ROS and NetROS Help

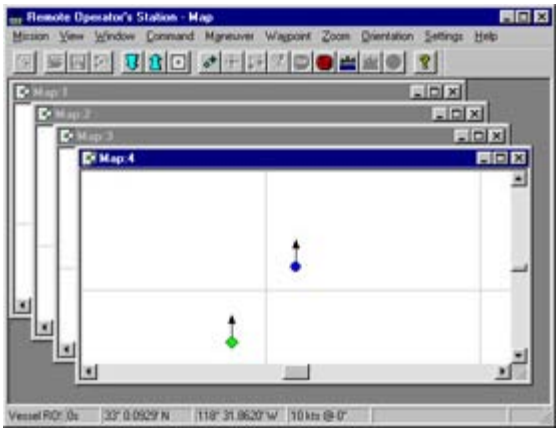
ROS is the Remote Operator's Station for the Ship Deployable Surface Target system (SDST) from Robotek Engineering, Inc. ROS has a second variant called NetROS. This document applies to both variants, with the information that applies only to NetROS clearly marked "NetROS only". ROS and NetROS are created by Third Hemisphere Interactive.

Using This Document

This document is designed to be read in any order, that is, the operator may browse the information in whichever order suits their learning style and needs. It is recommended, however, that the operator begin by skimming the sections entitled Features and Concepts, returning to them as necessary when reading the remainder of the document by clicking on the convenient links provided throughout. The sections entitled Before You Start, Starting a Mission, and Ending a Mission will guide the operator through the basics of initializing the setting, starting, and ending a mission. The operator should browse the Menus and Toolbar sections for information on how to use the full ROS functionality. The section on Dialog Boxes can be read sequentially, or more reasonably, referred to by following the hyperlinks from the places in which the dialog boxes are used in the remainder of this document.

ROS Basics

ROS and NetROS consist of a main window, which may be minimized, maximized, and closed in the normal Windows fashion. During a mission, this window may look as follows.



At the top of the ROS window is a Mission Menu Bar consisting of ten pull-down menus which are used to control the

ROS and issue commands to the target vehicles. Below it is a Toolbar consisting of buttons corresponding to frequently-used menu commands. The main area of the ROS window can be used to display map windows and dialog boxes. The maps cannot be moved outside of the ROS window, but the dialog boxes can. The map windows display icons representing the mission vehicles.At the bottom of the window is a Status Bar displaying telemetry data from mission vehicles.

Contents

A full Table of Contents, including sections and subsections, should be visible to the left of this pane. If it is not, click on the Show button at the top of this browser. The major sections are as follows:

Features

Features of ROS and NetROS include the following. The operator will need to become familiar with some important ROS and NetROS concepts while viewing these pages.

- Exclusion Zone
- Formations
- Log Files
- Maneuvers
- Map Windows
- Status Bar
- Vehicle Icons
- Zones

ROS Concepts

The following is a list of concepts that are important to the operation of ROS and NetROS. The operator will need to become familiar with the features of ROS and NetROS while viewing these pages.

- Current Maneuver
- Current Target
- Current Waypoint
- Current Window
- Map Lock

Before You Start

Before operating ROS and NetROS for the first time, it is recommended that the operator become familiar with the features and important concepts of ROS and NetROS. When ROS or NetROS is operated for the first time, it is important to make sure that the settings are correct before the first mission is begun.

The following settings are considered **important** and must be set before the first mission is begun. The settings can be modified from the Pre-mission Menu Bar. The following important settings will be recorded and used by default each time ROS or NetROS is run.

- Ports: Set from the Communication Ports Dialog Box.
- TSPI: (NetROS only.) Set from the TSPI Settings Dialog Box.

The remaining settings on the the Pre-mission Menu Bar and the Mission Menu Bar may be set at the discretion of the operator.

Starting a Mission

Before operating ROS and NetROS for the first time, it is recommended that the operator become familiar with the features and important concepts of ROS and NetROS. When ROS or NetROS is operated for the first time, it is important to make sure that the settings are correct before the first mission is begun.

To begin a new mission, either click on the New Mission Button on the toolbar, or select New from the Mission Menu in the Pre-mission Menu Bar.

The following dialog boxes will then be displayed in the order given below. Make the appropriate selection on each of them and click on the OK button. Clicking on the Cancel button on any of these dialog boxes will abort the new mission.

1. The Operation Mode Dialog Box selects a simulation or a live mission.
2. The Side Numbers Dialog Box lists information about the vehicles involved in the mission.
3. The Ship Data Dialog Box lists the position, heading, and speed of the command ship. This dialog box will appear in simulation mode, and in live mode when None has been selected for the GPS Port in the Communication Ports Dialog Box.
4. The Auxiliary Ship Data Dialog Box lists the position, heading, and speed of the auxiliary ship. It looks exactly he same as the Ship Data Dialog Box, except for the heading which reads "Auxiliary Ship Data" instead of "Ship Data". This dialog box will appear when Auxiliary Ship Present has been checked in the Side Numbers Dialog Box:
    - in simulation mode, and
    - in live mission mode, provided that the number of tries for the auxiliary ship was set to zero (this must be set before the mission using the Telemetry Dialog Box by selecting Telemetry from the Settings Menu in the Pre-mission Menu Bar).

The mission then begins with the display of a single map window that is locked on and centered on the command ship.

Once a live mission has begun, the operator may create, adjust, and arrange any desired number of map windows. It is a good idea to select a current target, then pop up an Engine Dialog Box and a Direction Dialog Box next. These dialog boxes may remain open during the entire mission, and can be used to send commands to different targets by selecting a new current target without needing to be closed down and reopened each time. These dialog boxes and maneuvers may alternatively be used to control target heading and speed.

Ending a Mission

The current mission is ended when the operator closes all map windows and dialog boxes. A new mission may then the started, or ROS/NetROS may be shut down by either selecting Exit from the Mission Menu in the Pre-mission Menu Bar, or by clicking on the small Close icon (which looks like this: ) in the title bar.

Alternatively, ROS/NetROS may be closed down quickly by selecting Exit from the Mission Menu in the Pre-mission Menu Bar, or by clicking on the Close icon in the title bar without first closing the map windows and dialog boxes.

Menus

ROS can be controlled through a set of menus, including the following.

- Pre-Mission Menu Bar: Visible at the top of the ROS window before and after a mission
- Mission Menu Bar: Visible at the top of the ROS window during a mission
- Floating Menus: Accessed by right-clicking inside a map window

Some of these functions can also be controlled from the toolbar.

Toolbar

The toolbar can be found initially at the top of the ROS window.

Frequently-used ROS functions can be controlled by clicking on the buttons on the toolbar. These functions can also be controlled from the menus. The buttons are arranged into five groups:

Mission Buttons 

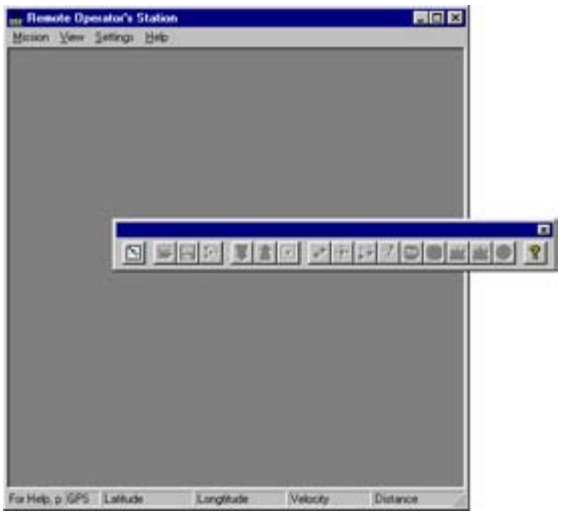
Maneuver Buttons 

Map Buttons 

Command Buttons 

Help Buttons 

The toolbar is initially docked at the top of the ROS window. It can be detached from the window by placing the mouse cursor on the toolbar (outside a button), pressing the left mouse button, and dragging the mouse with the left mouse button down. It may be made into a floating toolbar by then releasing the left mouse button inside the ROS window.



It may also be docked at the left, right, or bottom of the ROS window by dragging it to the respective border.

If the toolbar is not required, it can be disabled by unchecking Toolbar in the View Menu. This will leave more space available for the map windows.

Dialog Boxes

ROS and NetROS dialog boxes include the following.

- Arrival Radius Dialog Box: specify waypoint arrival radius
- Auxiliary Command Dialog Box: send auxiliary command to current target
- Auxiliary Command Name Dialog Box: assign name to auxiliary command
- Breadcrumbs Dialog Box: set breadcrumb duration and period
- Camera Dialog Box: send camera commands to current target
- Color Dialog Box: choose a color
- Communication Ports Dialog Box: choose communication ports
- Custom Color Dialog Box: choose a custom color
- Direction Dialog Box: send directional commands to current target
- Engine Dialog Box: send engine commands to current target
- Exclusion Zone Dialog Box: enable, disable, and set exclusion zones
- Formation Dialog Box: send formation commands to current target
- Load Maneuver Dialog Box: load maneuver from file
- Import Zone Dialog Box: import zone from text file
- Load Zone Dialog Box: load zone from file
- Log File Dialog Box: manual selection of log file
- MROS Dialog Box: enable or disable MROS on current target
- Operation Mode Dialog Box: choose simulation or live mission mode
- Rotate Maneuver Dialog Box: rotate current maneuver
- Rotate Map Dialog Box: rotate map
- Save Maneuver Dialog Box: save maneuver to file
- Save Zone Dialog Box: save zone to file
- Select Target Dialog Box: choose current target
- Ship Data Dialog Box: manual entry of ship location and velocity
- Side Numbers Dialog Box: enter side numbers for all ships and targets
- Telemetry Dialog Box: enter telemetry settings
- TSPI Settings Dialog Box: enter TSPI packet settings (NetROS only)
- Warnings Dialog Dialog Box: enable and disable warnings
- Waypoint Location Dialog Box: manually set waypoint location
- Waypoint Speed Dialog Box: set speed of target at waypoint
- Zones Dialog Box: edit zone
- Zone Edit Dialog Box: edit zone
- Zone Name Dialog Box: enter zone name
- Zone Style Dialog Box: choose zone drawing style

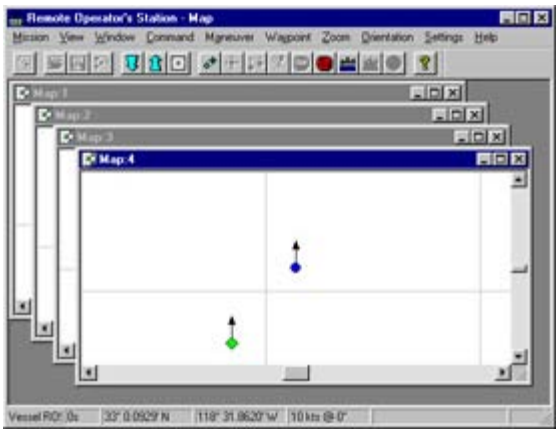
Mission Menu Bar

The Mission Menu Bar is visible at the top of the ROS window during a mission (it is replaced by the Pre-mission Menu Bar before and after a mission). It has the following pull-down menus.

