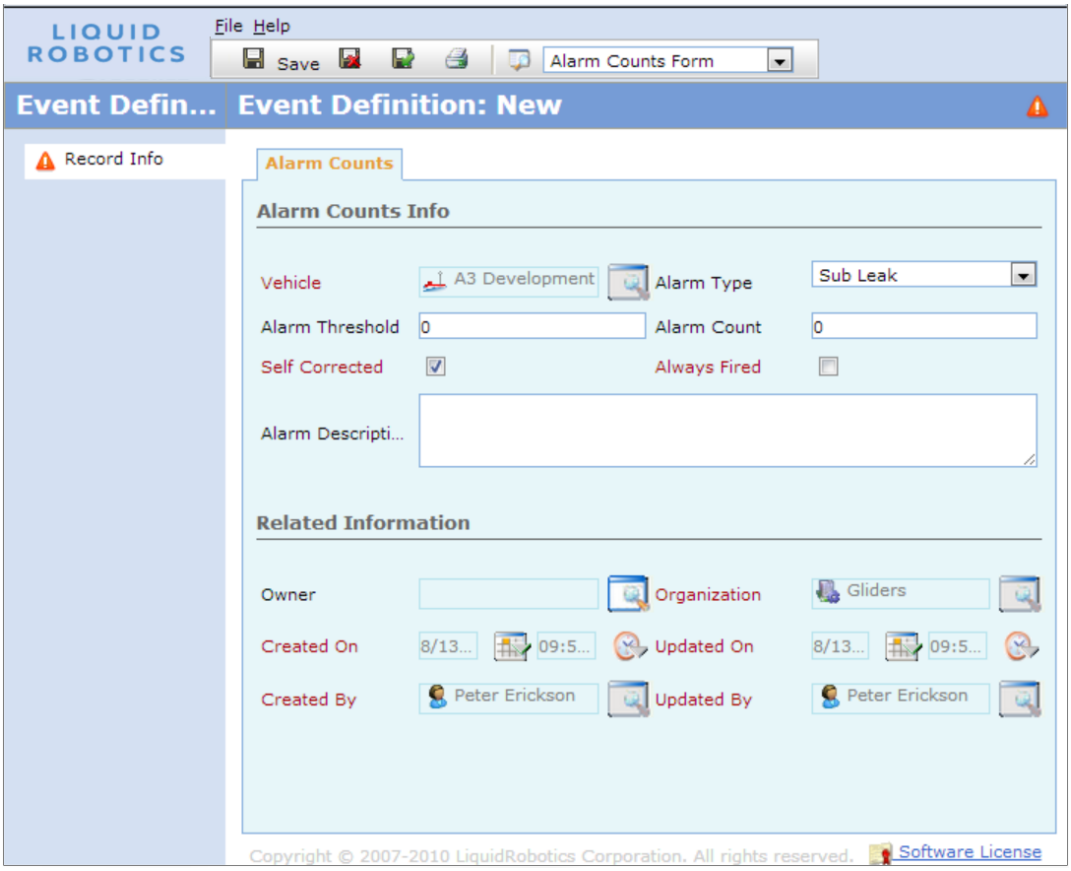
- **Sub To Float [1]**
- **Sub Reboot [1]**
- **GPS Not Functioning [15]**
- **RF Alarm [5]**
- **Out of Bounds [3]**
- **Communication Timeout [15]**
- **Empty Packet [5]**
- **Stuck GPS [5]**
- **File Read Timeout [25]**

Note that **File Read Timeout** is not in the Figure 5.8, and therefore must be added.

To add a new Alarm Type, click on the **New** icon 

in the toolbar. The **Alarm Counts Form** will appear.

Figure 5.9. New Event Definition - Alarm Counts Form



Enter the data as follows:

1. In the **Alarm Type** box drop-down menu select **File Read Timeout**.

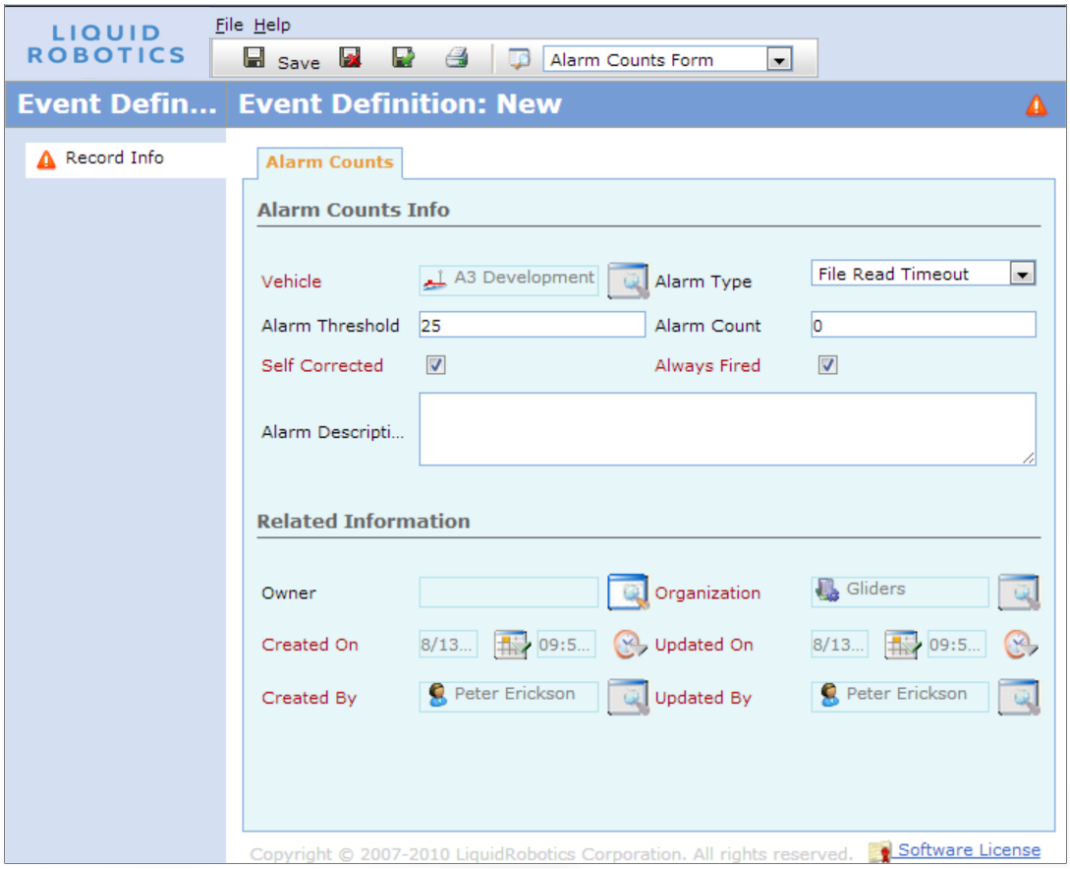
2. In the **Alarm Threshold** field, enter the threshold number (default setting is 25). The Alarm Threshold is the number of times the alarm will notify before stopping.

3. Verify that the **Self Corrected** box is checked.

4. Add a check in the **Always Fired** box.

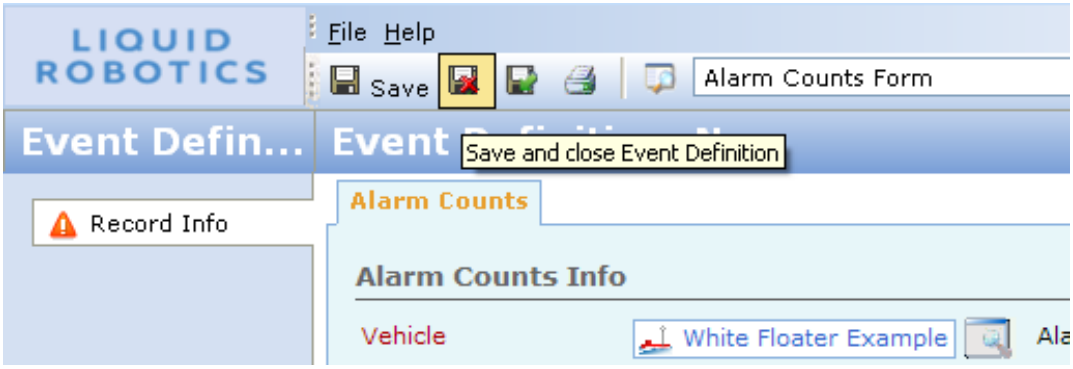
When complete, the upper part of the dialog should look similar to:

Figure 5.10. New Event Entered - Alarm Counts Form



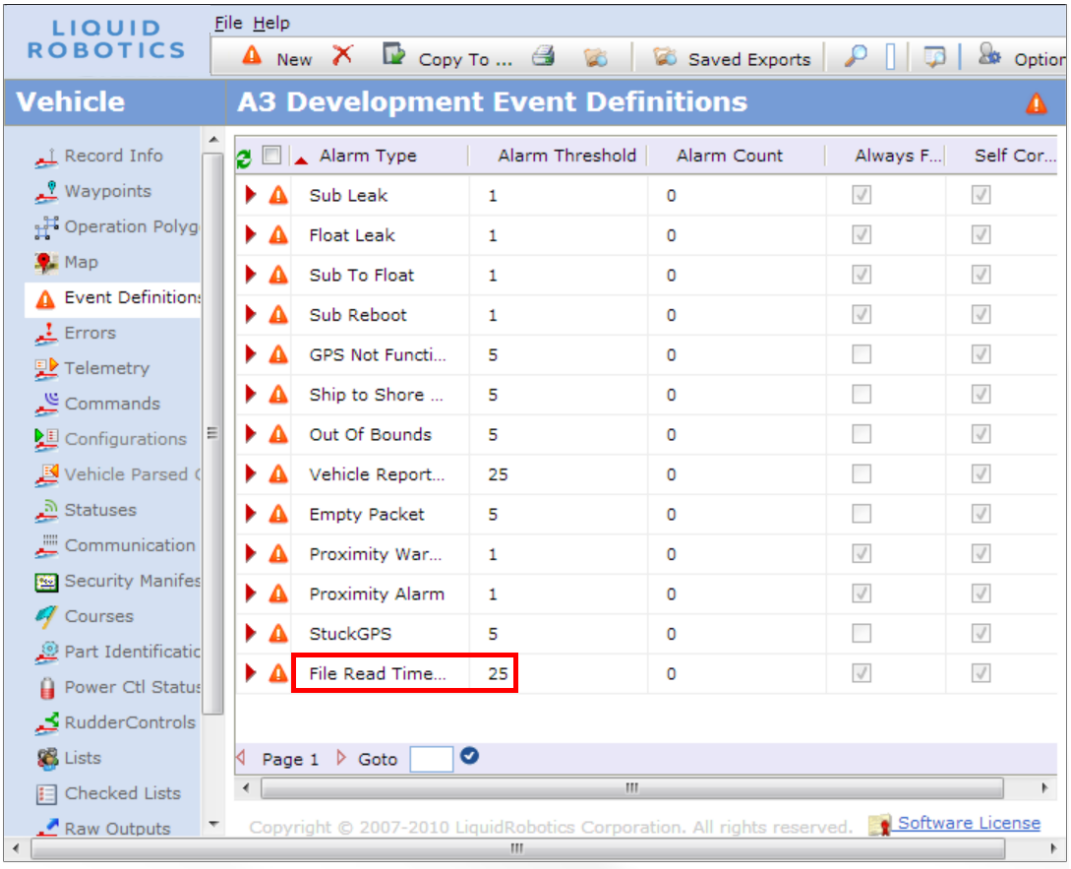
Click the [Save and Close Event Definition] icon in the toolbar to save the data and exit the Alarm Counts Form.

Figure 5.11. Save and Close Event Definition



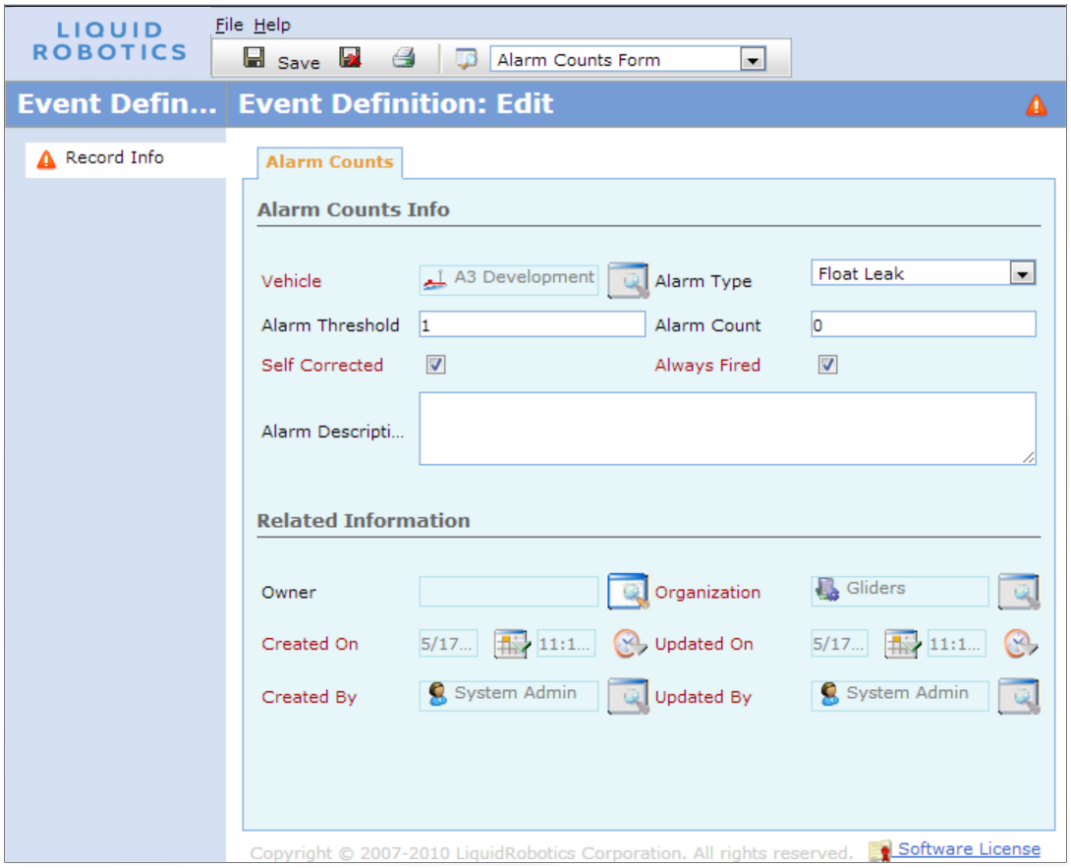
The **File Read Timeout** entry should now appear in the **Event Definitions** list.

Figure 5.12. Updated Event Definitions List



To edit an existing alarm type in the **Event Definitions** list, double-click on the name of the alarm type, or single-click on the icon next to the alarm type name. An **Alarm Counts Form Event** will appear.

Figure 5.13. Edit Event Definition - Alarm Counts Form



Edit the data value(s) as necessary, then click the [Save and Close Event Definition] icon in the toolbar to save your edits and exit the dialog box.

Chapter 6. Administrative Tasks - Data Page

The **Data** page is accessed from the side panel that appears when you select **Show System Menus** on the WGMS **Home** page. This chapter is focused on tasks that can be performed from the menus in the **Data** page by System Administrators and by Users who do not have Admin Role permissions. Vehicle-specific data is typically accessed from the **Data** page by Users who are assigned a Master Role. From the menus on the **Data** page you can view and edit information on **Payload Data** and **Sensor Data**. For an overview of the **Data** page UI, see "Data Page" (page 34).

Viewing Payload Data

To view the payload data for a vehicle:

1. Select **Show System Menus** on the WGMS **Dashboard**, to open the **Home** page sidebar.
2. Click on the

button in the **Home** page sidebar to open the **Data** page.
3. Click on any of the 6 side tabs under the **Payload Data** menu to view payload data records in chronological order for **all** of the vehicles in the WGMS Organization you are logged in to. The side tabs are:
   - **Payload Packets**
   - **Payload Status**
   - **Weather Stations**
   - **Weather Records**
   - **AISyg Records**
   - **AISyg Statuses**

Viewing Sensor Data Records

To view the sensor data for a vehicle:

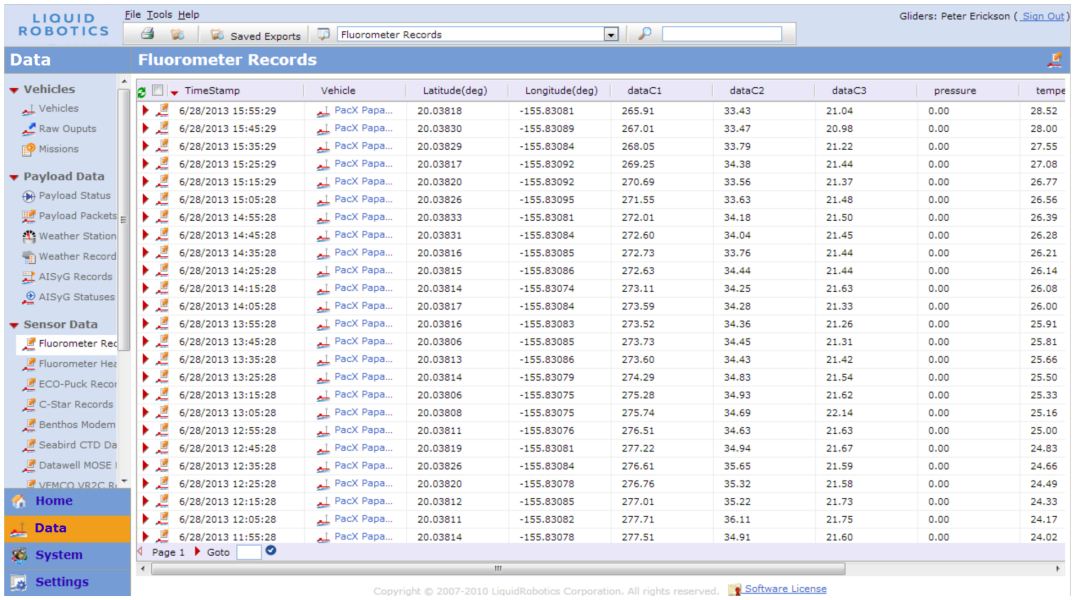
1. Select **Show System Menus** on the WGMS **Dashboard**, to open the **Home** page sidebar.
2. Click on the

button in the **Home** page sidebar to open the **Data** page.
3. Click on any of the side tabs under the **Sensor Data** menu to view sensor data records in chronological order for **all** of the vehicles in the WGMS Organization you are logged in to. There will be a side tab for each type of sensor data that is being generated by vehicles contained in the WGMS Organisation you are logged into.

For example, if you click on the **Fluorometer Records** side tab, a window with the most recent fluorometer records for each vehicle that generates fluorometer data will appear.

LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

Figure 6.1. Sensor Data - Fluorometer Records List

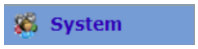


Chapter 7. Administrative Tasks - System Page

The **System** page is accessed from the side panel that appears when you select **Show System Menus** on the WGMS **Home** page. This chapter is focused on tasks that can be performed from the menus in the **System** page by System Administrators and by Users who do not have Admin Role permissions. Information is typically accessed from the **System** page by Users who are assigned a Master Role. From the menus in the **System** page you can view alarms, escalation lists, exported records, and system data telemetry records for each vehicle. For an overview of the **System** page UI, see "System Page" (page 40).

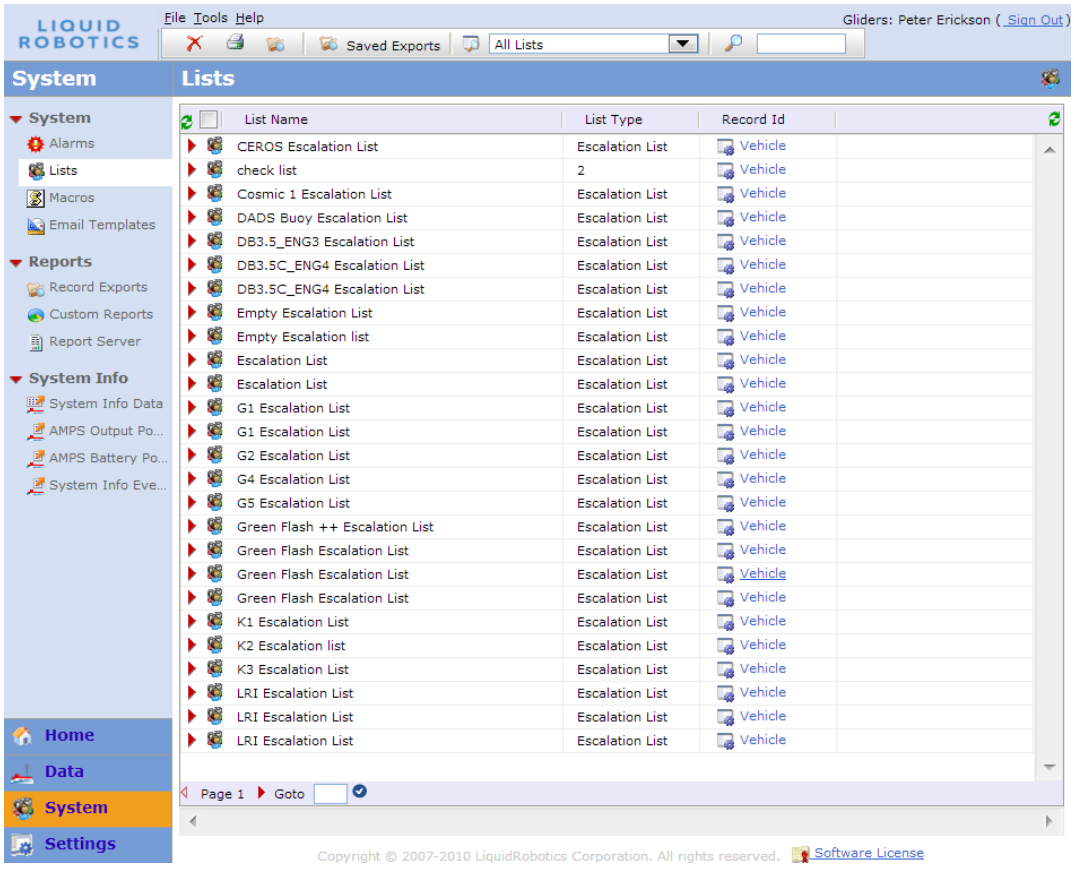
Updating Lists

Escalation Lists for Alarm notifications are the primary type of list that you may need to modify. To view the Escalation Lists for a vehicle:

1. Select **Show System Menus** on the WGMS **Dashboard**, to open the **Home** page sidebar.
2. Click on the 

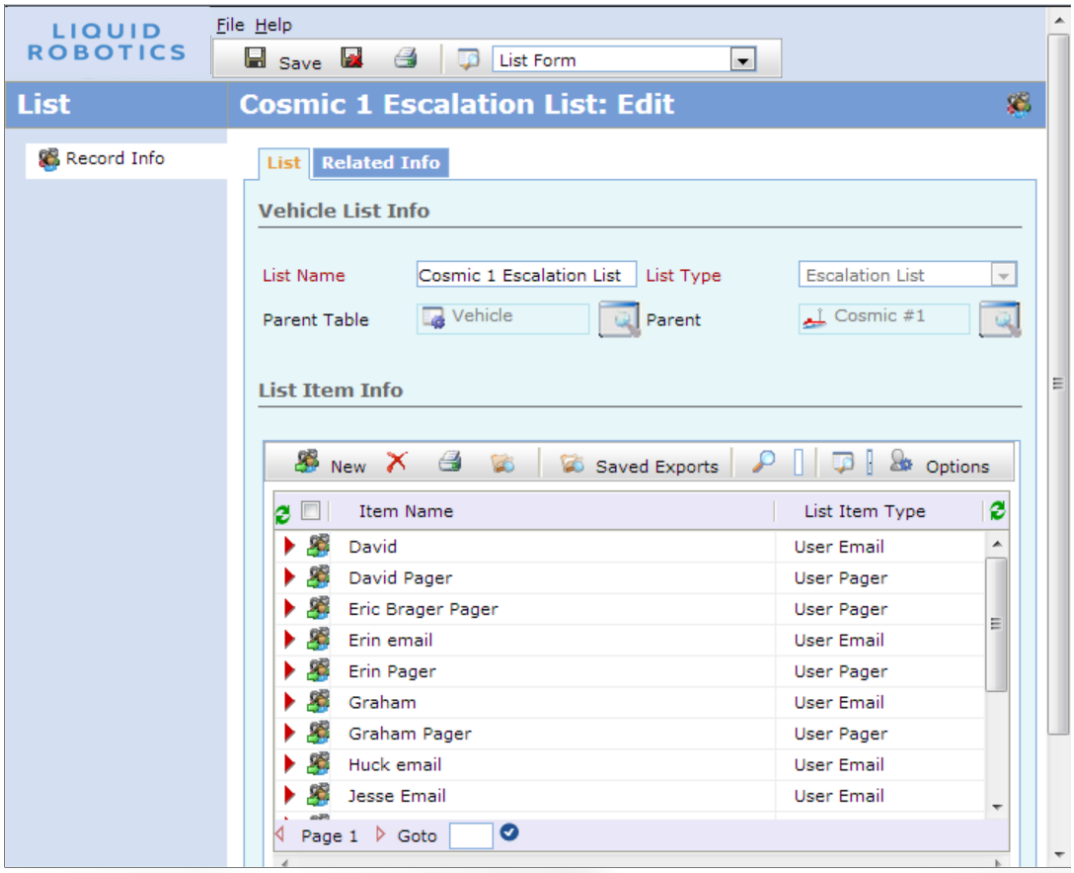
button in the **Home** page sidebar to open the **System** page.
3. Click on the **Lists** side tab under the **System** menu to open the **Lists** window where you can view all of the lists for all of the vehicles in the WGMS Organization you are logged in to. Most, if not all of the lists in the **Lists** window will be escalation lists for alarm notifications.

Figure 7.1. Lists Side Tab - Lists Window



To edit an escalation list, double-click on the **List Name** or single-click on the icon next to the **List Name** and a **List Form** will appear.

Figure 7.2. Escalation List - List Form



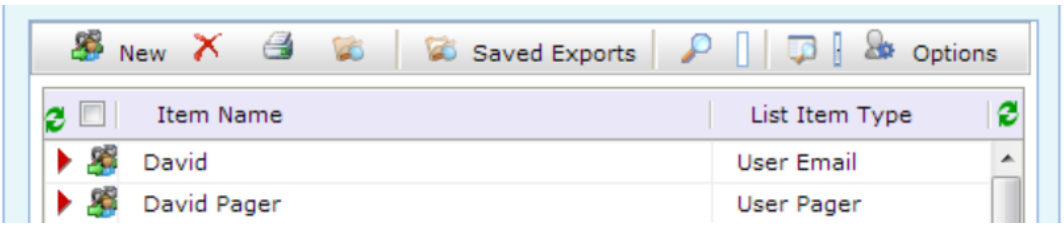
Typically, you will be adding or deleting a name from the list.

To add a name to the list in the **List Form**:

1. Click on the New icon

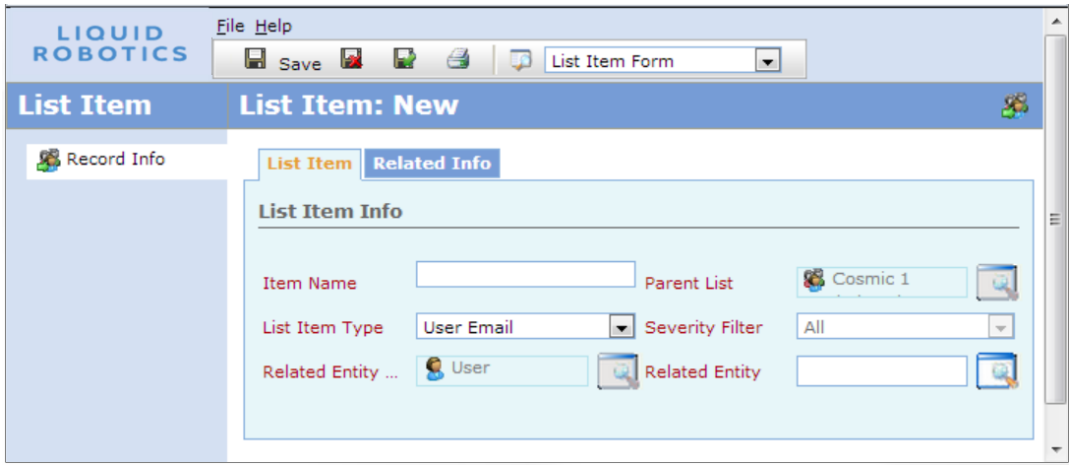
:

Figure 7.3. New Icon



A **List Item Form** will appear:

Figure 7.4. List Item Form

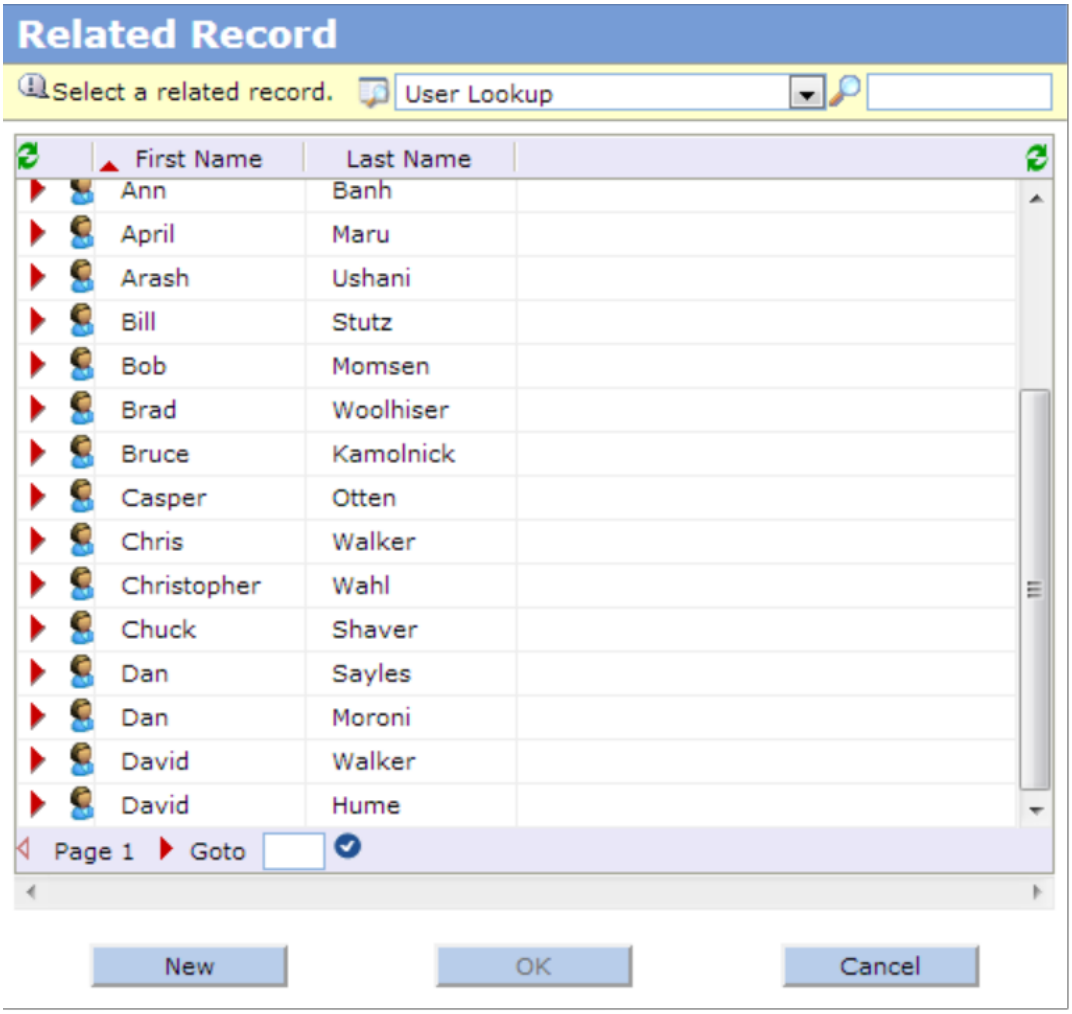


2. Enter the **Item Name** that you want to appear in the list, for example, Chuck.

3. Select the **List Item Type** in the drop-down menu, for example, **User Email**.

4. Next, click on the icon to the right of the **Related Entity** box. This will bring up a list of names to select from. The name and other information should have already been entered as described in " Adding New Users" (page 211).

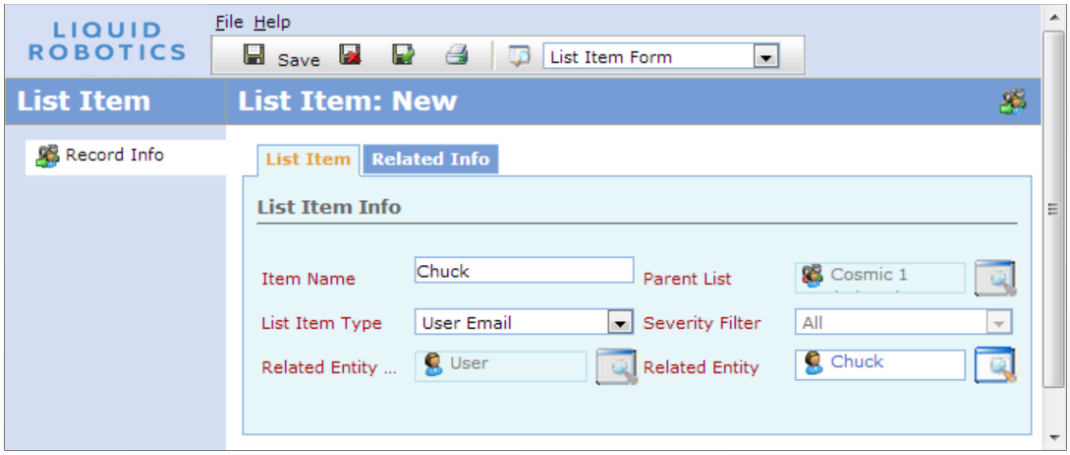
Figure 7.5. Contact List Records



5. Double-click on a name, or click on the icon next to a name, to select it.

   For example, selecting Chuck Shaver would add the name as a Related Entity in the **List Item Form**:

Figure 7.6. Example New List Item

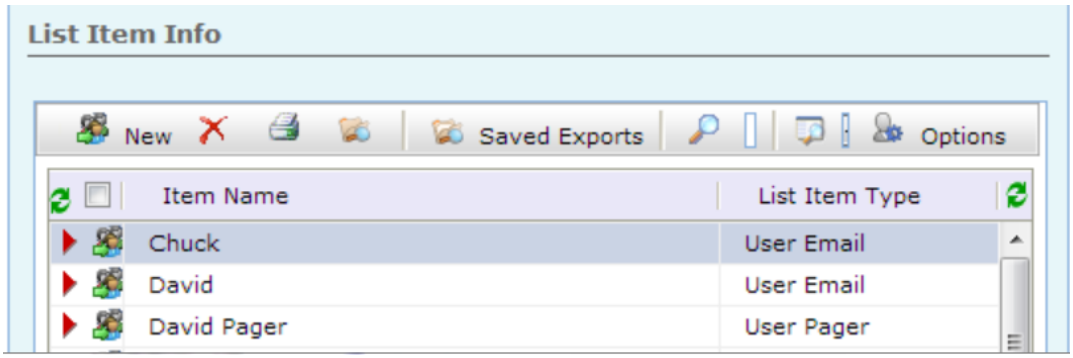


6. Click the [Save and close List Item] icon to exit back into the **List Form**. The new name will be added to the list.

To delete a name from the list in the **List Form**:

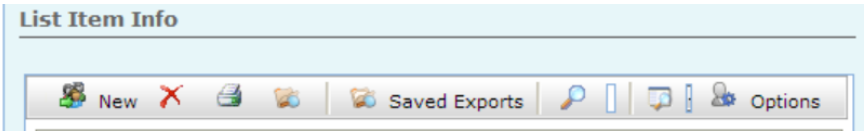
1. Click on a name to select it.

Figure 7.7. Select Name in List Form



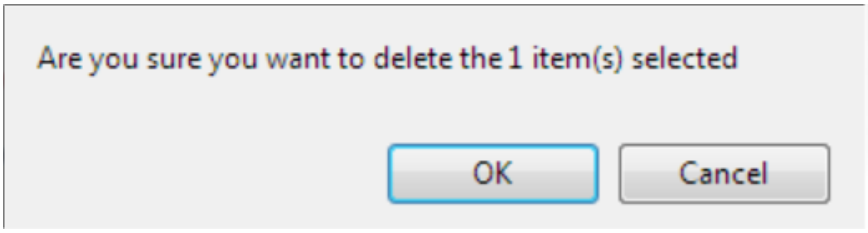
2. Click the Delete [Delete List Item] icon above the list:

Figure 7.8. Delete List Item Icon



You will be asked to confirm the deletion.

Figure 7.9. List Deletion Dialog Box



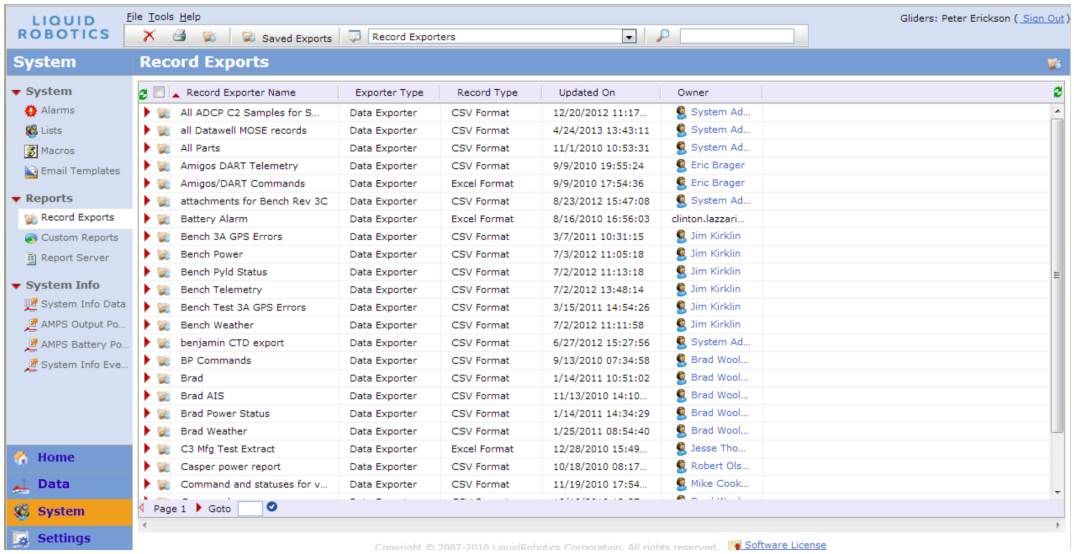
Click **OK** and the **Delete Record** dialog box will appear to confirm the deletion - again. Click **OK** to close the **Delete Record** dialog box and remove the name from the list. Note that this will only delete the name from the list - the User data will remain in the database.

Figure 7.10. Delete Record Dialog Box

Exporting Records

1. Select **Show System Menus** on the WGMS **Dashboard**, to open the **Home** page sidebar.
2. Click on the System button in the **Home** page sidebar to open the **System** page.
3. Click on the **Record Exports** side tab under the **Reports** menu to open the **Record Exports** window where you can view all of the record exports for all of the vehicles in the WGMS Organization you are logged in to.

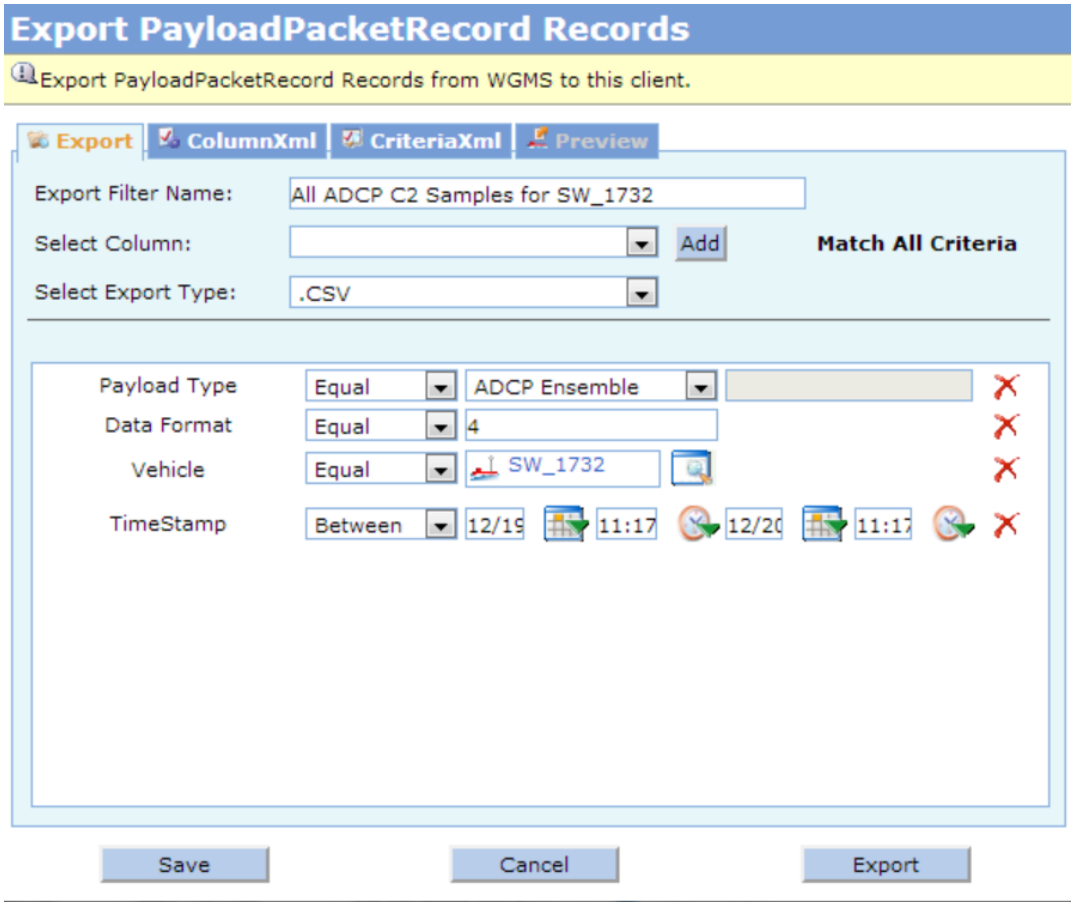
Figure 7.11. Record Exports List



To export a copy of a record (data) from the WGMS database to your computer, click on the record export icon next to the **Record Exporter Name**, or double click anywhere in the row that contains the **Record Exporter Name** - an Export dialog box will appear.