- Mission: Begin or end a mission
- View: Enable or disable the tool bar and status bar
- Window: Manage the map windows
- Command: Issue commands to vehicles
- Maneuver: Manage maneuvers
- Waypoint: Manage waypoints in maneuver
- Zoom: Zoom in and out on maps
- Orientation: Manage map orientation and position
- Settings: Manage settings
- Help: Display help

Map Windows

ROS and NetROS start with a single map window. Map windows show the relative positions of mission vehicles as icons. Additional map windows may be opened by selecting New Map from the Window Menu in the Mission Menu Bar. Map windows may be scrolled, dragged around, resized, maximized, minimized, and closed in the normal way. Additional functionality is available from the Window Menu and the Settings Menu in the Mission Menu Bar.

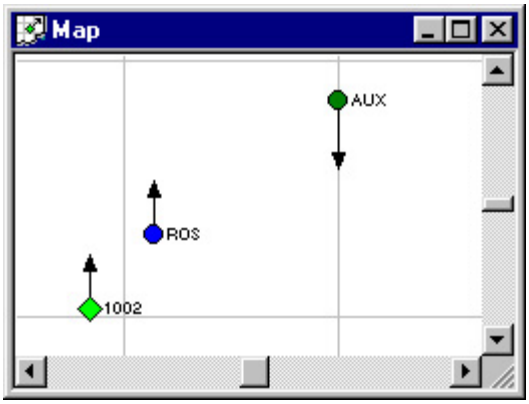


Each map window is locked on to a mission vehicle.

The operator has a great deal of control over how the map windows appear using the Orientation Menu, Settings Menu, and Zoom Menu on the Mission Menu Bar.

Vehicle Icons

Mission vehicles are drawn as icons in the map windows.



- The command ship (labeled ROS in the above image) is drawn as a blue circle.
- The auxiliary ship (labeled AUX in the above image) is drawn as a circle, the color of which will depend on the status of the auxiliary ship.
  - *Dark Green*: Telemetry status good
  - *White*: Not responding
- Targets (labeled 1002 in the above image) are drawn as a diamond, the color of which will depend on the status of the target.
  - *Green*: Engine running, status normal
  - *Yellow*: Low fuel, engine running
  - *Red*: Engine not running
  - *Cyan*: Engine status unknown
  - *White*: Not responding

Status Bar

	GPS	Latitude	Longtitude	Velocity	Distance	Age	Gas	Engine	Volts	M	Frmtn
Target 1 (1002) selected	0s	32° 59.7435' N	118° 32.1620' W	10 kts @ 0°	0.79Kyd @ 219°T (219°R)	0s	7/8	Running	12.0	M	IL-33

The Status Bar is visible at the bottom of the ROS window. If the Status Bar is not required, it can be disabled by unchecking Status Bar in the View Menu from the Pre-mission Menu Bar and the Mission Menu Bar.

During a mission, the Status Bar is used to monitor the status of the vehicles in the mission (see the lower of the two images at the top of this page). The Status Bar consists of a blank area that is used to indicate the vehicle whose status is being displayed, followed by eleven rectangular fields. Before and after a mission, the fields contain brief labels that describe their content (see the upper of the two images at the top of this page). The field labels and their corresponding functions are, from left to right:

1. **GPS**: Age of the vehicle's GPS information in seconds.
2. **Latitude**: The vehicle's latitude.
3. **Longtitude**: The vehicle's longtitude.
4. **Velocity**: The vehicle's speed and heading in degrees clockwise from true North.
5. **Distance**: The vehicle's distance from the ship in thousands of yards, followed by the angle to the vehicle in degrees clockwise from true North (indicated by T for True) and from forward (indicated by R for Relative).
6. **Age**: The age in seconds of the last telemetry signal received from the vehicle.
7. **Gas**: The vehicle's gasoline level, measured in eighths (0/8=empty, 8/8=full). If the display reads ?/8, then the fuel sensor on the vehicle has powered down. Either push the mode switch on the Polaris MFD, or crank the engine to turn the fuel sensor on.
8. **Engine**: "Running" or "Killed".
9. **Volts**: Battery voltage.
10. **M**: MROS status, "M" for enabled, "D" for disabled.
11. **Formation**: Four characters separated by a hyphen, of the form *XY-DE*, indicating formation information.
    - *X* is "F" if the vehicle is in a formation, "I" otherwise (Independent mode).
    - *Y* is "L" if it is the leader of a formation, or a digit indicating its position in the formation otherwise.
    - *D* is a single digit indicating crosstrack spacing in hundreds of feet.
    - *E* is a single digit indicating downtrack spacing in hundreds of feet.

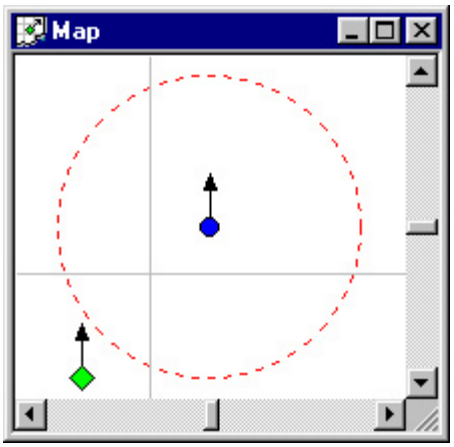
If no vehicle is selected, the Status Bar will rotate automatically between the vehicles in the mission, including the command ship, the auxiliary ship (if present), and the targets. If there is a current target selected, the Status Bar displays information on the current target. To display information on the command ship or auxiliary ship, simply click on its icon in one of the map windows. To make the Status Bar return to rotating status, simply click on a map window outside of the icons.

If telemetry contact with the vehicle is lost or its GPS is damaged, Status Bar fields that contain old and possibly inaccurate data are indicated by being drawn popped out instead of recessed into the Status Bar. In the following example, the upper version of the Status Bar shows data for a normal target, while the bottom version of the Status Bar shows data for a target with whom communication has been lost for 19 seconds.

Target 1 (1002) selected	0s	32° 59.7435' N	118° 32.1620' W	10 kts @ 0°	0.79Kyd @ 219°T (219°R)	0s	7/8	Running	12.0	M	IL-33
Target 1 (1002) selected	19s	33° 10.8800' N	97° 7.0500' W	0 kts @ 0°	0.01Kyd @ 92°T (92°R)	19s	8/8	Killed	12.5	M	IL-33

Exclusion Zone

ROS and NetROS can enforce a circular *exclusion zone* around all ships in the mission. Any target entering an enforced exclusion zone will be shut down automatically. Exclusion zones can be turned on and off and their radius set using the Exclusion Zone Dialog Box, which is displayed by selecting Exclusion Zone from the Settings Menu in the Mission Menu Bar. When exclusion zones are enforced, they are drawn as dotted red lines around the command ship and the auxiliary ship.



Formations

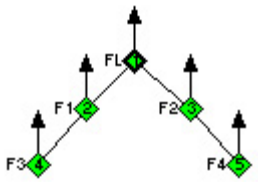
Several targets can be linked together in a *formation*. Targets in a formation will move as a group in response to commands sent to the formation leader.

A formation may contain up to nine targets arranged in a vee. The target in formation position 1 is behind and to the left of the formation leader. The target in formation position 2 is behind and to the right of the formation leader. Targets in later formation positions alternate in this fashion from left to right, as depicted by the radio buttons in the Formation Dialog Box.

The *crosstrack spacing* is the distance between the targets in a formation measured *across* the direction of travel. The *downtrack spacing* is the distance between the targets in a formation measured *along* the direction of travel.

Targets are added and removed from a formation by sending them formation commands. Formation commands are sent to the current target using the Formation Dialog Box, which is displayed by selecting Formation from the Command Menu in the Mission Menu Bar.

Formations are drawn on the map windows with lines joining the icons of the targets in the formation. The position of each target will be drawn next to it. The leader will be indicated by "FL", the target in position 1 by "F1", the target in position 2 by "F2", etc., as in the following image:



The formation status of each target is also displayed in the last field of the Status Bar.

Log Files

ROS and NetROS keep a record in a log file of all of the incoming and outgoing telemetry, the GPS signals, and comments on internal activity designed to aid readability. Each live mission results in a new log file in a folder named "logs" located wherever ROS or NetROS is installed.

Log File Names

Log file names are of the form 00081700.txt. The first two digits of the file name are the last two digits of the year (in this case 00, for 2000), the next two are the month (in this case 08, for August), the next two are the day of the month (in this case 17), and the last two are the *log file number*, that is, the number of live missions that have been carried out today (in this case 00, the first mission of the day). If the ROS or the computer on which it is running crashes, it may be necessary to increment the log file number manually using the Log File Dialog Box, which can be displayed from the Settings Menu on the Pre-mission Menu Bar.

Log File Format

Log files are text format, each line of which is either a *ROS comment*, which records internal ROS information; a *GPS data string*, which is a copy of the data string received from the GPS; *outgoing telemetry*, which is a copy of the outgoing telemetry string; or *incoming telemetry*, which is a copy of the incoming telemetry string. The first character of each line indicates what type of line it is:

- *****: ROS comment
- -: GPS data string
- >: outgoing telemetry
- <: incoming telemetry

This is followed by a time stamp of the form HH:MM:SS.SS, such as 14:55:08.72. To ensure that time stamps are as consistent as possible with the time reported by the GPS, ROS and NetROS will synchronize the computer's time with the GPS time. If this occurs, a ROS comment of the form:

```
*14:55:09.99 //Synchronizing system clock to GPS
*14:55:50.47 //System clock adjusted
```

will be placed into the log file - notice the jump in the time stamp between these two comments. The time stamp is in local time, whereas the time in the GPS data string is in UTC. This is followed by the relevant information:

- **ROS comment**: A comment prefaced by two slashes.
- **GPS data string**: The unprocessed string received from the GPS.
- **Outgoing telemetry**: The exact telemetry string sent out, followed by two slashes, then a brief comment indicating to the reader what kind of outgoing command it is.
- **Incoming telemetry**: The unprocessed string received from the telemetry stream, followed by two slashes, then a brief comment indicating to the reader what kind of incoming message it is.