For example, when you double click on the **All ADCP C2 Samples for SW_1732** Record Exporter Name, an **Export PayloadPacketRecord Records** dialog box appears.

Figure 7.12. Example - Export Dialog Box



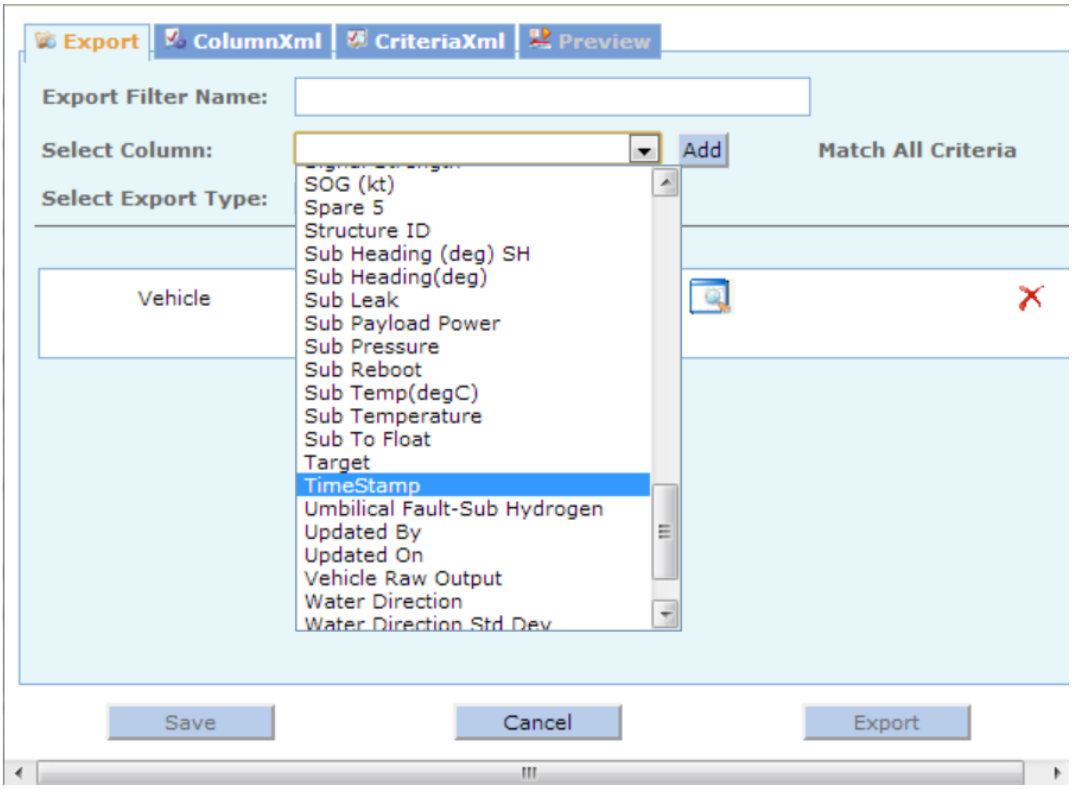
Note

You can also bring up an **Export Records** dialog from any window that includes an **Export Records** button in its toolbar by clicking on the **Export Records** button.

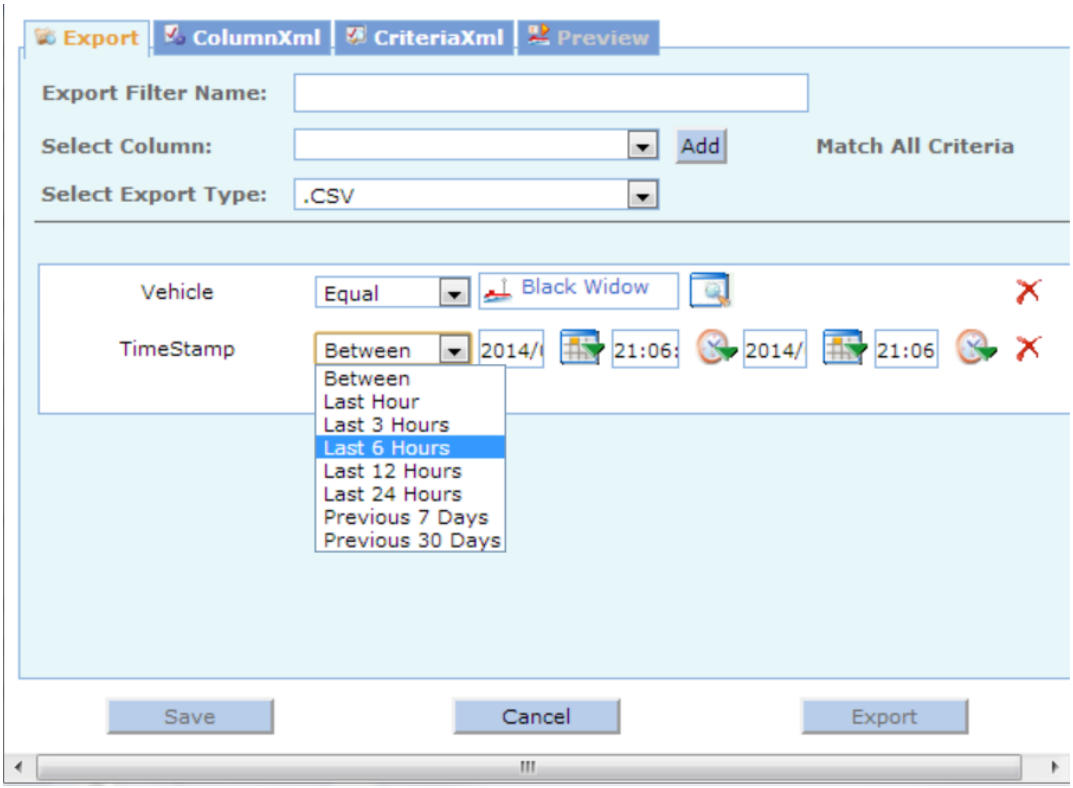
You will need to edit the fields in the **Export Records** dialog box to define the export parameters. Depending on the type of records being exported and whether you opened an **Export Records** dialog from the **System > Reports > Record Exports** menu, or from a Vehicle-specific window, some of the **Export Records** dialog fields may be pre-populated for you.

The **Export Records** dialog **Select Column** drop-down menu contains a wide range of parameters. Each time you select a parameter and click **Add** it will appear in the field at the bottom of the **Export Records** dialog.

For example, if you select **TimeStamp** and click **Add**.



A drop-down menu will allow you to select the time interval for the records export.



LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

You have the option to specify a custom records export interval by selecting **Between** and setting a date/time range in the fields adjacent to the calendar and clock icons or you can select from pre-set Records Export intervals of:

- Last Hour
- Last 3 Hours
- Last 6 Hours
- Last 12 Hours
- Last 24 Hours
- Previous 7 Days
- Previous 30 Days

After editing the Export Records dialog box:

1. Click **Save** to save the export record. A window will confirm that the export record was created successfully. Click **OK** to close the window
2. Click **Export** to export a copy of the data to your computer.

Click **Cancel** to close the Export dialog box after you export a record, or to cancel an export operation.

Similar export dialog boxes are available for:

- Part Records
- Vehicle Parsed Output Records
- Vehicle Command Records
- Attachment Records
- Vehicle Error Records
- Vehicle Power Status Records
- Vehicle Payload Status Records
- Weather Report Records

For information on how you can automatically export records at regular intervals using **curl** see the *Using curl to Poll WGMS* chapter in the *WGMS Administrators Guide*.

Chapter 8. Administrative Tasks - Settings Page

The **Settings** page is accessed from the side panel that appears when you select **Show System Menus** on the WGMS **Home** page. This chapter describes tasks that are accessible to System Administrators (or higher Roles) from the **Settings** page. The **Settings** page is focused on WGMS Organization administrative tasks and Customizing WGMS records. Although these tasks cannot be performed by WGMS users with a Master Role (or lower), they are tasks many WGMS users may want to be aware of. For an overview of the **Settings** page UI, see "Settings Page" (page 42)

About WGMS Organizations, Users, and Roles

Organizations

LRI-hosted WGMS has a muti-tenanted SaaS architecture that places customers into separate WGMS Organizations all running on the same hardware and software. A WGMS Organization provides a mechanism whereby multiple such groups can share a single physical copy of WGMS, but control access to data and Wave Gliders as if they had their own copy.

1. With LRI-hosted WGMS, LRI uses a single instance of WGMS to support multiple Organizations. The Organization serves as a privacy barrier between LRI customers. Each Organization has a private copy of its data, a private set of authorized users, separate user authentication controls and its own set of Wave Gliders to manage. Users may be aware of the existence of other Organizations, or have access to more than one Organization, depending on the login options offered on the LRI-hosted system.

2. With Mobile WGMS, there is a single Organization for each Mobile WGMS installation.

An Organization has an alphanumeric name that can be changed. There is also an LRI-assigned "Org Internal Name" for the Organization that is visible to System Administrators and must not be changed. The Org Internal Name is used by the WGMS API. For more information see " Editing Organization Information and Settings" (page 202)

Users

Users are members of an Organization. They have an email address and a temporary password which serve as their initial login. After their first login users are prompted to establish a Username and permanent password that will become their WGMS credentials.

Users are created and removed by a System Administrator, who also can reset passwords.

Roles

WGMS Users are assigned Roles by the WGMS System Administrator.

The defined Roles are:

- **Guest User:** A Guest User can only view the status of Vehicles that have been configured for display to guests.

- **Data Analyst:** A Data Analyst can view existing Vehicle and WGMS data and can download WGMS database data.
- **Master:** A Master manages Vehicle provisioning, mission planning or operations, as well as payload and web services development.
- **Admin:** A System Administrator has all the permissions required to go through the day-to-day administration of WGMS, adding users, managing customizations, and managing data.
- **Developer:** An incremental role that allows a user to gain access to payload data.
- **Provisioner:** A Provisioner can provision new vehicles and security manifests.
- **Beta User:** A Beta User can access WGMS changes and new features that are under development.
- **Root:** A Root user has full access to all aspects of the Vehicle and WGMS. A user with the Root role will either be an LRI developer or a customer under close direction from LRI.

Each Role has differing "Permissions" that restrict what actions a user can take and what commands they can use. The types of Permissions are:

Create, **Read**, **Update**, and **Delete**.

For example, a Data Analyst can only read Mission data. A Master has permission to create, read or update a mission, but cannot delete it. An Admin can create, read, update and delete mission data. It is possible for a user to be assigned more than one Role. However, this is rarely necessary.

See "Viewing Roles for an Organization" (page 224) for a more detailed explanation of Roles and Permissions.

See Appendix B: *Roles and Permissions* for a listing of the various permissions available to each Role.

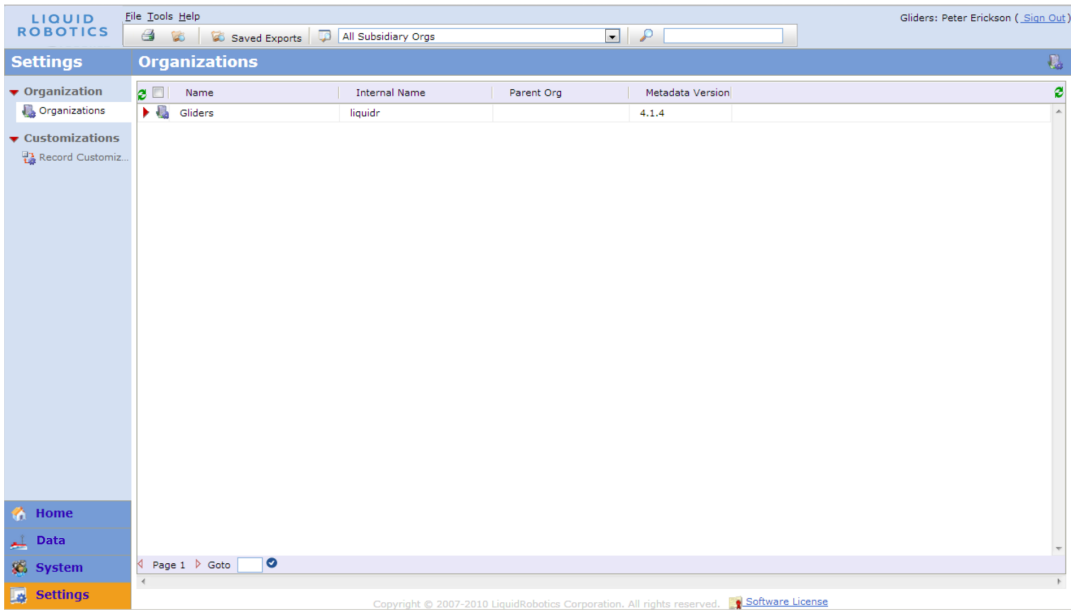
Typical Organization Initialization Tasks

For LRI-hosted Organizations, set-up is provided as part of the LRI service. The following sections describe typical initialization tasks.

Accessing the Organization Info

Click on **Show System Menus**, then click on **Settings** and the **Settings** page will open on the **Organizations** side tab displaying a list with a single Organization that you are authorized to use and log in to:

Figure 8.1. Organizations List



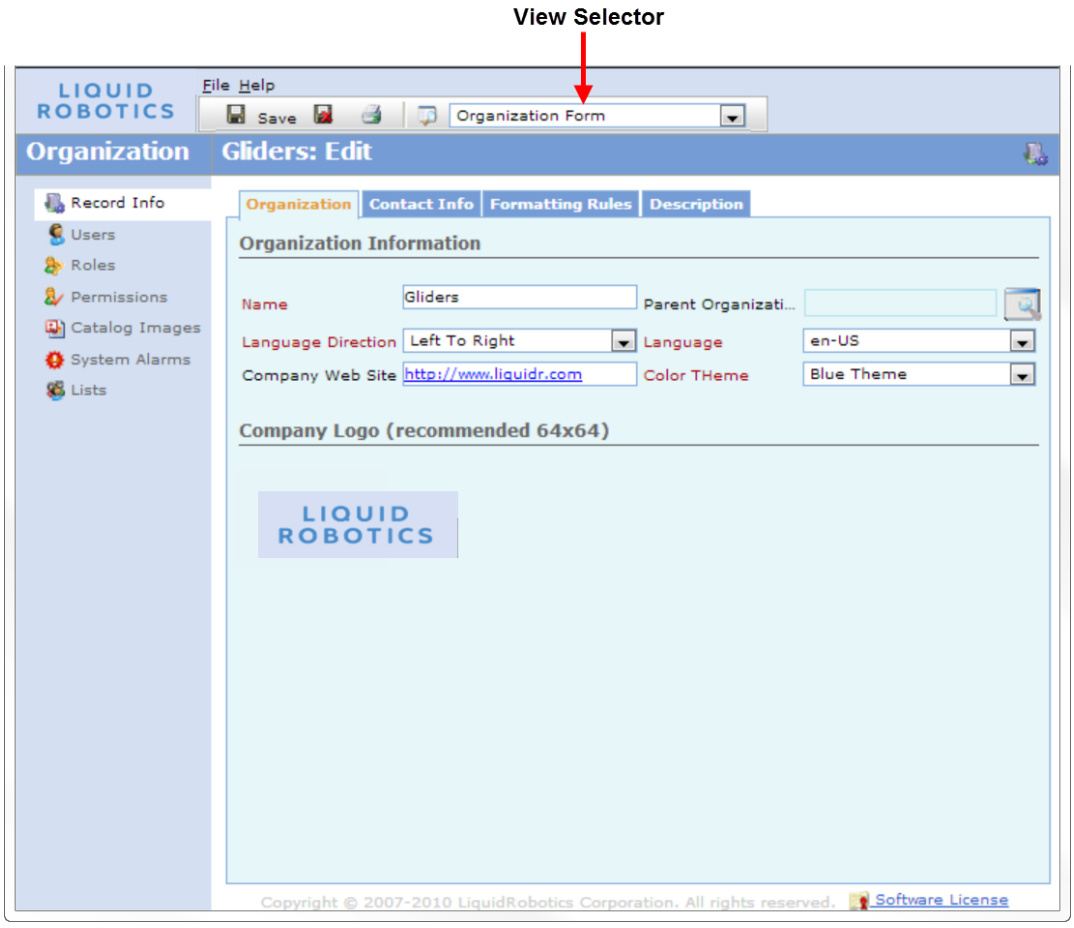
If this is the initial WGMS set-up, only one Organization will be listed. Double-click on the Organization name, or single-click on the icon to the left of the name and an Organization form will appear. See Figure 8.2.

Editing Organization Information and Settings

The Organization form is used to edit Organization information and settings. It is also used to format the GUI associated with each Organization.

The Organization form opens on the **Organization** tab with **Organization Form** selected in the View Selector, by default.

Figure 8.2. Organization Form

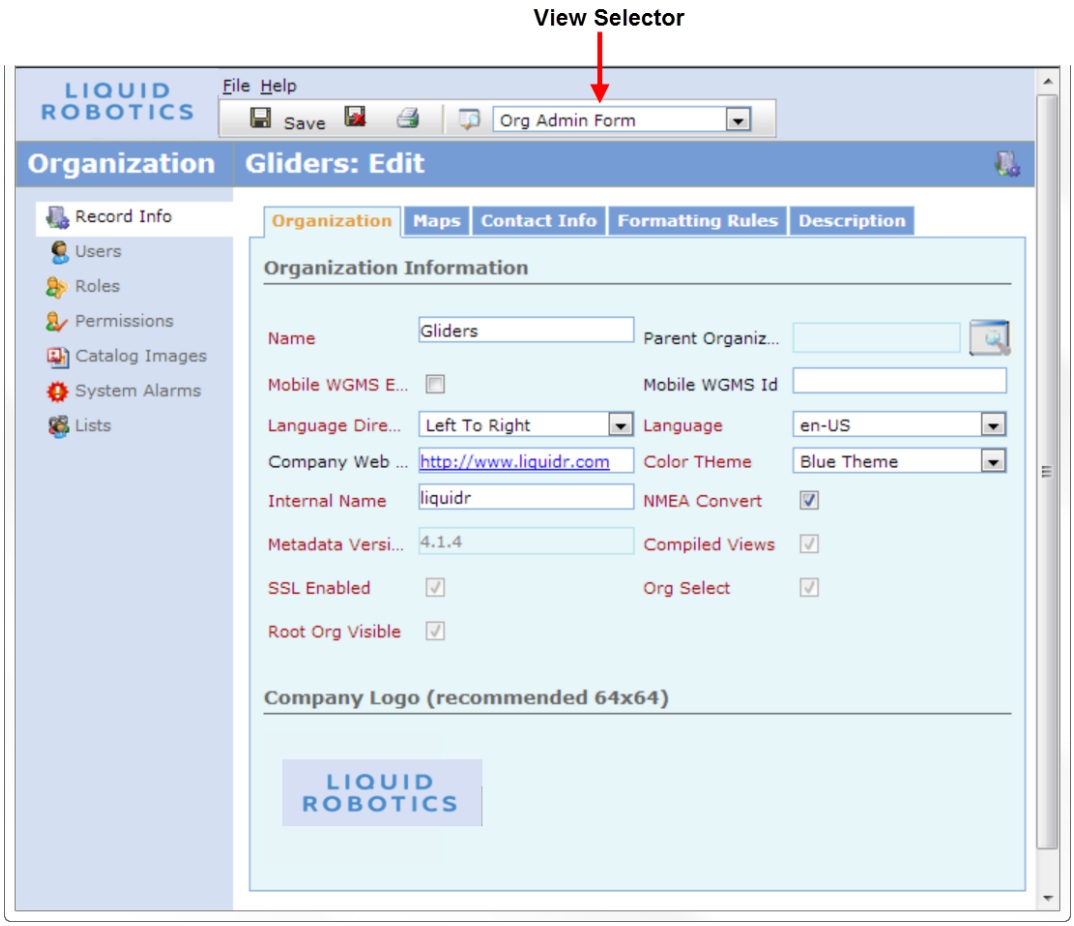


Select **Org Admin Form** in the View Selector drop-down menu to expose all of the settings that a WGMS Administrator can edit. The Org Admin Form has five tabs:

- **Organization**
- **Maps**
- **Contact Info**
- **Formatting Rules**
- **Description**

To add or edit settings and information in the Org Admin Form tabs, make a change and then click on the **Save** icon, or the **Save and Close** icon, in the toolbar at the top of the form. Required settings appear in red.

Figure 8.3. Org Admin Form

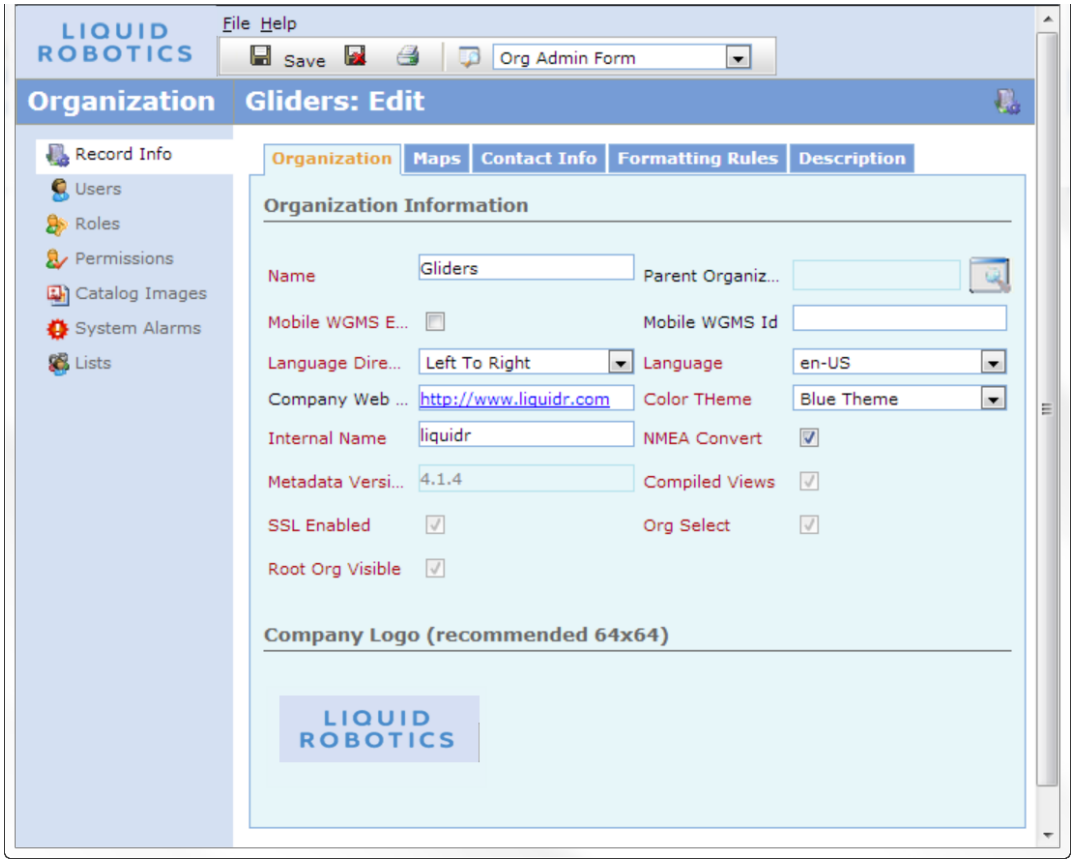


Editing the Organization Tab Settings

The entries under the **Organization** tab allow you to edit Organization configuration details.

To add or edit information, make a change and then click on the **Save** icon, or the **Save and Close** icon, in the toolbar at the top of the form. Required settings appear in red.

Figure 8.4. Org Admin Form - Organization Tab



- **Name**: The Organization name used in the GUI. This comes initially set with a placeholder name. Enter the name you want to use.
- **Parent Organization**: Leave this blank.
- **Mobile WGMS Enable**: Enables Mobile WGMS on a vehicle that supports Mobile WGMS.
- **Mobile WGMS Id**: Used to set or edit the Mobile WGMS Id.
- **Language Direction**: Specifies the placement of the GUI components, including the test positions. Does not change the text itself. The options are:
  - **Left to Right**: The default setting.
  - **Right-to-Left**: Placement positions are reversed.
- **Language**: Specifies the language used. The options are:
  - **en-US**: English, United States. (Default)
  - **en-GB**: English, Great Britain
  - **he-IL** Hebrew, Israel
- **Company Web Site**: (Optional) URL for the Organization's parent company or agency.

- **Color Theme**: Specifies the color scheme for the GUI. Options are:
  - **Gray Theme**
  - **Green Theme**
  - **Blue Theme**
  - **Maroon Theme**
- **Internal Name**: A name used only by WGMS - Do not change the Internal Name.
- **NMEA Convert**: Box checked → Convert incoming AIS data to NMEA format and store in the database. The NMEA data will also be immediately output on a previously-designated serial port. This option is typically used when there is no Internet connection to the WGMS.
- **Metadata Version**: Software version number. For reference use when contacting LRI customer support.
- **Compiled Views**: A check in this box indicates to cache the compiled views. This speeds up the response of the GUI. It is recommended that the box always be checked.
- **SSL Enabled**: A check indicates that the Secure Sockets Layer is enabled. It is recommended that the box be checked if an SSL Certificate has been installed.
- **Org Select**:
- **Root Org Visible**:

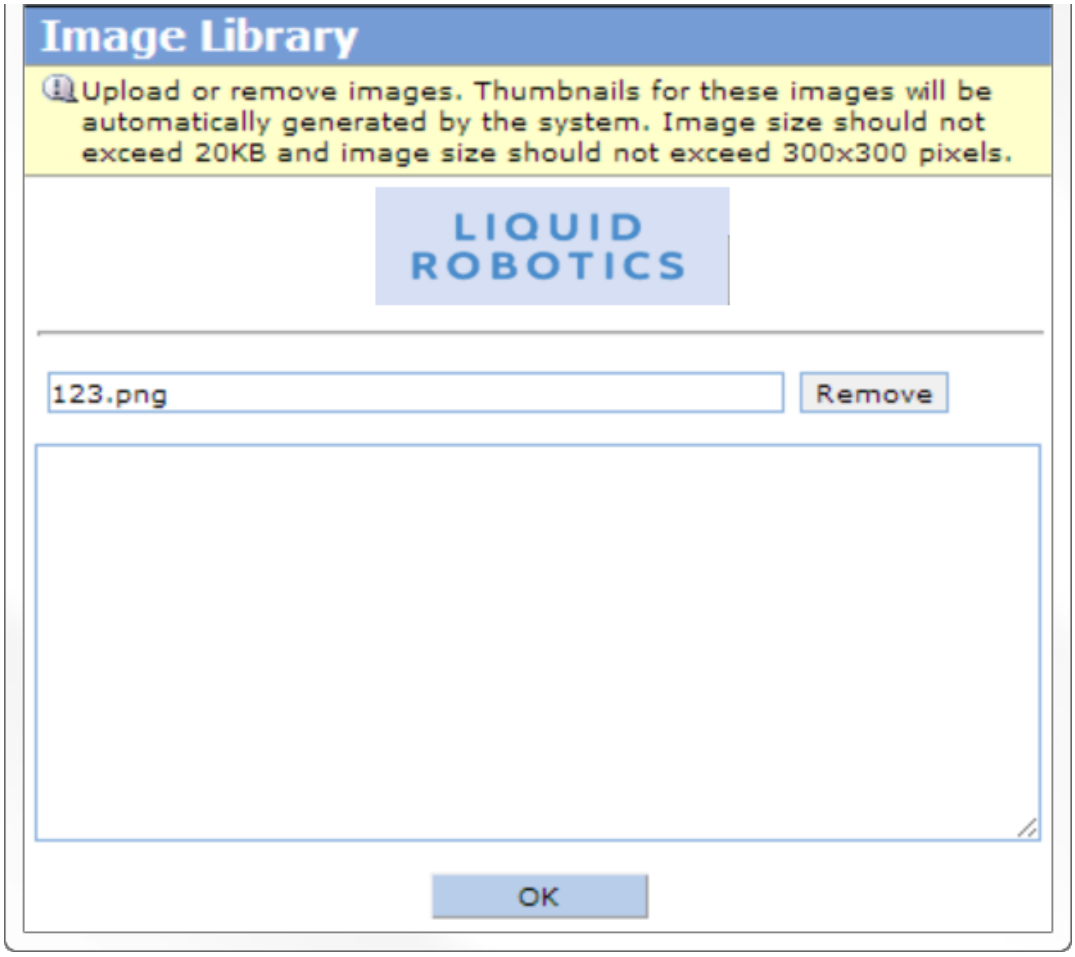
Note

The logo used in the GUI can be changed to denote your company/agency.

Figure 8.5. Changing Logo

Clicking on the logo image will bring up the following dialog:

Figure 8.6. Image Library Dialog Box



Note the restrictions indicated at the top of the **Image Library** dialog box. Enter the name of the file containing the logo image and click **OK**. If you do not want a logo, click **Remove** and then click **OK**.

Editing the Maps Tab Settings

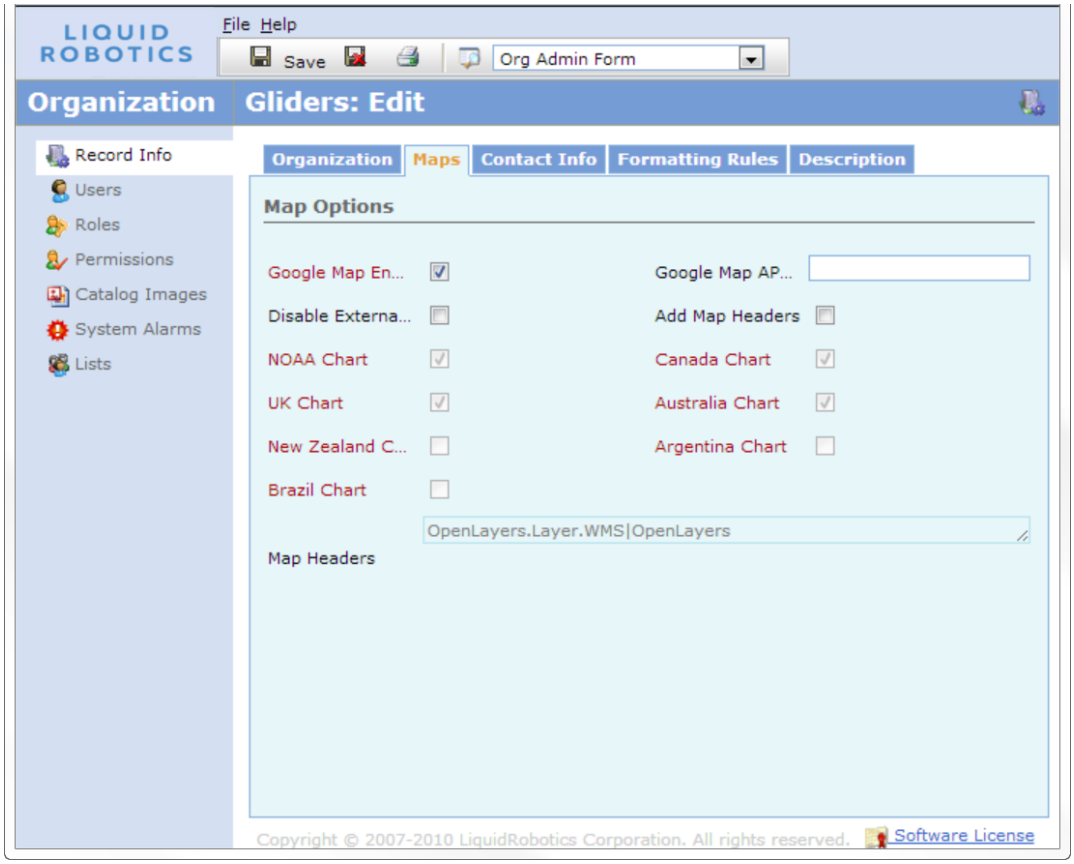
The entries under the **Maps** tab allow you to edit the map options that will be available on the WGMS dashboard.

To add or edit settings and information, make a change and then click on the **Save** icon, or the **Save and Close** icon, in the toolbar at the top of the form. Required settings appear in red.

Note

When **Google Map Enabled** is selected so Google maps are enabled on the WGMS dashboard, make sure that the **Add Map Headers** box is not checked.

Figure 8.7. Org Admin Form - Maps Tab

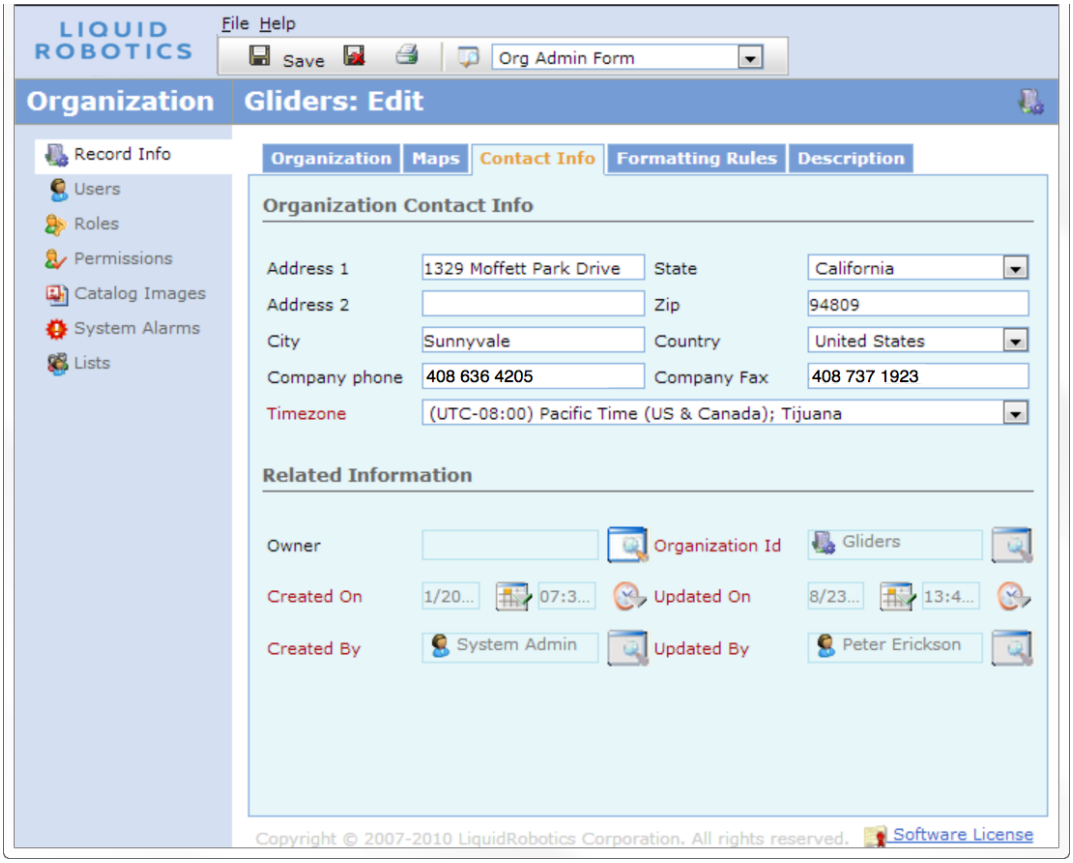


Editing the Contact Info Tab Settings

The entries under the **Contact Info** tab allow you to edit Organization contact information.

To add or edit settings and information, make a change and then click on the **Save** icon, or the **Save and Close** icon, in the toolbar at the top of the form. Required settings appear in red.

Figure 8.8. Org Admin Form - Contact Info Tab

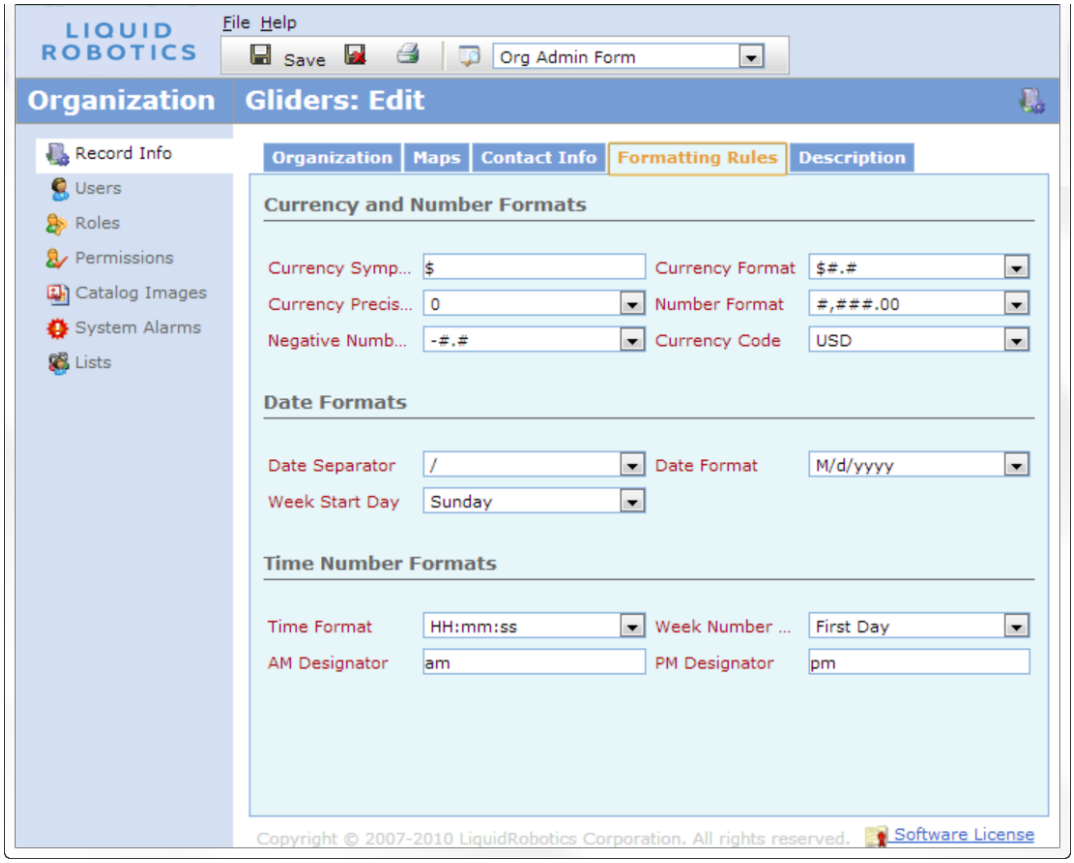


Editing the Formatting Rules Tab Settings

The entries under the **Formatting Rules** tab allow you to edit currency, number date, and time formats.

To add or edit settings, make a change and then click on the **Save** icon, or the **Save and Close** icon, in the toolbar at the top of the form. Required settings appear in red.

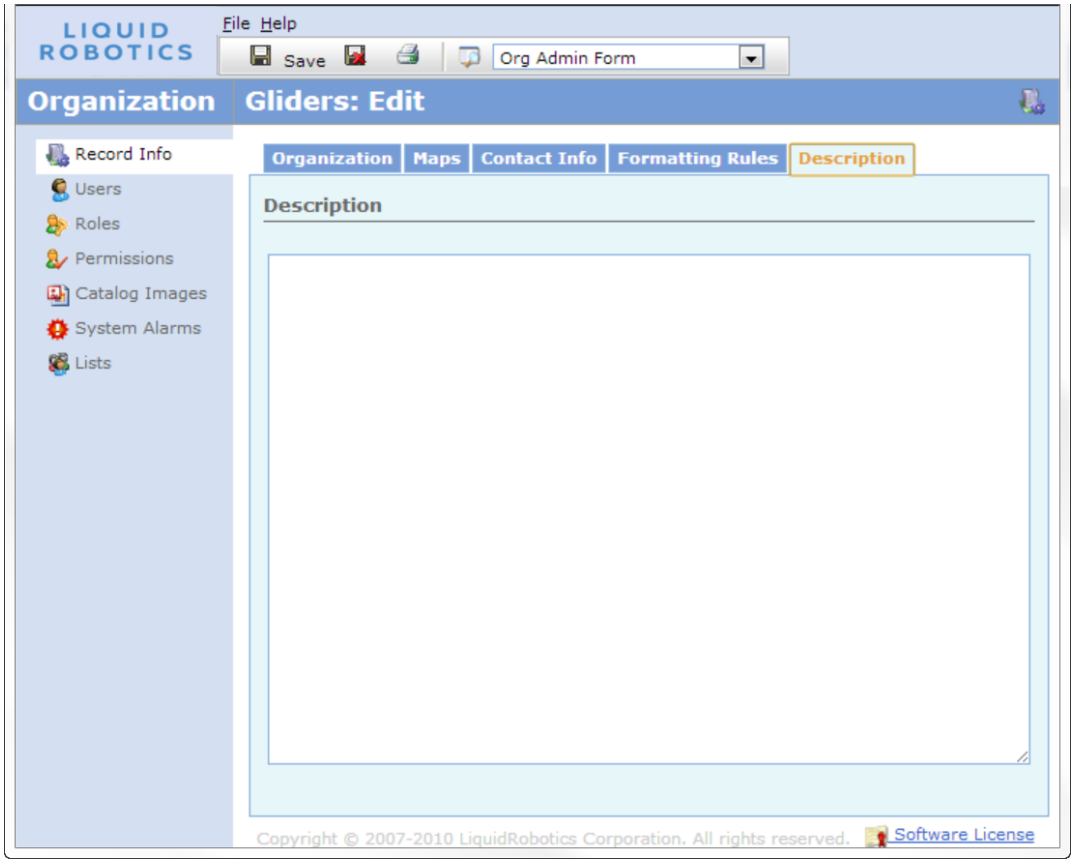
Figure 8.9. Org Admin Form - Formatting Rules Tab



Editing the Description Tab Information

The **Description** tab provides a place where you can enter free-form notes about the Organization. Enter a text description of your company or agency, or any other information you consider relevant to the Organization. Click on the **Save** icon, or the **Save and Close** icon, in the toolbar at the top of the form. The text will be saved but otherwise is not used.

Figure 8.10. Org Admin Form - Description Tab



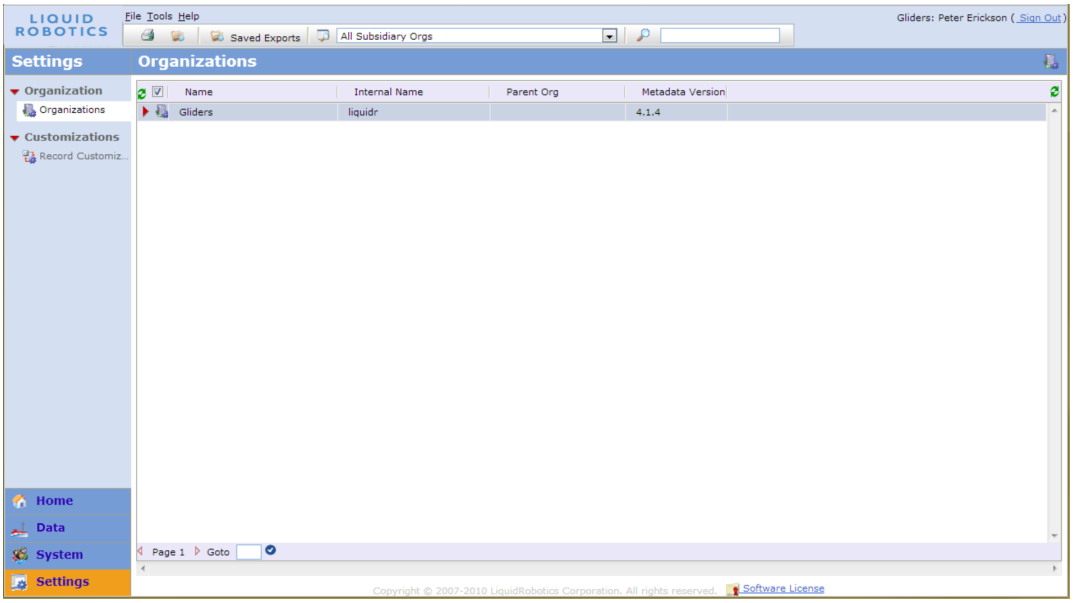
Standard Administrative Tasks

Adding New Users

To add a new User to an Organization:

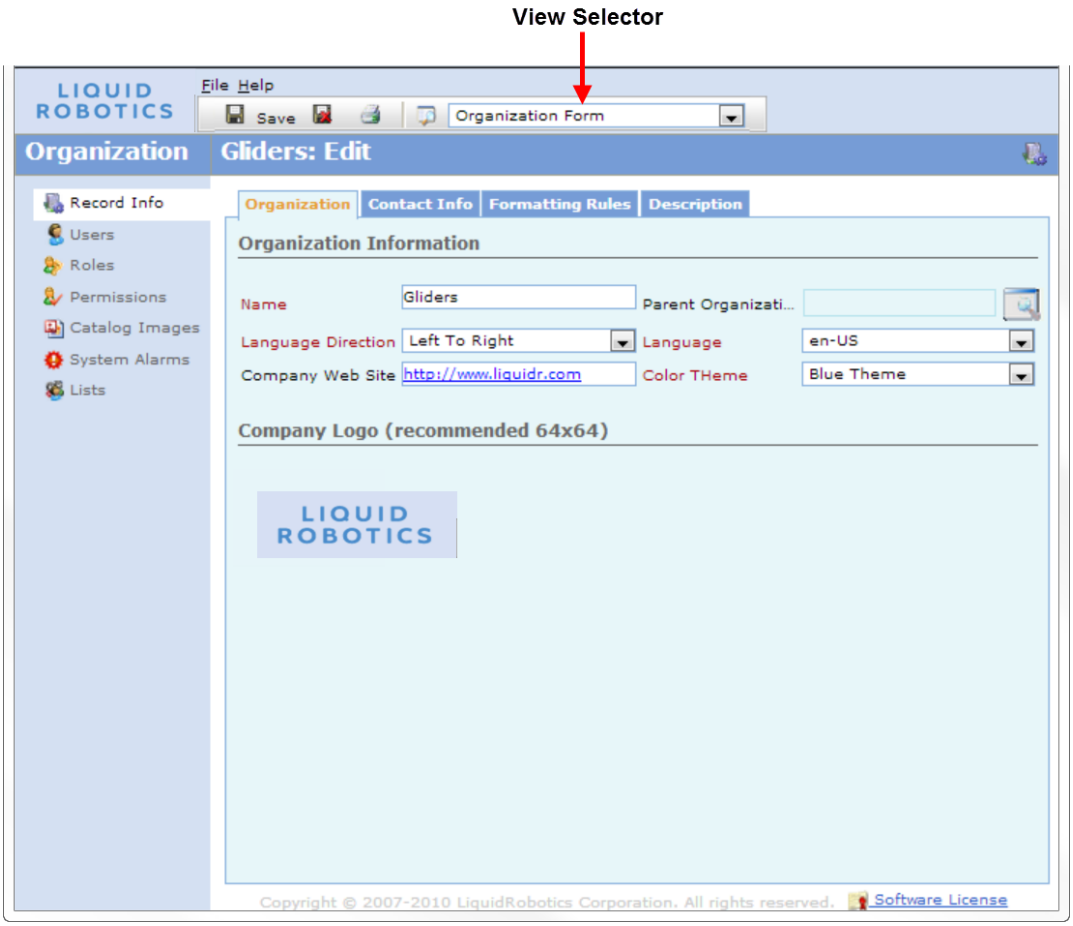
1. Click on **Settings** in the **System Menus** to open the Organizations list where you will see a single Organization that you are authorized to use and log in to.

Figure 8.11. Organizations Window



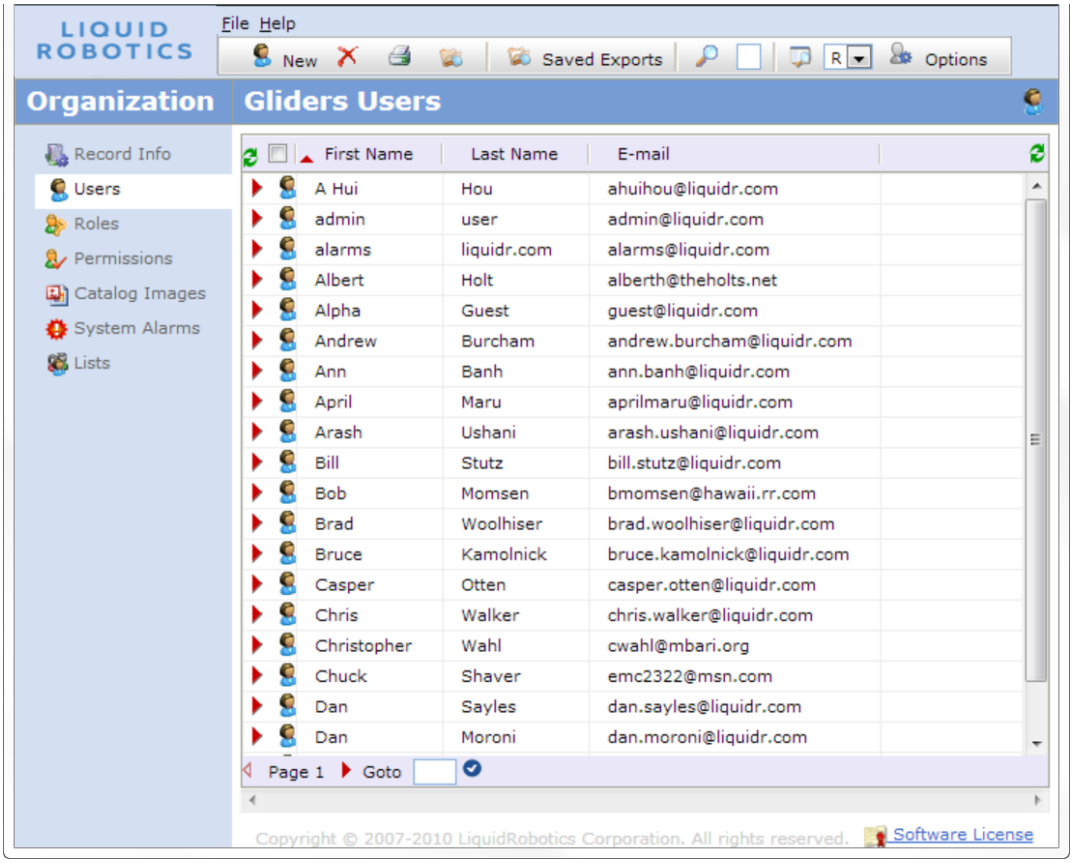
2. Double-click on an Organization name, or single-click on the icon to the left of an Organization name and the **Organization** dialog box will appear.

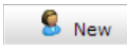
Figure 8.12. Organization Dialog Box



3. Click the **Users** side tab to open a list of individuals who have been granted access to the Organization. The list will be similar to the Figure 8.13, below.

Figure 8.13. Example List of Users



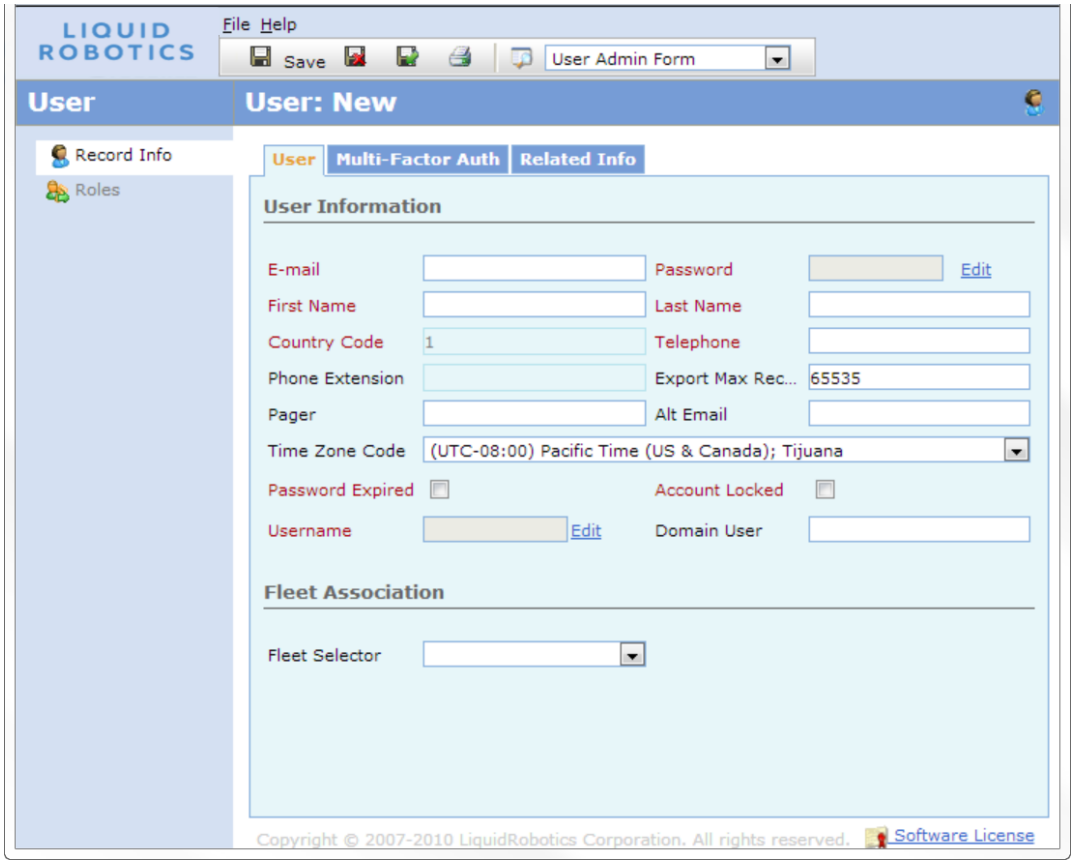
4. Click on New 

in the toolbar to open the **User: New** form. The **User: New** form has three tabs:

   - **User**
   - **Multi-Factor Auth**
   - **Related Info**

   The **User** tab will be selected by default.

Figure 8.14. User: New Form



Note

In the toolbar at the top of the window **User Admin Form** appears in the view selector - this format is visible only to System Administrators. Other Users will see the **User Form**, which is similar, but does not show the **Password Expired** and **Account Locked** options along with a few other differences (you can view the User Form by selecting **User Form** in the view selector).

The fields in the **User: New** form include:

- **E-mail**: The primary email address of the User. This will be used as the user's login ID and for email to the User.
- **Password**: The initial password for the User. All Roles except "Guest User" have the permission to change their own password.
- **FirstName/Last Name**: The User's name.
- **Country Code**: The country code preface to the User's telephone number.
- **Telephone**: The User's 9-digit telephone number, starting with the Area Code. The number can contain blanks or dashes.
- **Phone Extension**: The User's extension, if applicable.

- **Export Max Records**: The number of Excel records that the User can download at one time from various lists. Typically, the number should be less than the default 65535. The recommended value is 2000 or less. For large exports, the recommended value is 100000.

- **Pager**: This field is not a telephone number. It is an email address link to the User's pager. Alarms are emailed to the pager via this address.

- **Alt Email**: A secondary email address for the User, if available.

- **Time Zone Code**: The preferred time zone of the User. Time stamps will be displayed in this time zone. Pull down to select.

- **Password Expired**: A password can be manually expired using this check box. The common use is to create the User data with an administrator-selected password and to check this box. The first time a new User logs in, they will be prompted for the administrator-selected password and then must immediately change the password. If you leave the box unchecked, they can use whatever password you selected indefinitely.

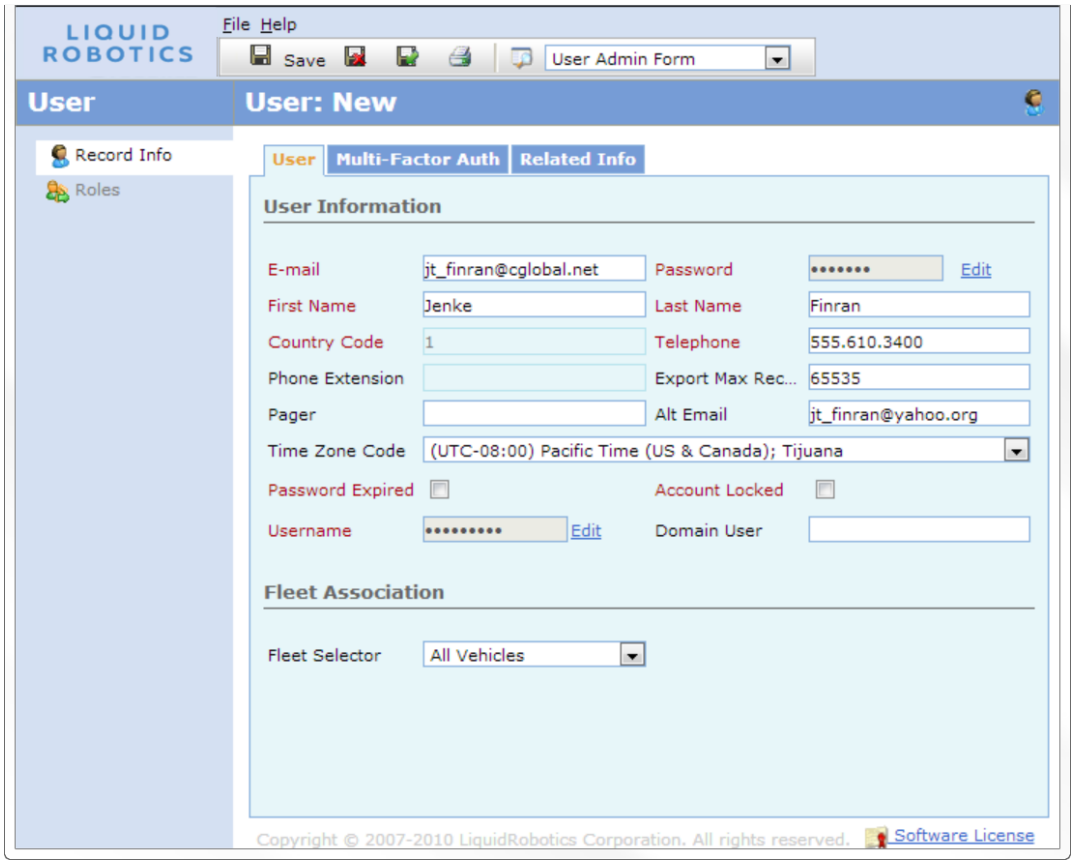
- **Account Locked**: For new Users, leave this box unchecked. A check in the box indicates that the User has been denied access to their account.

- **Username**: This is the username defined by the user after the first login.

- **Domain User**: Domain user name for the LRI Corportate network. Used in single sign on, requires both domain and user name, for example, LIQUIDR\lri.user

As an example, a completed User account form might look like:

Figure 8.15. Completed New User Account Example



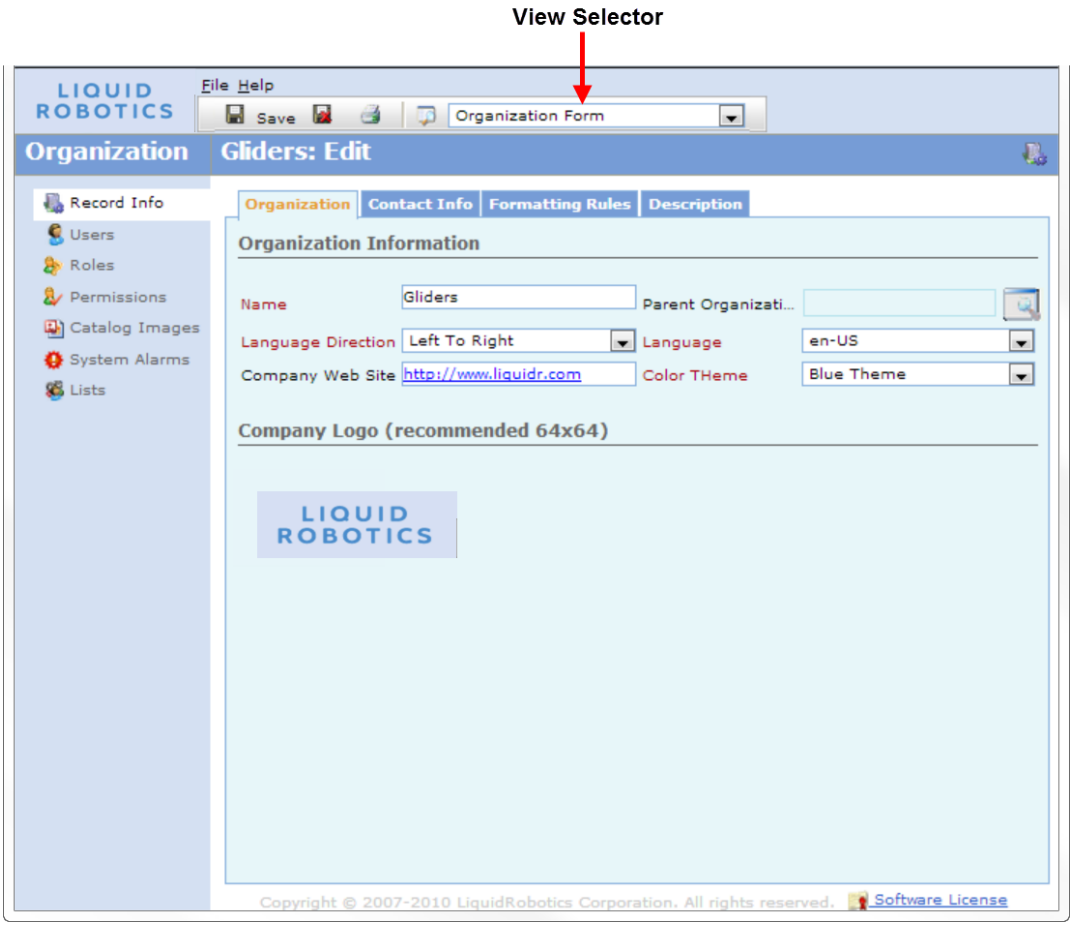
When the required information in the **User: New** form is completed, the **Roles** tab in the side-bar will become active.

Assigning or Removing User Roles

To assign a Role to a User:

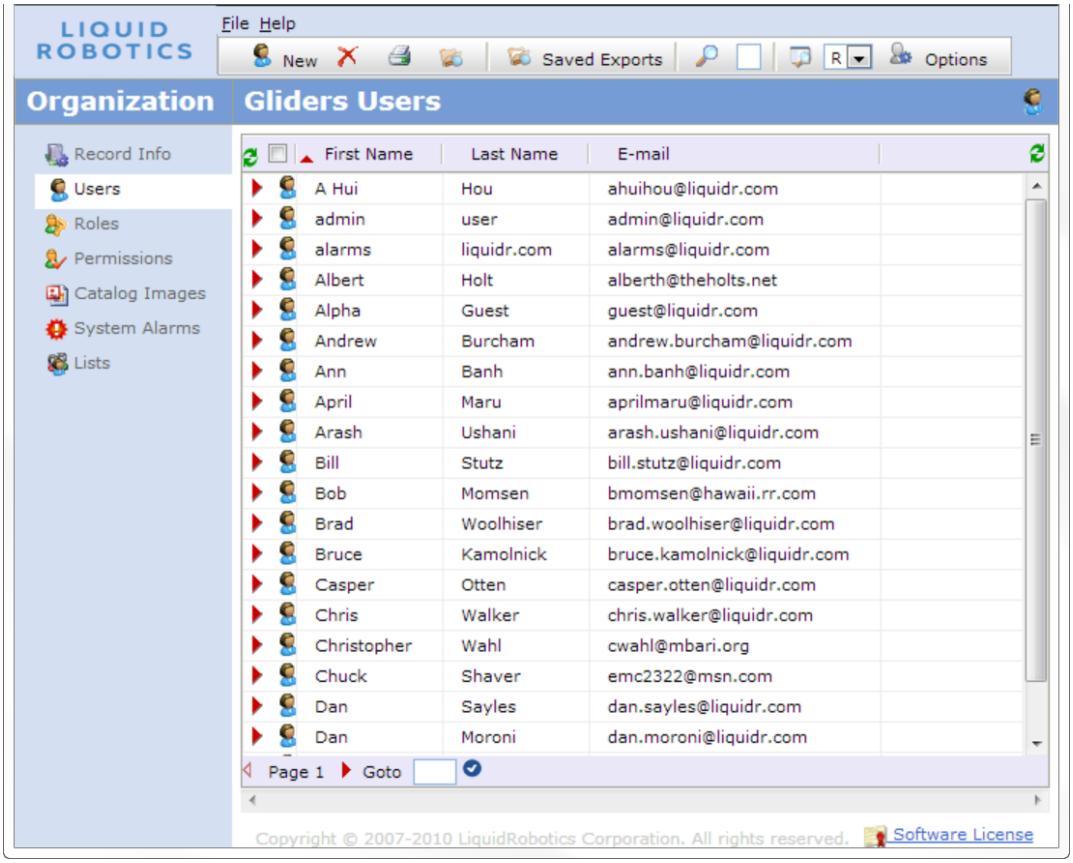
1. Click on **Settings** in the **System Menus** to open the list of Organizations managed by the instance of WGMS you are using, then double-click on an Organization name, or single-click on the icon to the left of an Organization name, and the **Organization** form will appear.

Figure 8.16. Organization Form



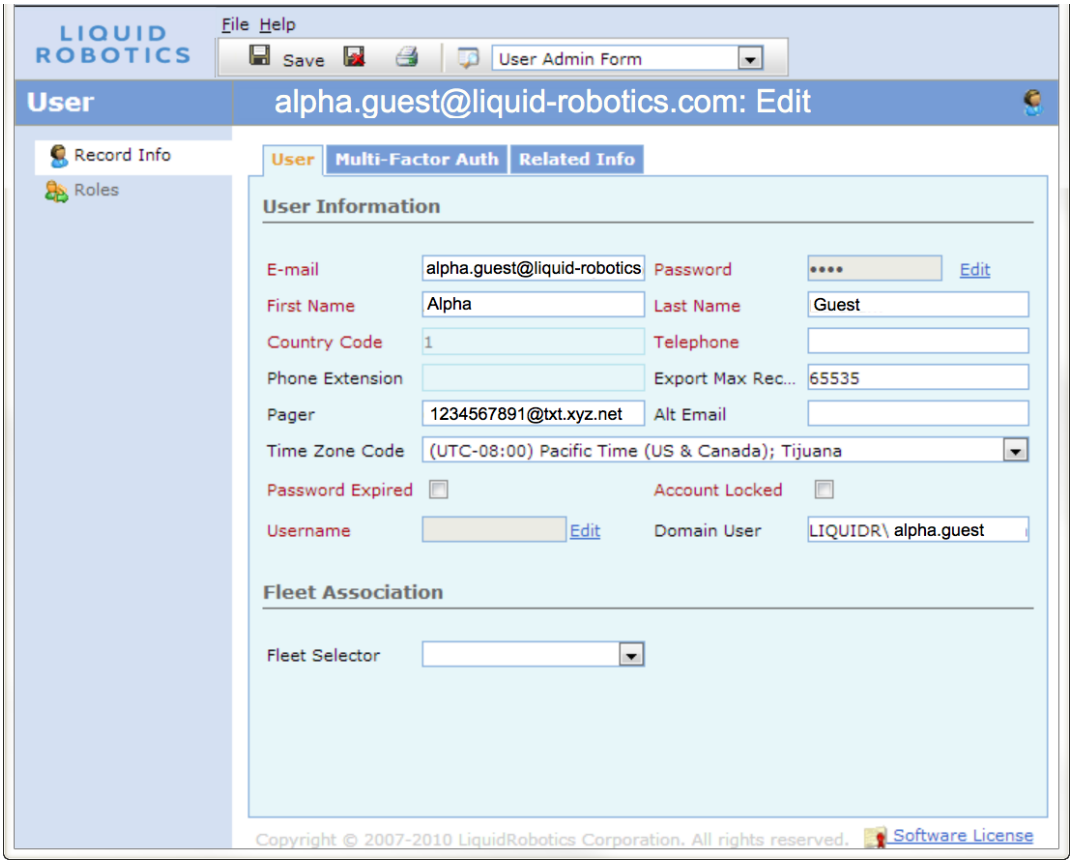
2. Click the **Users** side tab to open a list of individuals who have been granted access to the Organization.

Figure 8.17. WGMS Organization Users Example



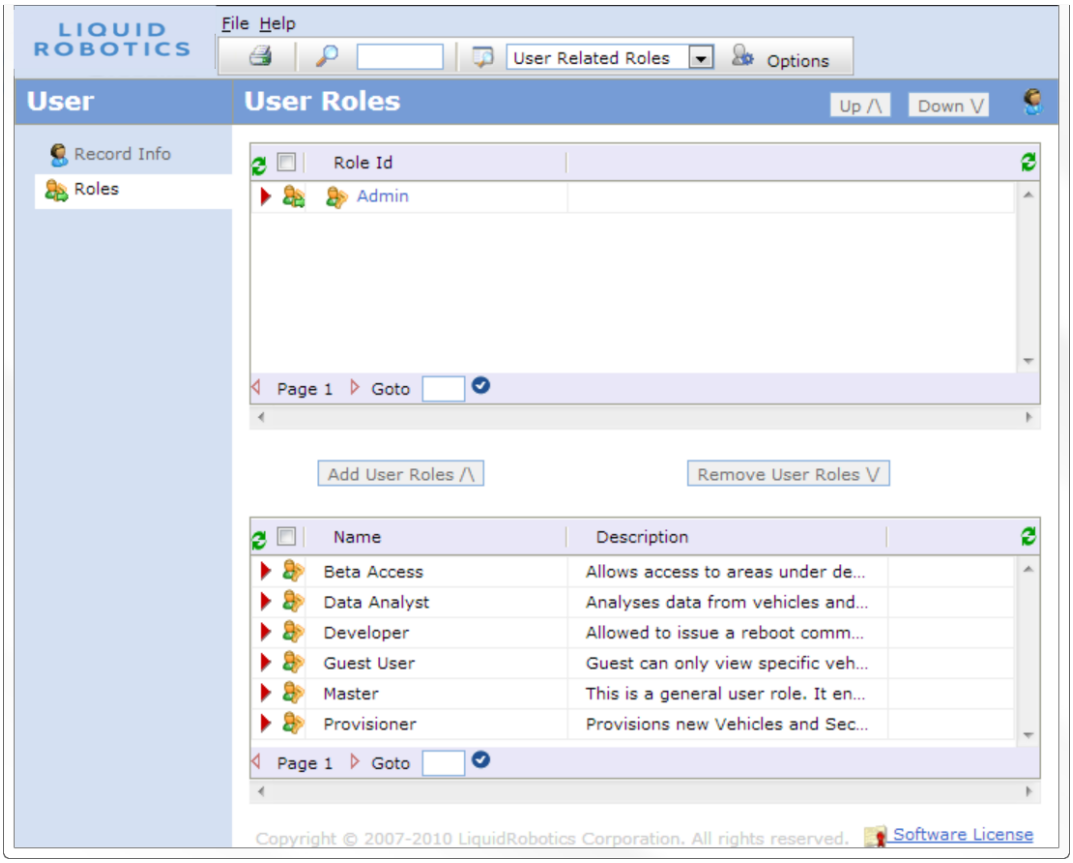
3. To select a User, double-click on a User name, or single-click on the icon to the left of a User name, and the **User Admin Form** for that User will appear.

Figure 8.18. User Admin Form Example



4. Click the **Roles** side tab and the **User Related Roles** form will appear as shown in Figure 8.19

Figure 8.19. User Related Roles Form



The upper section of the form contains the Roles assigned to the User. The lower section contains all of the available Roles. Although it is possible to assign more than one Role to a user, it is rarely necessary.

5. Click on a Role in the lower section of the **User Related Roles** form to select it, then click **Add User Roles** to assign that Role to the User. The Role will appear in the upper section of the **User Related Roles** form.

To remove a Role for a User:

1. In the upper section of the **User Related Roles** form, click on a Role to select it.

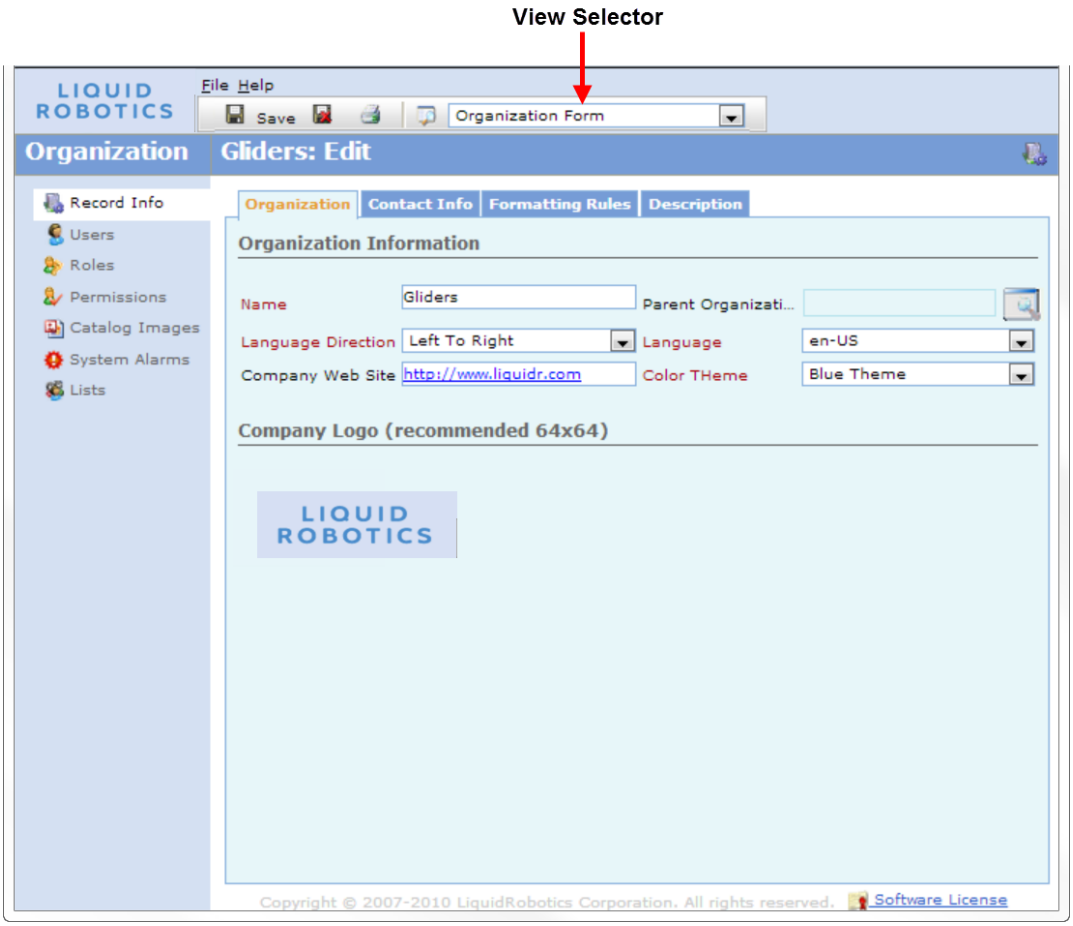
2. Click **Remove User Roles** to remove the Role from the User. The Role will move to the lower section of the **User Related Roles** form.

Deleting a User

To delete a User from an organization:

1. Click on **Settings** in the **System Menus** to open the list of Organizations managed by the instance of WGMS you are using, then double-click on an Organization name, or single-click on the icon to the left of an Organization name, and the **Organization** form will appear.

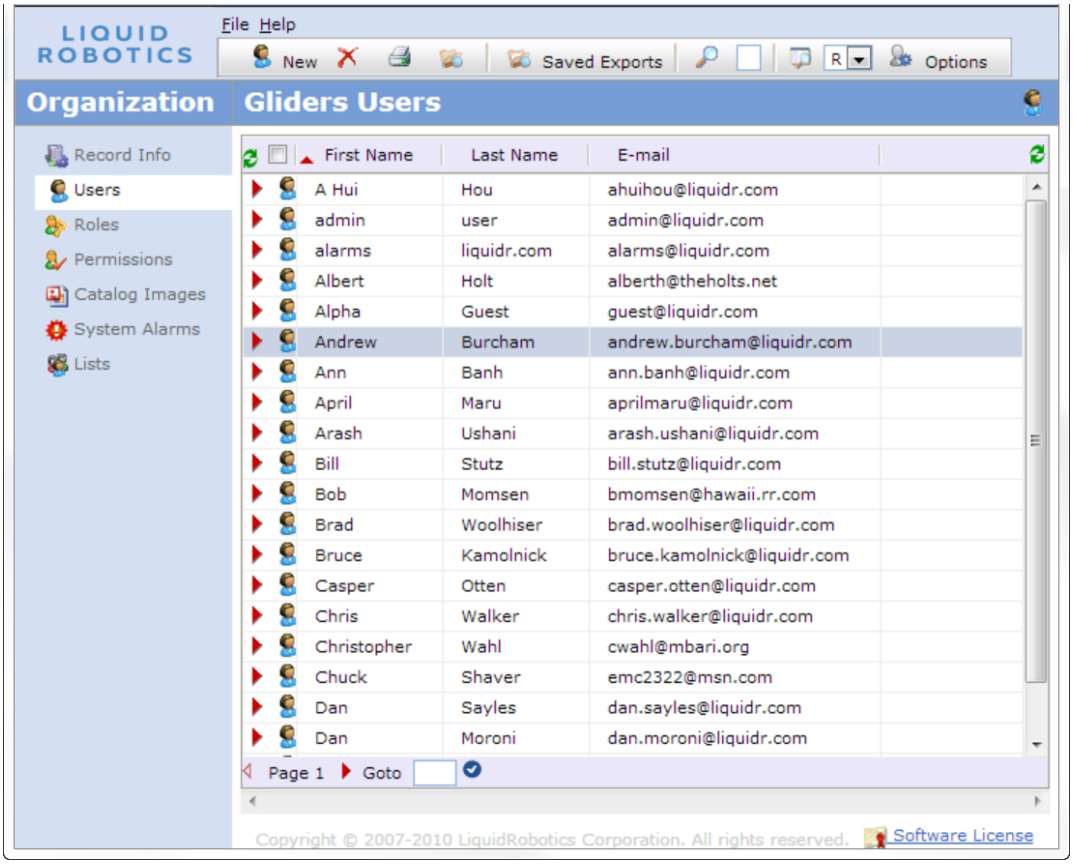
Figure 8.20. Organization Form



2. Click on the Users side tab to open the Users list.

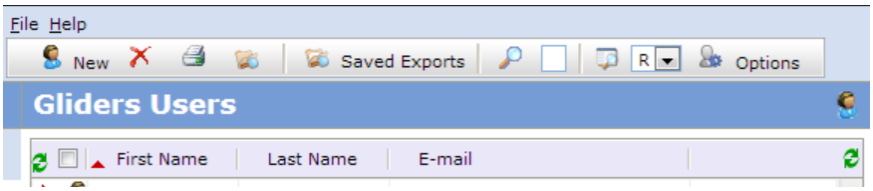
3. Select the name of the User you want to delete by clicking on it. For example, the name Andrew Burcham is selected in Figure 8.21 below.

Figure 8.21. Name Selected for Deletion



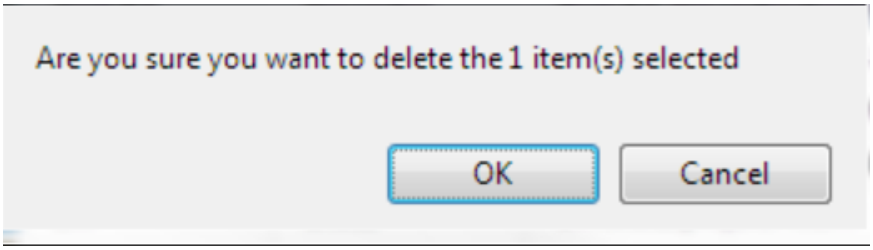
4. Click the delete icon in the toolbar:

Figure 8.22. Users Dialog Box Toolbar



5. A confirmation request dialog box will appear:

Figure 8.23. Deletion Confirmation Dialog Box



6. Click **OK** to permanently delete this User profile from the system.

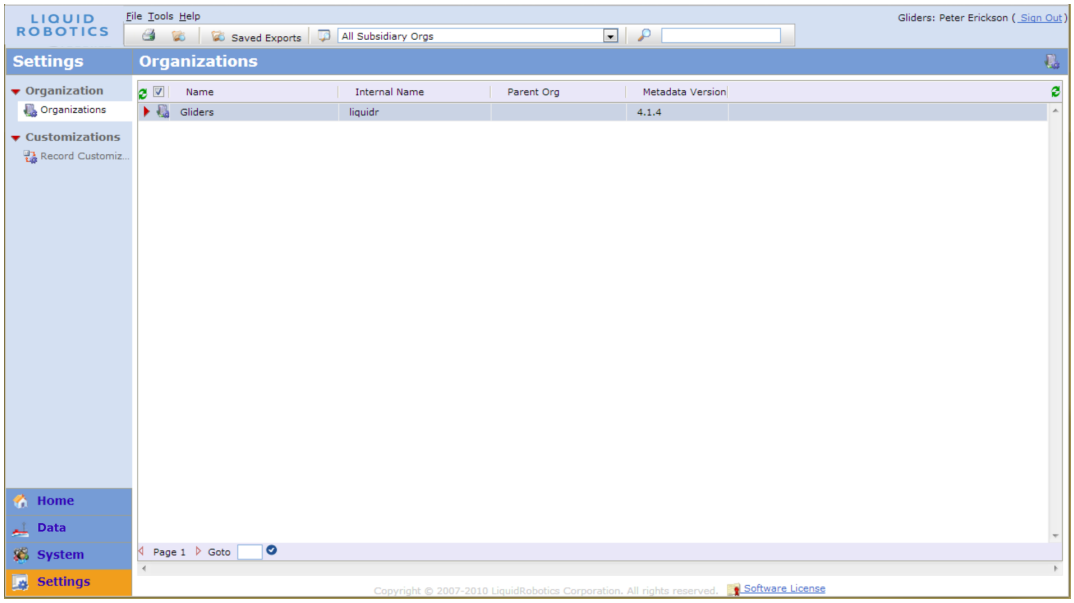
Specialized Administrative Tasks

The WGMS UI allows a System Administrator to view and change fundamental aspects of the system. It is strongly recommended that you contact LRI before making changes, as some changes may have unintended consequences.

Accessing an Organization

Click on **Settings** in the System Menus and the **Settings** page will open on the **Organizations** side tab displaying the list of Organizations you are assigned to:

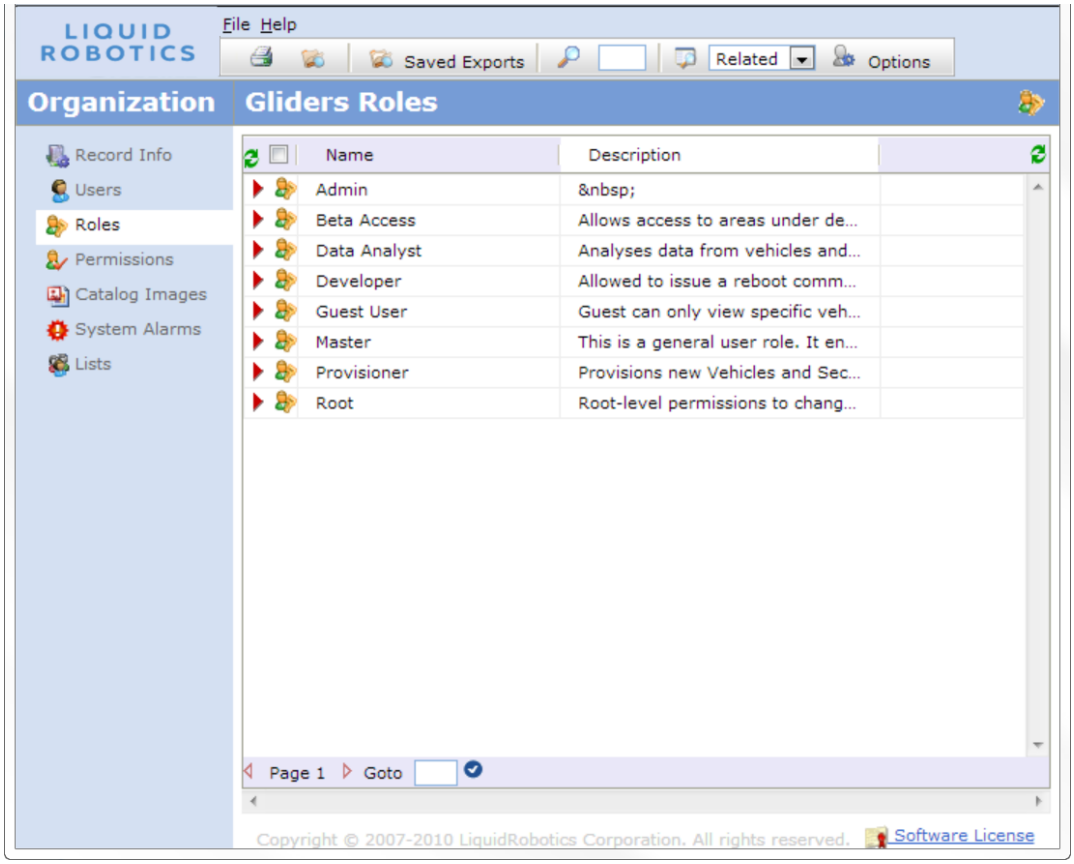
Figure 8.24. Organizations List



Viewing Roles for an Organization

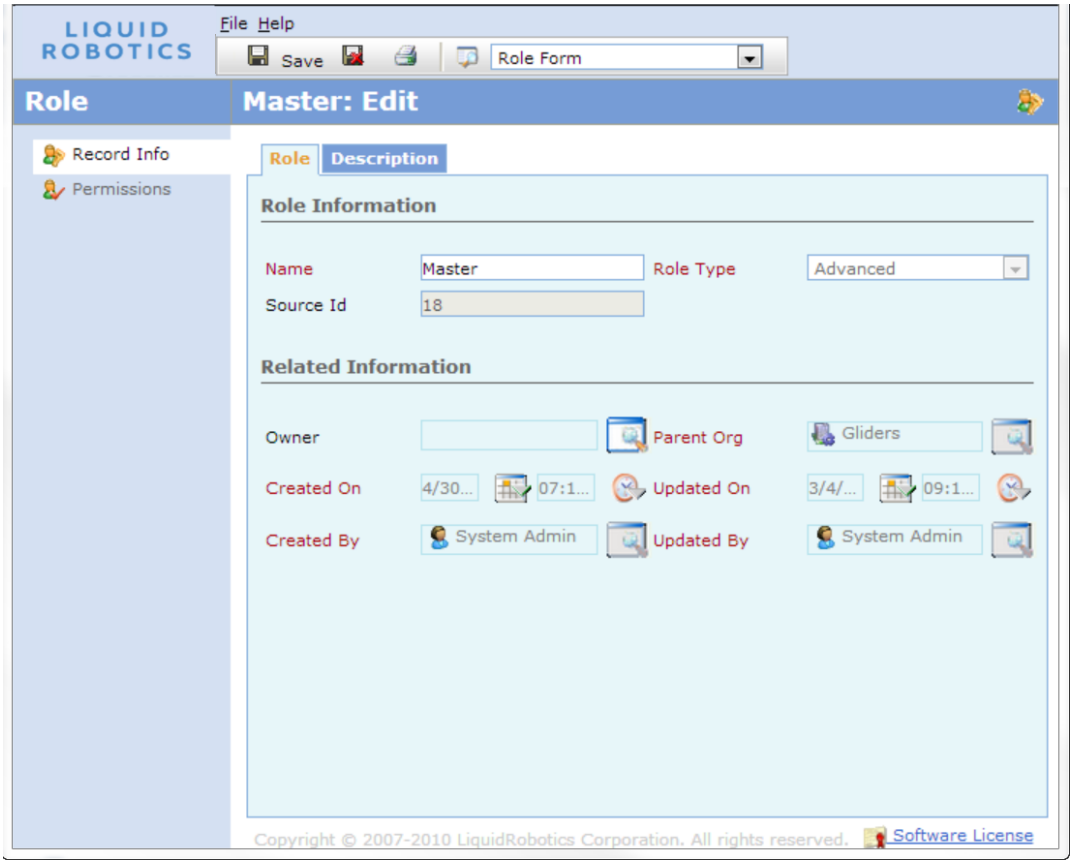
To view the Roles available within an Organization, double-click on the Organization name, or single-click on the icon to the left of the Organization name and the **Organizations Form** will appear. Click on the **Roles** side tab and the **Roles** list for the selected Organization will appear as shown in Figure 8.25.