Example

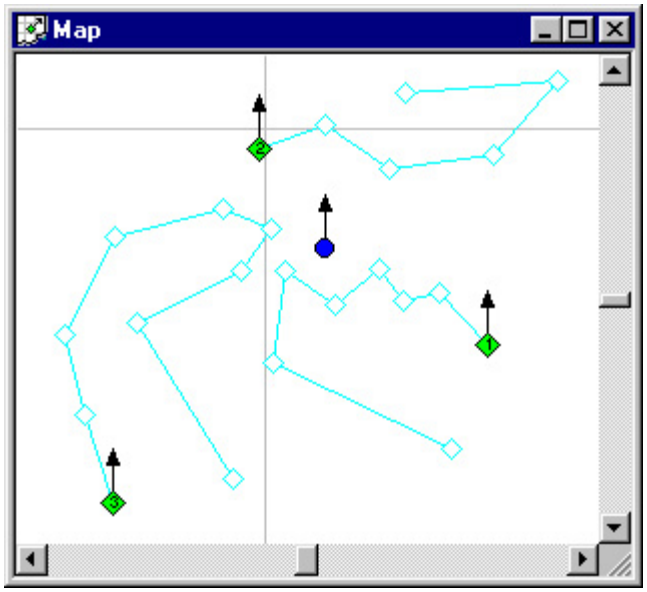
The following is a sample log file. ROS comments are indicated in gray. GPS data strings are indicated in red. Incoming telemetry is indicated in blue. Outgoing telemetry is indicated in green. This is to aid comprehension: note that the text is *not* colored in actual log files.

```
*14:55:08.72 //Mission date 30/09/1999 Central Daylight Time
*14:55:09.93 //Telemetry begins
-14:55:09.99 $GPRMC,195550,A,3310.8999,N,09707.0517,W,000.0,322.0,300999,005.5,E*6A
```

```
*14:55:09.99 //Synchronizing system clock to GPS
*14:55:50.47 //System clock adjusted
>14:55:50.47 >1002/D/&79 //telemetry request
<14:55:50.80 <1002/A/19908800/58270500/0/0/0/8/125/1/0033/&52
*14:55:50.80 //Roboski 1002 telemetry data good, GPS data good
>14:55:50.85 >1003/D/&78 //telemetry request
-14:55:51.35 $GPRMC,195551,A,3310.8999,N,09707.0515,W,000.0,322.0,300999,005.5,E*69
>14:55:51.68 >1003/D/&78 //resend
-14:55:52.33 $GPRMC,195552,A,3310.8999,N,09707.0513,W,000.0,322.0,300999,005.5,E*6C
>14:55:52.50 >1003/D/&78 //resend
*14:55:53.32 //Vessel 1003 not responding to telemetry requests
-14:55:53.38 $GPRMC,195553,A,3310.8994,N,09707.0513,W,000.0,322.0,300999,005.5,E*60
>14:55:53.43 >1002/D/&79 //telemetry request
<14:55:53.71 <1002/A/19908800/58270500/0/0/0/8/125/1/0033/&52
*14:55:53.76 //Roboski 1002 telemetry data good, GPS data good
>14:55:53.82 >1003/D/&78 //telemetry request
-14:55:54.37 $GPRMC,195554,A,3310.8994,N,09707.0511,W,000.0,322.0,300999,005.5,E*65
>14:55:54.70 >1003/D/&78 //resend
-14:55:55.36 $GPRMC,195555,A,3310.8990,N,09707.0511,W,000.0,322.0,300999,005.5,E*60
>14:55:55.52 >1003/D/&78 //resend
-14:55:56.34 $GPRMC,195556,A,3310.8982,N,09707.0504,W,000.0,322.0,300999,005.5,E*64
*14:55:56.40 //Vessel 1003 not responding to telemetry requests
>14:55:56.51 >1002/D/&79 //telemetry request
<14:55:56.78 <1002/A/19908800/58270500/0/0/0/8/125/1/0033/&52
*14:55:56.84 //Roboski 1002 telemetry data good, GPS data good
>14:55:56.89 >1003/D/&78 //telemetry request
*14:55:57.00 //Roboski 1003 offline
-14:55:57.28 $GPRMC,195557,A,3310.8974,N,09707.0496,W,000.0,322.0,300999,005.5,E*66
>14:55:57.72 >1003/D/&78 //resend
-14:55:58.38 $GPRMC,195558,A,3310.8971,N,09707.0495,W,000.0,322.0,300999,005.5,E*6F
>14:55:58.54 >1003/D/&78 //resend
-14:55:59.26 $GPRMC,195559,A,3310.8967,N,09707.0493,W,000.0,322.0,300999,005.5,E*6F
*14:55:59.42 //Vessel 1003 not responding to telemetry requests
>14:55:59.53 >1003/D/&78 //telemetry request
*14:56:00.35 //Vessel 1003 not responding to telemetry requests
-14:56:00.35 $GPRMC,195600,A,3310.8963,N,09707.0492,W,000.0,322.0,300999,005.5,E*65
>14:56:00.41 >1002/D/&79 //telemetry request
<14:56:00.74 <1002/A/19908800/58270500/0/0/0/8/125/1/0033/&52
*14:56:00.74 //Roboski 1002 telemetry data good, GPS data good
-14:56:01.29 $GPRMC,195601,A,3310.8959,N,09707.0491,W,000.0,322.0,300999,005.5,E*6E
>14:56:02.06 >1003/D/&78 //telemetry request
-14:56:02.28 $GPRMC,195602,A,3310.8956,N,09707.0490,W,000.0,322.0,300999,005.5,E*63
*14:56:02.94 //Vessel 1003 not responding to telemetry requests
>14:56:03.05 >1002/D/&79 //telemetry request
-14:56:03.26 $GPRMC,195603,A,3310.8952,N,09707.0490,W,000.0,322.0,300999,005.5,E*66
<14:56:03.32 <1002/A/19908800/58270500/0/0/0/8/125/1/0033/&52
*14:56:03.32 //Roboski 1002 telemetry data good, GPS data good
>14:56:03.65 >1002/A/4/1/&79 //aux command 4 on
<14:56:03.87 <1002/&10       //acknowledgement
-14:56:04.25 $GPRMC,195604,A,3310.8947,N,09707.0489,W,000.0,322.0,300999,005.5,E*6D
>14:56:05.08 >1003/D/&78 //telemetry request
-14:56:05.24 $GPRMC,195605,A,3310.8943,N,09707.0489,W,000.0,322.0,300999,005.5,E*68
*14:56:05.96 //Vessel 1003 not responding to telemetry requests
>14:56:06.01 >1002/D/&79 //telemetry request
<14:56:06.34 <1002/A/19908800/58270500/0/0/0/8/125/1/0033/&52
*14:56:06.34 //Roboski 1002 telemetry data good, GPS data good
-14:56:06.40 $GPRMC,195606,A,3310.8943,N,09707.0487,W,000.0,322.0,300999,005.5,E*65
>14:56:06.45 >1002/A/8/0/&74 //aux command 8 off
<14:56:06.67 <1002/&10       //acknowledgement
-14:56:07.38 $GPRMC,195607,A,3310.8942,N,09707.0485,W,000.0,322.0,300999,005.5,E*67
>14:56:08.04 >1003/D/&78 //telemetry request
-14:56:08.26 $GPRMC,195608,A,3310.8941,N,09707.0483,W,000.0,322.0,300999,005.5,E*6D
*14:56:08.59 //Mission completed
```

Maneuvers

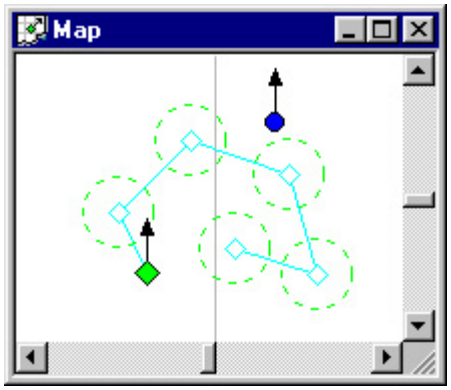
A *maneuver* is a collection of connected waypoints for a target. Maneuvers are drawn in cyan, with the waypoints drawn as diamonds.



The target will move from waypoint to waypoint until it reaches the last one. If ROS Relative Navigation was checked in the Operation Mode Dialog Box at the start of the mission, then the target will begin moving towards the waypoint (or more correctly, where the waypoint will be when it gets there) when its speed exceeds the speed of the command ship containing the ROS. Otherwise it will begin to move towards the first waypoint as soon as that waypoint is created. A speed may be specified for each waypoint; the target's speed changes to that value when it arrives at the waypoint. If no speed is specified for the last waypoint, the target will match the command ship's speed and heading on arrival. The word "hold" will be drawn at the tip of the target's vector at that time, and the target will continue to hold the command ship's speed and heading (even if the ship changes its speed and heading) until it receives a speed or heading command.

Waypoint Arrival

A target will be deemed to have *arrived* at a waypoint when it enters the waypoint's *arrival zone*, which is a circle of a given *arrival radius* centered at the waypoint's location. The arrival radius may be set by using the Arrival Radius Dialog Box, which can be displayed by selecting Arrival Radius from the Settings Menu in the Mission Menu Bar. Arrival zones can be drawn on the map windows by checking Arrival Zones in the Settings Menu in the Mission Menu Bar. Arrival zones are drawn as dotted circles around each waypoint. They are drawn in green in the next image, but the color may be changed using the Color Dialog Box by selecting Arrival Zone from the Settings/Colors Menu .



Creating a Maneuver

Maneuvers can be created using the mouse. Using the left mouse button, double-click on a target icon, and move the mouse to the desired position of the first waypoint. Click to drop the first waypoint, then move to the second and subsequent waypoints. Double click to drop the last waypoint.

Editing a Maneuver

Waypoints may be moved by clicking on them and dragging with the left mouse button down. Releasing the left mouse button drops the waypoint. The current maneuver may be rotated around the current target using the Rotate Maneuver Dialog Box, which can be displayed by either selecting Rotate from the Maneuver Menu in the Mission Menu Bar, or by clicking on the Rotate Maneuver Button on the toolbar, or by selecting Rotate Maneuver from the Maneuver Floating Menu.

The current waypoint may also be moved by using the Waypoint Location Dialog Box, which can be displayed by either selecting Position from the Waypoint Menu in the Mission Menu Bar, or by selecting Location of Waypoint from the Waypoint Floating Menu.

Target speed at the current waypoint may be set by using the Waypoint Speed Dialog Box, which can be displayed by either selecting Speed from the Waypoint Menu in the Mission Menu Bar, or by selecting Speed at Waypoint from the Waypoint Floating Menu.

The current waypoint may be deleted from a maneuver by either selecting Delete from the Waypoint Menu in the Mission Menu Bar, or by selecting Delete Waypoint from the Waypoint Floating Menu.

A waypoint may be inserted into a maneuver in front of the current waypoint by either selecting Insert from the Waypoint Menu in the Mission Menu Bar, or by selecting Insert Waypoint from the Waypoint Floating Menu. The new waypoint will appear near the current waypoint, and will need to be dragged to the correct position.

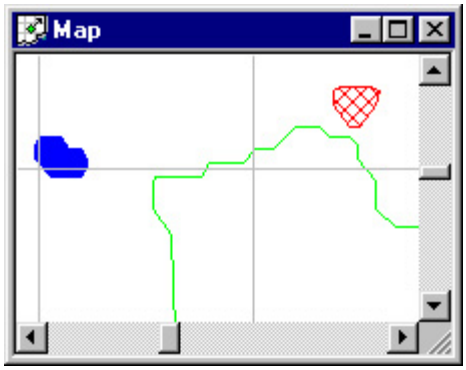
Loading and Saving Maneuvers

The current maneuver can be loaded using the Load Maneuver Dialog Box, which can be displayed by either selecting Load from the Maneuver Menu in the Mission Menu Bar, or by clicking on the Load Maneuver Button on the toolbar, or by selecting Load Maneuver from the Maneuver Floating Menu.

Maneuvers can be saved using the Save Maneuver Dialog Box, which can be displayed by either selecting Save from the Maneuver Menu in the Mission Menu Bar, or by clicking on the Save Maneuver Button on the toolbar, or by selecting Save Maneuver from the Maneuver Floating Menu.

Zones

A *zone* is a fixed polygonal area that is drawn to all map windows. They can be used to represent land or other features of interest.



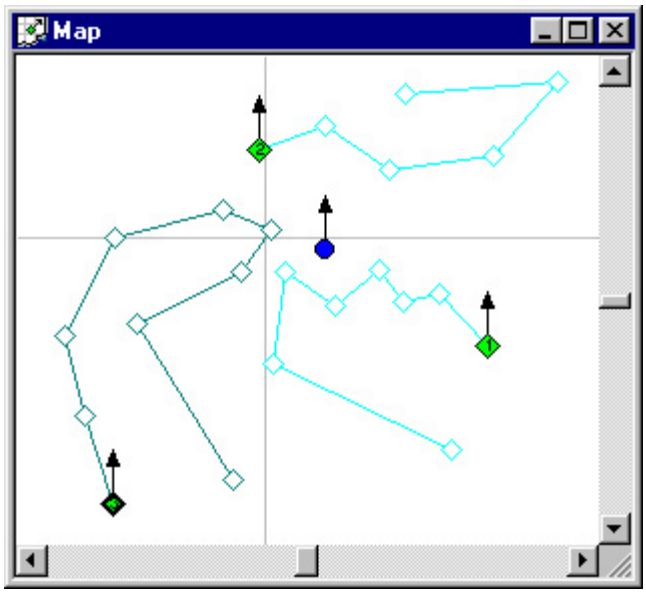
Zones can be created, edited, saved to a file, and loaded from a file using the Zones Dialog Box, which can be displayed by selecting Zones from either the Settings Menu in the Pre-Mission Menu Bar or the Settings Menu in the Mission Menu Bar. Each zone may be drawn in a different color, and may be either solid, hollow, or crosshatched.

The zone names may optionally be drawn on the map windows by checking Draw Zone Labels on either the Settings Menu in the Pre-Mission Menu Bar or the Settings Menu in the Mission Menu Bar. The drawing of individual zone names may be turned on and off (NetROS only) using the Draw Name checkbox on the Zone Edit Dialog Box. The font size of the zone names drawn on the current window can be adjusted (NetROS only) using the Settings/Font Size Menu.

Current Maneuver

Any maneuver may be selected as the *current maneuver* by either clicking on one of its waypoints, or selecting its target as the current target. To deselect the current maneuver, click anywhere else on the map window. The current maneuver may be edited in various ways, and may also be loaded and saved to a file.

The current maneuver is drawn in dark cyan, in contrast to the others which are drawn in cyan. In the following example, target 3 at lower left is the current target, and its maneuver is the current maneuver.



The *current maneuver* is one of a small set of ROS concepts.

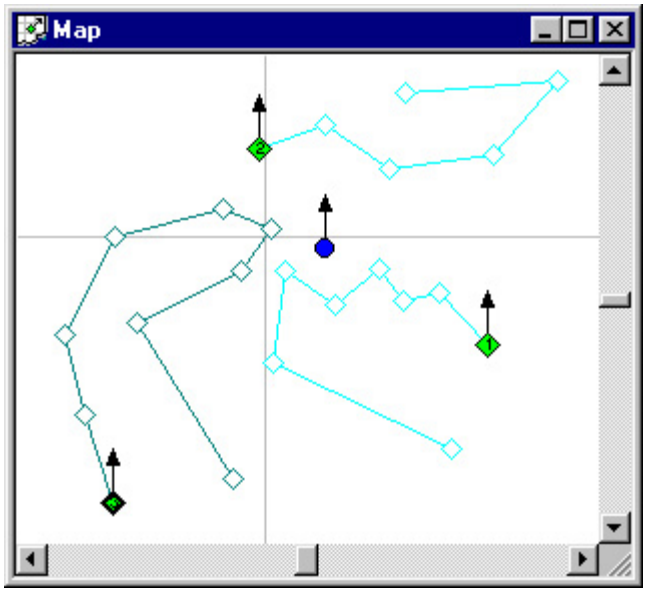
Current Target

Any target may be selected as the *current target* either:

- by clicking on its icon on one of the map windows, or
- by clicking on one of the waypoints on its maneuver (if any is present), or
- by selecting Target from the Command/Select Menu, or
- by clicking the Select Target Button on the Toolbar, or
- by selecting Select from the Default Floating Menu.

Its maneuver then becomes the the current maneuver. To deselect the current target, click anywhere else on the map window. Commands may be sent to the current target, including for example Speed and Throttle Commands and Heading and Rudder Commands.

The current target is drawn with a heavy outline. In the following example, target 3 at lower left is the current target, and its maneuver is the current maneuver.



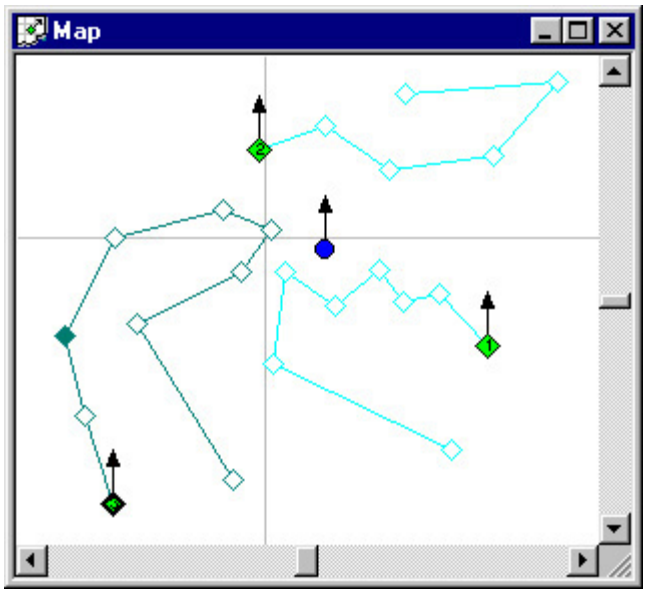
While there is a current target selected, the Status Bar displays information for the current target instead of rotating between all mission vehicles.

The *current target* is one of a small set of ROS concepts.

Current Waypoint

The *current waypoint* is a waypoint that has been selected by the operator in order to examine or edit it. Any waypoint may be selected as the current waypoint by clicking on it. Its maneuver then becomes the the current maneuver, and its target becomes the current target. The current waypoint may be dragged around to move it, or edited using the Waypoint Floating Menu. To deselect the current waypoint, click anywhere on the map window outside the current waypoint.

The current waypoint is drawn filled in dark cyan, in contrast to the others which are hollow. In the following example, target 3 at lower left is the current target, its maneuver is the current maneuver, and the second waypoint (counting from the target) is the current waypoint.

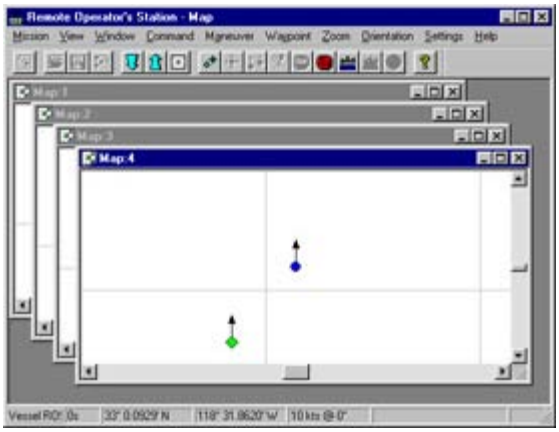


The *current waypoint* is one of a small set of ROS concepts.

Current Window

Any map window may be selected as the *current window* by clicking inside it or on its border. The current window may be scrolled using the scroll bars to the left and bottom of the window, moved around inside the ROS window, maximized and minimized in the usual ways, and its appearance may be edited in various ways, for example, zooming in and out using the Zoom Menu.

The current window is the one that is in front of the other map windows, and has its title bar at the top of the window drawn in color (all others are grayed out). In the following example, the current window is at the front with its title bar drawn in blue.



The *current window* is one of a small set of ROS concepts.

Map Lock

Each map window may be independently locked on to one of the mission vehicles, meaning that vehicle's icon remains in the same place on the window iregardless of its motion. The current window may be locked on to the Command Ship, the Auxiliary Ship, or the current target using the Orientation/Lock On Menu. The current window is by default centered on the vehicle. This may be changed by using the scroll bars to move the center of the map away from the vehicle - the map center will however continue to move as the vehicle moves so that its center maintains at a fixed location relative to the vehicle. To recenter the map on its vehicle, either select Recenter from the Orientation Menu, or click on the Recenter Button on the toolbar or select Recenter from the Default Floating Menu.

Map lock is one of a small set of ROS concepts.

Pre-mission Menu Bar

The Pre-mission Menu Bar is visible at the top of the ROS window before and after a mission (it is replaced by the Mission Menu Bar during a mission). It has the following pull-down menus.

- Mission: Begin or end a mission
- View: Enable or disable the tool bar and status bar
- Settings: Manage settings
- Help: Display help

Communication Ports Dialog Box

The Communication Ports Dialog Box sets the communication ports for live missions.