Figure 8.25. Roles List



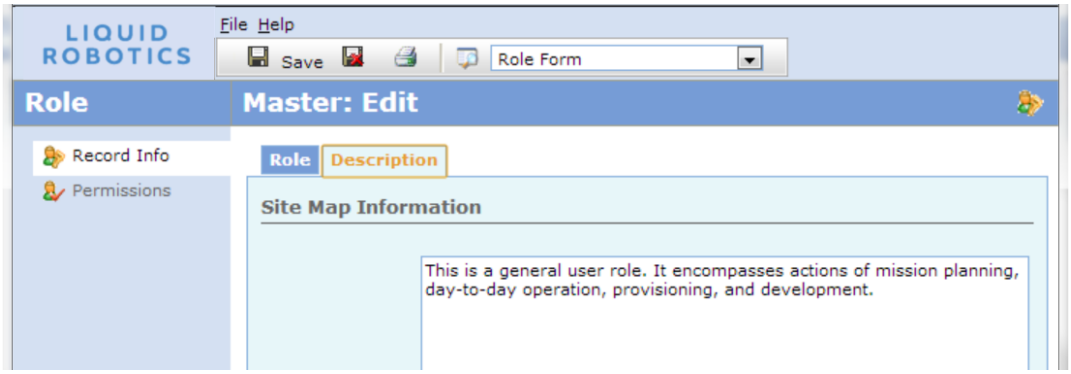
For more information on a Role, double-click on a Role name, or single click on the icon to its left. For example, double-clicking on **Master** will bring up the form shown in Figure 8.26.

Figure 8.26. Master Role Form



Click on the Descriptions tab to view the Role description as shown in Figure 8.27.

Figure 8.27. Master Role Description



Viewing Permissions

To view the Permissions granted for each Role in an Organization:

1. Click **Settings** in the **System Menus**

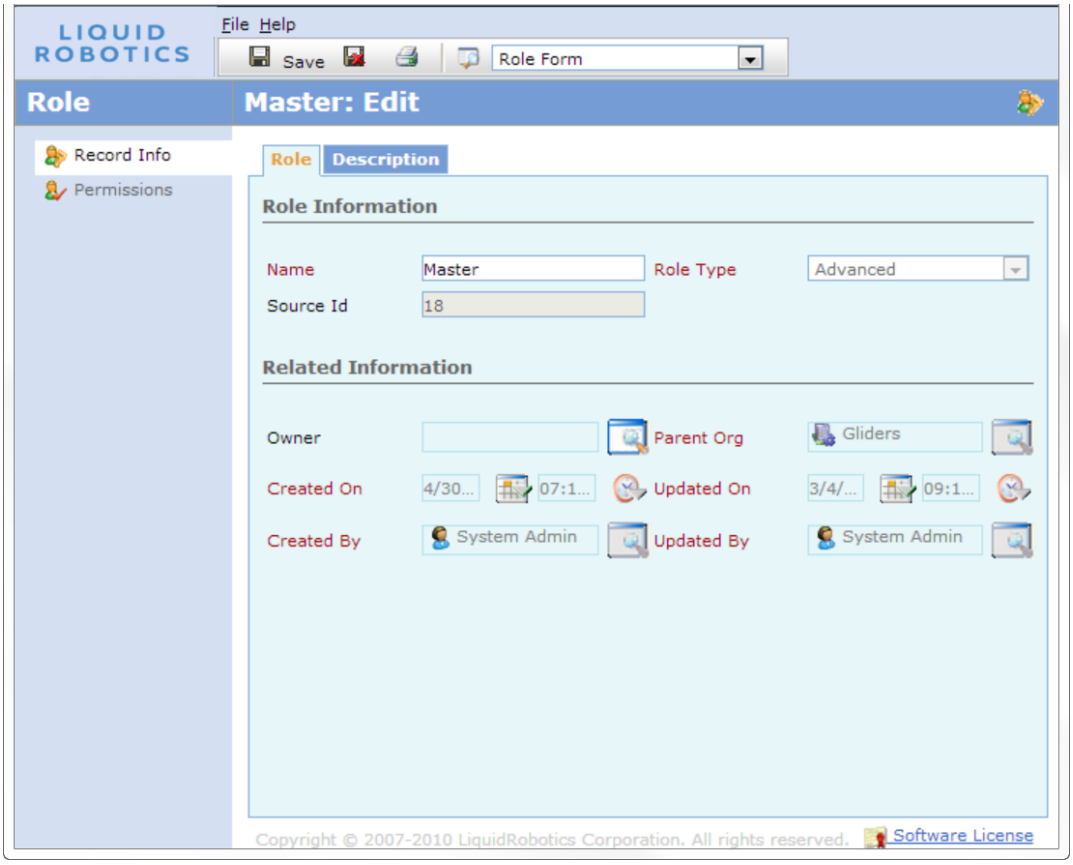
   and the **Settings** page will open with the **Organizations** side tab selected displaying the **Organizations** list.

2. Double-click on an Organization name, or single-click on the icon to the left of an Organization name and the **Organization Form** for that Organization will appear.

3. Click on the **Roles** side tab.

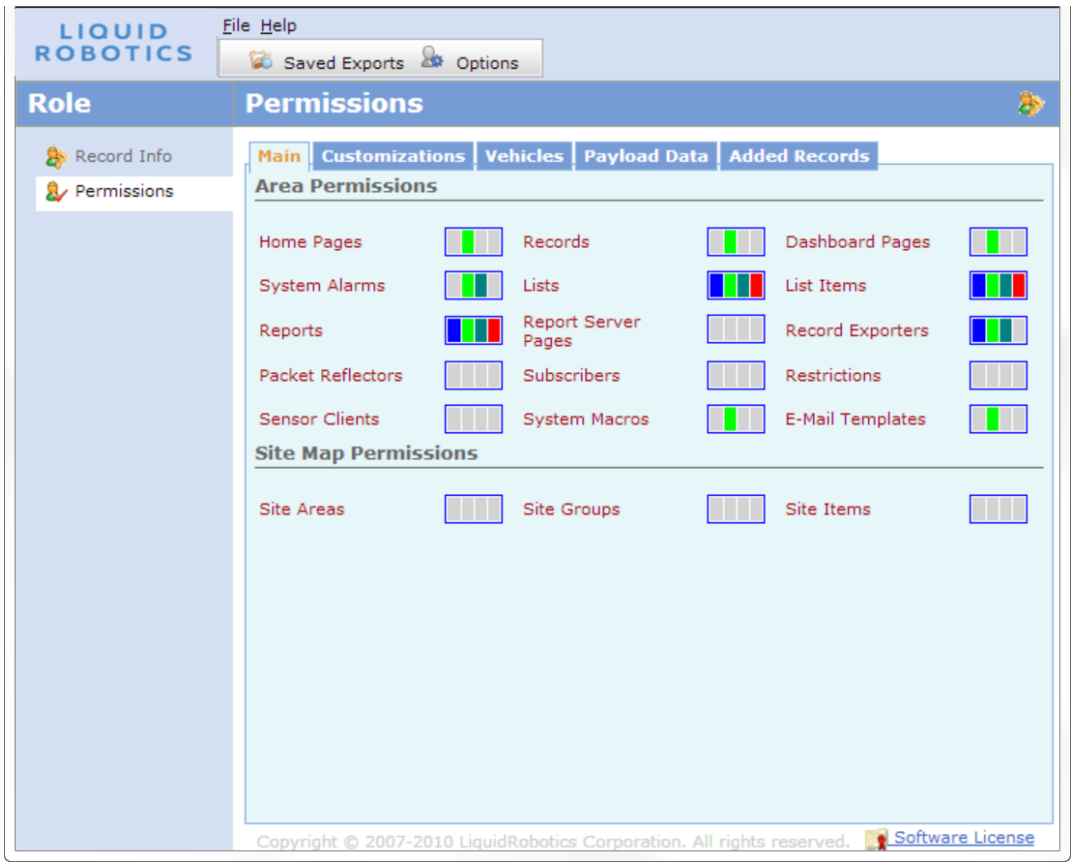
4. Double-click on a Role, for example, **Master**, or single-click on the icon to the left of that Role, and the **Role Form** will appear.

Figure 8.28. Master Role Form



5. Click on the **Permissions** side tab and the **Permissions** window for the Master Role will appear. The **Permissions** window is used to edit the permissions associated with a specific Role for a specific Organization.

Figure 8.29. Master Role Permissions Window



The **Permissions** window includes five tabs where different categories of permissions can be edited:

- **Main**
- **Customizations**
- **Vehicles**
- **Payload Data**
- **Added Records** (This tab is not commonly used, consult with LRI before using to avoid unexpected results.)

There is a four part icon associated with each type of permission. Moving from left to right, the color of each of the 4 boxes in the icon indicate if the Role has permission to Create, Read, Update, or Delete the type of permission the icon is associated with, as shown in Figure 8.30.

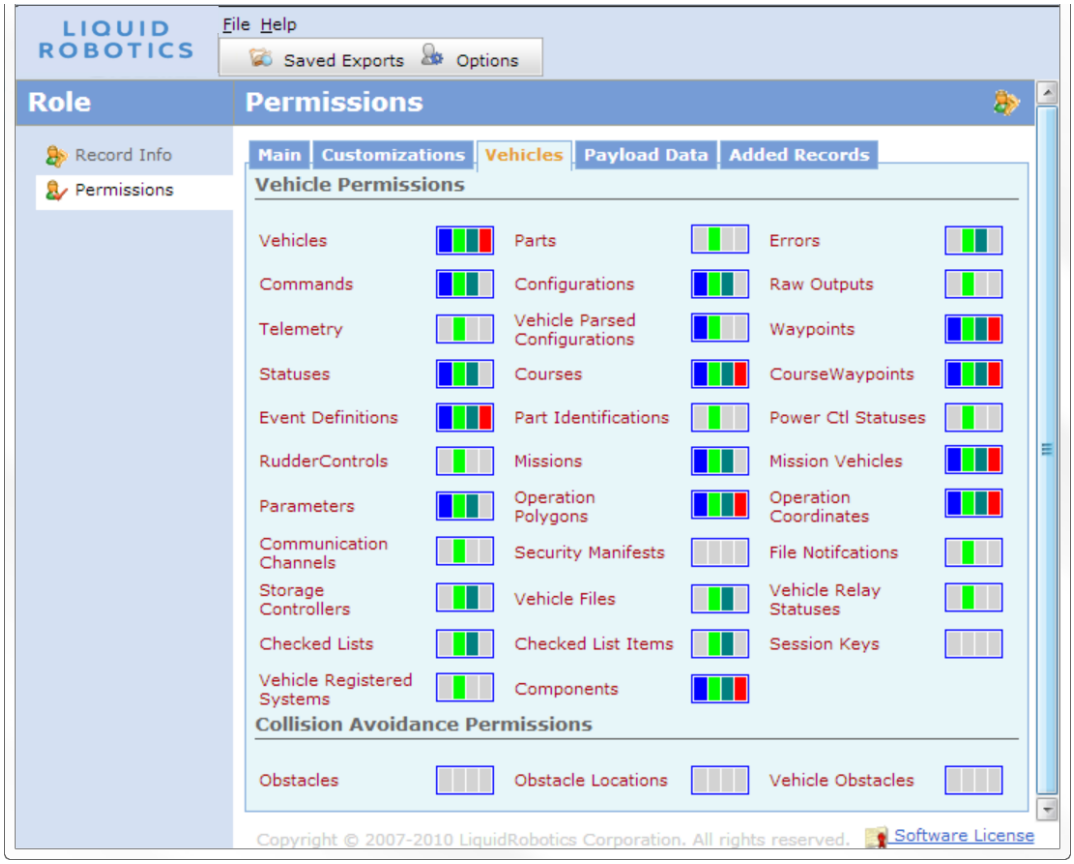
Figure 8.30. Permission Icon Descriptions

The colors of the boxes indicate the permission status:

- **Gray**: Does not have permission
- **Blue**: Create permission
- **Light Green**: Read permission
- **Dark Green**: Update permission
- **Red**: Delete permission

For example, Figure 8.31 shows some of the Vehicles permissions for the Master Role.

Figure 8.31. Master Vehicles Permissions



Changing Permissions

Changing the Permissions for a Role requires a Root Role and is strongly discouraged. Keep in mind that changing a Permission for a Role affects all Users that have been assigned that Role. For more information, contact the LRI Support Organization.

Changing Catalog Images

Custom images (such as your company/agency logo) must be stored in the WGMS database for use in the GUI. To view custom images:

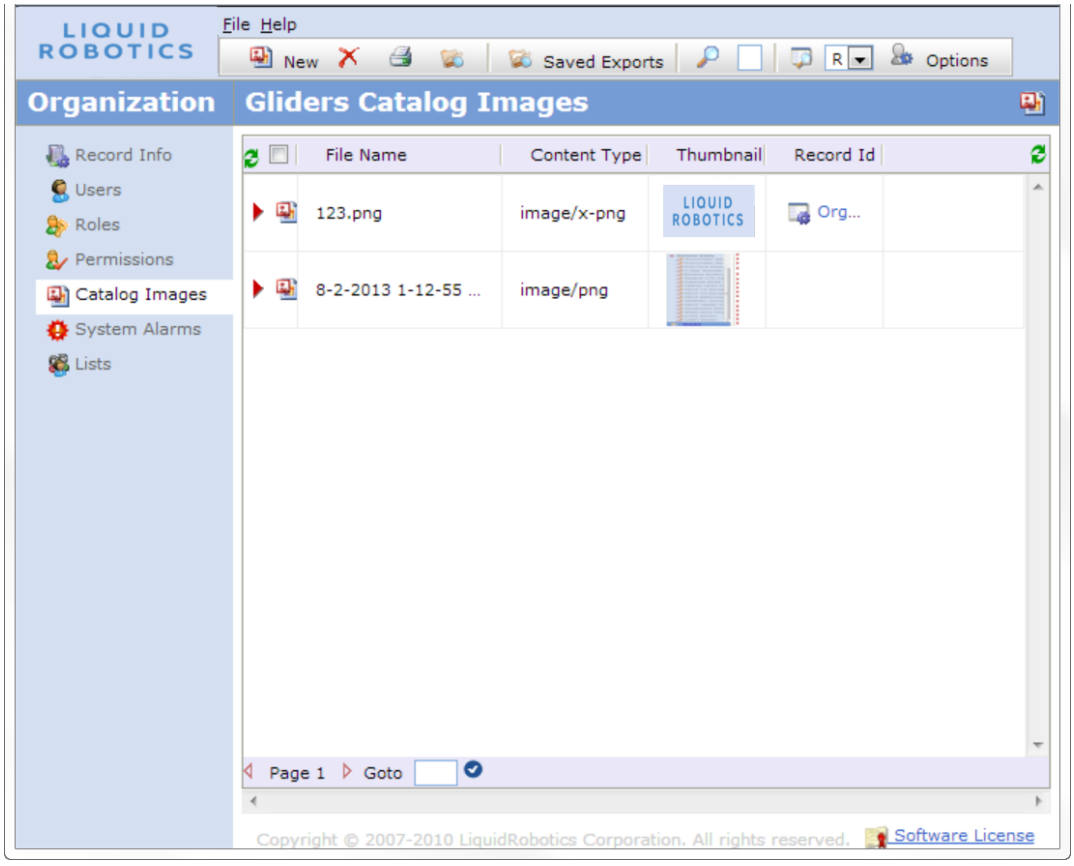
1. Click **Settings** in the **System Menus**

   and the **Settings** page will open with the **Organizations** side tab selected displaying the **Organizations** list.

2. Double-click on an Organization name, or single-click on the icon to the left of an Organization name and the **Organization Form** for that Organization will appear.

3. Click on the **Catalog Images** side tab and the **Catalog Images** list for the Organization you selected will appear.

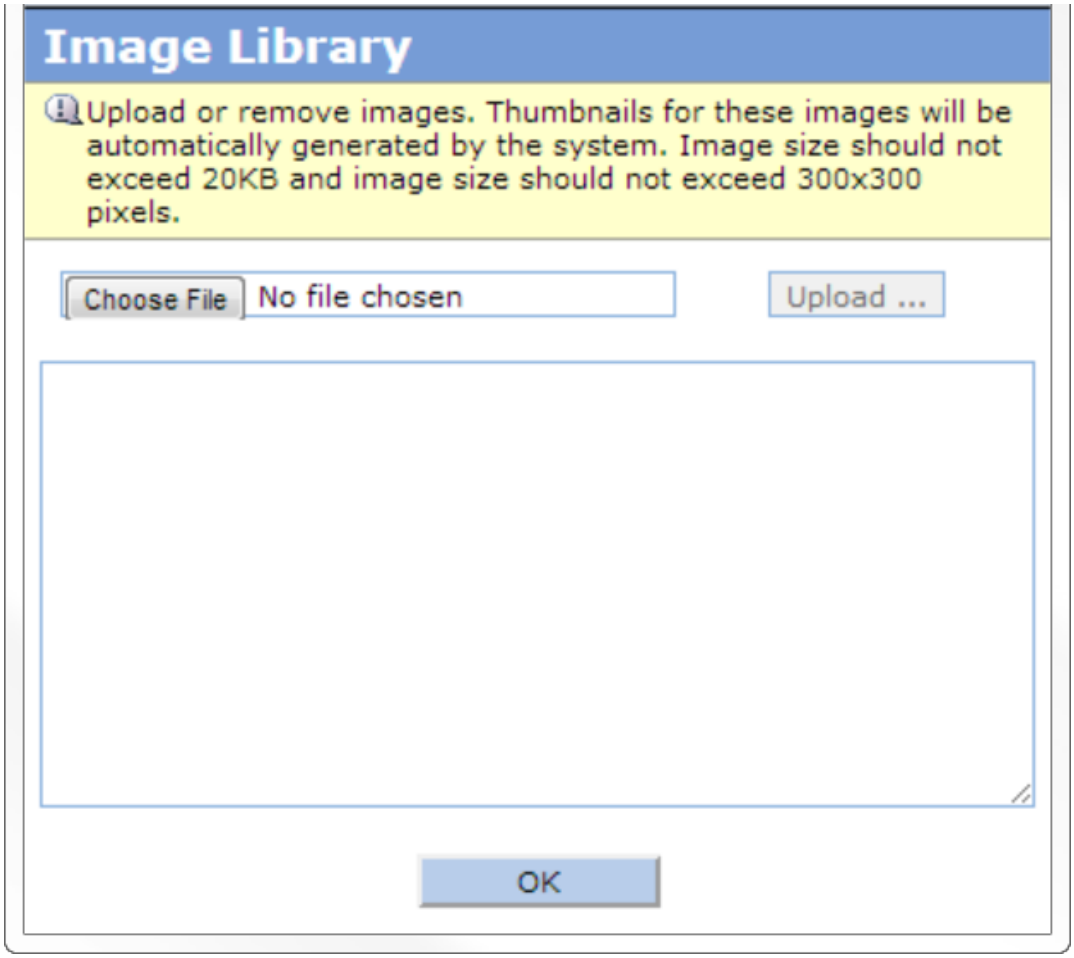
Figure 8.32. Catalog Images List



To add a new image click on the new image icon

in the toolbar near the top of the dialog box and an **Image Library** dialog box will appear.

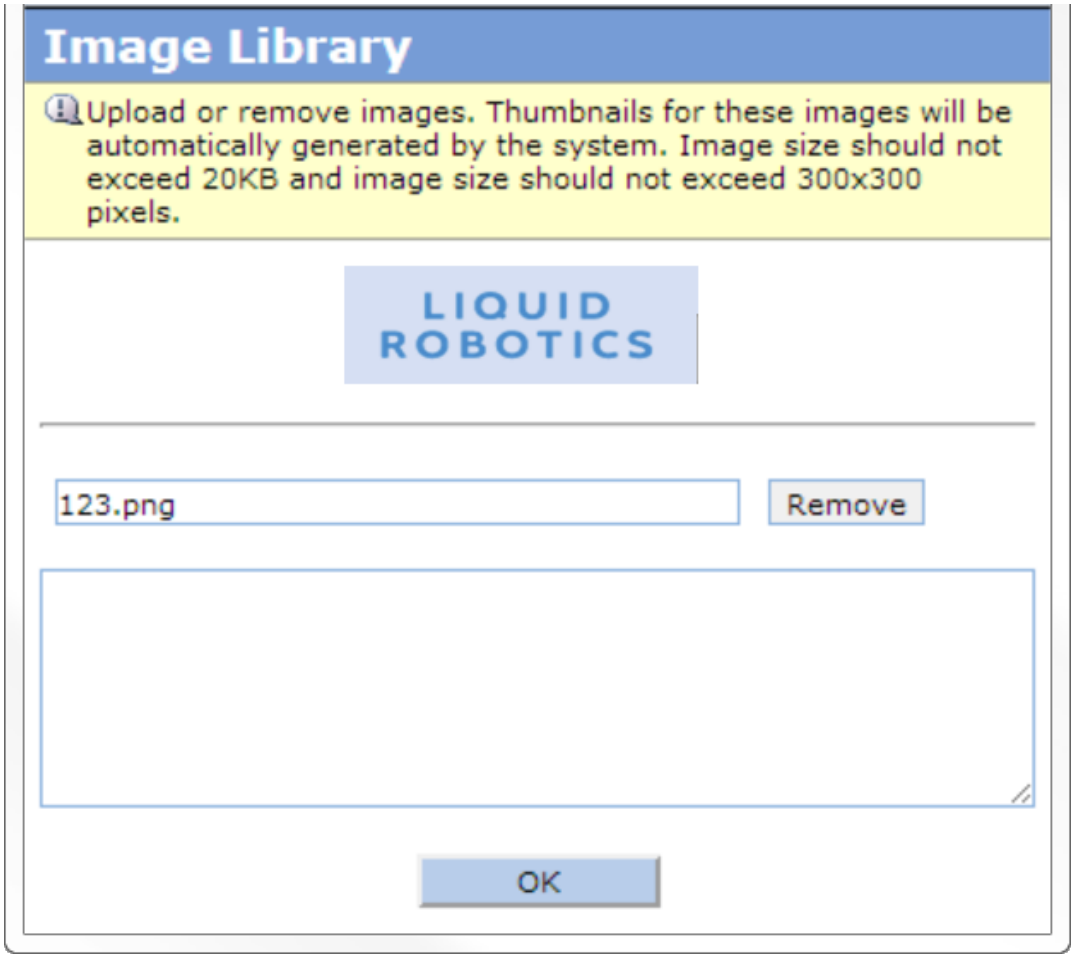
Figure 8.33. Image Library Upload Dialog Box



Click **Choose File** to browse and select an image, then click **Upload...**. A thumbnail of the uploaded image and related information will appear in the **Image Library** dialog box. If you want to keep the image, click **OK** and the image will appear in the **Catalog Images** list.

To remove an image from the WGMS database, from the **Catalog Images** dialog box double-click on the image file name, or single click on the logo to the left of the image file name and an **Image Library** dialog box will appear displaying the image file name with a **Remove** button adjacent to it. Click **Remove** and then click **OK** to delete the image and the image will be removed from the **Catalog Images** list (you may have to refresh your browser for the image to be removed from the **Catalog Images** list).

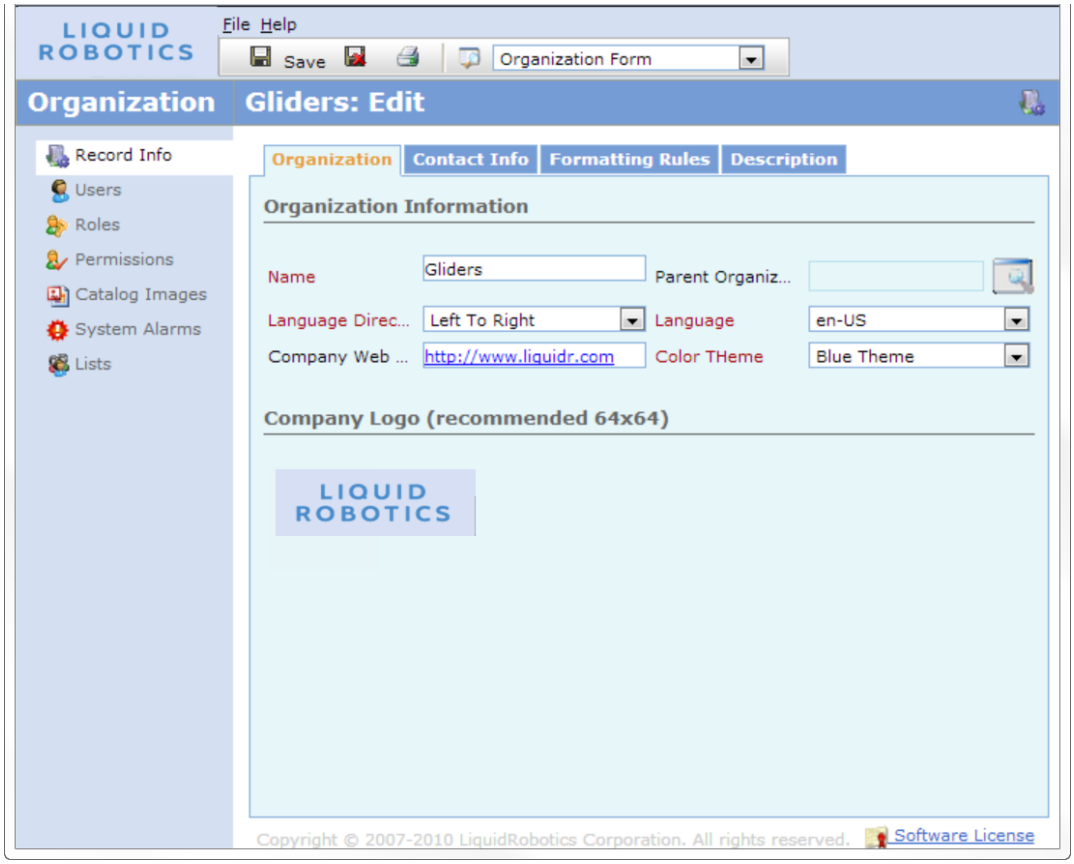
Figure 8.34. Image Library Remove Dialog Box



Advanced Organization Options

The **Permissions**, **System Alarms** and **Lists** side tabs on the **Organization Form** control basic aspects of the UI and the WGMS database. A Root Role is required to change them. These options should not be modified without the direct involvement of LRI Customer Support.

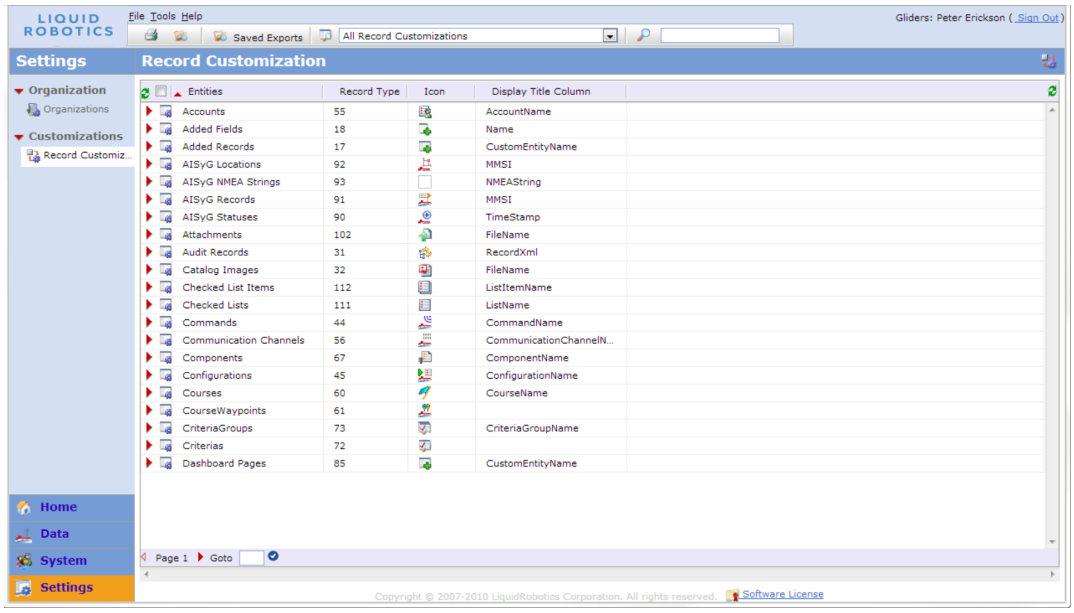
Figure 8.35. Advanced Organization Options Side Tabs



Advanced Settings Options - Record Customization

The **Customizations** menu in the side-bar of the **Settings** page includes the **Record Customization** side tab. Record Customizations are available to Root users only. They support very specialized use cases and should not be modified without the direct involvement of LRI Customer Support. Incorrectly applied changes can result in significant damage to your database.

Figure 8.36. Record Customization Side Tab



Chapter 9. Provisioning a Wave Glider

This chapter covers the general steps required to provision a new Wave Glider Vehicle.

If the Vehicle is new (to your Organization), its data and configuration will need to be entered into the WGMS system database. If the Vehicle has already been named and entered into the system, you can skip this chapter.

For details on Vehicle unpacking and assembly, refer to one of the following:

- *Wave Glider SV2 Unpacking and Assembly Guide*
- *Wave Glider SV3 Unpacking and Assembly Guide*

For information on configuring payloads for the Float and Sub, refer to one of the following:

- *Wave Glider SV2 Interface Control Description*
- *Wave Glider SV3 Interface Control Description*

Provisioner Role Requirements

WGMS Roles are assigned by a System Administrator and each Role grants specific privileges for mission controls when using WGMS. See “ Roles ” (page 200) for more information.

In order to provision a Vehicle you will need to be assigned either **Master** or **Admin** Role privileges.

Entering a Vehicle into the Database

Organizations

When you logged on to WGMS, you selected your Organization. All of the descriptions in this chapter refer to provisioning Vehicles within that Organization.

Even if you are allowed to log into more than one Organization, you cannot directly copy or otherwise transfer information from one Organization to another.

Vehicle Name

The first step is to come up with a unique name for your Vehicle. It can be whimsical ("Shark Bait"), descriptive ("Yellow Boat") or indicate its purpose ("#5 Weather Station").

All database information for the Vehicle (for example, Waypoints, Inclusion polygons, and Exclusion polygons) will be associated only with that Vehicle name.

The Vehicle name can have a maximum of 128 characters and can include blanks, numbers or any printable keyboard character. However, most of the name display boxes in the user interface show about 20 characters. If your Organization has more than one Vehicle, it's best if the first characters of your Vehicle name are descriptive and unique. For example,

#1 North Station, Acme Oceanic Inc.

#2 South Station, Acme Oceanic Inc.

would be preferable to...

Acme Oceanic Inc. Station North #1

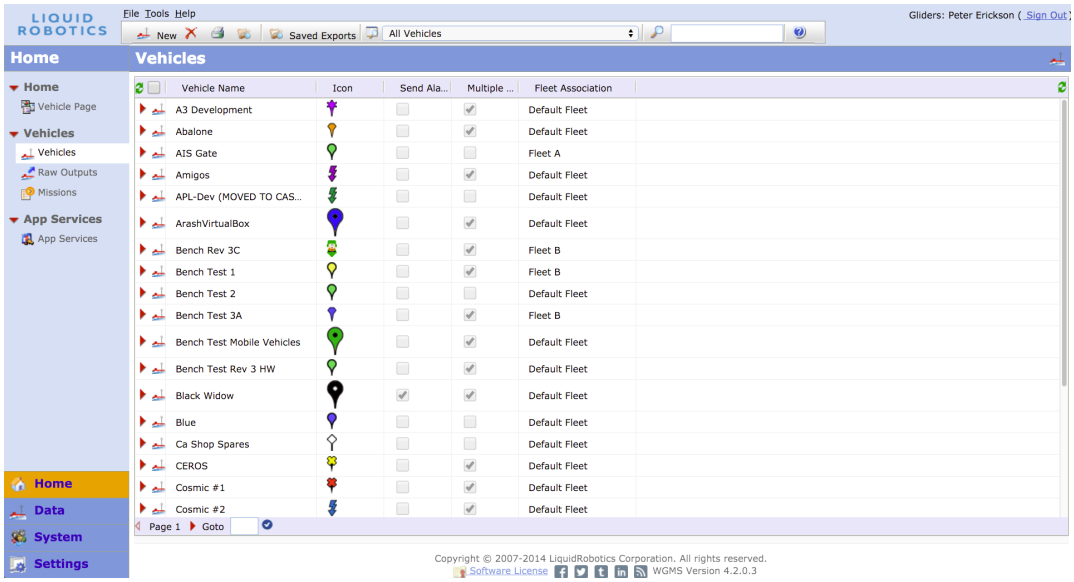
Acme Oceanic Inc. Station South #2

There is nothing to prevent provisioning different Wave Gliders with the same name. The database will store each Vehicle's data separately. However, this practice is not recommended because it will lead to confusion about which Vehicle's data is being referenced.

Create and Name a New Vehicle

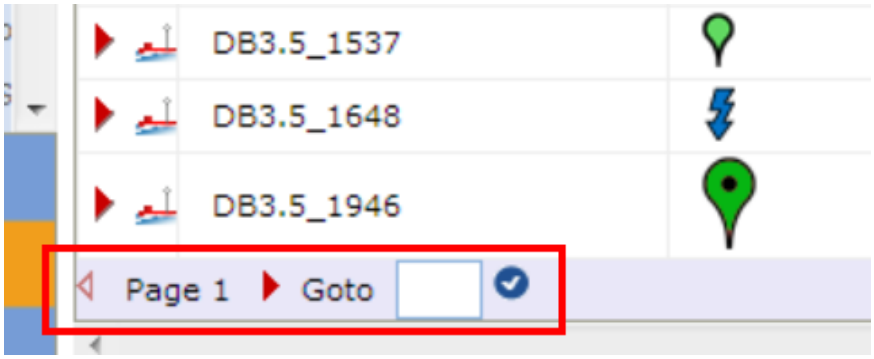
Sign in to the WGMS **Dashboard** and click on **Show System Menus** to bring up the **Home** page. Next, click on the **Vehicles** side tab under in the **Vehicles** menu to bring up the **Vehicles** page.

Figure 9.1. Data Page, Vehicles Tab



Only 26 Vehicles are shown on each page. If there are more than 26 Vehicles in the list, the right-pointing triangle at the bottom of the list of Vehicles will be solid. Click on the solid triangle to go to the next page, or enter the page number you want to jump to in the **Goto** field and click on the check-mark next to the **Goto** field.

Figure 9.2. Changing Pages in the Vehicles Tab



To create a new Vehicle in the Organization you are logged into, click on **New** in the **Home** page toolbar and a **Vehicle: New** form will open with the **Vehicle** tab selected by default. Note that there are also tabs on the **Vehicle: New** form for **Settings**, **File System**, **Components**, and **Related Info**.

Figure 9.3. Click on New

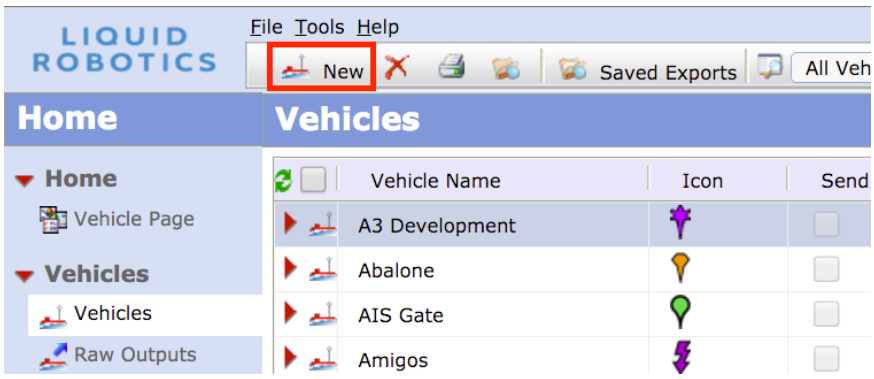
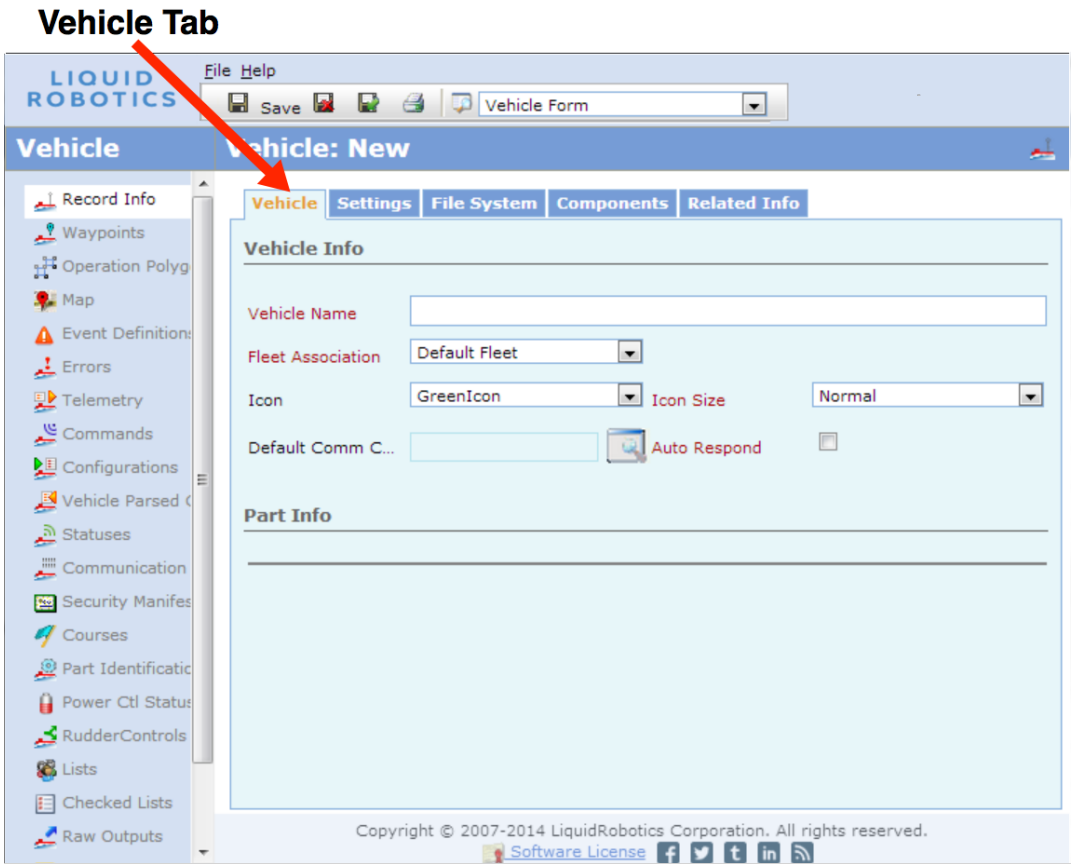


Figure 9.4. Vehicle: New Form



You must enter information, or make selections, for all items that appear in red text for each tab in the **Vehicle: New** form.