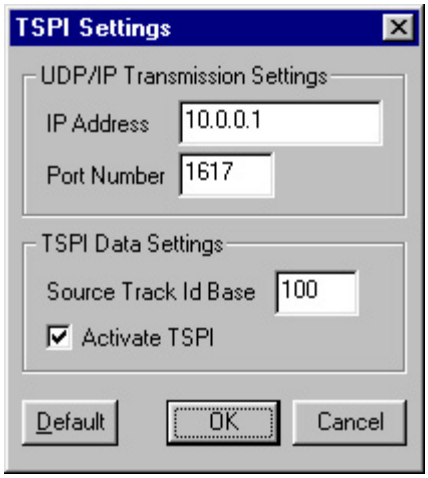
Select the COM ports for the GPS and the telemetry from the corresponding pull-down menus. The GPS port may be set to COM1 through COM4, or to None if no GPS is available for the ROS (in which case the ROS position, speed, and heading must be entered by hand). The telemetry port may be set to COM1 through COM4.

Select the baud rate for the GPS from its pull-down menu.

- **9600 baud** for the standard ROS Garmin GPS
- **4800 baud** for the optional PLGR military GPS receiver

Click OK when finished.

TSPI Settings Dialog Box



(NetROS only) The TSPI Settings Dialog Box manages the TSPI settings. Two edit boxes at the top of the dialog box contain the IP address and port number of the computer receiving the TSPI packets. The third edit box contains the *source track id base*, which is added to the identification number of each vehicle in the TSPI packets. The checkbox is checked if TSPI packets are to be sent (in which case TSPI packets are sent during both simulations and live missions), and unchecked otherwise.

Enter the IP address, port number, and source track id base into the edit boxes. The IP address and port number can be set to default values (IP address 10.2.255.255, port 1617) by clicking on the Default button. Check the Activate TSPI checkbox to activate the TSPI. Click OK when finished.

Mission Buttons

The mission buttons are the first group of buttons on the toolbar.

New Mission Button: Begin a new mission (this function is also available by selecting New from the Mission Menu). This button is enabled only when there is no mission in progress.

Mission Menu

The Mission Menu is accessible from the Pre-mission Menu Bar and the Mission Menu Bar. It has two selections:

1. **New**: Begin a new mission (this function is also available from the Mission Button on the toolbar). This menu selection is enabled only when there is no mission in progress.
2. **Exit**: Shut down ROS, closing any mission that may be in progress.

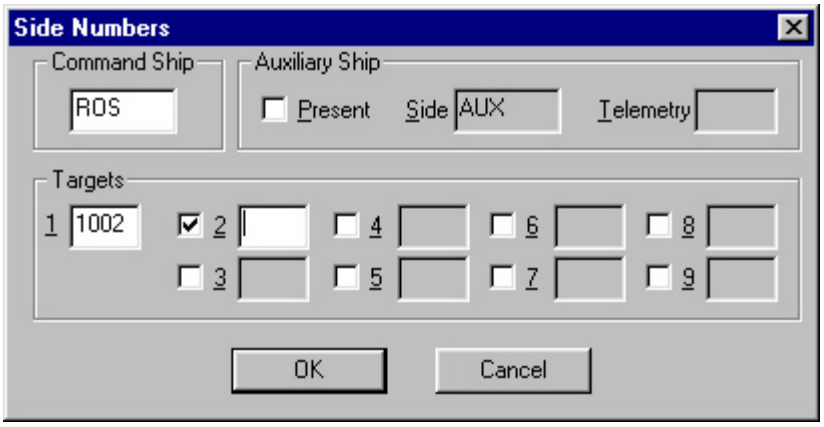
Operation Mode Dialog Box

The Operation Mode Dialog Box sets the operation mode for a new mission.

Click on the Simulation radio button for a simulation, or on the Live radio button for a live mission. Simulation mode is designed to help train the operator in the use of the ROS interface. Live mode is to be used for live missions with real targets. In simulation mode no commands will be sent to targets via the telemetry stream, but (NetROS only) TSPI packets will be sent.

Checking on the ROS Relative Navigation checkbox will cause all waypoints to move at the same speed and heading as the command ship carrying the ROS, that is, all navigation will be relative to the ROS. Leaving this checkbox unchecked will give each waypoint a fixed latitude and longtitude. Note that this will affect the appearance of the waypoint location in the Waypoint Location Dialog Box.

Side Numbers Dialog Box



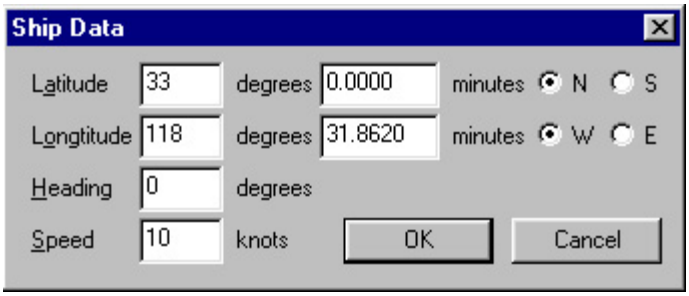
The Side Numbers Dialog Box sets the side numbers for the vehicles at the start of a mission.

The side number for the command ship, which is assumed to carry the ROS and its GPS, should be entered in the edit box at top left. If an auxiliary ship is present, check the Present checkbox under Auxiliary Ship, and enter its Side Number and Telemetry Number (corresponding to the onboard telemetry package) in the corresponding edit boxes.

Target 1 must always be present. Click on the checkboxes for any additional targets. Targets must be used in numerical order (for example, Target 2 must be used before Targets 3, 4, 5, etc.) Enter their side numbers in the corresponding edit boxes, which will become active once their checkboxes have been checked.

Click OK when finished. Click Cancel to cancel the mission.

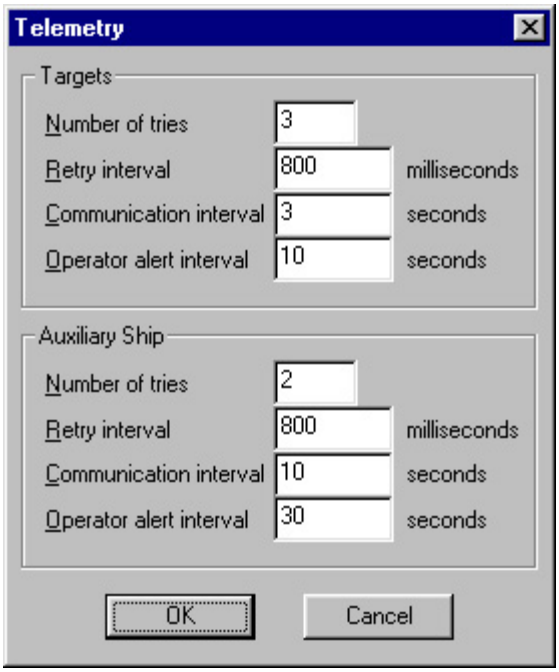
Ship Data Dialog Box



The Ship Data Dialog Box allows the operator to manually set the position, heading, and speed of the command ship. It is designed primarily to be used in Simulation Mode and in Live Mode missions in which the ROS GPS is not available or has malfunctioned. The edit boxes will initially contain the best values for the ship data and are not updated while the dialog box is open. Heading data is in degrees clockwise from true North.

Enter the ship's data into the edit boxes and click on OK.

Telemetry Dialog Box



The Telemetry Dialog Box manages telemetry settings. It is strongly recommended that the operator **not** change the telemetry settings from the default values pictured above, with the possible exception of the setting mentioned at the end of this page.

The ROS gets telemetry information from its vehicles by sending telemetry requests to each vehicle in turn, issuing a request once in every *communication interval* under normal conditions. Commands are also sent in response to input from the operator. If the vehicle does not respond to a telemetry request or command, it is repeated for a total *number of tries*, waiting for a *retry interval* between each retry. If the vehicle continues to be unresponsive after an *operator alert interval*, a warning is issued to the operator.

The Telemetry Dialog Box is divided into two parts. The uppermost part of the dialog box deals with communication with the targets. The lowermost part deals with communication with the auxiliary ship. Each part has four values:

1. **Number of Tries**: If a vehicle does not respond to a telemetry request or command, it is sent this many times in total, including the initial try.
2. **Retry Interval**: The amount of time in milliseconds between repeats of a telemetry request or command to a nonresponding vehicle.
3. **Communication Interval**: The amount of time in seconds between telemetry requests for responding vehicles.
4. **Operator Alert Interval**: The period of time in seconds after which the operator is notified that a vehicle is not responding to telemetry requests or commands.

If the number of tries for the auxiliary ship is set to zero and an auxiliary ship is selected in the Side Numbers Dialog Box at the start of the mission, then the auxiliary ship will be simulated instead of having telemetry requests sent to it. If telemetry requests are to be sent to the auxiliary ship, the number of tries should be set to the default value shown in the picture at the top of this page.

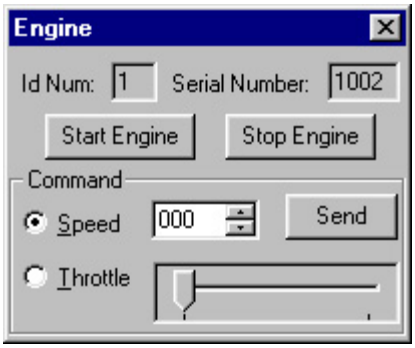
Enter the telemetry settings into the edit boxes and click OK.

Settings Menu

This version of the Settings Menu is accessible from the Pre-mission Menu Bar (there is a more extensive version of this menu in the Mission Menu Bar). It has eleven selections:

1. **Arrival Radius**: Display the Arrival Radius Dialog Box.
2. **Breadcrumbs**: Display the Breadcrumbs Dialog Box.
3. **Colors**: Display the Setting/Colors Menu.
4. **Draw Zone Labels**: Checking this selection will draw zone labels.
5. **Exclusion Zone**: Display the Exclusion Zone Dialog Box.
6. **Log File**: Display the Log File Dialog Box.
7. **Ports**: Display the Communication Ports Dialog Box.
8. **Telemetry**: Display the Telemetry Dialog Box.
9. **TSPI**: (NetROS only.) Display the TSPI Settings Dialog Box.
10. **Warning**: Display the Warnings Dialog Box.
11. **Zones**: Display the Zones Dialog Box.

Engine Dialog Box

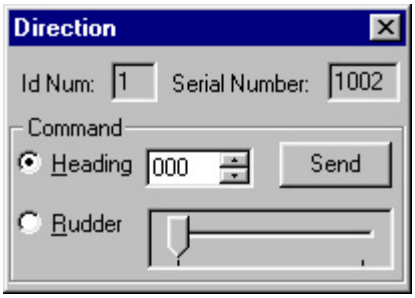


The Engine Dialog Box sends Speed and Throttle Commands to the current target. The Identification Number and Side Number (Serial Number) of the current target are displayed at the top of the dialog box.

Click on the Start Engine button to send a Start Engine Command to the current target. Click on the Stop Engine button to send a Stop Engine Command to the current target.

Click on the radio button for either Speed or Throttle. For Speed, enter the speed in knots. For Throttle, adjust the slider to the left for lower throttle settings and to the right for higher throttle settings. Click on the Send button to send the selected command to the current target.

Direction Dialog Box



The Direction Dialog Box sends Heading and Rudder Commands to the current target. The Identification Number and Side Number (Serial Number) of the current target are displayed at the top of the dialog box.

Click on the radio button for either Heading or Rudder. For Heading, enter the course in degrees clockwise from true North. For Rudder, adjust the slider to the left for left rudder, at the center for center rudder, and to the right for right rudder. Click on the Send button to send the selected command to the current target.

Floating Menus

The Floating Menus can be accessed by clicking on the right mouse button when the mouse pointer is inside a map window. One of three floating menus will appear, depending on whether a waypoint or a target has been selected before right-clicking.

- Waypoint Floating Menu: When a waypoint has been selected
- Maneuver Floating Menu: When a target has been selected
- Default Floating Menu: When nothing has been selected

Maneuver Buttons

The maneuver buttons are the second group of buttons on the toolbar.

Load Maneuver Button: Display the Load Maneuver Dialog Box (this function is also available by selecting Load from the Maneuver Menu and by selecting Load Maneuver from the Maneuver Floating Menu). This button is enabled only when there is a current target selected.

Save Maneuver Button: Display the Save Maneuver Dialog Box (this function is also available by selecting Save from the Maneuver Menu and by selecting Save Maneuver from the Maneuver Floating Menu). This button is enabled only when there is a current maneuver selected.

Rotate Maneuver Button: Display the Rotate Maneuver Dialog Box (this function is also available by selecting Rotate from the Maneuver Menu and by selecting Rotate Maneuver from the Maneuver Floating Menu). This button is enabled only when there is a current maneuver selected.

Map Buttons

The map buttons are the third group of buttons on the toolbar.

- **Zoom In Button**: Zoom in on the map displayed in the current window (this function is also available by selecting Zoom In from the Zoom Menu and by selecting Zoom In from the Default Floating Menu).
- **Zoom Out Button**: Zoom out on the map displayed in the current window (this function is also available by selecting Zoom Out from the Zoom Menu and by selecting Zoom Out from the Default Floating Menu).
- **Recenter Button**: Recenter the map in the current window to its current map lock (this function is also available by selecting Recenter from the Orientation Menu and by selecting Recenter from the Default Floating Menu).

Command Buttons

The command buttons are the fourth group of buttons on the toolbar.

- **Select Target Button**: Display the Select Target Dialog Box (this function is also available by selecting Target from the Command/Select Menu and by selecting Select from the Default Floating Menu).
- **Direction Button**: Display the Direction Dialog Box (this function is also available by selecting Direction from the Command Menu). This button is enabled only when there is a current target selected.
- **Engine Button**: Display the Engine Dialog Box (this function is also available by selecting Engine from the Command Menu). This button is enabled only when there is a current target selected.
- **Camera Button**: Display the Camera Dialog Box (this function is also available by selecting Camera from the Command Menu). This button is enabled only when there is a current target selected.
- **Stop Command Button**: Send a Stop Command to the current target, which will stop its engine (this function is also available by selecting Stop from the Command Menu). This button is enabled only when there is a current target selected.
- **All Stop Command Button**: Send a Stop Command to all targets (this function is also available by selecting All Stop from the Command Menu and by pressing the Esc key on the keyboard).
- **Ship Data Button**: Display the Ship Data Dialog Box (this function is also available by selecting Ship Data from the Command Menu).
- **Aux Ship Data Button**: Display the Ship Data Dialog Box (this function is also available by selecting Aux Ship Data from the Command Menu). This button is enabled only when there is an auxiliary ship on the current mission.
- **Auxiliary Command Button**: (NetROS only) Display the Auxiliary Command Dialog Box (this function is also available by selecting Auxiliary from the Command Menu). This button is enabled only when there is a current target selected.

Help Buttons

The help buttons are the fifth and last group of buttons on the toolbar.

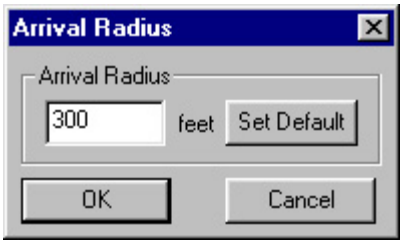
Help Button: Display this help file (this function is also available by selecting Help Topics from the Help Menu).

View Menu

The View Menu is accessible from the Pre-mission Menu Bar and the Mission Menu Bar. It has two selections:

1. **Toolbar**: Checking this selection will display the toolbar.
2. **Status Bar**: Checking this selection will display the Status Bar.

Arrival Radius Dialog Box



The Arrival Radius Dialog Box sets the *arrival radius*, which is the distance from the center of a waypoint in a maneuver at which a target is deemed to have arrived at the waypoint. Enter the desired arrival radius in feet in the edit box and click OK. Click on the Set Default button to set the default recommended arrival radius. Making the arrival radius smaller will not make the navigation more accurate, as the target vehicle will always aim for the center of the waypoint.

Auxiliary Command Dialog Box

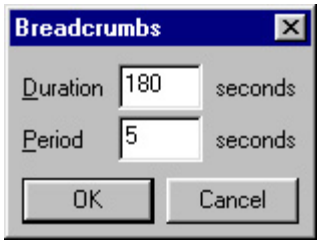
(NetROS only.) The Auxiliary Command Dialog Box sends an Auxiliary Command to the current target. The Identification Number and Side Number (Serial Number) of the current target are displayed at the top of the dialog box. There are nine possible auxiliary commands that can be sent to the target. The action taken by the target in response to an auxiliary command will depend on what hardware is on board. Each Auxiliary Command has an On mode and an Off mode.

Click on a radio button to select one of the nine auxiliary targets. Click on the Send On button to send an Auxiliary Command On, and click on the Send Off button to send an Auxiliary Command Off. Click on the Assign Name to Command button to display the Auxiliary Command Name Dialog Box. Once commands have been named, their names will appear here next to the corresponding radio buttons.

Auxiliary Command Name Dialog Box

The Auxiliary Command Name Dialog Box records a name for one of the auxiliary commands. Enter the desired name into the edit box, then click on OK. This name will then appear on the Auxiliary Command Dialog Box.

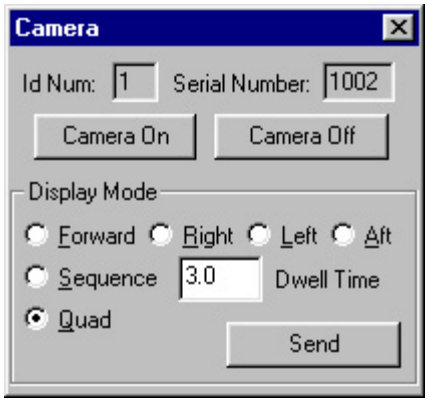
Breadcrumbs Dialog Box



The Breadcrumbs Dialog Box sets the duration of the breadcrumbs (the amount of time that each breadcrumb exists) and the period of the breadcrumbs (the amount of time between the creation of each breadcrumb by an individual vehicle).

Enter the duration and period in seconds into the corresponding edit box, then click OK.

Camera Dialog Box



The Camera Dialog Box sends commands to the camera mounted on the current target. The Identification Number and Side Number (Serial Number) of the current target are displayed at the top of the dialog box. The current target must contain a camera module for these commands to work.

Clicking on the Camera On button sends a Camera On Command to the current target. Clicking on the Camera Off button sends a Camera On Command to the current target. Click on the radio button corresponding to the required Display Mode then click on the Send button to send a Display Mode command to the camera. Available display modes include:

- **Forward**: Send image from forward camera.
- **Right**: Send image from right camera.
- **Left**: Send image from left camera.
- **Aft**: Send image from aft camera.
- **Sequence**: Send images from each of the four cameras in cyclic sequence. The edit box contains the desired *dwell time*, which is the time interval between camera changes in seconds.
- **Quad**: Split the screen into four quadrants, one for each camera.

Color Dialog Box

The Color Dialog Box selects a color.

Click on one of the Basic colors, then click on OK to select that color. If you wish to use a color that does not appear in one of the Basic colors, click on the Define Custom Colors button to display the Custom Color Dialog Box.

Communication Ports Dialog Box

The Communication Ports Dialog Box sets the communication ports for live missions.

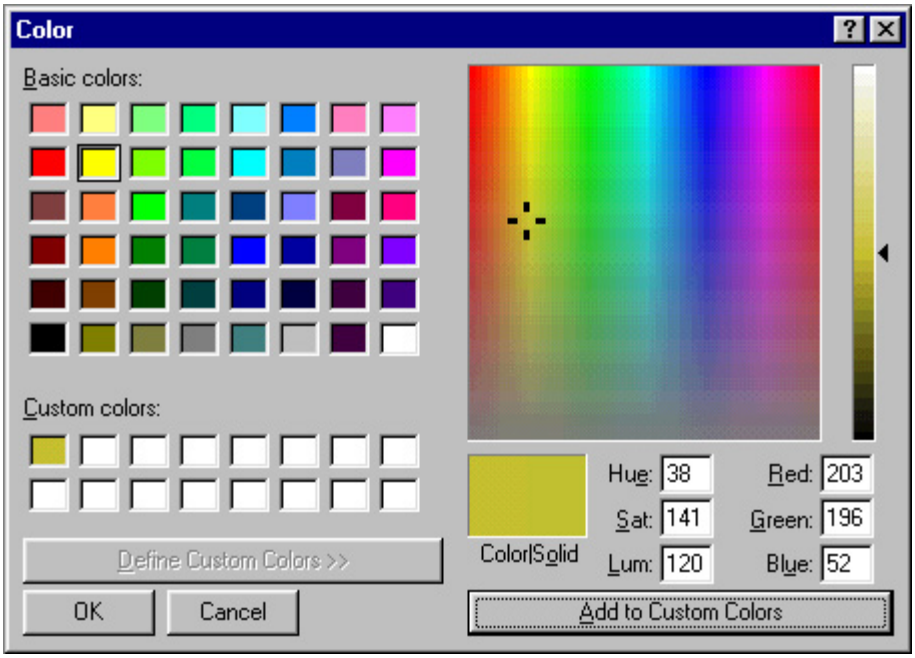
Select the COM ports for the GPS and the telemetry from the corresponding pull-down menus. The GPS port may be set to COM1 through COM4, or to None if no GPS is available for the ROS (in which case the ROS position, speed, and heading must be entered by hand). The telemetry port may be set to COM1 through COM4.