In the **Vehicles** tab of the **Vehicle: New** form:

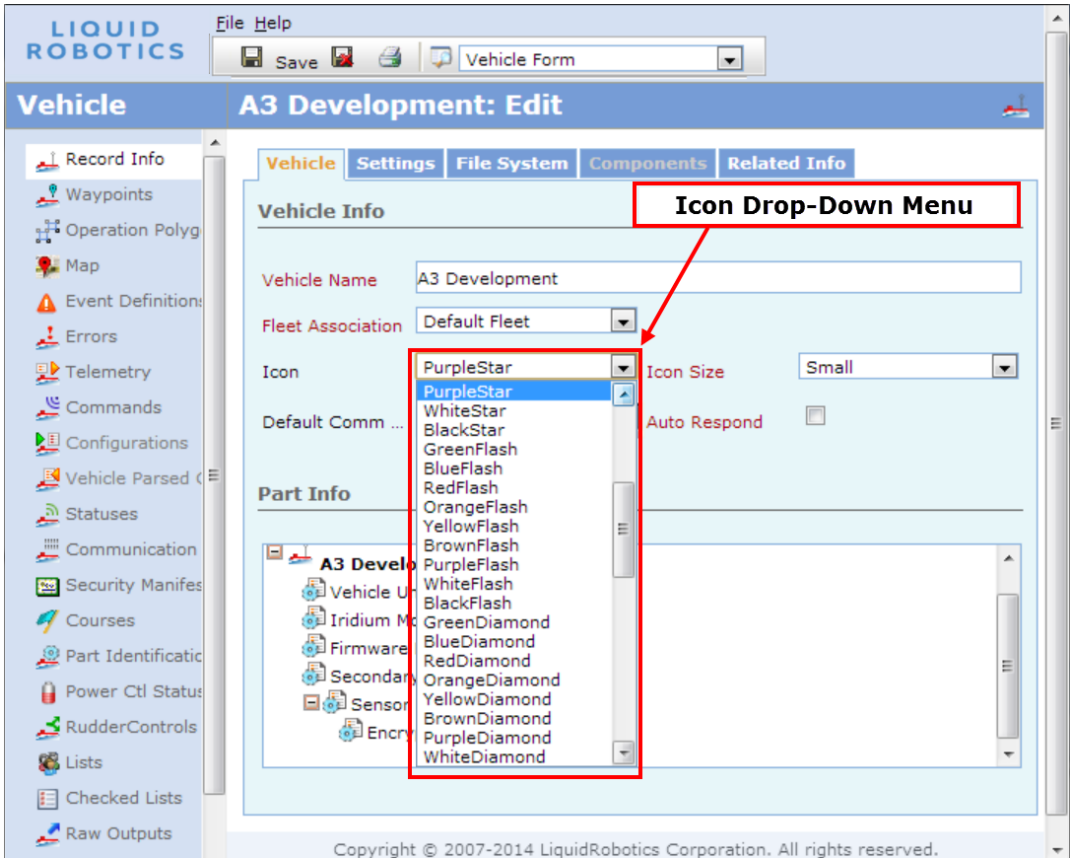
1. Enter a name for the Vehicle in the **Vehicle Name** field.
2. Select a fleet association for the Vehicle in the **Fleet Association** drop-down menu. The **Default Fleet** contains all of the Vehicles in the Organization. If any other fleets have been defined, they will be sub-sets of the Vehicles in the Default Fleet.

Note

A Fleet provides a view of a subset of the Vehicles and personnel in an Organization. For information on setting up Fleets see the *WGMS Admin Guide*.

3. Select an icon from the Icon drop-down menu - it will be used to represent the Vehicle on the Position Map. There are 7 shapes and 4 cartoon characters. The shapes can be any one of 9 colors.

Figure 9.5. Vehicle Icon Drop-Down Menu



4. Select the Icon Size, Normal or Small. The recommended size is Small.
5. Select the **Auto Respond** check-box. The Auto Respond check-box should always be selected, except in the rare situation where the same Vehicle is controlled by more than one WGMS instance, or if the Vehicle is configured for Mobile WGMS. If either of these circumstances apply, consult with your WGMS Administrator for guidance.

Note

You cannot enter information in the **Part Info** box. This data is entered in a different dialog. See "Initializing the Part Info Tree (SV2 Only)" (page 240) for more information.

In the **Settings** tab of the **Vehicle: New** form:

1. Vehicle alarms are always recorded in the database, and they also appear in the Communications list below the Position Map in the Dashboard. Checking the **Send Alarm** box specifies that each alarm will also be sent to an Escalation List.

2. Checking the **Multiple Vehicle Display** box specifies that the vehicle will be available for selection in the Vehicle drop-down menu on the WGMS Dashboard.

3. Checking the **Display for Guests** box specifies that the Vehicle can be viewed by persons within your Organization with Guest User privileges.

4. Checking the **Towing** box specifies that the towing alarm will be checked (this feature is deprecated).

The **File System** tab is not currently in use.

The **Components** tab is not currently in use.

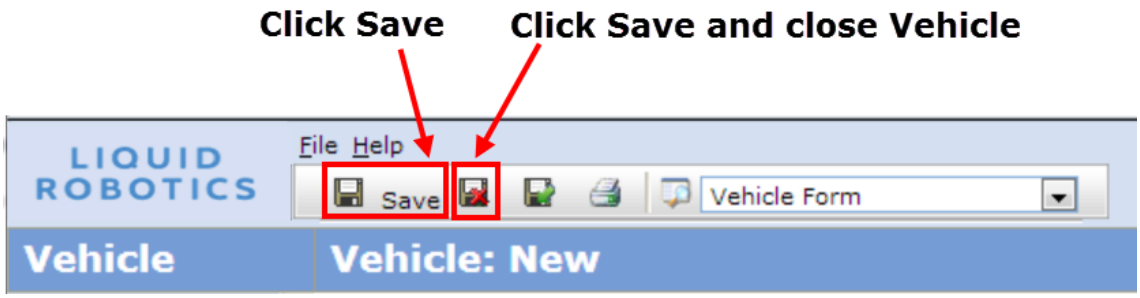
The **Related Info** tab is automatically populated for you.

After all of the required new Vehicle data has been entered:

- Click **Save** in the **Vehicle** page toolbar to save the new Vehicle information and keep the **Vehicle: New** form open.

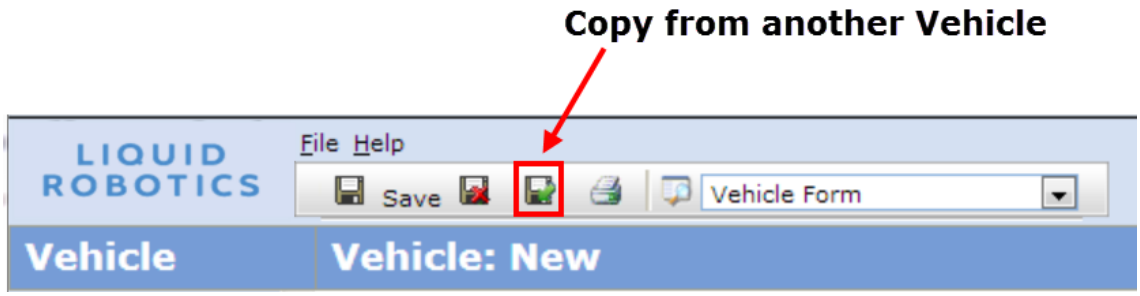
- Click the **Save and close Vehicle** icon in the **Data** page toolbar to save the new Vehicle information and close the **Vehicle: New** form. You can then open the **Vehicle: Edit** form for the newly created Vehicle to add Vehicle part information. See "Initializing the Part Info Tree (SV2 Only)" (page 240) for more information.

Figure 9.6. Click Save or Save and close Vehicle



Click the **Copy from another Vehicle** icon to open a **Related Record** that lists all of the Vehicles in the Organization that you are logged into. By selecting a Vehicle in the **Releated Record** and clicking **OK**, the information for that Vehicle will be copied into the **Vehicle: New** form. At this point, you can make edits, for example, changing the Vehicle Name, before clicking **Save** in the **Vehicle: New** form toolbar. Note: Once you click Save, the **Copy from another Vehicle** icon no longer appears in the toolbar.

Figure 9.7. Copy from another Vehicle



Initializing the Part Info Tree (SV2 Only)

The Part Info tree specifies the basic characteristics of your new Vehicle. The steps below show how to create the initial Part Info data, then " Completing the Part Info Tree (SV2 Only)" (page 269) describes how to complete the tree using data sent from the Vehicle.

Obtaining the IMEI Number

In order to set up the Part Info data, you will need the IMEI number of the Iridium modem in the Vehicle. The IMEI is the "phone number" of the modem. It is a 15-digit number starting with the numbers: **300034012**. The number can be obtained as follows:

1. The IMEI should be on the Packing Slip that accompanied the Vehicle.

2. If the Packing Slip is not available, the IMEI may be shown on the top of the C&C drybox in the Vehicle. You will need to remove the turtledeck cover to access the C&C box.

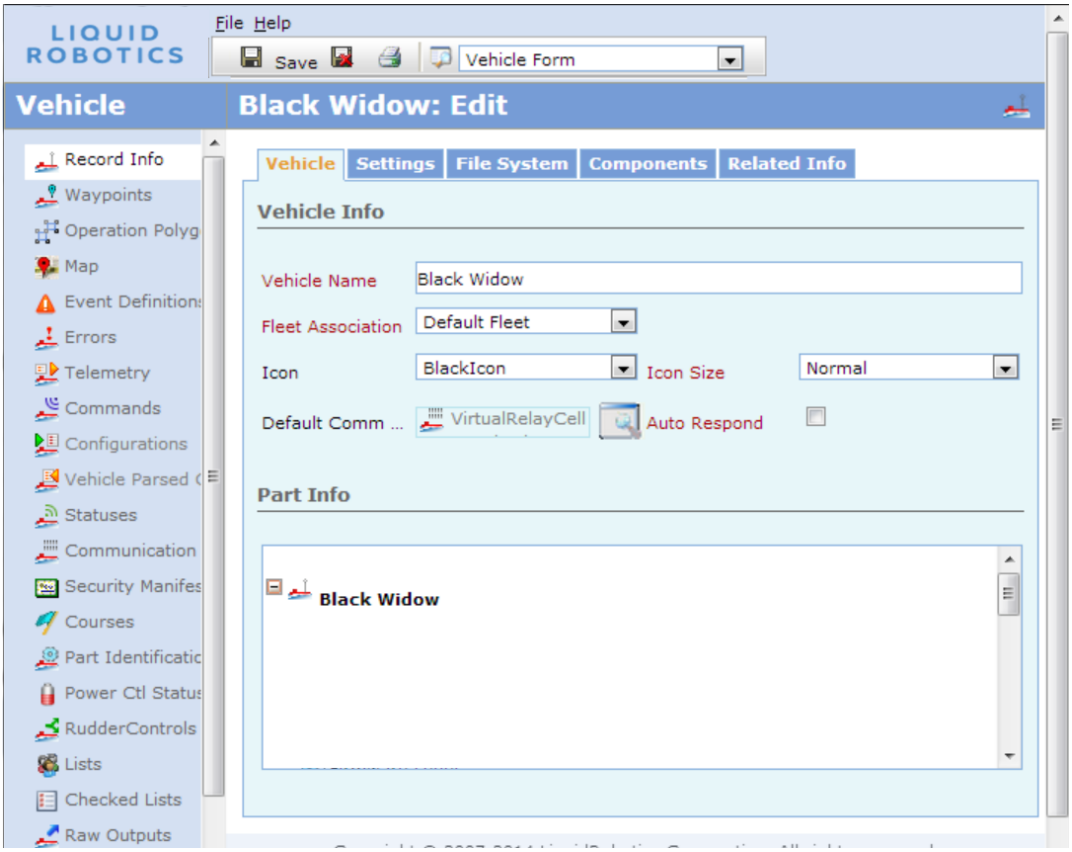
3. If neither of the above sources yields the IMEI and you are working with an SV2 Vehicle, you can obtain it using an XBee connection to issue XBee command number 96 [Show Modem IMEI]. XBee should then return the number.

Adding Part Info Data

If the **Vehicle: New** form was closed, re-open it by selecting the newly created Vehicle from the list in the **Vehicles** tab on the **Home** page.

Note that the form's header is now **Vehicle Name: Edit**, rather than **Vehicle: New**, and the **Part Info** box now contains the Vehicle name, as shown in the example below (Figure 9.8).

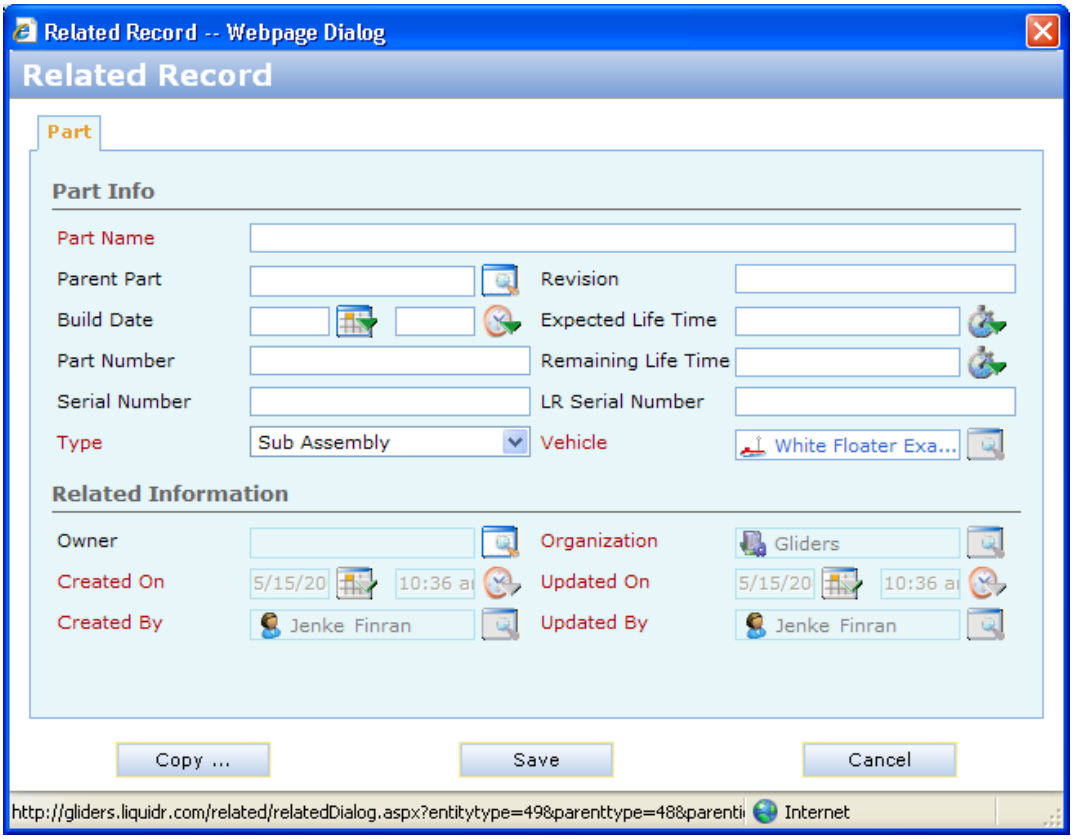
Figure 9.8. New Vehicle Edit Dialog Box



First, add the Float and its basic sub-assemblies to the Part Info tree:

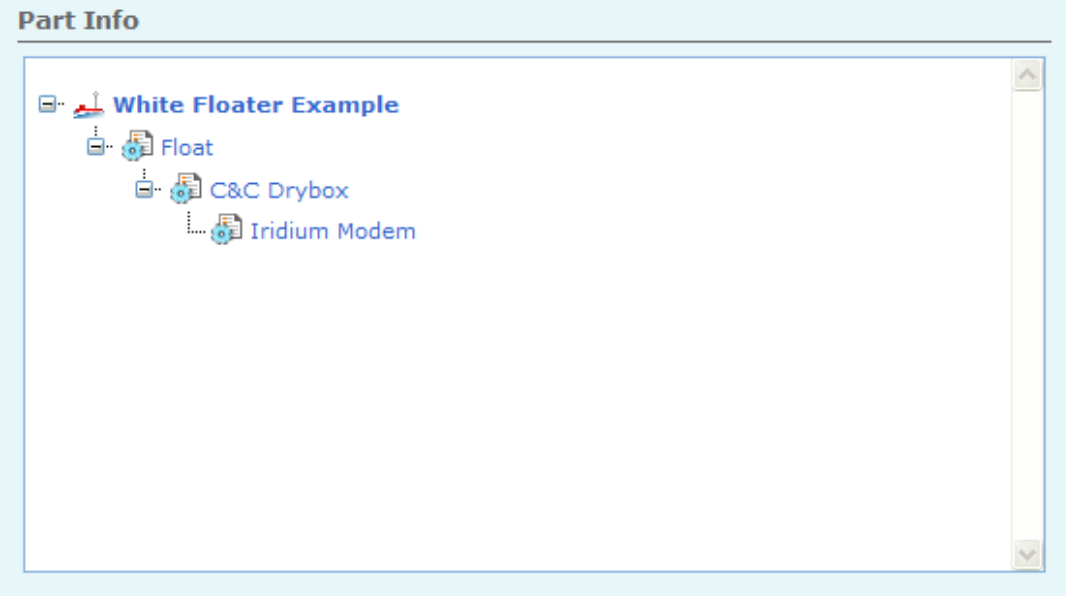
1. Right click on the Vehicle name in the **Part Info** box. Select "New Part" and left click. The dialog box below should appear (Figure 9.9):

Figure 9.9. New Part Dialog Box



2. For the **Part Name**, enter Float.
3. For the **Type**, leave Sub Assembly.
4. Click the **Save** button at the bottom center. The dialog box will close, and "Float" should now show in the **Part Info** box below the Vehicle name.
5. In the **Part Info** box, right click on "Float", then select "New Part" to again bring up the dialog box.
6. Add a new **Part Name** of C&C Drybox. Leave the **Type** as Sub Assembly. Click the **Save** button to close the dialog box.
7. Now, right click on "C&C Drybox", and again select "New Part" to bring up the dialog box.
8. Add a new **Part Name** of Iridium Modem. For the **Type** click down to select from the list "Iridium Modem".
9. In the **Serial Number** field, type in the 15-digit IMEI number you obtained earlier, as described in " Obtaining the IMEI Number " (page 240).
10. Click **Save** to exit. The **Part Info** box should now look similar to Figure 9.10:

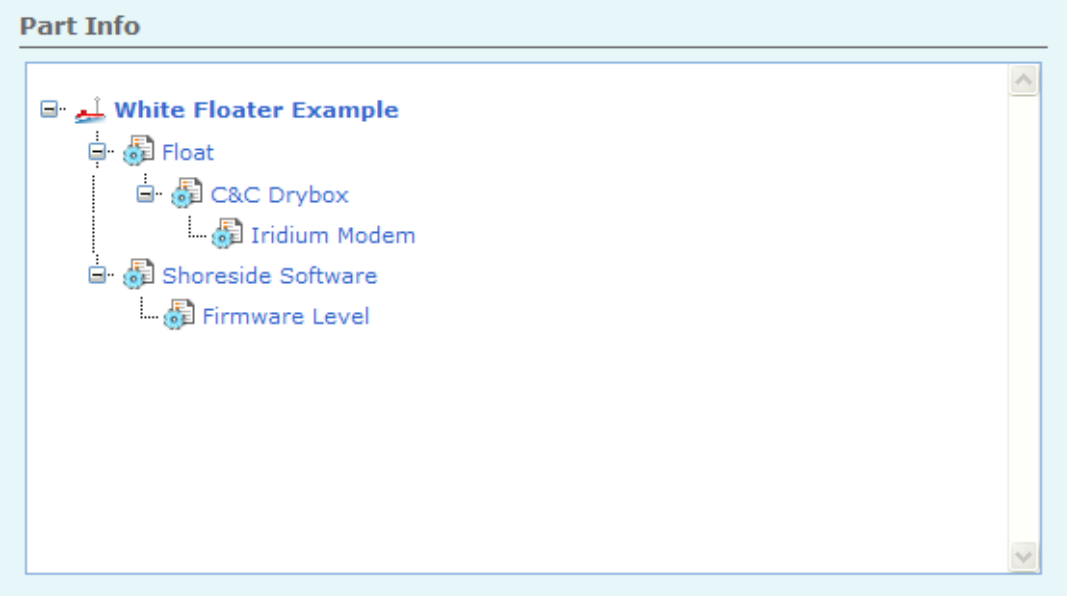
Figure 9.10. Part Info Box with Float Info



Next, add the basic software data to the Part Info tree:

1. Right click on the Vehicle name at the top, and click New Part to bring up the dialog box.
2. Add a new **Part Name** of Shoreside Software. Leave the **Type** as "Sub Assembly".
3. Click **Save**" to exit.
4. Now, right click on Shoreside Software, and then New Part.
5. Add a new **Part Name** of Firmware Level. Click down to set the **Type** as "Firmware Level".
6. In the **Revision** field, enter:
   - **2.0** - For **SV2 Vehicles** with C&C Revision 2.0
   - **3.0** - For **SV2 Vehicles** with C&C Revision 3.0
   - **3.5** - For **SV2 Vehicles** with C&C Revision 3.5
   - **4.0** - For **SV3 Vehicles**
7. Click **Save** to exit the dialog box. The **Part Info** box should now look like Figure 9.11:

Figure 9.11. Part Info Box Initial Setting



This completes the initial setting of the **Part Info** box. Instructions for adding more parts data are provided in " Completing the Part Info Tree (SV2 Only)" (page 269).

For now, click Save to exit the **Vehicle: Edit** dialog.

Adding Event Definitions

All alarms have default values to indicate when each type of alarm will be triggered, and what the response should be. Event Definitions are used to modify these defaults.

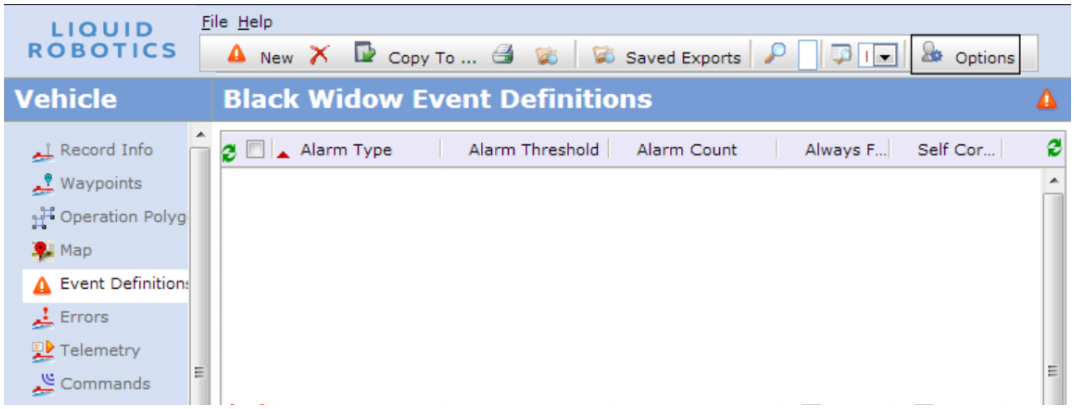
There are two ways Event Definitions can be added:

- If this is your first Vehicle, you will need to enter each of the definitions manually, as described in " Creating New Event Definitions" (page 244).
- If your Organization has another Vehicle that has already been provisioned, and has similar characteristics to your new Vehicle, then you can copy over the definitions from the other Vehicle, as described in " Copying Event Definitions " (page 247).

Creating New Event Definitions

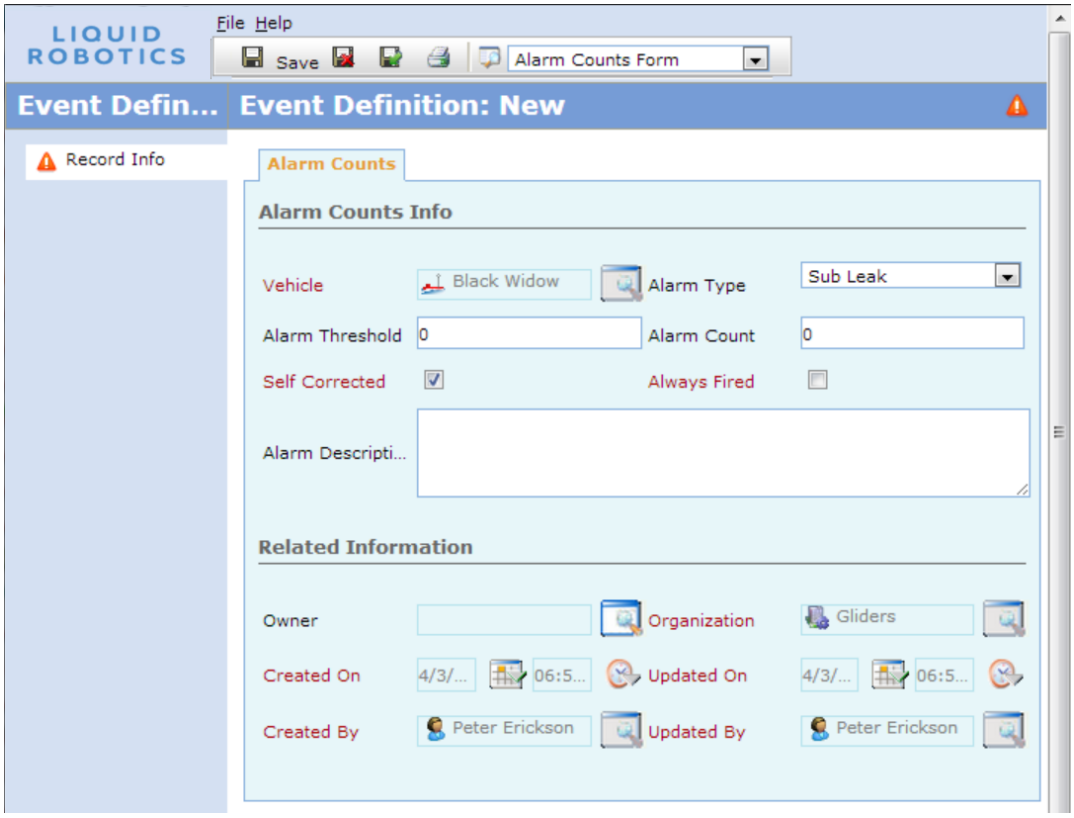
Double-click on the Vehicle name in the list of vehicles on the **Vehicles** tab of the **Home** page. When the **Vehicle Info** window comes up, click on the **Event Definitions** tab in the side bar. You should get a box with no definitions, similar to Figure 9.12:

Figure 9.12. Event Definitions Empty Specification



You want to add nine sets of alarm values. To start, click on the New [New Event Definition] icon. This should bring up the dialog box shown in Figure 9.13:

Figure 9.13. New Event Definition Dialog



First, set the **Sub To Float** alarm:

1. In the **Alarm Type** box, pull down to select Sub To Float.
2. In the **Alarm Threshold** box, enter the number 1.
3. Verify that the **Self Corrected** box is checked.

4. Add a check in the **Always Fired** box.

5. Click the left Save [Save Event Definition] icon to save the data, but not exit the dialog.

Next, set the **Sub Reboot** alarm.

1. In the **Alarm Type** box, pull down to select Sub Reboot.

2. In the **Alarm Threshold** box, enter the number 1.

3. Add checks in the **Self Corrected** and **Always Fired** boxes.

4. Click the Save [Save Event Definition] icon to save the value.

Next, set the **GPS Not Functioning** Alarm:

1. Select GPS Not Functioning.

2. Set the **Alarm Threshold** to 15.

3. Check the **Self Corrected** and **Always Fired** boxes, then Save.

Next, set the **RF Alarm**:

1. Select RF Alarm.

2. Set the **Alarm Threshold** to 5.

3. Check the **Self Corrected** and **Always Fired** boxes, then Save.

Repeat the procedure to set the remaining Alarm Type names and Threshold numbers:

- Out of Bounds [**3**]
- Communication Timeout [**15**]
- Empty Packet [**5**]
- Stuck GPS [**5**]
- File Read Timeout [**25**]

The final Event Definitions box should now look similar to Figure 9.14:

Figure 9.14. Completed Event Definitions Specification

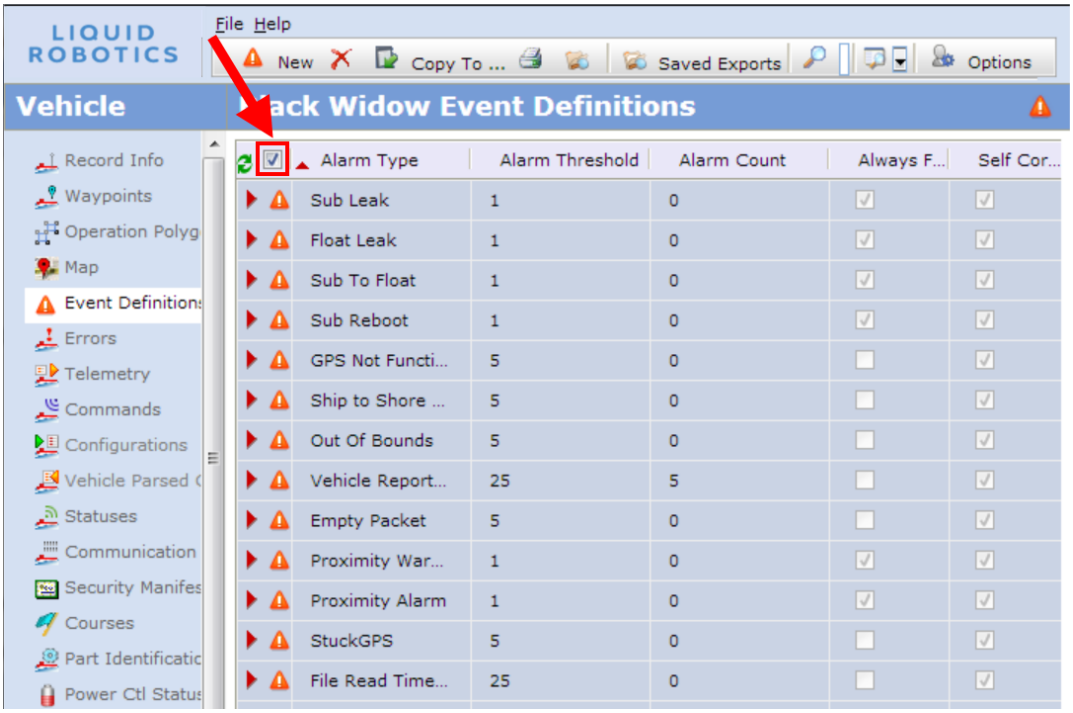
Any of the above data values (including the Alarm Type name) can be changed by double-clicking on a name to call up a dialog box for editing.

Copying Event Definitions

To copy Event Definitions from another Vehicle, do the following:

1. From the **Home** page, locate another Vehicle that is identical or similar to your new Vehicle.
2. Double-click on the other Vehicle's name to bring up its Vehicle Info.
3. On the side bar, click on the **Event Definitions** tab to bring up the dialog for event definitions. The box should be similar to Figure 9.15.
4. Click in the **Select All** checkbox. A check should appear in the box, and all the items below should be selected (indicated by a blue-grey background).

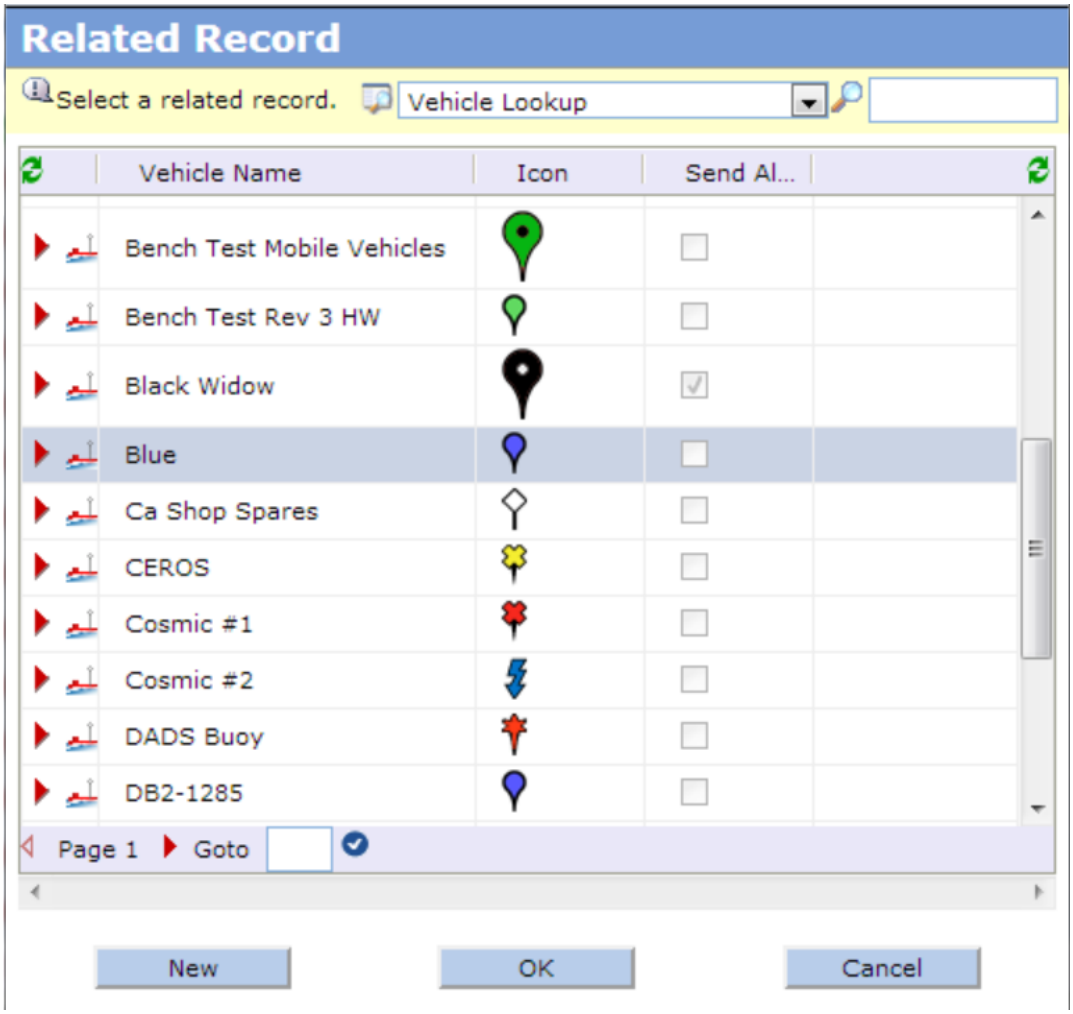
Figure 9.15. Event Definitions Copy Dialog



5. Click on the icon for Copy To ... [Copy to another Event Definition]. Click **OK** when queried with **"Are You Sure….?"**

6. A new **Related Record** dialog box should come up, showing a current list of the Vehicles. Single-click on the name of your new Vehicle (the one to want to copy the event data to). The name should be highlighted in Blue-Gray, similar to Figure 9.16:

Figure 9.16. Copy-To Dialog Box (Event Definition)



7. To copy the data, click the **OK** button at the bottom center.

8. You should now see a small box with the words "Records Copied". Click on the **OK** button at the bottom.

9. Close the **Event Definitions** dialog box for the Vehicle you copied from.

You can cross-check that the values were copied. Double click on your Vehicle's name on the **Home** page to bring up the **Vehicle Edit** page, then click on "Event Definitions" on the side bar. You should see the copied values.

Note

There may be more Alarm Types than shown in the above Figure 9.15. However, the five shown are considered the "minimum set" necessary.

Changing or Deleting Event Definitions

Event Definitions can be changed or added by double-clicking on an Alarm Type name to call up a dialog box for editing. (You can even change the Alarm Type name itself.)

Deleting Event Definitions requires Master or Admin Role privileges.

Adding Operation Polygons

Operation Polygon Definition

Recall that there are two types of Operation Polygons, Inclusion and Exclusion.

- Inclusion Polygons are used to define the "boundary" of a course. If the Vehicle goes

  outside an Inclusive Polygon boundary, an Alarm will be issued.

- Exclusion Polygons are used to define "off-limits" areas where the Vehicle is not supposed to go.

  If the Vehicle crosses into one of these areas, an Alarm will be issued.

An Operation Polygon is specified as a series of points. Each of the points has:

1. A sequence number (the "Order" number)
2. A Latitude position value
3. A Longitude position value

The polygon is defined by connecting each of the position points in the specified order. The polygon is closed by connecting the last point with the first. The Order numbers need not start at zero or one, though that is recommended. Also, the numbers do not need to be sequential (i.e., you can skip numbers).

The minimum number of points (sides) is three, and there is no maximum limit. The polygon can be any shape but must enclose a single area (i.e., none of the defining edges can cross). The points have to be specified in a counter-clockwise order.

In addition to defining the points, you assign each Operation Polygon a descriptive name (e.g., "Marine Sanctuary Exclusion"). Each Operation Polygon has the option of being displayed (or not) on the Dashboard map. Typically, an Alarm will be sent if the Vehicle crosses an Operation Polygon boundary, but this feature can be disabled.

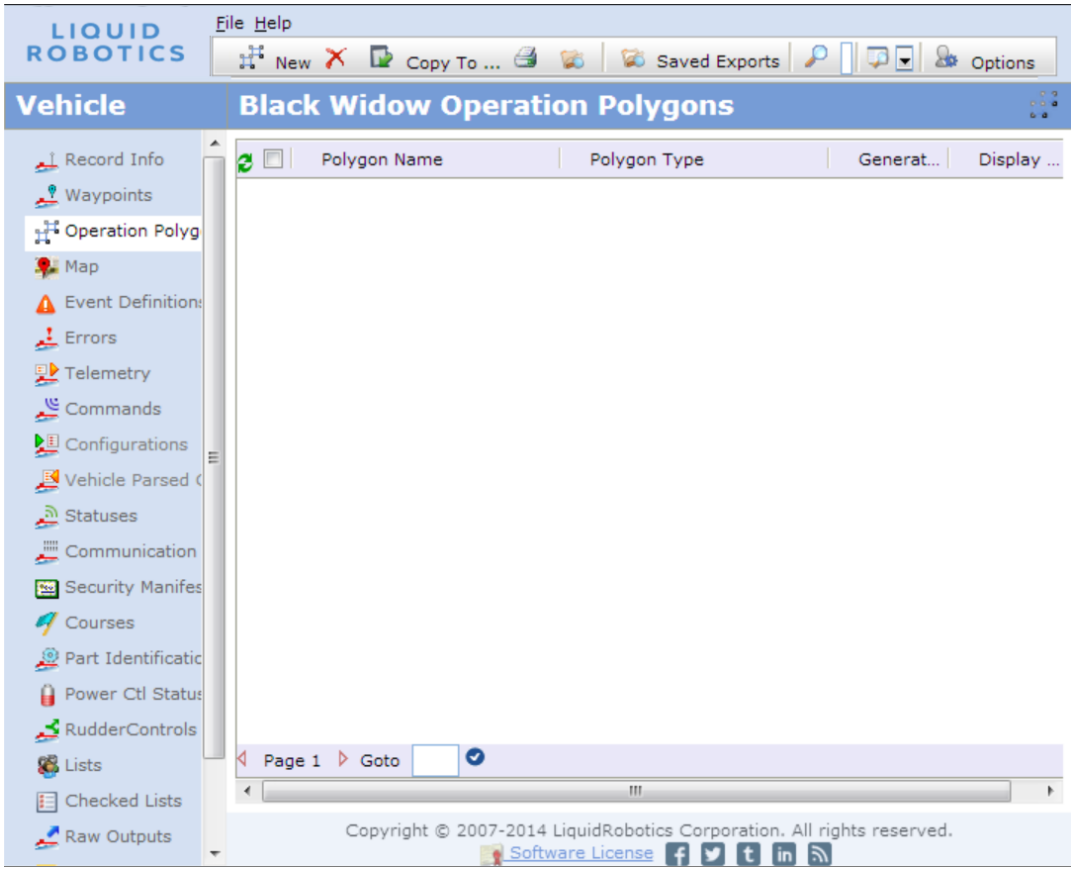
As with Event Definitions, Operation Polygons can be either defined "from scratch" (“ Creating New Operation Polygons” (page 250)), or copied over from another Vehicle (“ Copying Operation Polygons ” (page 255)).

Creating New Operation Polygons

You can create a new Operation Polygon from the Position Map using the **Map Utility**, or from the **Operation Polygon** tab in the **Vehicle** window. For information on creating new Operation Polygons using the **Map Utility** see “Using the Map Utility” (page 91). The following procedure is for creating new Operation Polygons from the **Vehicle** window.

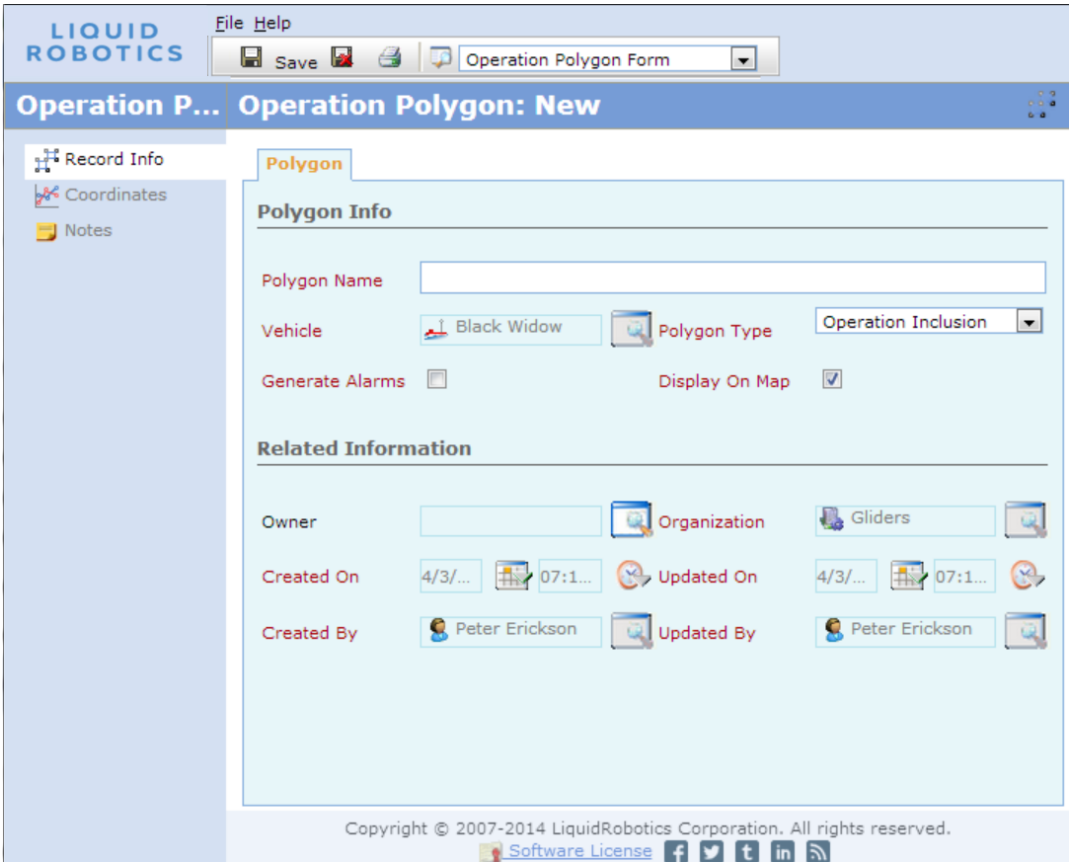
Go to the **Home** page and double-click on the new Vehicle's name, which will bring up the **Vehicle** window. Then click on the **Operation Polyg...** tab on the left side. You should get a box with no definitions, similar to Figure 9.17:

Figure 9.17. Operation Polygons List (Empty)



To add a new Operation Polygon, click on the New [New Operation Polygon] icon. This should bring up the dialog page Figure 9.18:

Figure 9.18. New Operation Polygon Definition



Fill in the following:

1. In the **Polygon Name** box, enter a name for the polygon. This name should be descriptive of the polygon, such as "Shipping Lane Exclusion".

2. In the **Polygon Type** box, pull down to select one of the two options:

   Operation Inclusion

   Operation Exclusion

3. Click in the box for **Generate Alarms** if you want the Vehicle to issue an alarm if the polygon boundary is crossed.

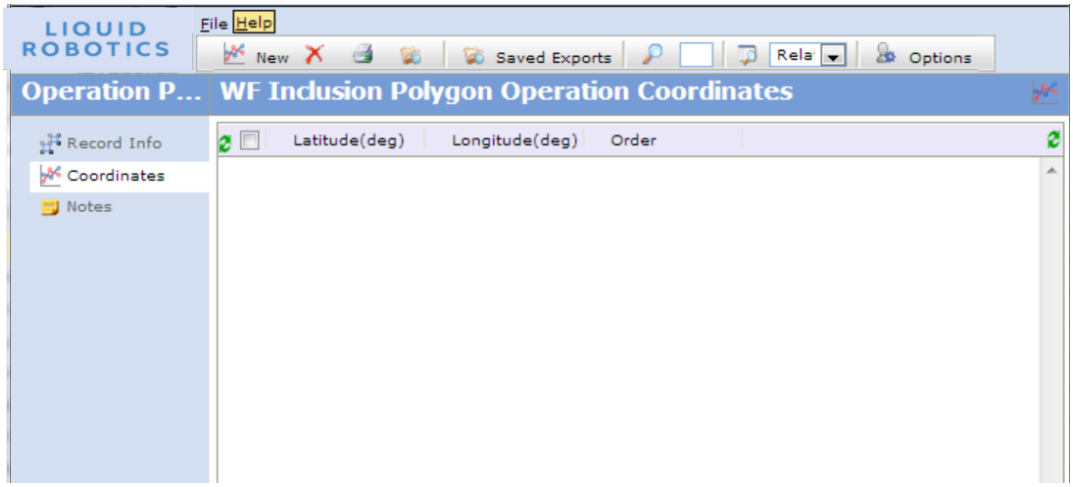
4. Click in the box for **Display on Map** if you want the Operation Polygon to be visible on the Dashboard map.

5. Click the left Save [Save Operation Polygon] icon to save the data, but not exit the dialog.

For the example below, assume that the assigned Polygon Name was "WF Inclusion Polygon".

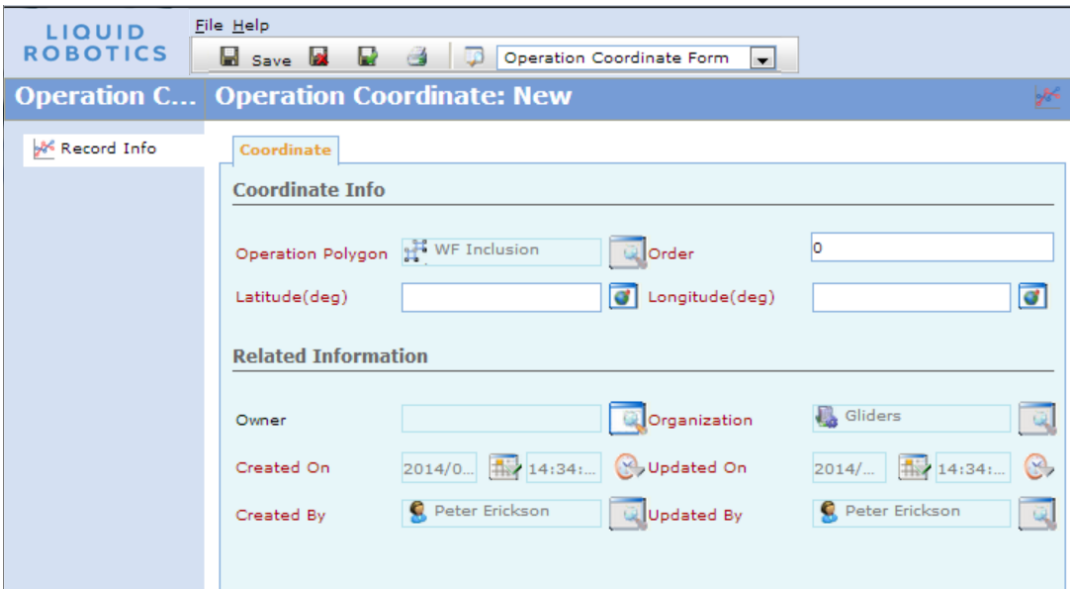
The next step is to assign the set of points defining the polygon. Click on the **Coordinates** tab to bring up the dialog for defining the Lat/Long coordinates and Order number, as shown below (Figure 9.19).

Figure 9.19. Operation Polygon Coordinates List (Empty)



Now, click on the New [New Operation Coordinate] icon. This should bring up a dialog box to enter the coordinates and Order number Figure 9.20:

Figure 9.20. New Operation Coordinates Entry Dialog



Note

The icons to the right of the **Latitude** and **Longitude** entry boxes call up a dialog that converts degrees and minutes to the required degrees and fractions format.

In the box:

1. Enter the **Order** number. It is suggested that you start from 0 or 1 and count up.
2. Enter the **Latitude** in degrees and fractions (positive → N, negative → S).

3. Enter the **Longitude** in degrees and fractions (positive → E, negative → W).

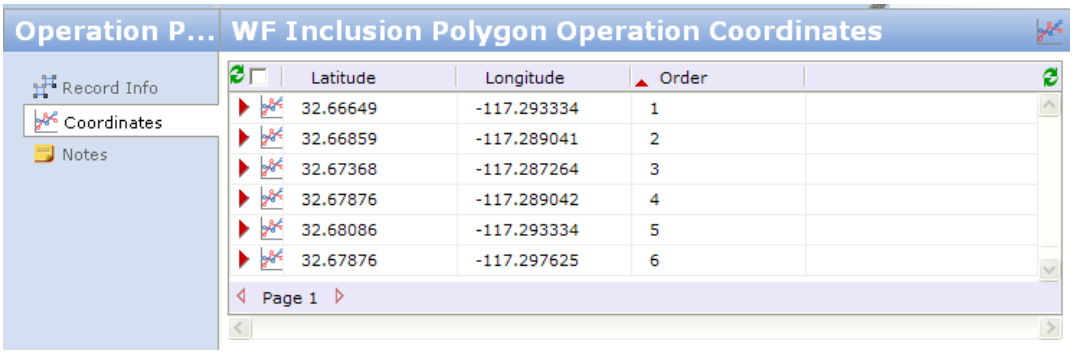
4. After all of the coordinates have been entered and show up in the coordinates page, return to the **Record Info** tab and select Save and close icon. Click on the left-side Save [Save Operation Coordinate] icon. This saves the values and clears the box for another entry.

5. Repeat steps 1 thru 4 until all the points for "WF Inclusion Polygon" have been entered.

6. Finally, after all of the coordinates have been entered and show up in the coordinates page, return to the **Record Info** tab and select the **Save and close** icon, then click the X in the upper right to close the dialog box.

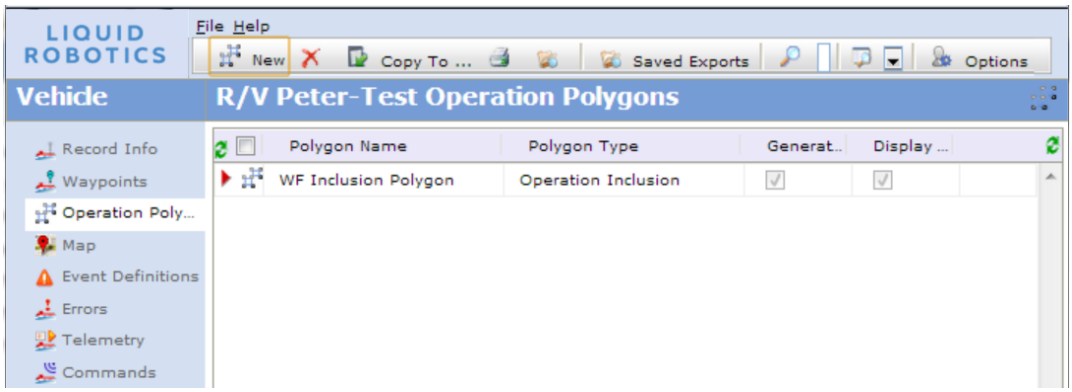
At this point, the polygon has been defined. Re-opening (or refreshing) the Operation Polygon Coordinates List will show the set of coordinates that have been defined for the polygon named "WF Inclusion Polygon" (Figure 9.21).

Figure 9.21. Operation Polygon Coordinates List



If you re-open (or refresh) the **Vehicle Operation Polygons** box, you will now seen an entry for the polygon just defined (Figure 9.22):

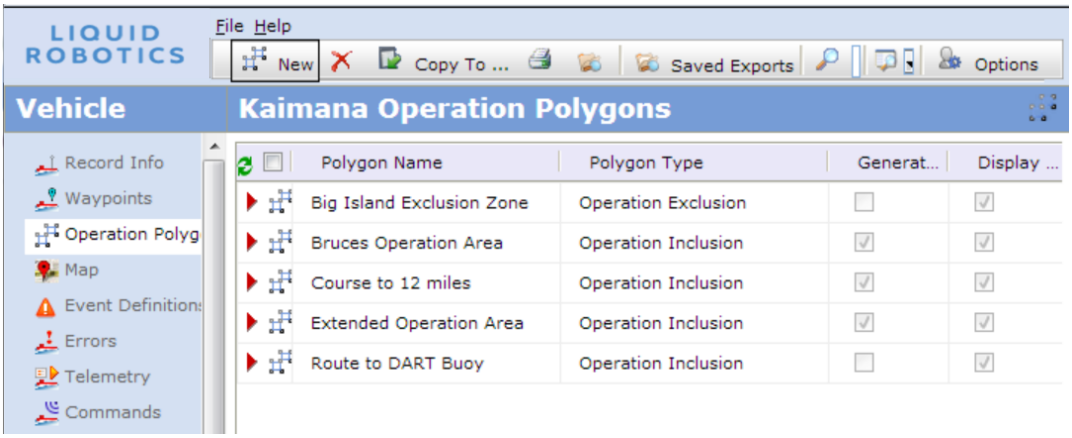
Figure 9.22. New Operation Polygon Specification



For each additional polygon, click on the New icon to repeat the procedure defined above.

When complete, the above specification box will likely have multiple Inclusion and Exclusion polygons, such as the example list shown below (Figure 9.23):

Figure 9.23. Example Operation Polygons List



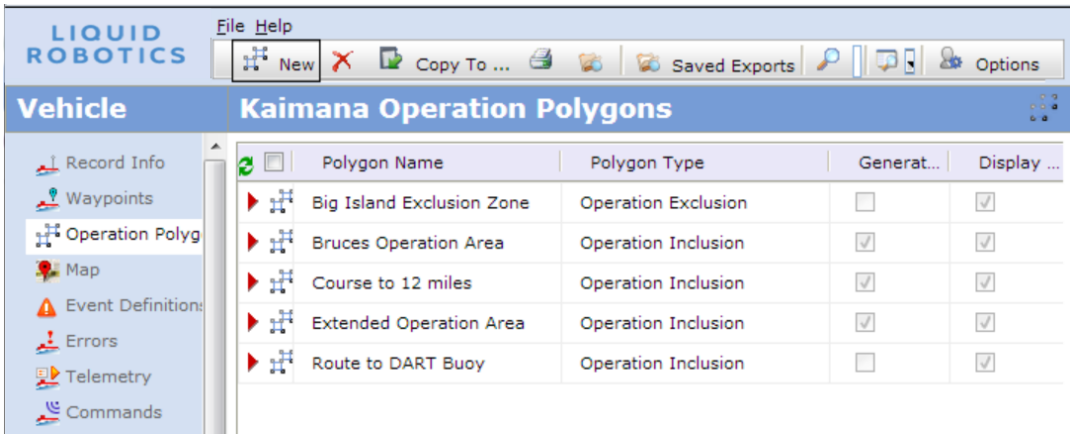
Copying Operation Polygons

When copying Operation Polygons, the assumption is that the new Vehicle will be operating in essentially the same area as the Vehicle whose data is being copied. The copied polygons can then be deleted or edited as necessary.

The procedure for copying is:

1. On the **Home** page, locate another Vehicle in your Organization that operates in the same region as your new Vehicle.
2. Double-click on the other Vehicle's name to bring up its Vehicle Data.
3. On the left side, click on the **Operation Polygons** tab to show the polygons defined for that Vehicle. The window should be similar to (Figure 9.24):

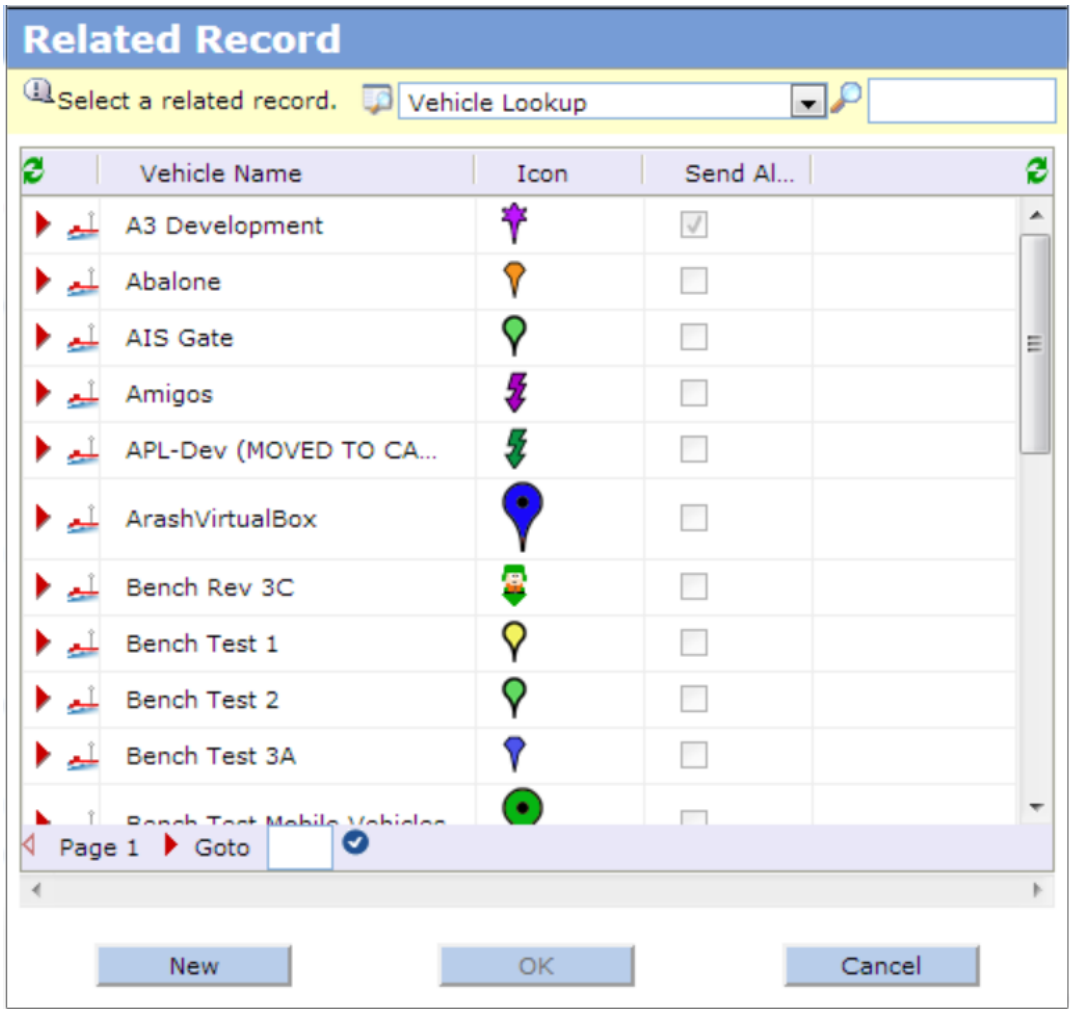
Figure 9.24. Operation Polygons Copy Dialog



4. Hold down the **Ctrl** key and left-click to select each of the polygons that you want to copy. Or, click in the box to the left of **Polygon Name** to select all. The selected lines will turn Blue-Gray. (**Ctrl**-clicking a selected line will un-select it.)
5. Click on the icon for Copy To ... [Copy to another Operation Polygon]. Click **OK** when queried on the copy.

6. A new **Related Record** dialog page should come up, showing a current list of Vehicles:

Figure 9.25. Copy-To Dialog Box (Polygons)



7. Click on the name of your new Vehicle (the one to want to copy the polygons to). The name line should be highlighted in Blue-Gray (as shown above).

8. Click the center **OK** button.

9. Expect to see a small box with the words "Records Copied", then click on its **OK** button.

Cross-check that the values were copied: On the **Vehicle** page, double click on the new Vehicle's name to bring up the **Vehicle Edit** page, then click on Operation Polygons on the left bar.

Adding Waypoints

Each Vehicle has its own set of Waypoints. As with other data, the Waypoint numbers and values can be created (see " Creating New Waypoints " (page 257)), or copied from another Vehicle (see " Copying Waypoints " (page 258)).

Creating New Waypoints

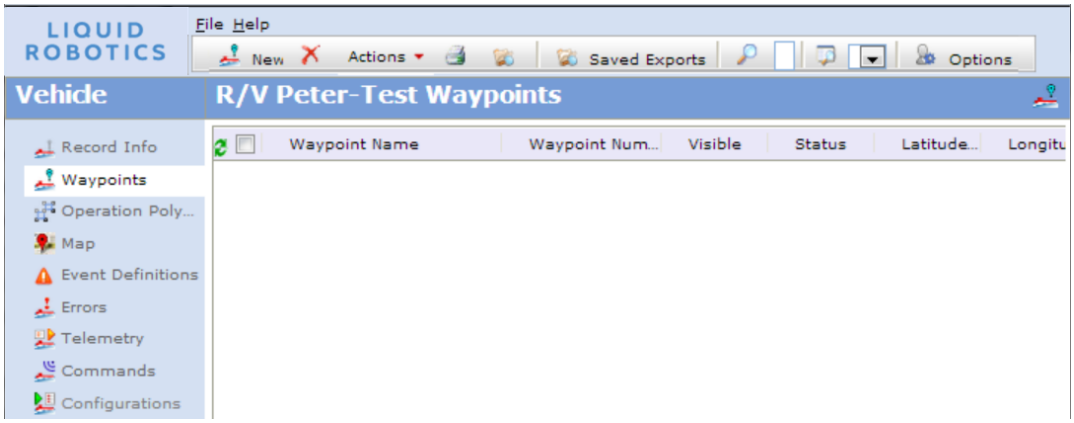
You can create new Waypoints from the Position Map using the **Map Utility**, or from the **Waypoints** tab in the **Vehicle** window. For information on creating new Waypoints using the **Map Utility** see "Using the Map Utility" (page 91). The following procedure is for creating new Waypoints from the **Vehicle** window.

As before, bring up the **Home** page and double-click on the new Vehicle's name. This will call up the familiar **Vehicle** window.

Click on the **Waypoints** tab on the left side.

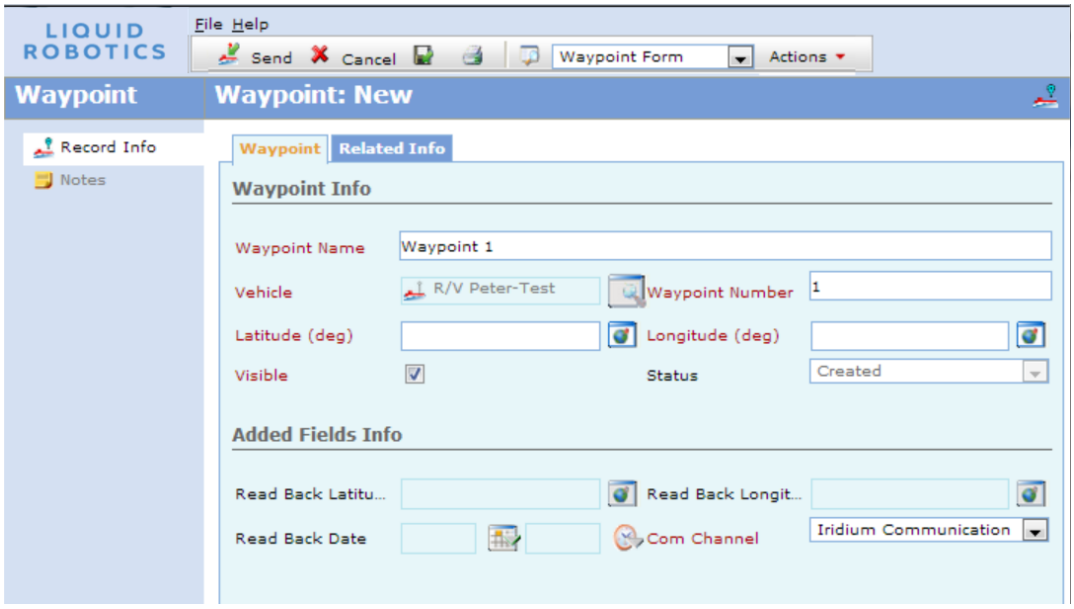
Selecting the **Waypoints** tab should show an empty Waypoints list, similar to (Figure 9.26):

Figure 9.26. Empty Waypoint List



To create a new Waypoint, click on the New [New Waypoint] icon near the upper left. That should bring up the **New Waypoint** dialog page (Figure 9.27):

Figure 9.27. New Waypoint Dialog



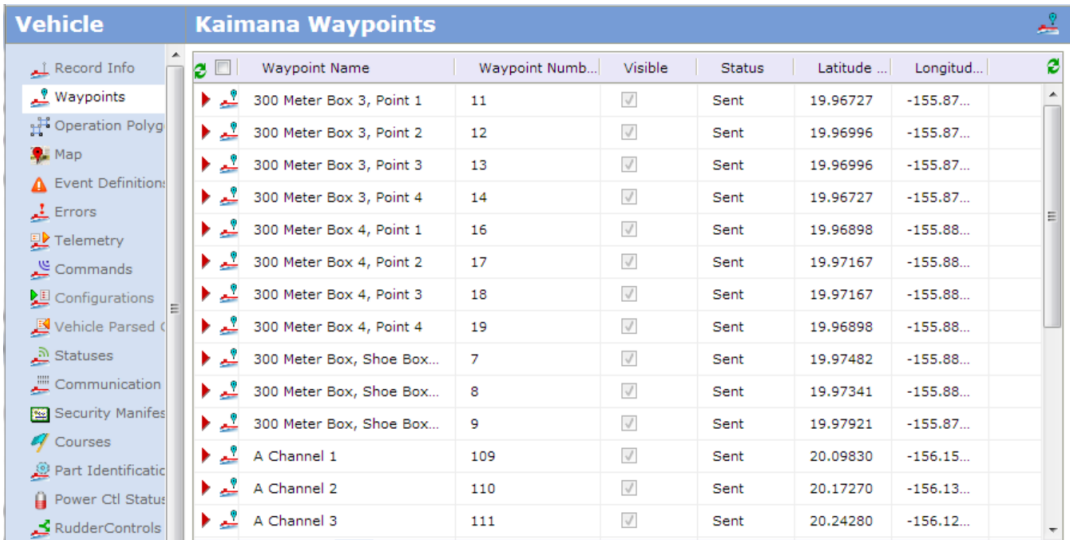
1. Enter the **Waypoint Name**. This should be descriptive of the Waypoint's position and purpose.
2. Enter both the **Latitude** and **Longitude** Coordinates in degrees and fractions.
3. Change the **Waypoint Number**" if desired. The value in the box is initially set to the previous largest number, plus one. You can change the number, but if the number is used for an existing Waypoint, you will overwrite that Waypoint's coordinates.
4. Check the **Visible** box if you want to see the Waypoint on the map.
5. Click the left Save [Save Waypoint] icon to save the Waypoint, and leave the box open.

Repeat steps 1 through 5 for each new Waypoint.

When done, click the right Save [Save and Close Waypoint] icon to save the Waypoint and close the dialog box. (Or, click the X at the upper right of the box). There will be no "Are you sure?" confirmation.

Re-open or refresh the Vehicle Waypoints list. You should see the names and values you entered, similar to (Figure 9.28):

Figure 9.28. Example New Waypoints List



Note

A way of creating new Waypoints from the Position Map in the Dashboard is described in . “Using the Map Utility” (page 91)

Copying Waypoints

Where possible, it is easier to add initial Waypoints by copying selected Waypoints from another Vehicle operating in the same area. Waypoints can be changed or added as necessary later.

To copy Waypoints:

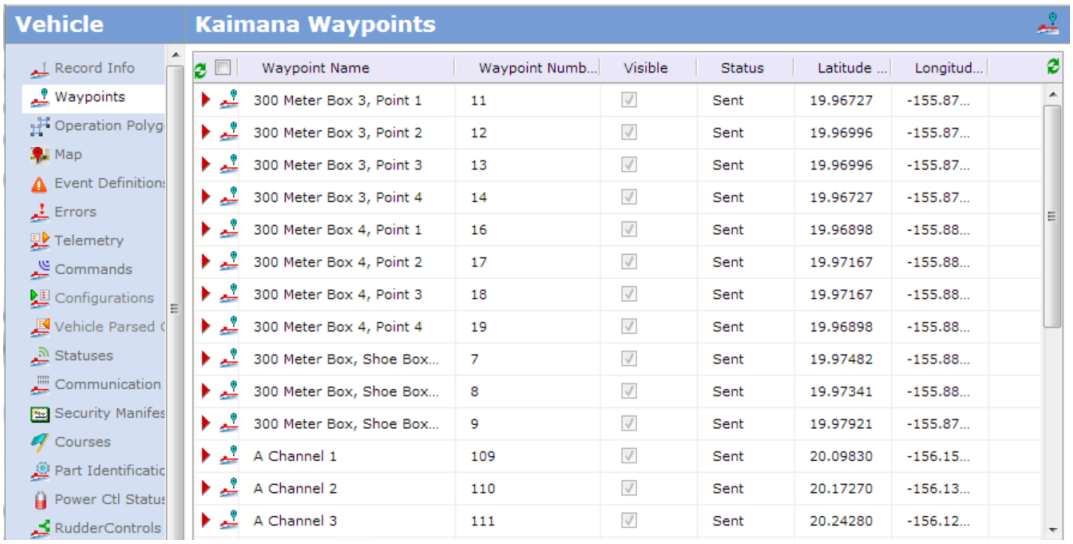
1. Locate another Vehicle that operates in the same region as the one you are provisioning.

2. Double-click on the other Vehicle's name to bring up its Vehicle Data.

3. Click on the **Waypoints** tab on the left to bring up a list of the Waypoints defined for that Vehicle.

   The Waypoints list should generally look like (Figure 9.29):

Figure 9.29. Waypoints List for Copying



4. In the list, use the **Ctrl**-click to select those waypoints that you want to copy over to your new Vehicle.

Note

You can only select 20 records at a time from the list. If you want to copy more than 20 Waypoints, you'll need to repeat the copy operation (steps 4 thru 8) multiple times.

5. Click on the Copy To ... [Copy to another Waypoint] icon. When queried on the copy, click **OK**.

6. A new **Related Record** dialog page should come up, showing the current list of Vehicles (similar to Figure 9.25).

7. Single-click on the name of your new Vehicle, which should highlight it in Blue-Gray. Then, click the **OK** button.

8. Expect a box with the words "Records Copied", and click on its "OK" button.

Cross-check that the values were copied: Double-click on your Vehicle's name on the **Vehicle Page** to bring up its Vehicle Data, then click on the **Waypoints** tab on the left. You should see the newly-copied Waypoints.

Adding a List

A Vehicle can reference multiple lists of data. There are currently two types:

- An Escalation List specifies the people to contact (and the order of contact) in case of a serious alarm or other emergency involving a Vehicle.

- A Group List contains the names of people with some associated purpose (such as the people who support a specific Vehicle).

As with other data, a list can be created (see “ Creating a New Escalation List ” (page 260)), or copied from another Vehicle (“Copying Existing Escalation Lists ” (page 267)).

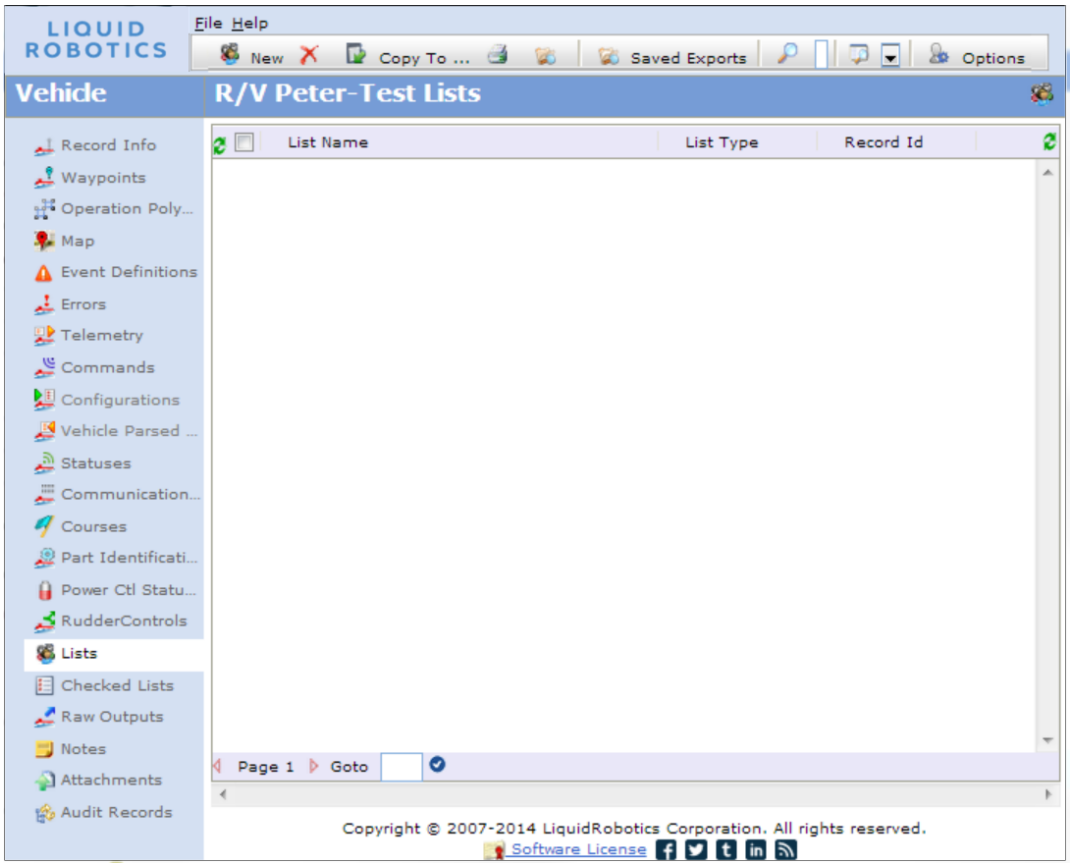
Creating a New Escalation List

To create an Escalation List from scratch:

1. Go to the **Home** page and double-click on the new Vehicle's name, which will bring up the **Vehicle Data** window.

2. Click on the **Lists** tab on the left. You should get a box with no lists, similar to (Figure 9.30):

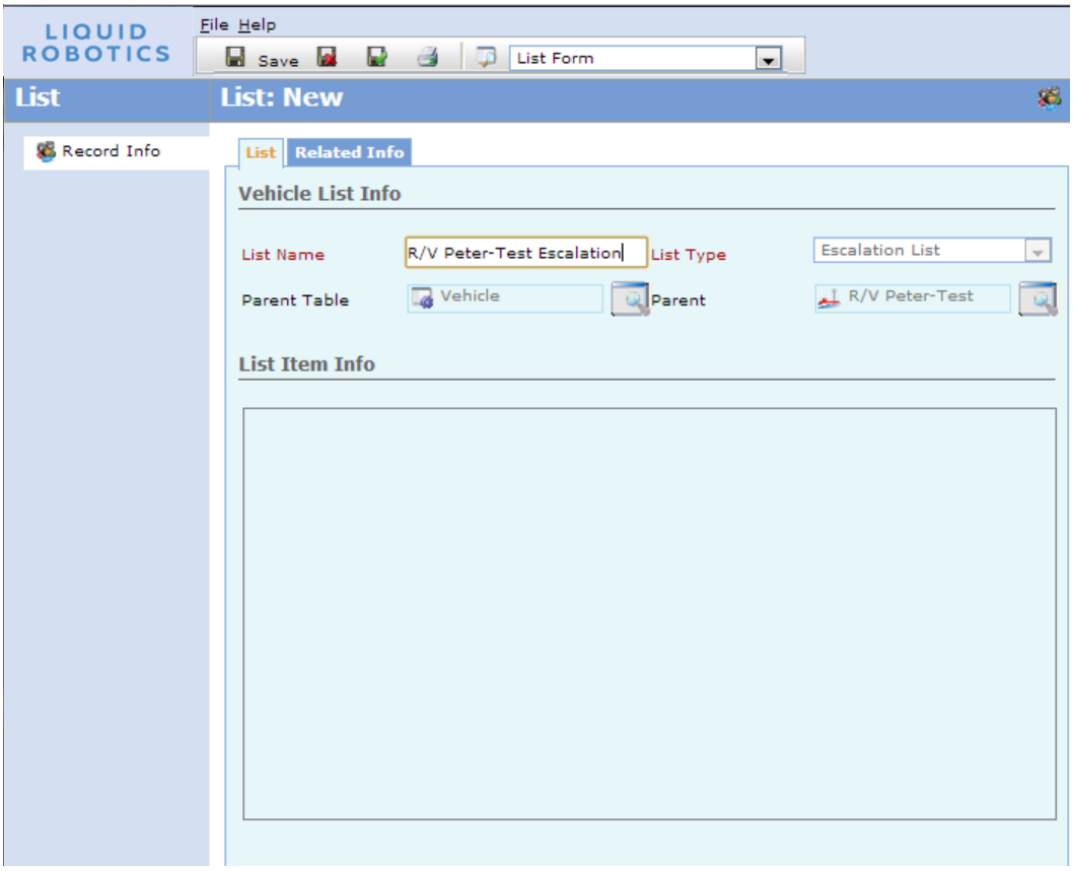
Figure 9.30. Lists (Empty)



3. Click on the New [New List] icon. This will bring up the **New List** dialog box shown below in Figure 9.31.

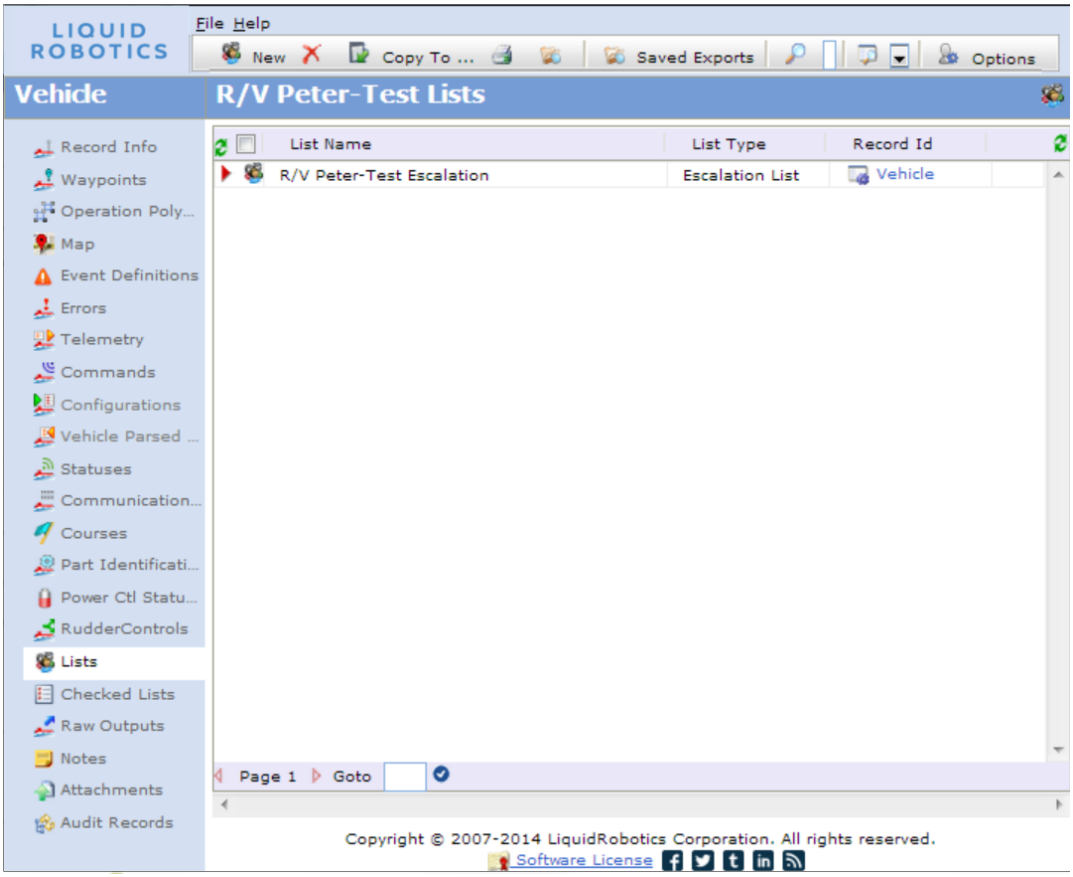
4. Enter your choice of a List Name, as shown in the example below (Figure 9.31).

Figure 9.31. New List Dialog Example



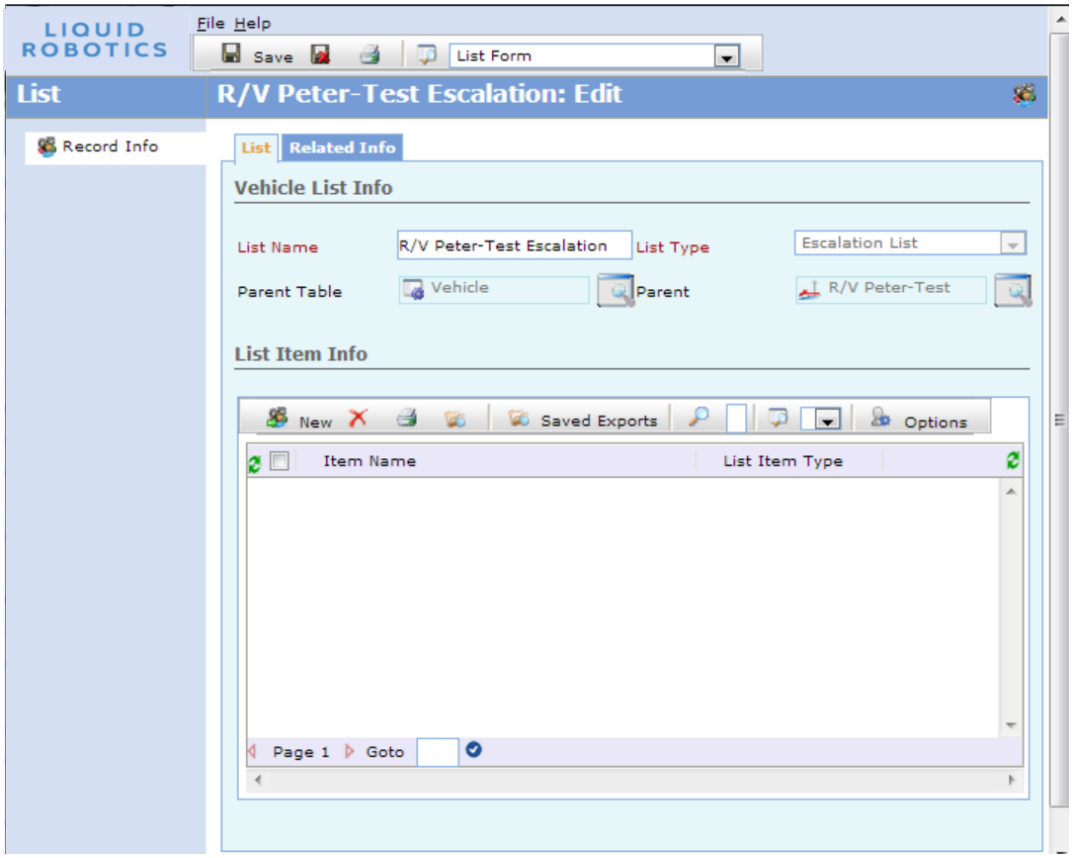
5. Click on the Save [Save and close List] icon near the top. The **Lists** page should now show the new Escalation List name entered (Figure 9.32).

Figure 9.32. Escalation List Name Entry



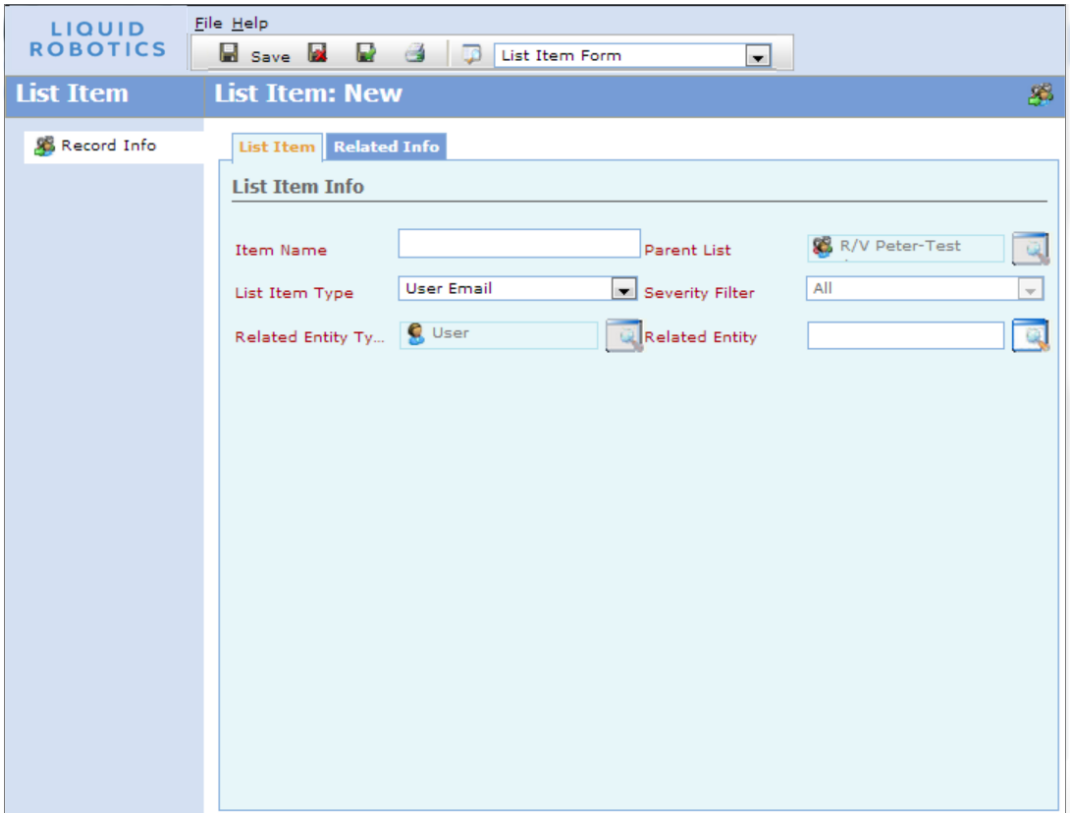
6. Now, double-click on the **R/V Peter-Test Escalation** name. This will bring up the dialog to enter new items in the list (Figure 9.33).