Select the baud rate for the GPS from its pull-down menu.

- **9600 baud** for the standard ROS Garmin GPS
- **4800 baud** for the optional PLGR military GPS receiver

Click OK when finished.

Custom Color Dialog Box



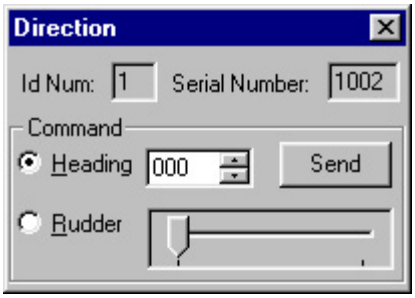
The Color Dialog Box selects a custom color.

Add a Custom color to the list of Custom Colors by either:

- Clicking on the large color matrix on the right of the dialog box, and adjusting the color slider on its right, or
- Entering Hue, Saturation, and luminosity values in the corresponding edit boxes, or
- Entering RGB values into the corresponding edit boxes.

The Custom Color will be displayed in the rectangle under the color matrix. Click on the Add to Custom Colors button to add the new color to the Custom colors table at the lower left quadrant of the dialog box. Click on that color to select it, then click OK.

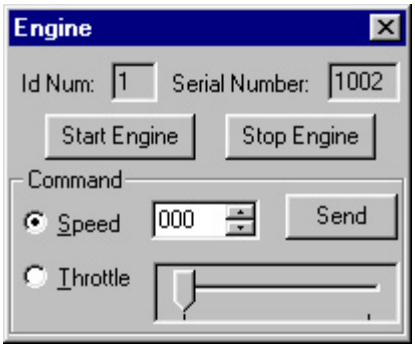
Direction Dialog Box



The Direction Dialog Box sends Heading and Rudder Commands to the current target. The Identification Number and Side Number (Serial Number) of the current target are displayed at the top of the dialog box.

Click on the radio button for either Heading or Rudder. For Heading, enter the course in degrees clockwise from true North. For Rudder, adjust the slider to the left for left rudder, at the center for center rudder, and to the right for right rudder. Click on the Send button to send the selected command to the current target.

Engine Dialog Box

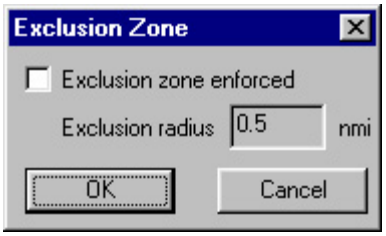


The Engine Dialog Box sends Speed and Throttle Commands to the current target. The Identification Number and Side Number (Serial Number) of the current target are displayed at the top of the dialog box.

Click on the Start Engine button to send a Start Engine Command to the current target. Click on the Stop Engine button to send a Stop Engine Command to the current target.

Click on the radio button for either Speed or Throttle. For Speed, enter the speed in knots. For Throttle, adjust the slider to the left for lower throttle settings and to the right for higher throttle settings. Click on the Send button to send the selected command to the current target.

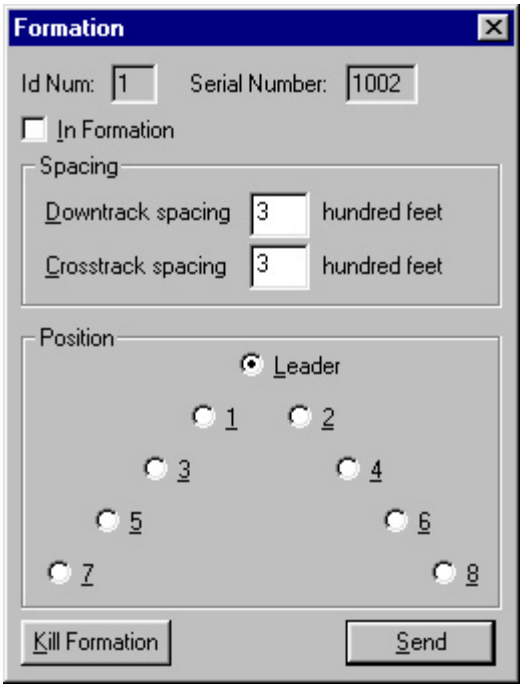
Exclusion Zone Dialog Box



The Exclusion Zone Dialog Box manages a circular exclusion zone around the ships in the mission.

Check the Exclusion Zone Enforced checkbox to enforce the exclusion zone. Enter a radius for the exclusion zone in nautical miles into the edit box. Click OK when ready.

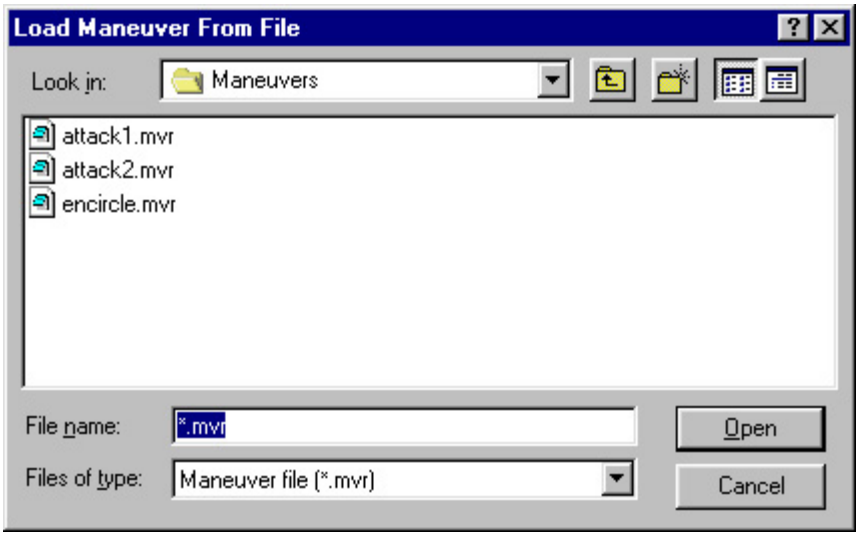
Formation Dialog Box



The Formation Dialog Box sends Formation Commands to the current target. The Identification Number and Side Number (Serial Number) of the current target are displayed at the top of the dialog box. The remainder of the fields will reflect the formation state of the current target as far as it is known by the ROS.

Check the In Formation checkbox to add the current target to the formation. Uncheck it to remove the current target from the formation. Enter the downtrack spacing and crosstrack spacing in hundreds of feet. Click on the radio button corresponding to the desired position of the current target in the formation. Click on the Send button to send the Formation Command to the current target. Click on the Kill Formation button to kill the formation, that is, to remove all targets from the formation.

Load Maneuver Dialog Box

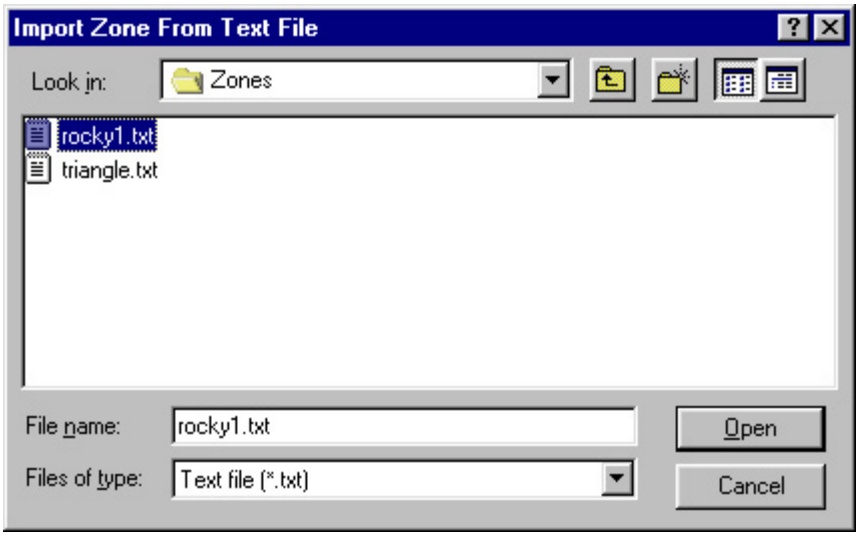


The Load Maneuver Dialog Box loads a maneuver from a file to the current target.

The large window will show all available maneuvers. Select one by either double-clicking on it, or by clicking on it and then clicking on the Open button, or by entering its name into the File Name edit box and clicking on the Open button.

The Load Maneuver Dialog Box will open in the default maneuver folder, and it may be navigated to other folders in the usual manner.

Import Zone Dialog Box



The Import Zone Dialog Box loads a zone from a text file, the format of which will be described below.

The large window will show all available text files. Select one by either double-clicking on it, or by clicking on it and then clicking on the Open button, or by entering its name into the File Name edit box and clicking on the Open button. Multiple text files may be selected by holding down the Shift or Ctrl key while clicking.

The Import Zone Dialog Box will open in the default zone folder, and it may be navigated to other folders in the usual manner.

Text File Format

Imported text files must contain a list of points, one per line, with each line in one of the following two formats:

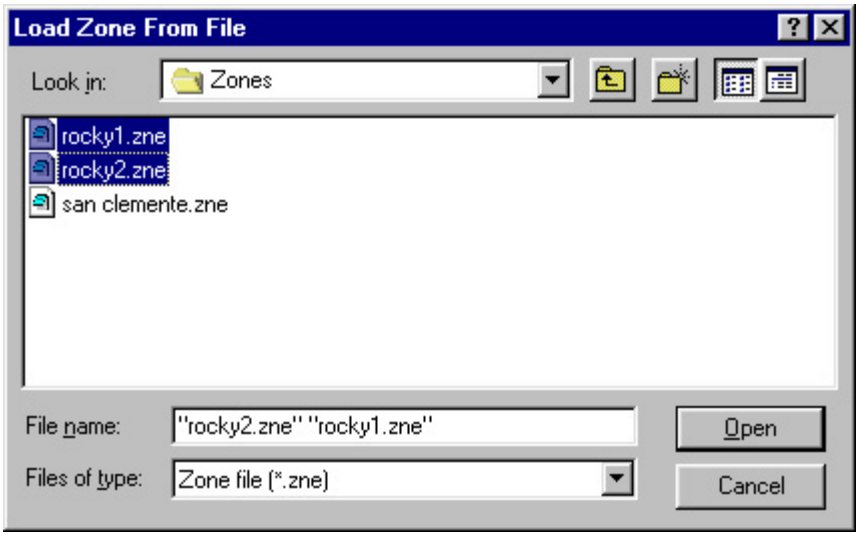
1. Latitude and longtitude in degrees and minutes: integer latitude degrees, followed by a comma, followed by floating point minutes,followed by a comma, followed by the hemisphere ("N" or "S"), followed by a comma, followed by integer longtitude degrees, followed by a comma, followed by floating point minutes, followed by a comma, followed by the hemisphere ("W" or "E"). The following example shows 33 degrees, 2.0430 minutes North latitude, 118 degrees 37.0181 minutes West longtitude.

```
33,2.0430,N,118,37.0181,W
```

2. Latitude and longtitude in minutes: floating point minutes of latitude (North is positive, South is negative), followed by a space, followed by floating point minutes longtitude (West is positive, East is negative). The following example shows 1982.0430 minutes North and 7117.0181 minutes West (which is exactly the same location as the previous example).

```
1982.0430 7117.0181
```

Load Zone Dialog Box

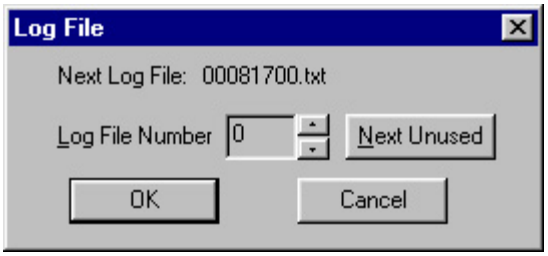


The Load Zone Dialog Box loads a zone from a file.