Figure 9.33. Escalation List Edit Dialog (Empty)



7. Click on the New [New List Item] icon just above the list data box. This should bring up the dialog that allows you to enter a new list item (Figure 9.34).

Figure 9.34. New List Item Dialog



8. For the "Item Name", enter the name of a contact person and an indication of the communications mode (e.g., "Chuck Pager").

9. For the **List Item Type**, use the pull down to select one of three choices:

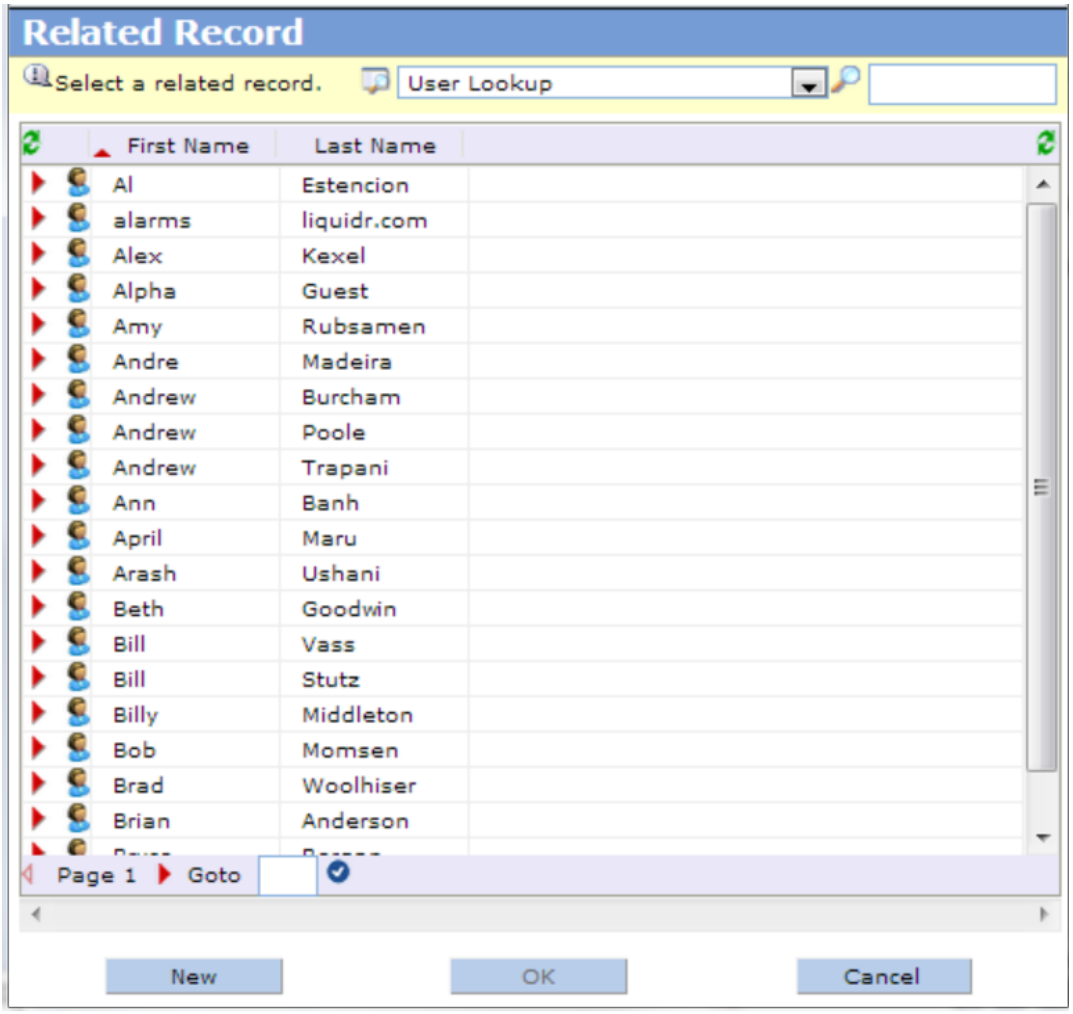
   User Email

   User Pager

   User Alt Email

10. Click on the icon to the right of the **Related Entity** box. This should bring up a list of the contact people in your Organization, similar in format to (Figure 9.35):

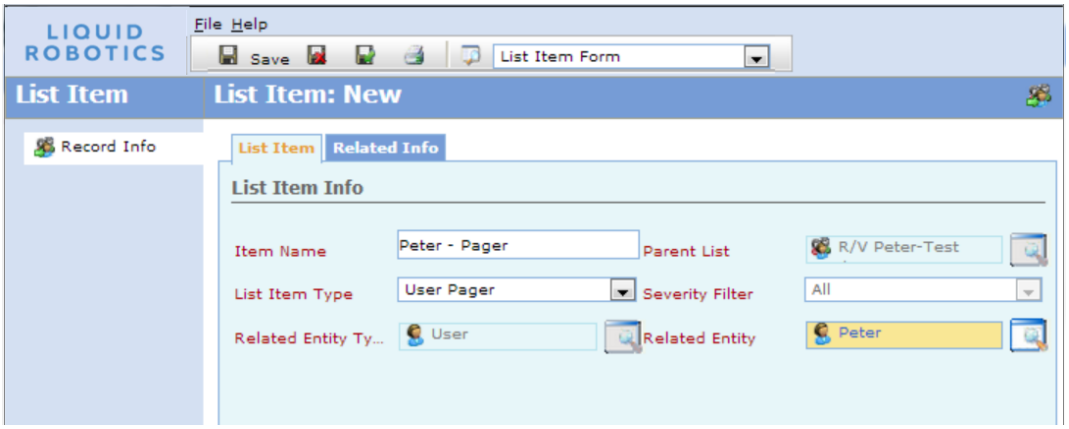
Figure 9.35. Contact List Records



11. Click on the name of the person you want to go into the **Related Entity** box. Then Click the center **OK** button.

    A completed List Item entry would look similar to (Figure 9.36):

Figure 9.36. New List Item Example Entry



Note

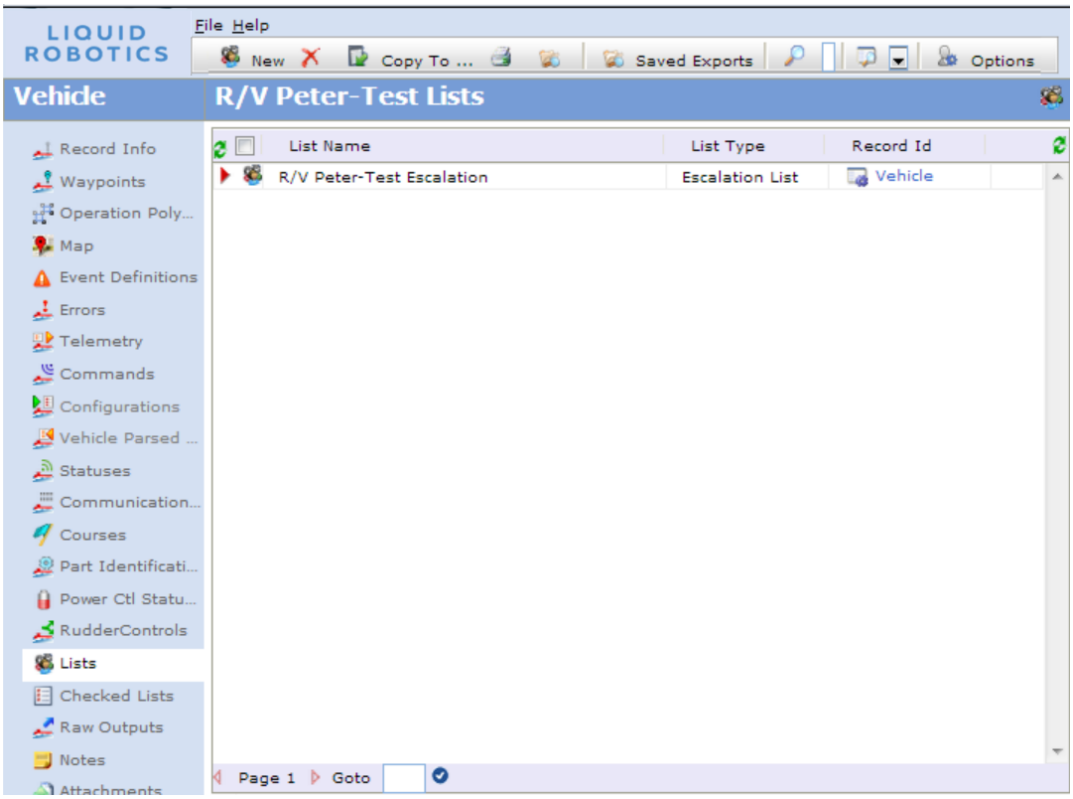
The name in the **Related Entity** box is now a link to the contact information for that person.

12. Click on the Save [Save List Item] icon to save the new list item.

13. Repeat steps 7 thru 12 for each person (and contact method) that you want to be in the Escalation List.

    When the names have been entered, the new Escalation List should look similar to (Figure 9.37):

Figure 9.37. Example New Escalation List



Copying Existing Escalation Lists

As with other data, you can create an Escalation list by copying from another of your Organization's Vehicles.

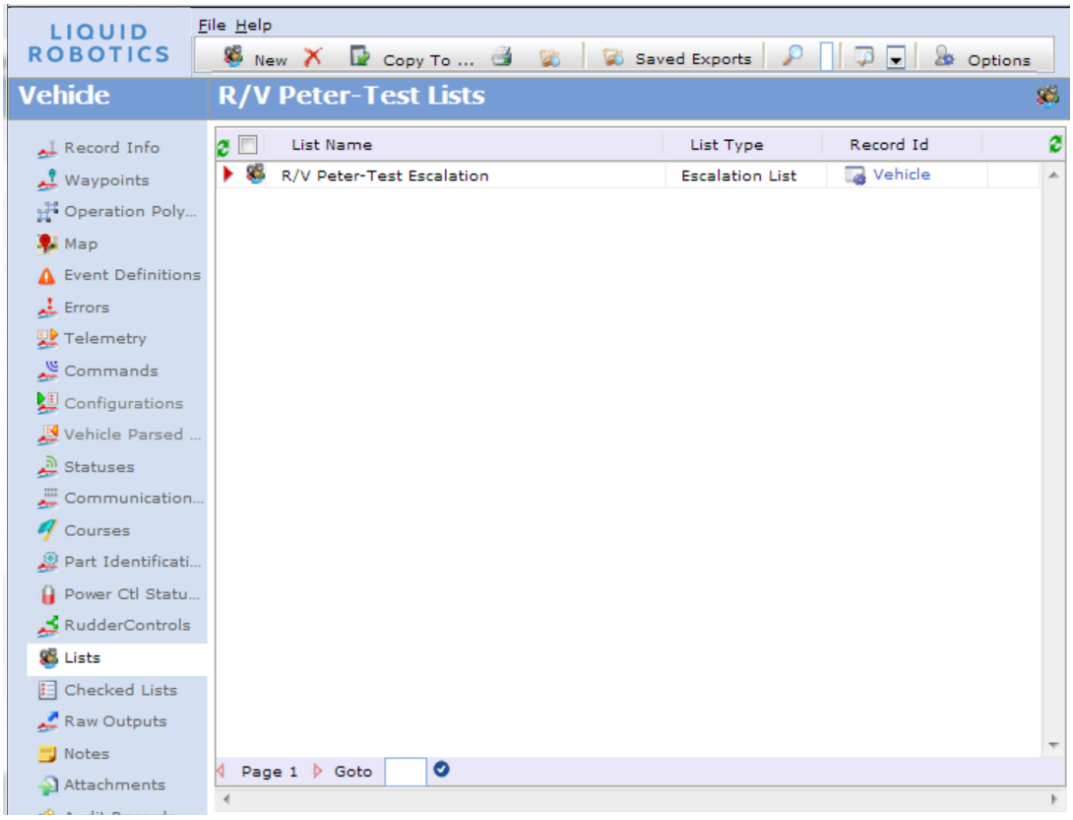
To copy Escalation lists:

1. Locate another Vehicle whose Escalation list you want to use.

2. Double-click on that Vehicle's name to bring up its Vehicle data.

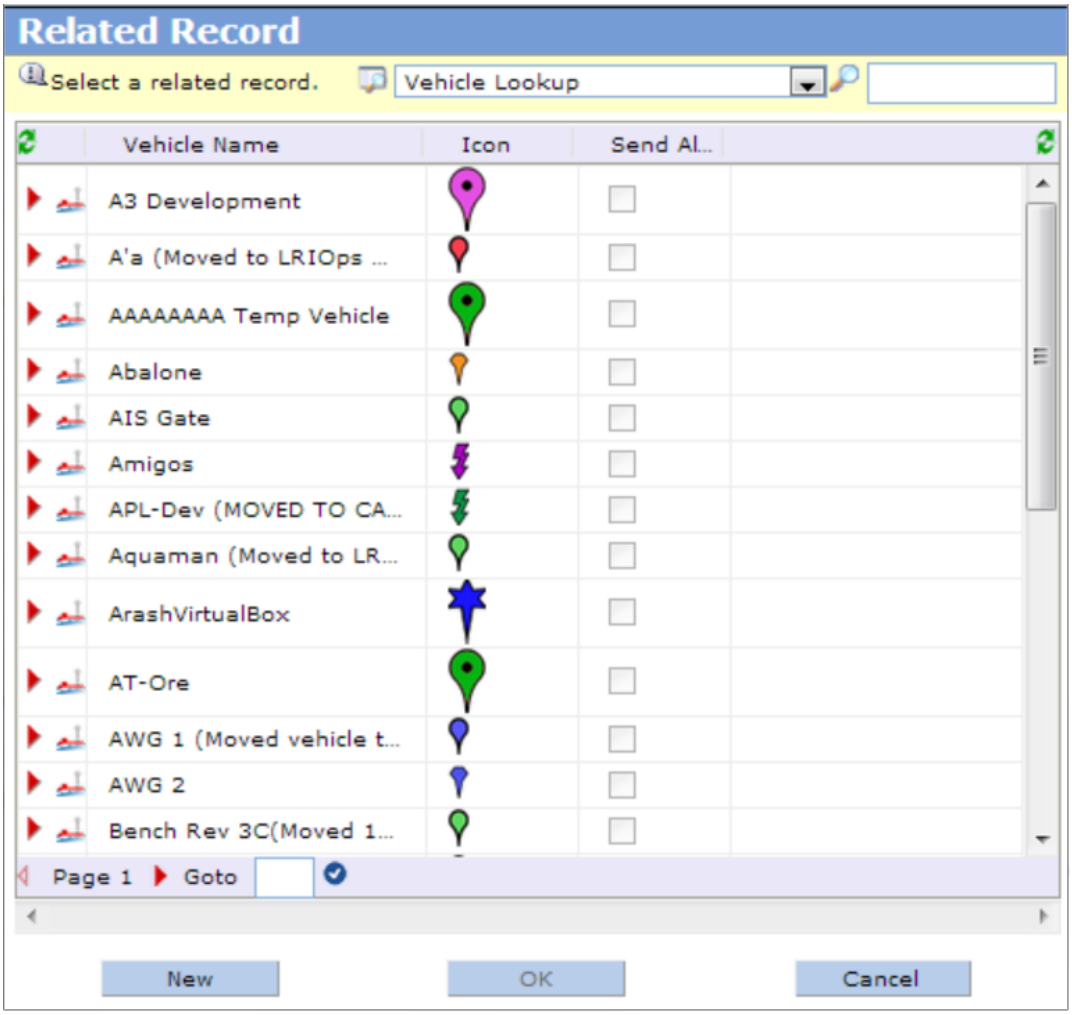
3. Click on **Lists**, to bring up the lists defined for that Vehicle. Usually, there is only the Escalation list as shown below (Figure 9.38):

Figure 9.38. List of Vehicle Lists



4. Click on one or more Escalation lists to select them, then click on the **Copy To...** A list of Vehicles in your Organization will appear.

Figure 9.39. Vehicle Selecton List



5. Click on the name of the Vehicle you want to copy the list(s) to), then click the **OK** button.

6. A window with the words **Records Copied** will appear - you must click on the **OK** button to complete the copying task and close the window.

7. Confirm that the Escalation list, or lists, were copied by opening the Vehicle data form for the Vehicle you copied to and then clicking on the **Lists** side tab. The copied list(s) should be there.

Completing the Part Info Tree (SV2 Only)

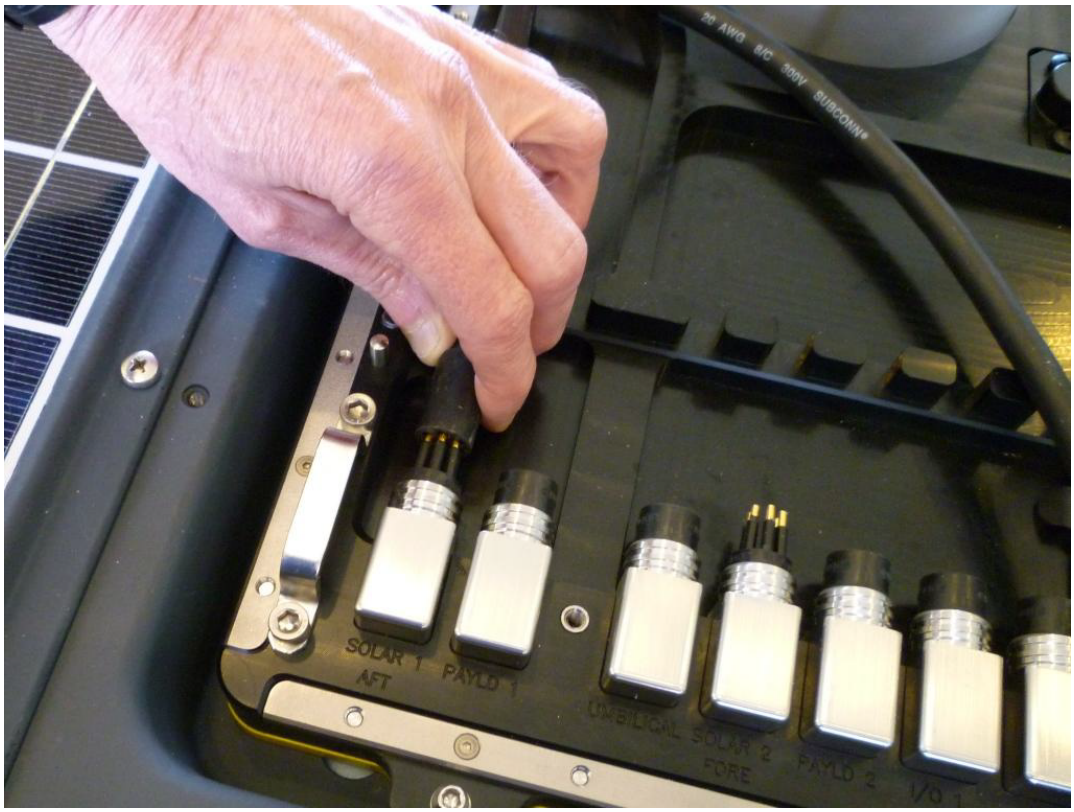
For SV2 Vehicles, the Part Info tree that was started in "Initializing the Part Info Tree (SV2 Only)" (page 240) can now be completed by downloading the information from the new Vehicle. **For SV3 Vehicles, the Part Info tree is completed automatically when you power on the Vehicle and the CCU completes its boot sequence.**

Powering Up the Vehicle

First, locate the Vehicle so that it has a clear view of the sky. This is necessary to get good Iridium reception.

Next, power up the Vehicle. If you have the Original C&C Drybox, start power by connecting one of the Solar Panel cables to either one of the C&C Drybox Solar Panel connectors (Figure 9.40). Alternatively, connect a shorting plug designed to mimic solar panel connection.

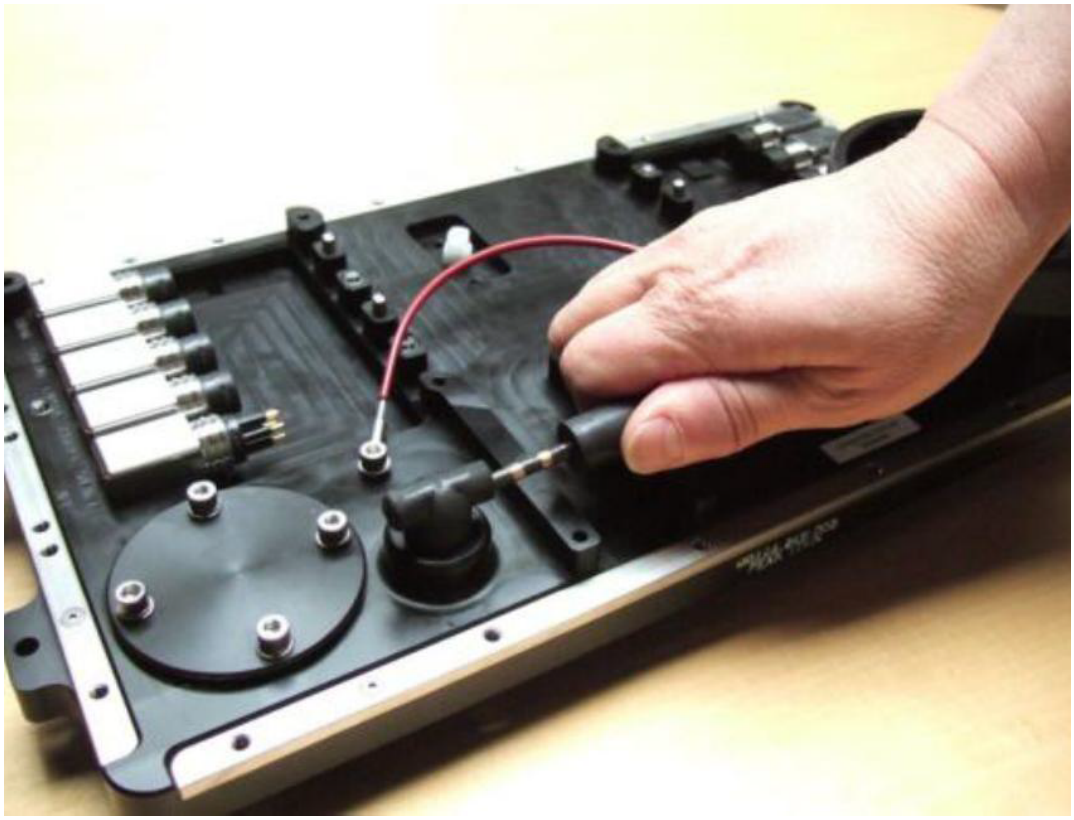
Figure 9.40. Attaching a Solar Panel Connector



The light should turn on, indicating that the electronics have been powered-up.

If you have the Revised C&C drybox, start power by inserting the power key on the top of the drybox, as shown in Figure 9.41. There is no need to connect a solar panel.

Figure 9.41. Inserting the Power Key

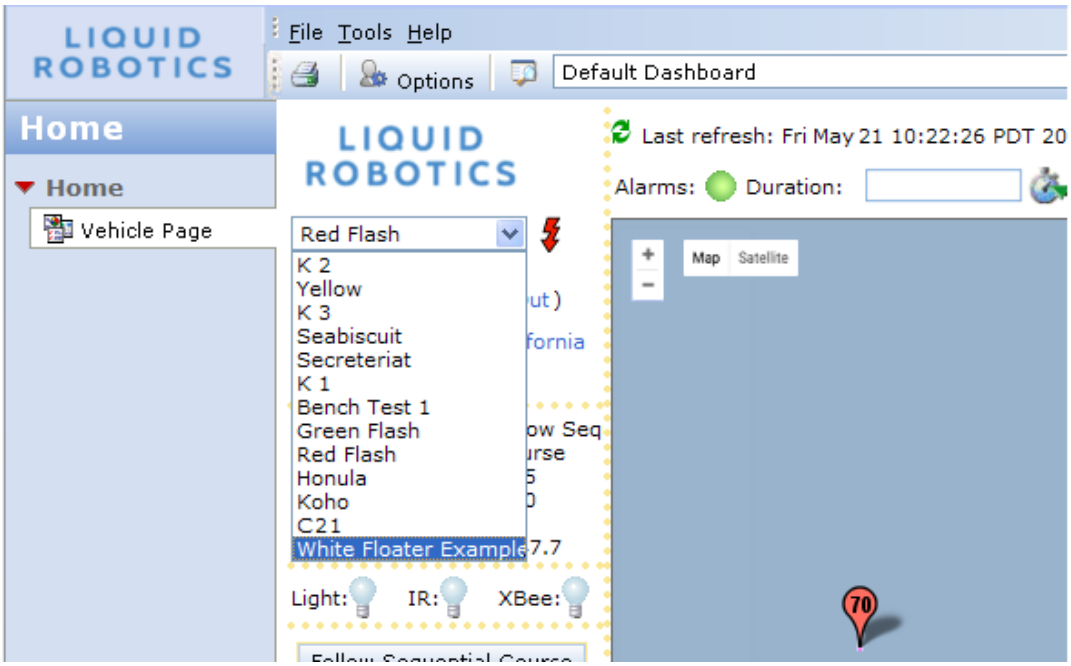


Getting Part Info Data

When Vehicle powers on, it will start transmitting telemetry records and respond to commands. The following action is needed to complete the Part Info tree:

1. Select the name of new Vehicle in the select box, as shown in Figure 9.42:

Figure 9.42. Vehicle Name Select

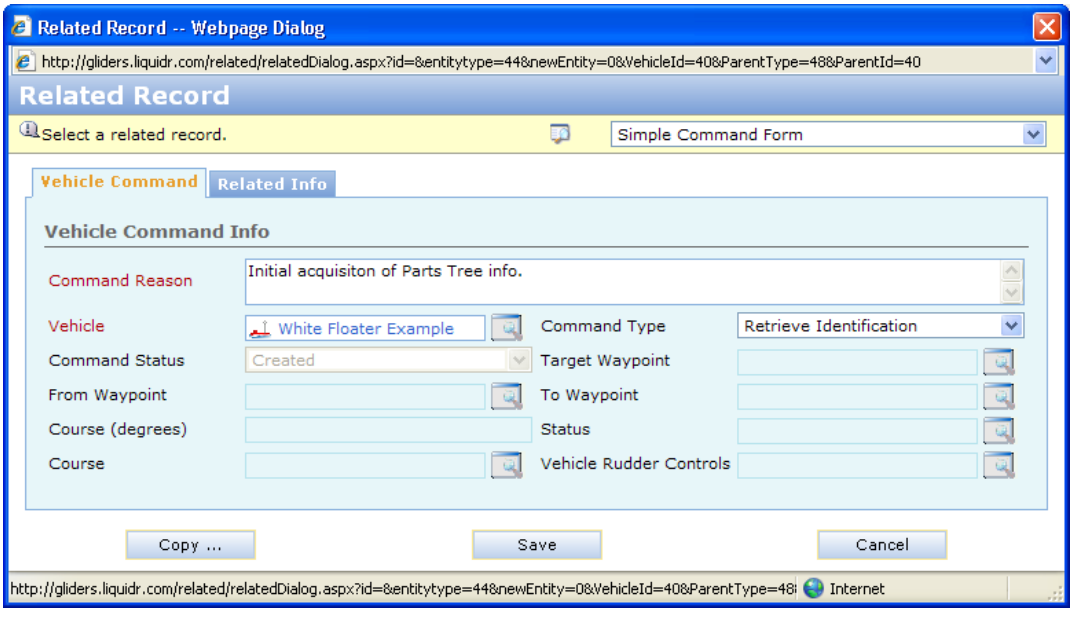


2. Next, click the **More Commands...** link below the other **Command** buttons. This should bring up the **Vehicle Command** dialog.

3. In the **Command Type** box, select the **Retrieve Identification** command (Figure 9.43). Enter an appropriate comment in the **Command Reason** box.

4. Send the command to the Vehicle by clicking the **Save** button at the bottom.

Figure 9.43. Retrieve Identification Command Dialog

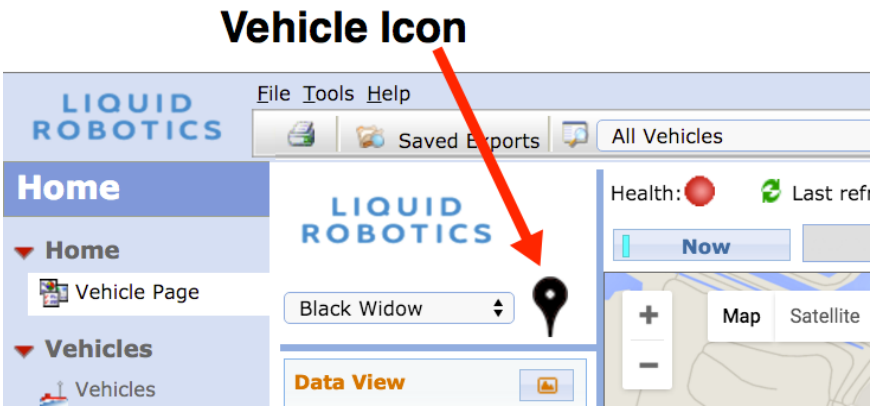


5. Monitor the Telemetry List on the Dashboard. Wait for the command to be ACK'ed by the Vehicle. Note that you will have to refresh the screen to see the telemetry updates.

> **Note**
>
> The default telemetry transmission interval is 2 minutes. However, the interval could be set to a longer time.

6. Single-click on the icon to the right of **Vehicle** name in the WGMS Dashboard, shown below (Figure 9.44).

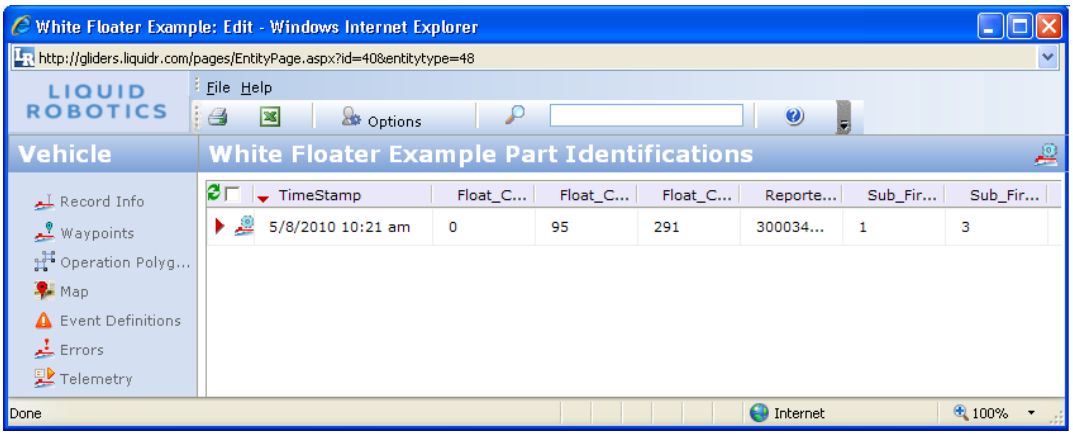
Figure 9.44. Vehicle Icon



This should bring up the **Vehicle Data** window.

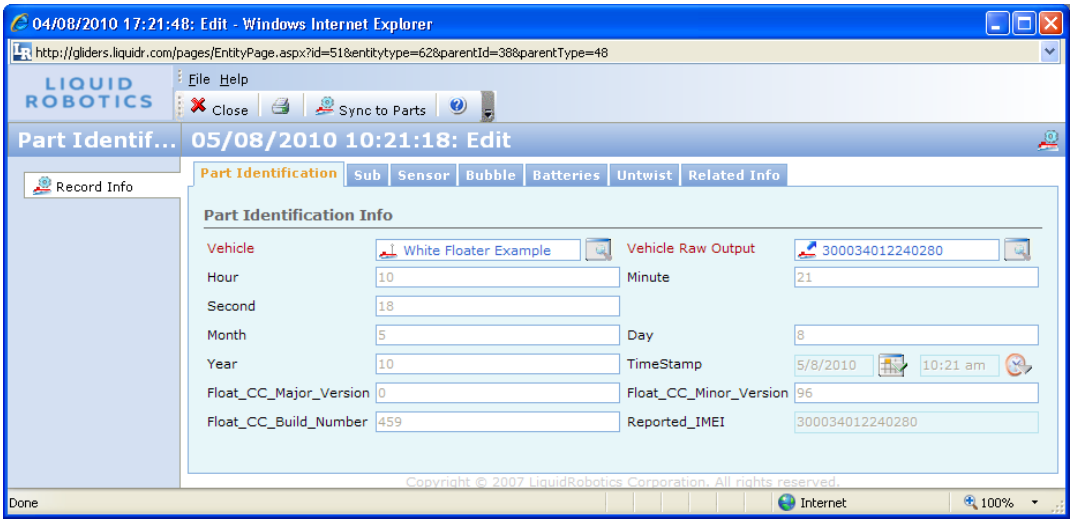
7. Click on the **Part Identification** tab on the left. This should bring up the Part Identifications data received from the Vehicle, similar to Figure 9.45:

Figure 9.45. Received Part Identification



8. Double-click on the time stamp in the line to open the **Part Identification Edit** form. It should appear similar to Figure 9.46:

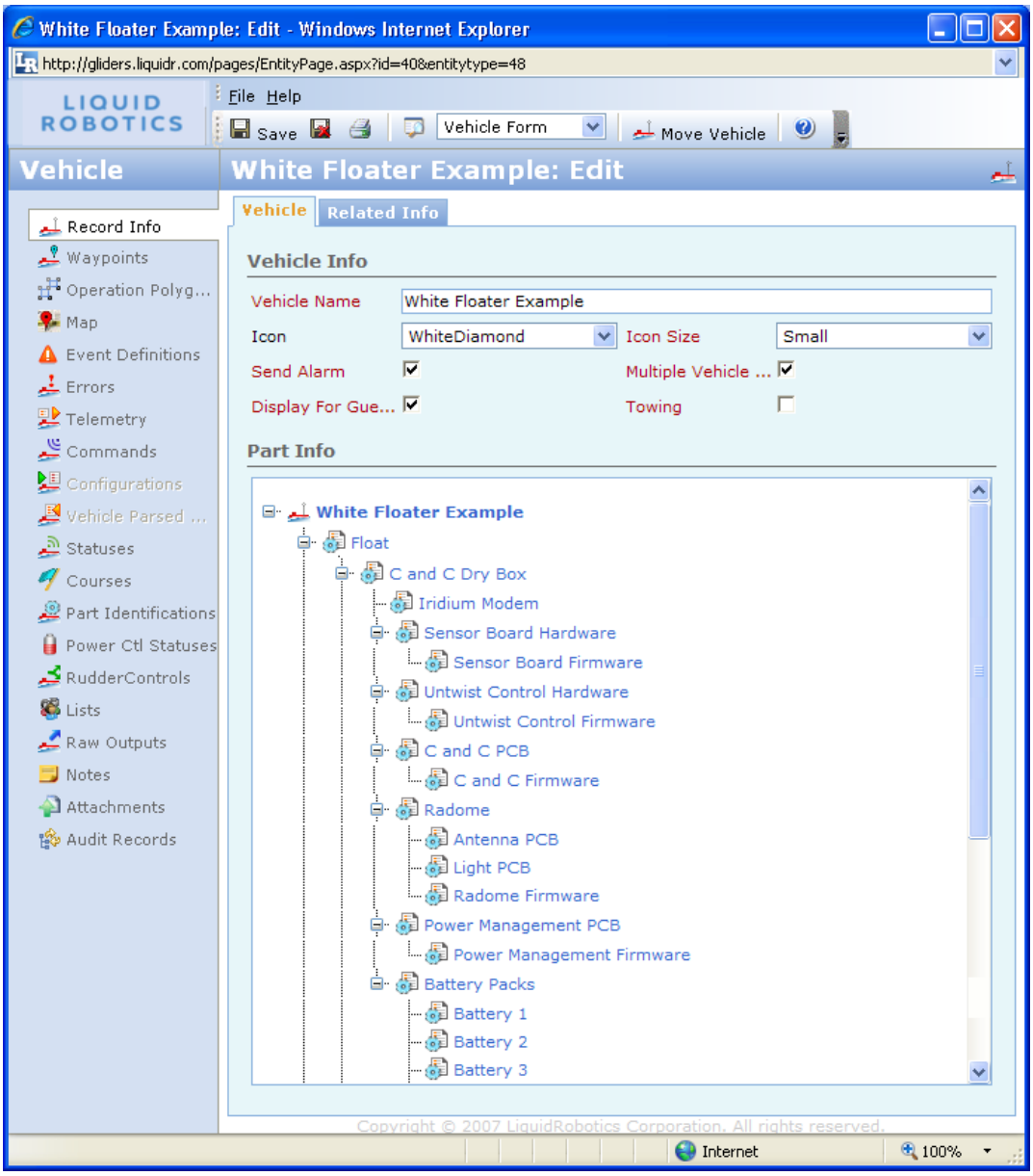
Figure 9.46. Part Identification Edit Dialog



9. Click on the **Sync to Parts** text or icon near the top of the form. You should receive a message from the system that it synchronized the parts successfully.

10. Click on the **Record Info** tab of the **Vehicle Data** window. This should now display the completed Part Info tree, showing all data for Vehicle parts (Figure 9.47).

Figure 9.47. Completed Part Info Data Tree



Note

Be sure to power-off the Vehicle once the data has been transferred.

Adding Serial Numbers (SV2 Only)

Now that the complete Part Info tree has been created, the part serial numbers for your new Vehicle can be entered. This is optional, but recommended. **For SV3 Vehicles, the part serial numbers are completed automatically when you power on the Vehicle and the CCU completes its boot sequence.**

Numbers can be entered for the:

- Float
- Sub
- Umbilical

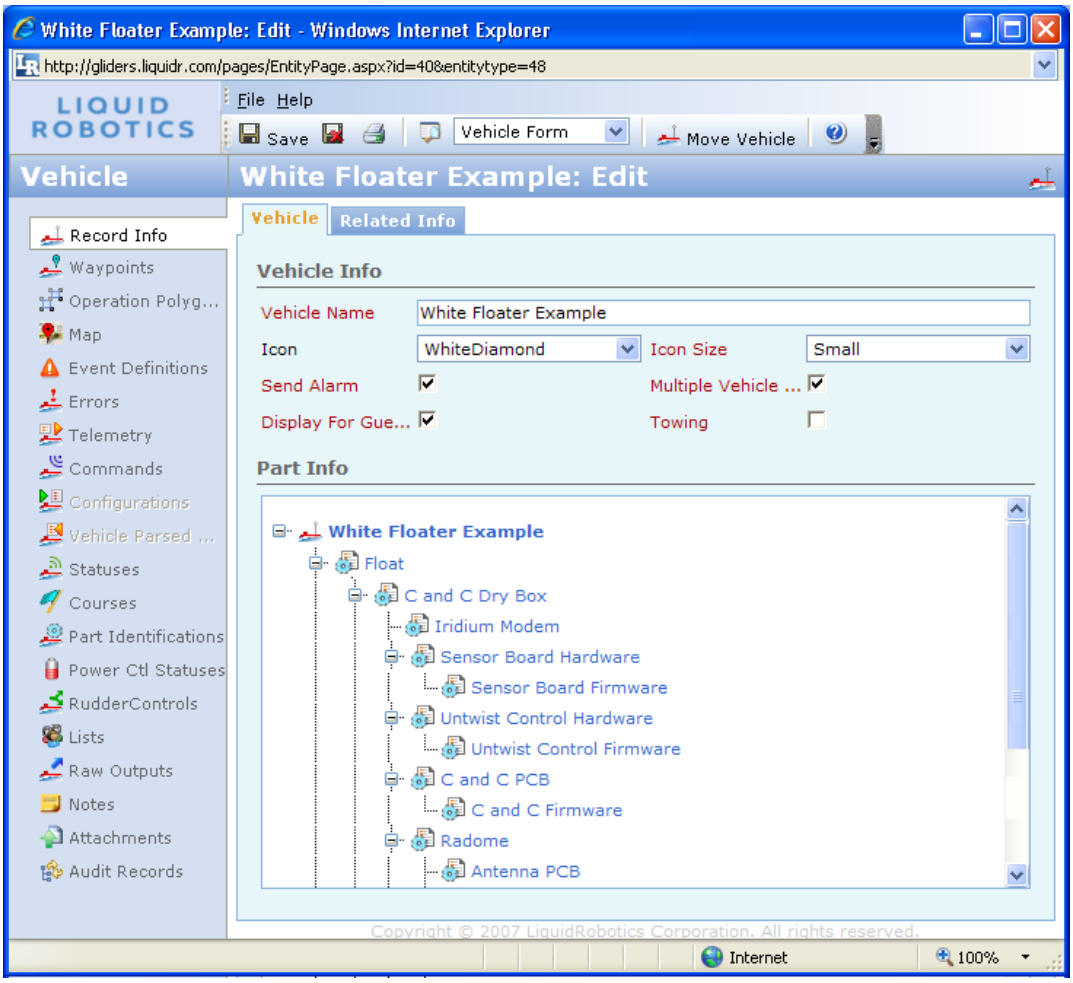
Each serial number should be listed in the Packing Slip, or on the part itself.

Setting the Float Serial Number

Add the Float Serial Number as follows:

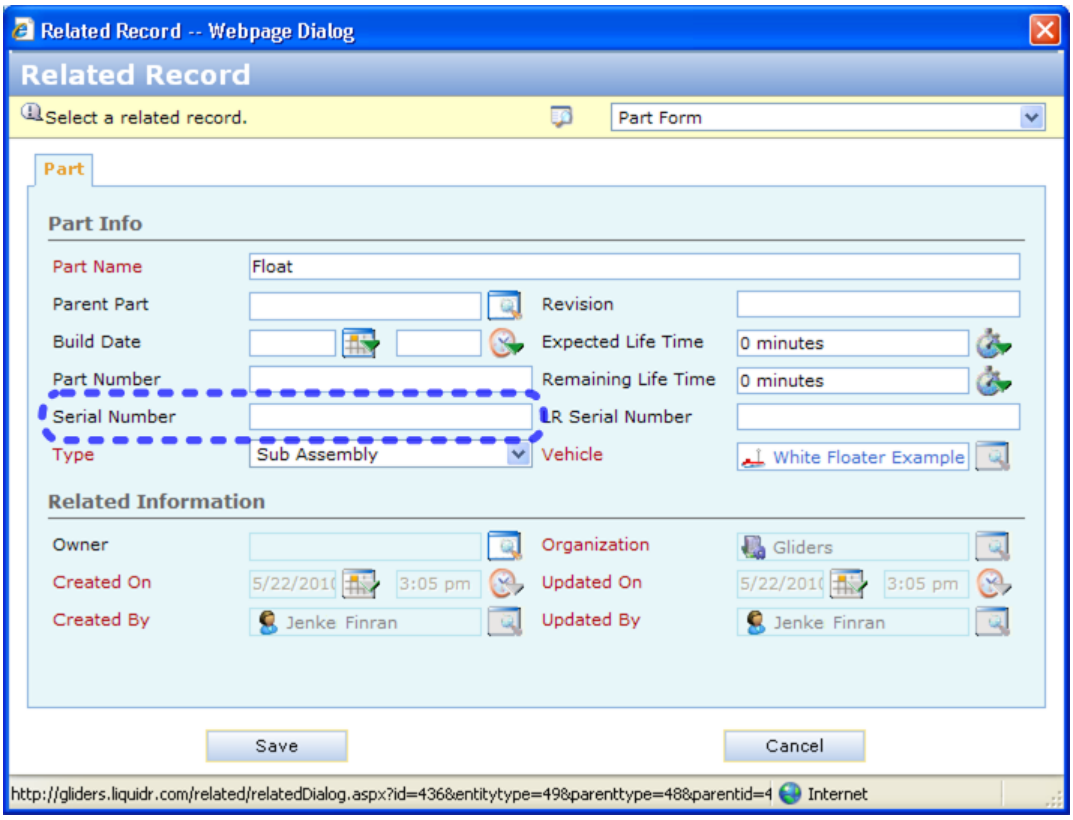
1. Click on the Vehicle Icon on the **Dashboard** page to bring up the **Vehicle Edit** box (Figure 9.48).

Figure 9.48. Vehicle Edit with Part Info



2. In the **Part Info** box, single-click on "Float" to call up the Float Info dialog (Figure 9.49).

Figure 9.49. Float Part Info Dialog



3. Enter the Float serial number in the left-side box labeled **Serial Number**. (Do not enter data in the **LR Serial Number** box).

4. Click the **Save** button, bottom left, to save the value and close the dialog box.

Setting Remaining Serial Numbers

Using the same procedure described in " Setting the Float Serial Number " (page 276), you can set the serial numbers for the Sub and the Umbilical.

Complete Vehicle Provisioning

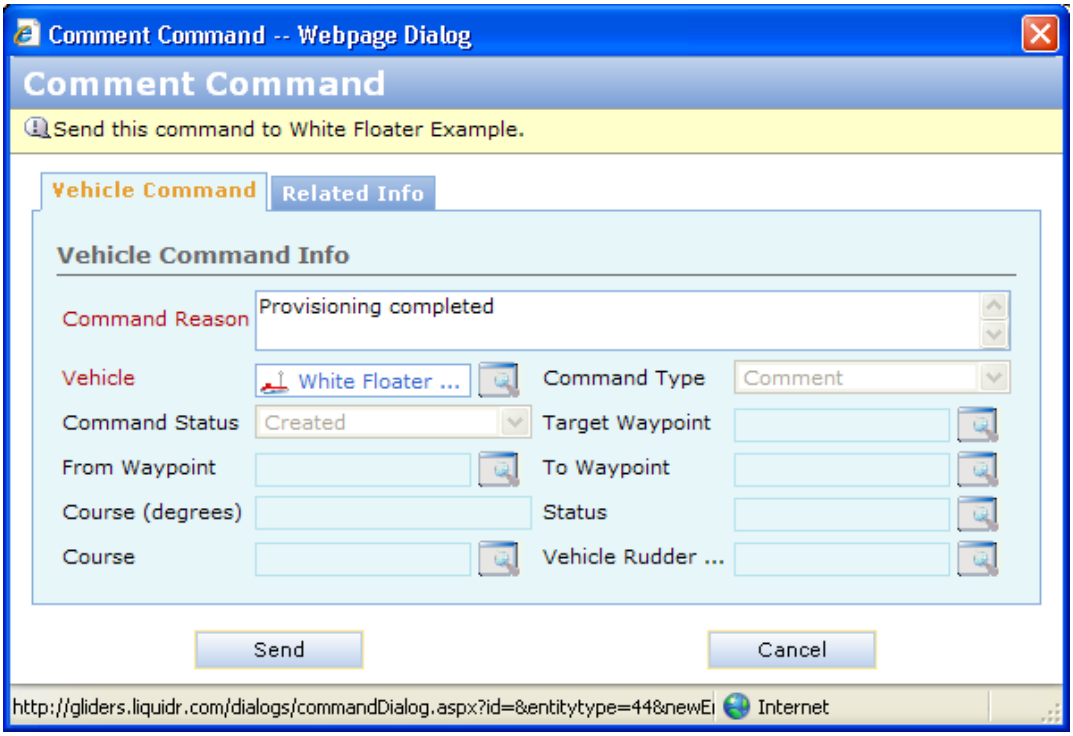
To complete the Vehicle provisioning process, enter a comment stating that the new Vehicle has been provisioned. Doing this is optional, but recommended.

Commenting On Provisioning

1. Click on the **Comment** command button on the **Dashboard** page to open the dialog box for entering a comment (Figure 9.50).

2. In the **Command Reason** box, enter a comment indicating that initial provisioning of the new Vehicle has been completed.

Figure 9.50. Provisioning Completed Comment



3. Click the **Send** button.

The software will record the comment, along with your name and a timestamp, in the WGMS database. This completes the initial provisioning process for the Vehicle.

Chapter 10. Troubleshooting

Typically troubleshooting involves addressing problems that may occur when the Vehicle is being tested prior to launch, or when responding to alarms when the Vehicle is on a Mission.

Troubleshooting a WGMS Installation

This section describes various WGMS installation problem scenarios and suggested responses. There is also information on interpreting the Packet Reflector log and Com Server log error messages.

I don't see any Vehicles when I start the WGMS

The Vehicles tab on the Home page is empty	
Possible Causes	**Actions**
If not LRI-Hosted, when WGMS is initially installed, there are no Vehicles.	Enter the Vehicles and data.
If LRI-Hosted, someone inadvertently deleted all the Vehicles in the list.	Re-enter the Vehicle data.

There is no response from the Vehicle

On start-up, there is no response from the Vehicle	
Possible Causes	**Actions**
There is no Internet connection.	Verify the Internet connection.
Vehicle is not powered On.	On shore: Check Vehicle Power. Off shore: Attempt to contact using XBee (SV2 Only).
Relay not configured correctly.	Check connections to Relay hardware.
The Iridium modem was deleted from the parts table.	Check that the Iridium modem is listed in the Parts List.
The wrong IMEI was entered for the Vehicle.	Check the IMEI number in the Parts List against the Vehicle delivery documents.
The Packet Reflector/COM Server is not running	Check Packet Reflector and Com Server Dialog windows.
The Address and/or Port values are incorrect.	Check the Address and Port values. Check Com Server for log for error messages.
The WGMS Unique ID number is not the same as the predefined Vehicle Unique ID number.	Check the Unique IDs as follows: 1. Open a debug window on the Relay 2. Get the WGMS Unique ID 3. Open the WGMS Vehicle form 4. Click on “Unique ID Part” to get the ID

On start-up, there is no response from the Vehicle	
Possible Causes	**Actions**
	5. If the IDs do not match, follow the procedure described in “Viewing Vehicle Parts Information” (page 178)

Commands are not being ACKed/NAKed

Receiving Telemetry, but no response to Commands	
Possible Causes	**Actions**
Vehicle is powered off.	Verify that power is on.
Relay is not configured correctly.	Check connections to Relay hardware.
There is no Internet connection.	Verify the Internet connection.
The Iridium modem was deleted from the parts table.	Check that the Iridium modem is listed in the Parts List.
The wrong IMEI was entered for the Vehicle.	Check the IMEI number in the Parts List against the Vehicle delivery documents.
The Packet Reflector or COM Server is not running.	Check the buttons and click if necessary.
The Address and/or Port values are incorrect.	Check the Address and Port values.
Command Timer Box not checked.	Check “Enable Command Timer” box.

A Vehicle no longer responds to WGMS commands

Vehicle was operating correctly, then stopped responding to commands	
Possible Causes	**Actions**
Lost Internet connection.	Verify the Internet connection.
Temporary Iridium communications loss.	Wait 10 to 15 minutes to confirm that Iridium loss is not temporary.
Batteries fully discharged.	Check the last telemetry battery level. Check for any previous System alarms.
Vehicle electronics malfunction.	If close to the Vehicle, try communicating via XBee (SV2 Only). Check for any previous System alarms.
If still receiving telemetry, Vehicle mechanical failure.	If close to the Vehicle, try communicating via XBee (SV2 Only). Notify Mission Operator to prepare for recovery.
Com Server Fatal Error.	Check Com Server Log for error messages. Restart Com Server.
Packet Reflector Fatal Error.	Check Packet Reflector Log for errors. Restart Packet Reflector.

Map is not being displayed in the WGMS Dashboard

The Google map is not being displayed on the Dashboard page	
Possible Causes	**Actions**
No Internet connection – Error Message.	Verify the Internet connection
API Key not specified.	Enter the API key
Wrong API key – Error Message.	Check/update the API key. A pop-up message should advise you on what to do.
No check in the “Display Google Maps” checkbox.	Check the maps checkbox

XBee doesn't seem to be working (SV2 Only)

Cannot communicate via the XBee connection	
Possible Causes	**Actions**
XBee startup can take up to 1 minute.	Wait at least 1 minute after startup before sending commands.
XBee reception is turned off on Vehicle.	Turn on XBee via Iridium.
Vehicle is too far away.	Move within 100 meters of Vehicle.
Wrong XBee IP address on the Packet Reflector	Check Packet Reflector IP address.
Wrong IP address for your computer.	Check computer IP address.
Wrong PAN ID number.	Check XBee PAN ID.
Multiple XBee connections with same PAN ID.	Go through one Relay to avoid problem.

I'm not getting Iridium messages

Communications with XBee works, but not through Iridium	
Possible Causes	**Actions**
Lost Internet connection.	Check Internet connection.
Temporary Iridium communications loss.	Wait 10 minutes to verify. These outages can sometimes last up to an hour.
Packet Reflector configuration set to wrong IP address or port number.	Re-check IP address and port number. If “correct” values are set, contact your VAR to verify the IP address and/or port number.
Packet Reflector/COM server not running.	Check the buttons and click if necessary.
System was configured for Mobile WGMS	Confirm that the Wave Glider modem is configured for DirectIP.

Mobile WGMS is not working

Cannot establish Iridium Mobile WGMS communications	
Possible Causes	**Actions**
Iridium signal is blocked.	If indoors, move outdoors with a clear view of the sky.

Cannot establish Iridium Mobile WGMS communications	
Possible Causes	**Actions**
Temporary Iridium communications loss.	Wait 10 minutes to verify. These outages can sometimes last up to an hour.
System was not configured for Mobile WGMS.	Confirm that the Wave Glider modem is configured for ISU-to-ISU.
Incorrect Packet Reflector configuration.	Check the Packet Reflector IP addresses and port numbers.
Incorrect Virtual Relay Server configuration.	Check the Virtual Relay Server address and port values.

I changed and then lost the Administrator's password

Cannot remember or find the Administrator’s password	
Host	**Actions**
Hosted by LRI.	Contact LRI to reset the password.

Troubleshooting C&C Initiated Alarms

Alarms detected by the C&C are sent as telemetry data. They are displayed on the WGMS Dashboard and accessed by clicking on the Alarms icon.

A summary of the C&C alarms is given below. More complete descriptions and responses are given in the sections referenced.

Table 10.1. C&C-Initiated Alarms

Alarm Type	Description	Ref.
Sub Leak Alarm	Water leak detected in Rudder Module.	“ Sub Leak Alarm ” (page 284)
Float Leak Alarm	Water leak detected in the C&C Drybox.	“ Float Leak Alarm ” (page 284)
Sub-to-Float Comm Error	C&C computer detected a datacomm error from the Rudder Module computer.	“ Sub-to-Float Comm Error ” (page 285)
Payload Alarm	Communications problem between the C&C computer and a payload.	“ Payload Alarm ” (page 285)
Float Battery Low	C&C battery level is below the defined "Low Battery Power" value.	“ Float Battery Low ” (page 285)
Umbilical Fault	Umbilical integrity problem detected.	“ Umbilical Fault ” (page 285)
GPS Not Functioning	Vehicle has not received a valid GPS fix within a specified time.	“ GPS Not Functioning ” (page 286)
Sub Reboot Alarm	An automatic re-boot occurred on the Rudder Module computer.	“ Sub Reboot Alarm” (page 286)

Alarm Type	Description	Ref.
Float-to-Sub Comm Error	Rudder Module computer detected a datacomm error from the C&C computer.	“ Float-to-Sub Comm Error ” (page 286)
Float Temperature Exceeded	Temperature in the C&C Drybox is above the "Float Temperature Threshold".	“ Float Temperature Exceeded ” (page 286)
Float Pressure Outside Range	Pressure in the C&C Drybox is outside the "Float Pressure Threshold" values.	“ Float Pressure Outside Range ” (page 287)
EEPROM Error	Error uploading data from EEPROM to Flash during re-boot.	Figure 9.38
Float Reboot Alarm	An automatic re-boot occurred on the C&C computer.	“ Float Reboot Alarm ” (page 287)

Troubleshooting WGMS Initiated Alarms

Some SV2 style alarms are initiated by the WGMS software:

Table 10.2. WGMS SV2 Software Alarms

Software Alarm	Explanation	Ref.
Report Timeout	No telemetry was received for 25 minutes	“ Report Timeout ” (page 288)
Link Error	Error in Iridium data packet	“ Link Error ” (page 288)
Invalid GPS	GPS time-stamp or coordinates are all zeros	“ Invalid GPS ” (page 288)
Empty Record	Iridium packet from Vehicle contains no data	“ Empty Record ” (page 288)
Checksum Error	Data packet checksum is not correct	“ Checksum Error ” (page 289)
Out of Bounds	Outside/Inside of Operation Polygon	“ Out of Bounds ” (page 289)

Note

There are also SV3-only alarms initiated by Regulus. Contact the Liquid Robotics Support Organization for more information.

General Alarm Response

Generally, the first response to any alarm is to check other sensors to both verify the problem, and determine the cause of the alarm.

Vehicle retrieval is sometimes the best option, but in certain cases, it's acceptable to monitor the telemetry to see if the alarm has any detrimental effect on Vehicle performance.

Intermittent Alarms

Alarms on the Wave Glider are not self-resetting; an alarm will continue until the triggering problem has been fixed. Occasionally, an alarm may be caused by a temporary electrical or communications glitch. Thus, if an alarm shows only on a single telemetry transmission, it is probably not cause for concern. Obviously, if the same alarm shows up relatively often, some action needs to be taken.

Multiple Alarms

Often, one problem on the Vehicle will trigger more than one alarm. In this case, correlating the alarms and their meanings can be a useful diagnostic tool. For example, a "Low Float Pressure" alarm by itself may not be an issue, but if there is also a "Float Leak" alarm, there probably is a problem.

XBee Communication (SV2 Only)

It can be helpful to have XBee available. This gives you an alternate method of communication for troubleshooting, though it does require close proximity to the Vehicle.

XBee also allows re-booting of the system without System Administrator (“Admin”) privileges. However, re-booting the system is generally a solution of last resort. Re-booting may temporarily reset the alarm, but not address the root cause.

Contacting Liquid Robotics

If you've tried the solutions suggested below, and the problem persists, see “Contacting Liquid Robotics” (page 291).

C&C Alarm Responses

Responses to the C&C alarms are described below. The responses generally assume that the Vehicle is operational in the water.

Responses to the Shore alarms are given in “ Shore Alarm Responses ” (page 288).

Sub Leak Alarm

A water leak was detected in the Rudder Module. Salt water in the Rudder Module can damage or short out the rudder-control electronics and result in failure of the Vehicle steering mechanism.

Responses:

1. Check for a Float-Sub comm error alarm. If there is, immediately initiate Vehicle retrieval.

2. If no other alarms, monitor. If the alarm continues for more than one hour, initiate Vehicle retrieval.

Float Leak Alarm

A water leak was detected in the C&C Dry Box. Salt water in the C&C can short out the batteries and eventually result in failure of the communications electronics. Telemetry failure can make locating the Vehicle difficult.

Responses:

1. Check the Float C&C pressure. If the pressure is OK, monitor. If the pressure is low, immediately initiate Vehicle retrieval
2. Check for a change in the battery storage capacity. If it is decreasing rapidly (especially in daytime), initiate Vehicle retrieval.

Sub-to-Float Comm Error

The C&C computer detected a datacomm transmission error from the Sub's rudder controller. Unless the problem is persistent, it is probably not critical.

Responses:

1. Monitor. If the alarm continues for more than 10 minutes, command the Vehicle to make a 90° turn and check telemetry to verify a correct response.
2. If no response to the 90° turn (or an incorrect response), try again. If still no response, prepare for Vehicle retrieval.

Payload Alarm

Indicates a general problem with a payload. Possibly a data transmission error between the C&C and one (or both) of the Payloads. It also may be an electrical or environmental issue.

Responses:

1. Check if a payload is supposed to be transmitting data, but is not.
2. If a payload is transmitting data, check the data for correctness.
3. Check the Payload currents on the Power Controller Status.

Float Battery Low

C&C battery capacity level is below the specified "Low Battery Power" value. This could be the result of several days' operation with limited sunlight, failure of a solar panel, or high current draw from a payload. This condition will trigger a longer telemetry interval in order to conserve power.

Responses:

1. Check the solar panel outputs.
2. Turn off power to the payloads and check if the alarm stops.
3. Check the present and previous battery energy values in the telemetry data.
4. Turn off lights, center the rudder and check if the alarm stops.
5. If no solution, prepare for Vehicle retrieval.

Umbilical Fault

The C&C continually checks the current in the Umbilical wires. This alarm indicates either a broken conductor or possibly a damaged (or broken) Umbilical.

Responses:

1. Check the course on the telemetry to verify that the Umbilical has not broken.
2. Check telemetry for an abnormal slowdown in Vehicle speed.
3. Command the Vehicle to make a 90° turn and use telemetry to verify a correct response.
4. Check for a Float-Sub communications alarm.
5. If poor directional control or other alarm, prepare for Vehicle retrieval.

GPS Not Functioning

The Vehicle has not received a valid GPS fix for two minutes. The GPS signal can be lost for several minutes, but longer outages usually indicate a problem with the Vehicle. There may be an electronics failure, or possibly something is blocking the antenna.

Responses:

1. For SV2 Vehicles, cycling the "Bubble Power" in the paramete settings often fixes this issue.
2. If telemetry stops after receiving the alarm, initiate immediate retrieval.
3. If the telemetry is OK, check to see how long the problem has been going on.
4. Check the battery voltage levels.
5. If the problem persists for more than 20 minutes, prepare for retrieval.

Sub Reboot Alarm

An error occurred in the Rudder Module computer, causing a re-boot. If this happens only once, it may not be a problem. However, if it occurs often (or continuously), it's probably serious.

Responses:

1. Turn the Vehicle 90° and monitor the course. Then turn the Vehicle back 90° onto the original course.
2. If no response (or an incorrect response) to the maneuvers, prepare for Vehicle retrieval.

Float-to-Sub Comm Error

The Sub rudder-control computer detected a datacomm transmission error from the C&C computer. Unless the problem is persistent, it is probably not critical.

Responses:

1. Monitor. If alarm continues for more than 10 minutes, command Vehicle to make a 90° turn and check telemetry to verify a correct response.
2. If no response to the 90° turn (or an incorrect response) prepare for Vehicle retrieval.

Float Temperature Exceeded

The temperature in the C&C Drybox is above the "Float Temperature Threshold". This may be caused by high outdoor temperatures and direct sunlight, especially if the Turtledeck has become detached. At

night, or if the outside temperature is moderate, the alarm may indicate either an electronics error or a battery problem.

Responses:

1. If the Vehicle is not in water, shade the C&C box from direct sunlight.
2. If on water during the day, power down as much as possible and monitor.
3. Check for rapid drop in battery capacity.
4. If the float pressure is high and rising, initiate retrieval.
5. Monitor. If the temperature alarm persists, prepare for retrieval.

Float Pressure Outside Range

The pressure in the C&C Drybox is above or below the "Float Pressure Threshold" values. It is most likely that the pressure has gone below the minimum pressure value. If it goes above the pressure limit, check the float temperature alarm.

Responses:

1. Check the Float pressure value.
2. If the pressure value is within the OK range, re-boot and see if the alarm goes off again.
3. If the pressure value is too low, monitor for a Float leak alarm.
4. If low pressure or a Float leak alarm, initiate Vehicle retrieval.

EPROM Error

During the initial power-up booting, the system transfers data from EEPROM to Flash memory, using error checking. This alarm is activated if there is an error in the data transfer.

Responses:

1. Try re-booting. If the error occurs again, contact LRI.

Float Reboot Alarm

A serious error occurred on the C&C computer, causing a re-boot. This can happen occasionally due to a temporary electrical glitch. If it occurs repeatedly, there is a serious problem.

Responses:

1. Turn the Vehicle 90° and monitor the course. Then turn the Vehicle back 90° onto the original course.
2. If no response (or an incorrect response) to the maneuvers, prepare for Vehicle retrieval.

Note

After a Float Reboot, the IR light will be OFF, and the visible light will be ON in a low-power-consumption mode. The Shore-side software will attempt to restore the light to the

state that it was in prior to the re-boot. This will result in a Vehicle ACK of the light ON/OFF command.

Shore Alarm Responses

The Shore alarms are generated by the software not the C&C computer. Often, this occurs when there is an error in the telemetry data.

Report Timeout

No telemetry has been received from the Vehicle for 25 minutes.

Responses:

1. Waiting up to an hour often reveals if it is an iridium connection issue.
2. Check previous telemetry for alarms or other anomalies.
3. Check the last-transmitted battery power level. If it is low, the C&C computer may have reverted to a longer (lower-power) telemetry interval.
4. If battery power is low, consider Vehicle retrieval.

Link Error

Each Iridium message contains a descriptive header followed by a data packet. This alarm indicates that the Iridium message header has flagged an error in the data packet.

Responses:

1. Check previous and subsequent telemetry for errors.
2. Monitor. If the alarm persists, consider Vehicle recovery.

Invalid GPS

The GPS time-stamp is received from the satellites. The coordinates are computed aboard the Vehicle. This alarm is generated if either the time-stamp is zero, or the coordinates compute to zero.

Responses:

1. Check previous telemetry for possible position errors.
2. Monitor. If the alarm persists, consider Vehicle retrieval.

Empty Record

The Iridium message from the Vehicle consists of a header followed by a data packet. This alarm indicates that the data packet is empty.

Responses:

1. Monitor to check if this is a sporadic event, or a constant occurrence.
2. If the error occurs consistently, plan on Vehicle retrieval.

Checksum Error

Each Iridium data packet contains an error-checking checksum. This alarm indicates that the data has been corrupted. This may be a one-time communications glitch, or it may indicate a problem with the Vehicle computer or antenna.

Responses:

1. Monitor to check if this is a sporadic event, or a constant occurrence.
2. If error occurs consistently, plan on Vehicle retrieval.

Out of Bounds

The Vehicle has moved outside its Operation Polygon. Or else it has entered an Exclusionary Polygon. This alarm can be triggered by a one-time data transmission error.

Responses:

1. Check the telemetry crumbs on the Dashboard Position Map.
2. Check the Vehicle's Waypoints and commanded course to verify that it was not deliberately sent to its current position.
3. If off-course, issue a heading command that will take the Vehicle back into bounds.
4. Monitor. If the Vehicle does not respond to the heading command, initiate retrieval.

Other Vehicle Problems and Actions

The responses below generally assume that the Vehicle is on-shore during testing or pre-launch.

No XBee Connection (SV2 Only)

The XBee should power up when the Vehicle electronics are first turned on, or when the system is re-booted.

Responses:

1. Move closer to the Vehicle. When initiating contact, the range should be under 20 meters.
2. Verify that the serial port speed is set to 115,200 bps on the computer terminal software.
3. Verify that the PAN ID has been set correctly.
4. Check that the dongle for the XBee is fully plugged into the computer.
5. Turn on the XBee connection using the Dashboard Iridium link.

No Iridium Connection

The Iridium connection is initiated by the Vehicle at the Telemetry intervals. The interval can be set for an especially long time (as much as 24 hours). Also, if the batteries are low, the Vehicle may revert to the "Low Battery" telemetry rate, which is typically longer than the standard rate (to conserve battery power).

Responses:

1. Check that the correct Vehicle is selected on the Dashboard.
2. Refresh the Dashboard page.
3. Use the Dashboard to check the strength of the last-sent Telemetry data. The column "ISS" indicates the Iridium Signal Strength, from 0 to 5. Level zero indicates no signal.
4. Use XBee (SV2 Only) to get the IMEI and verify that it is the correct one for the Vehicle.

LED Light Won't Turn ON/OFF

The visible LED lights turn ON whenever the system is powered-up. If it fails to do this, there is probably an electrical failure in the C&C box, requiring repair. If the light was ON at power-up, but fails to turn OFF, or if it won't go from OFF to ON, then it's probably a software or communications issue.

Responses:

1. Check that other commands (e.g., rudder position) work.
2. If using XBee (SV2 Only), try using the Dashboard.
3. If using the Dashboard, try using XBee (SV2 Only).

IR Light Won't Turn On/OFF

The IR light is not visible, even in a dark room. Typically, it can be seen on the view screen of a digital camera. It can also be checked using an IR "Viewing Card".

If it's verified that the light is not turning on, try the responses described in “ LED Light Won't Turn ON/OFF ” (page 290).

No Float Payload Power

When the system is powered up (or re-booted), power to the payloads is turned off. The payload power needs to be explicitly turned on.

Also, the maximum current that can be supplied to any payload is limited to one Amp. Any attempt to use more current will result in power to that payload being shut off.

Responses:

1. Check that the payload is connected to the correct connector on the C&C Drybox.
2. Check the connectors on C&C and Payload Dryboxes.
3. Check for an over-current alarm.
4. Check the power status for low batteries.

No Sub Payload Power From C&C

As with the Float payloads, Sub payload power is off when the Vehicle power is turned on. Also the maximum current that can be supplied to both the Rudder motor and Sub payload combined is one Amp.

Responses:

1. Verify that rudder can move. If not, check both the Float and Rudder Module Umbilical connectors. Also check the Umbilical for cracks or tears.
2. Check for an over-current alarm.
3. Check the power status for low batteries.
4. Disconnect the Sub payload power cable from the Rudder Module, then re-connect.

Float Continuously Reboots

This indicates a serious electronics problem. Contact LRI.

Sub Continuously Reboots

This indicates a serious electronics problem. Contact LRI.

Contacting Liquid Robotics

If you need assistance, contact Liquid Robotics Customer Support.

Important

Before contacting Liquid Robotics Customer Support, please have the following information available for the Vehicle(s) you are contacting Customer Support about:

- Wave Glider Model Number
- Wave Glider Serial Number
- Any special or added payloads on the Vehicle.
- Time/Date when problem occurred.
- Location of Vehicle when problem occurred.
- Initial indication of problem.
- Any other indications or unusual readings.
- Attempts at corrective actions and their results.

The Liquid Robotics Customer Support organization is available 24/7.

Telephone:

(US) 888-574-4574

(International) 1-408-636-4205

Email:

support@liquid-robotics.com

Appendix A. Solar Flux

Below is a chart of the average daily solar flux (Watts/Meter2) for each month at various locations. The primary point of this chart is to show how much the flux can vary for different times of the year.

The numbers indicate Watt-hours per day.

		Puako HI	San Diego CA	Seattle WA	Nome AK	Puntas Arenas CHL
Latitude		**N 20°**	**N 32°**	**N 48°**	**N 64°**	**S 53°**
	Jan	378	288	90	90	549
	Feb	423	360	162	54	423
	Mar	477	450	261	180	288
	Apr	513	540	360	333	162
	May	522	576	441	441	81
Month	Jun	522	585	504	522	54
	Jul	531	594	522	468	72
	Aug	540	558	459	324	135
	Sep	504	486	351	198	252
	Oct	441	387	207	90	405
	Nov	387	315	108	27	531
	Dec	360	261	81	9	567
	Min	360	261	81	9	54
	Max	540	594	522	522	567

Appendix B. Roles and Permissions

Roles and permissions are shown in the table below. In the table, the "C-R-U-D" codes indicate the following permissions:

- **C – Create** User can add a new entity.
- **R – Read** User can access information about an entity.
- **U – Update** User can update a previously created entity.
- **D – Delete** User can delete an entity.

Permission Type	Guest User	Data Analyst	Master	Admin	Root	Description
Area Permissions						
Home Pages	• R • •	• R • •	• R • •	• R • •	C R U D	Grids and top levels of the main window.
System Alarms	• R • •	• R • •	• R U •	• R U •	C R U D	Information for alarm escalation
Records	• • • •	• • • •	• R • •	• R U •	C R U D	Top-level metadata records. (outputs, vehicles, permissions)
Lists	• • • •	• R • •	C R U D	C R U D	C R U D	Escalation lists, user groups (future)
Dashboard Pages	• R • •	• R • •	• R • •	• R • •	C R U D	Allows user to edit dashboard pages.
List Items	• • • •	• R • •	C R U D	C R U D	C R U D	Items in a list
Report	• • • •	C R U D	C R U D	C R U D	C R U D	Data reports
Users, Roles Permissions						
Users	• • • •	• R U •	• R U •	C R U D	C R U D	User data
Organizations	• • • •	• R • •	• R • •	• R U •	C R U D	Organization parameters
Notes	• • • •	C R U D	C R U D	C R U D	C R U D	Any entity can have a note attached (user, vehicle) (html or text)
Accounts	• • • •	• • • •	• • • •	• • • •	C R U D	For future use
Catalog Images	• • • •	• R • •	C R U D	C R U D	C R U D	Logos, images, photographs
Roles	• • • •	• • • •	• • • •	• R U •	C R U D	Editing the roles available in the system
User Roles	• • • •	• • • •	• • • •	C R U D	C R U D	Mapping between users and roles
Audit Records	• • • •	• R • •	• R • •	• R • •	C R U D	Entity change history (parts, vehicle changes)
Vendors	• • • •	• • • •	• • • •	• • • •	C R U D	For future use
Attachments	• • • •	• R • •	C R U D	C R U D	C R U D	Files attached to an entity

LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

Permission Type	Guest User	Data Analyst	Master	Admin	Root	Description
Permissions	• • • •	• • • •	• • • •	• R • •	C R U D	What permissions are allowed in the system
Role Permissions	• • • •	• • • •	• • • •	• R • •	C R U D	Mapping between roles and permissions
Work flow Events	• • • •	• • • •	• • • •	• • • •	C R U D	For future use
Inventory Items	• • • •	• • • •	• • • •	• • • •	C R U D	For future use
Record Customization						
Fields	• • • •	• R • •	• R • •	• R U •	C R U D	Metadata for each entity field (user name) (change the name of a column)
Data Views	• • • •	• • • •	• R • •	C R U D	C R U D	Metadata defining how entities are displayed (column grids) (change column in a grid)
Relationships	• • • •	• • • •	• R • •	• R • •	C R U D	Structure that tells how entities are related. (inverse of foreign keys)
Criteria	• • • •	• • • •	• R • •	C R U D	C R U D	Additional conditions on grids (filters)
Selects	• • • •	• • • •	• R U •	C R U D	C R U D	Values for fields with multiple values
Criteria Groups	• • • •	• • • •	• R • •	C R U D	C R U D	Grouping class for criteria
Payload	• • • •	• • • •	• • • •	• • • •	C R U D	Edit Payload display structures
Vehicle Permissions						
Vehicles	• • • •	• R • •	C R U D	C R U D	C R U D	Access to records on vehicles in database (Guests can see vehicles marked "visible for guest")
Commands	• • • •	• R • •	C R U •	C R U •	C R U D	Entities representing commands
Telemetry	• R • •	• R • •	• R • •	• R • •	C R U D	Data coming back from vehicles
Statuses	• • • •	• R • •	C R U •	C R U •	C R U D	Statuses coming and going from vehicle
Event Definitions	• • • •	• R • •	C R U D	C R U D	C R U D	Alarm definitions
Rudder Controls	• • • •	• R • •	• R • •	C R • •	C R U D	Parameters for Rudder Module control loop.
Parameters	• • • •	• R • •	C R U •	C R U •	C R U D	Data user can send to vehicle

LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

Permission Type	Guest User	Data Analyst	Master	Admin	Root	Description
Communication Channels	• • • •	• • • •	• • • •	• R U •	C R U D	Automatically created by relays
Parts	• R • •	• R • •	C R U D	C R U D	C R U D	Manufacturing track listing of what's on vehicle
Courses	• • • •	• R • •	C R U D	C R U D	C R U D	Vehicle routes
Part Identifications	• • • •	• R • •	• R • •	• R • •	C R U D	Vehicle-generated list of parts
Missions	• • • •	• R • •	C R U •	C R U D	C R U D	Time-delineated vehicle status that states a vehicle is in water.
Operation Polygons	• • • •	• R • •	C R U D	C R U D	C R U D	Geographical area for vehicle presence
File Notifications	• • • •	• • • •	• • • •	• • • •	C R U D	Entities used during file transfers
Errors	• • • •	• R • •	• R U •	• R U •	C R U D	Vehicle Events
Raw Outputs	• R • •	• R • •	• R • •	• R • •	C R U D	Telemetry received from the vehicle
Waypoints	• R • •	• R • •	C R U D	C R U D	C R U D	Waypoint data associated with a vehicle.
Course Waypoints	• • • •	• R • •	C R U D	C R U D	C R U D	How a course is mapped to a waypoint
Power Control Status	• • • •	• R • •	• R • •	• R • •	C R U D	Telemetry
Mission Vehicles	• • • •	• R • •	C R U •	C R U •	C R U D	Mapping between missions and vehicles
Operation Coordinates	• • • •	• R • •	C R U D	C R U D	C R U D	Coordinates of an operational polygon
Payload Data Permissions						
Payload Packets	• R • •	• R • •	• R • •	• R • •	C R U D	Generic data from the payloads
Payload Statuses	• R • •	• R • •	• R • •	• R • •	C R U D	Parsed payload packets
AISyG Locations	• R • •	• R • •	• R • •	• R • •	C R U D	AIS updates
Weather Stations	• R • •	• R • •	• R • •	• R • •	C R U D	Weather station telemetry
AISyG Statuses	• R • •	• R • •	• R • •	• R • •	C R U D	AIS updates
Weather Reports	• R • •	• R • •	• R • •	• R • •	C R U D	Weather station telemetry
AISyG Records	• R • •	• R • •	• R • •	• R • •	C R U D	AIS vehicles seen
Site Permissions						

LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

Permission Type	Guest User	Data Analyst	Master	Admin	Root	Description
Site Areas	• • • •	• • • •	• • • •	• • • •	C R U D	Allows different orgs to change page structure (home, vehicles…)
Site Groups	• • • •	• • • •	• • • •	• • • •	C R U D	Groups of items (Vehicles, Payload data)
Site Items	• • • •	• • • •	• • • •	• • • •	C R U D	Items that appear within a group
Custom Entity						
Added Records	• • • •	• • • •	• • • •	• • • •	C R U D	Ability to add new entities without changing the database
Added Fields	• • • •	• • • •	• • • •	• • • •	C R U D	
Added Mappings	• • • •	• • • •	• • • •	• • • •	C R U D	Relationships between added records and existing entities
Collision Avoidance Permissions						
Obstacles	• • • •	• • • •	• • • •	• • • •	C R U D	Obstacle in the Wave Glider's path
Obstacle Locations	• • • •	• • • •	• • • •	• • • •	C R U D	Obstacle telemetry
Vehicle Obstacles	• • • •	• • • •	• • • •	• • • •	C R U D	Mapping between obstacles and vehicles

Glossary

Acknowledged (Alarm)	The alarm was reset by a User.
Active (Alarm)	The alarm was issued, but no other action has been taken.
Admin (Role)	A User who has all the permissions required to go through the day-to-day administration of the WGMS, add users, manage customizations, and deal with data.
AIS	Automatic Identification System
AISyG	Automatic Identification System
Alarm	A message either from the Vehicle C&C or from the Shore-based software indicating that a problem has occurred.
API	Application Programming Interface
Arrival Distance	Distance from a Waypoint at which the C&C computer assumes that the Vehicle has “arrived” at the Waypoint.
Audit Records	Record of changes or updates made to a Vehicle and/or its parts.
AWAC	Acoustic Wave and Current Profiler
BGAN	Broadband Global Area Network
Checkbox	A yes/no selection box in a Dialog Box. Checking one box does not preclude checking another (also see Radio Button).
Coastal Explorer	A mapping service that provides a DVD with nautical maps. Used as an alternative to Google Maps.ara>
Command and Control Drybox	The center-mounted Drybox in the Wave Glider Float. Contains the main control computer and communications equipment.
Command Packets	Data packets containing Commands sent to the Vehicle.
Commands	Messages sent to the Vehicle for control or to request status.
COTS	Commercial, Off-The-Shelf
Course	The path a Vehicle is attempting to follow (also see Track).
Create (Permission)	A Role permission that allows creation of a Vehicle-related system parameter.
Dashboard	The Home Page of the User Interface to the Wave Glider Management System.
Data Analyst (Role)	A User who looks at existing Vehicle and WGMS data and can download database data.
Database (WGMS)	The part of the WGMS that stores configuration and communications data for one or more Vehicles.
Delete (Permission)	A Role permission that allows deletion of a Vehicle-related system parameter.

LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

Dialog Box	An on-screen box that typically requests data to be entered.
Drybox	A sealed watertight container on either the Sub or the Float. Typically used for housing electronics.
EMSS	Enhanced Mobile Satellite Service
Errors	Messages sent by the Vehicle or the Shore-based software indicating a problem.
Escalation List	A prioritized list of people to contact in case of an error.
Events	Types of Alarms.
Float	The part of the Wave Glider Vehicle that rides on the surface of the water.
Glider	"Glider" is an alternate (and discouraged) term that has been used in the past to refer to the Sub (the Sub is the sub-marine wave motion propulsion component of the Wave Glider vehicle).
Global Positioning System (GPS)	A satellite-based broadcasting system that allows determination of geographical coordinates.
GPS	Global Positioning System
Google Maps	A mapping service provided by Google.
GSM	Global System for Mobile Communications
Guest User (Role)	Someone allowed to view certain Vehicle data, but who cannot create or modify any system parameters.
GUI	Graphical User Interface
Home Page	The initial page that comes up on the browser after logging onto the WGMS system.
Hyperion	An alternate name for the WGMS Kernel
Icon	A small pictogram on a GUI. Typically, clicking on the Icon will start some other action.
IMEI	International Mobile Equipment Identity
International Mobile Equipment Identity (IMEI)	A 15-digit number used by the Iridium system to identify handsets and modems that can connect with the Iridium system.
IP	Internet Protocol
IP Address	Equivalent to IP Number.
IP Number	Internet Protocol Number. A combination of numbers that defines the destination of TCP or UDP data. Of the form xxx.xxx.xxx.xxx, where “xxx” represents a number from 1 to 255 (e.g., 10.10.5.145).
Iridium	A constellation of satellites that provides world-wide voice and data transmission. Wave Glider Vehicles use the SBD form of transmission.
Iridium Network Server	A server maintained by the Iridium Corporation that provides access to the Iridium system via the Internet.

LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

ISU	Iridium Subscriber Unit
LRI	Liquid Robotics, Inc.
M2M	Mobile-to-Mobile
Master (Role)	A User who manages Vehicle provisioning, mission planning and operations, as well as payload and Web services development.
Menu	Allows selection of one or more items from a list.
Mission	A set of Vehicle operational actions, either by itself, or in cooperation with other Vehicles.
MTBF	Mean Time Between Failures
National Marine Electronics Association (NMEA)	An industry association that creates standards for, and certifies electronics used in marine applications.
NMEA	National Marine Electronics Association
Operation Region	A user-defined closed region in the water that defines limits on where a Vehicle should go. Commonly referred to as an "Operation Polygon."
Operation Polygon	A user-defined closed region in the water that defines limits on where a Vehicle should go. Sometimes referred to as an "Operation Region" in the WGMS UI.
Org	Abbreviation for Organization.
Organization	An entity that operates one or more Wave Glider Vehicles. Each Organization has its own data, and that data cannot be accessed by any other Organization.
Page	A browser window that displays data, and typically has links to other pages and data.
Part Identifications	Lists of hardware and software version numbers.
Payload Drybox	A Drybox that is optionally installed on/in a Vehicle. The Float has provision for two internal dryboxes. Payload Dryboxes may also be mounted externally on the Glider.
Permissions	For each Role, the specifications of what system parameters are allowed to be Created, Read, Updated and/or Deleted.
Privileges	Refers to the combined set of Permissions for someone who has been granted multiple Roles.
Protocol (Internet)	Method by which data is sent from one computer to another on the Internet.
Radio Button	One of a set round-icon selection options. Only one option can be selected (also see Checkbox).
Raw Outputs	Data packets received from the Vehicle as-is, with no processing.
Read (Permission)	A Role permission that allows read-only viewing of WGMS system parameters.
Roles	A set of Permissions granted to a person that allows them specific types of access to WGMS system parameters.

LIQUID ROBOTICS, INC. PROPRIETARY AND CONFIDENTIAL

Self-Corrected (Alarm)	An Alarm situation corrected itself.
Shore-Side (Software)	Refers to any software that does not reside on the Vehicle. WGMS software in a laptop on a boat is still considered “Shore-Side”.
Short Burst Data (SBD)	An Iridium data communications method that utilizes small data packets.
Status Data	Information sent via Telemetry indicating the operational status (position and system health) of the Vehicle.
Sub	"Sub" is the preferred naming convention for the sub-marine wave motion propulsion component of the Wave Glider vehicle. "Glider" is an alternate (and discouraged) term that has been used in the past to refer to the Sub.
System Page	An alternate page used to display all System information for an Organization’s Vehicle(s).
Tab	A label in the WGMS GUI. Tabs may be placed near the top of a window, or on the left side. Clicking on a tab selects different data on a Page.
Telemetry	Data sent from the Vehicle on a periodic basis. Typically sent every two minutes.
Tether	An alternate (and incorrect) term for the Umbilical.
toolbar	A bar, typically along the top of a window, that contains data entry boxes and icons.
Track	The path a Vehicle actually traverses in the water when it is trying to stay on a course (also see Course).
UI	User Interface - In the case of WGMS this would be a graphical user interface.
Umbilical	The flexible connecting cord between the Float and the Glider. Contains power and signal conductors, as well as strengthening elements.
Update (Permission)	A Role permission that allows updating of a Vehicle-related system parameter.
Vehicle	An alternate term used to describe the Wave Glider Float + Umbilical + Glider system.
Data Page	A page that provides links to all Vehicle information for all of the Vehicles in an Organization.
Wave Glider Management System (WGMS)	The combined software package that is used to manage communications to and from a Vehicle.
Waypoint	A geographical point defined by Lat/Long coordinates. Used to define a Vehicle’s Course or holding position.
Web Services	Automated information services that are conducted over the Internet, using standardized formats and protocols.
XBee	A short-range low-to-medium bandwidth radio communications method included with SV2 Vehicles only.