The large window will show all available zones. Select one by either double-clicking on it, or by clicking on it and then clicking on the Open button, or by entering its name into the File Name edit box and clicking on the Open button. Multiple zones may be selected by holding down the Shift or Ctrl key while clicking.

The Load Zone Dialog Box will open in the default zone folder, and it may be navigated to other folders in the usual manner.

Log File Dialog Box



The Log File Dialog Box manages log files. It should only be used after the ROS or its computer hardware or software has malfunctioned.

The name of the log file to be used for the next mission is shown at the top of the dialog box. The last two digits of the log file name are the *log file number*, that is, the number of live missions that have been carried out today.
Occasionally there may be a need to adjust the log file number manually. This can be done either by clicking on the up and down arrows next to the Log File Number edit box, or by clicking on the Next Unused button, which advances the log file number to the next unused log file number.

MROS Dialog Box

The MROS Dialog Box sends MROS Commands to the current target. MROS commands tell the target vehicle whether to respond to ("enable") or ignore ("disable") commands from the MROS. At power up the vehicle will always be in MROS enabled mode, and will respond to the MROS. All normal operations should leave it enabled, and the MROS should simply be turned off when not needed. The ROS command to disable the MROS should only be used for multiple vehicle operations when the operator wishes to use the MROS on a second or subsequent vehicle without affecting vehicles already under ROS control.

Click on the Enable button to send an MROS Enable command to the current target, which places it under MROS control. Click on the Disable button to send an MROS Disable command to the current target, which removes it from MROS control.

Operation Mode Dialog Box

The Operation Mode Dialog Box sets the operation mode for a new mission.

Click on the Simulation radio button for a simulation, or on the Live radio button for a live mission. Simulation mode is designed to help train the operator in the use of the ROS interface. Live mode is to be used for live missions with real targets. In simulation mode no commands will be sent to targets via the telemetry stream, but (NetROS only) TSPI packets will be sent.

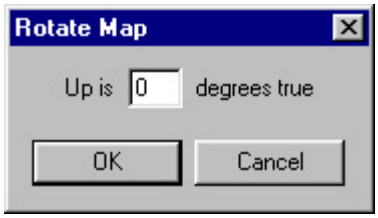
Checking on the ROS Relative Navigation checkbox will cause all waypoints to move at the same speed and heading as the command ship carrying the ROS, that is, all navigation will be relative to the ROS. Leaving this checkbox unchecked will give each waypoint a fixed latitude and longtitude. Note that this will affect the appearance of the waypoint location in the Waypoint Location Dialog Box.

Rotate Maneuver Dialog Box

The Rotate Maneuver Dialog Box rotates the current maneuver clockwise about the current target.

Enter the number of degrees into the edit box and click on OK.

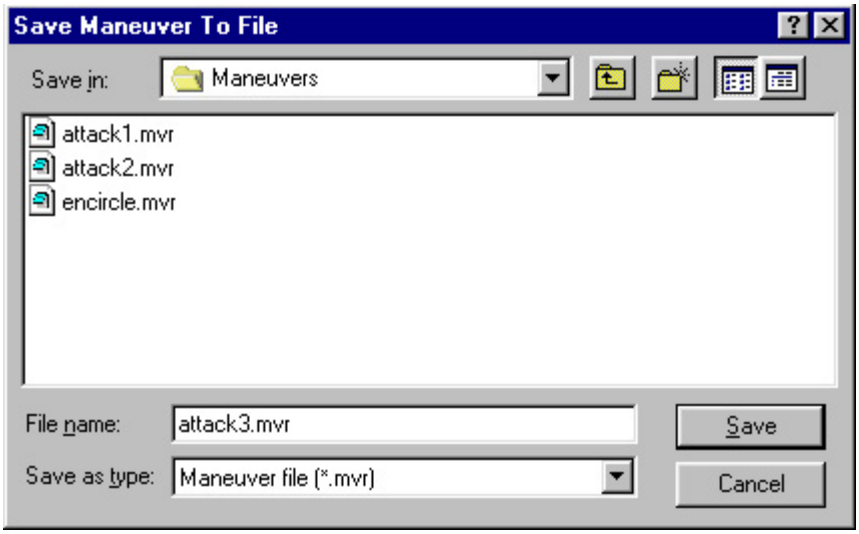
Rotate Map Dialog Box



The Rotate Map Dialog Box is used to rotate the maps in the ROS window. This operation applies to all maps.

Enter the number of degrees clockwise from true North that is to be up in the new map orientation, then click OK.

Save Maneuver Dialog Box

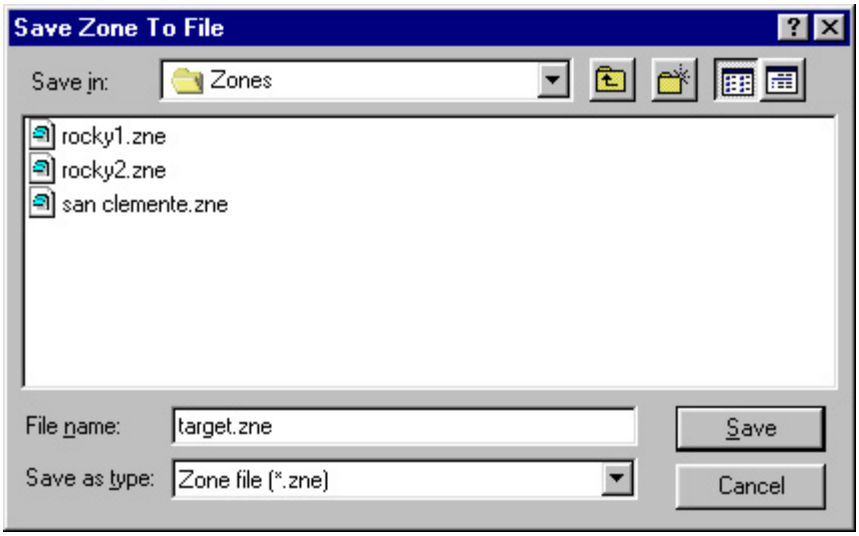


The Save Maneuver Dialog Box saves a maneuver to a file from the current target.

The large window will show all available maneuvers. Select one by either double-clicking on it, or by clicking on it and then clicking on the Save button, or by entering its name into the File Name edit box and clicking on the Save button.

The Save Maneuver Dialog Box will open in the default maneuver folder, and it may be navigated to other folders in the usual manner.

Save Zone Dialog Box

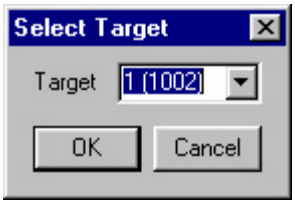


The Save Zone Dialog Box saves a zone to a file.

The large window will show all available zones. Select one by either double-clicking on it, or by clicking on it and then clicking on the Save button, or by entering its name into the File Name edit box and clicking on the Save button.

The Save Zone Dialog Box will open in the default zone folder, and it may be navigated to other folders in the usual manner.

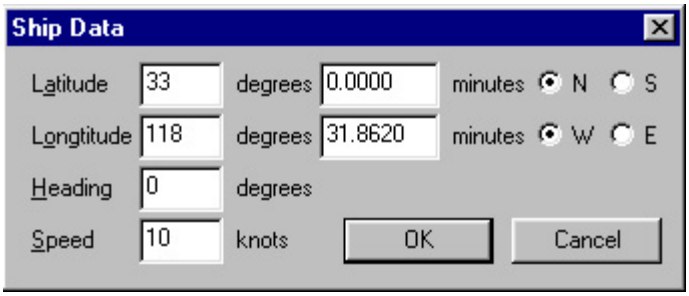
Select Target Dialog Box



The Select Target Dialog Box allows the selection of a target that is not necessarily displayed on any map as the current target. Targets are listed by identification number, with the side number in parentheses.

Select the desired target from the drop-down menu and click on OK.

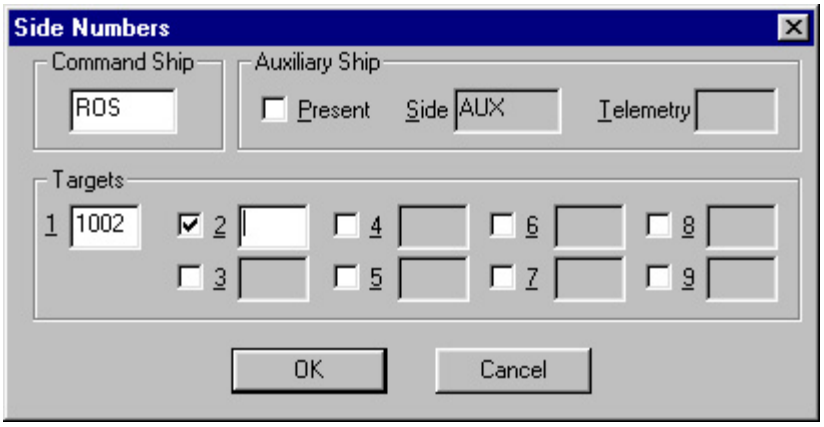
Ship Data Dialog Box



The Ship Data Dialog Box allows the operator to manually set the position, heading, and speed of the command ship. It is designed primarily to be used in Simulation Mode and in Live Mode missions in which the ROS GPS is not available or has malfunctioned. The edit boxes will initially contain the best values for the ship data and are not updated while the dialog box is open. Heading data is in degrees clockwise from true North.

Enter the ship's data into the edit boxes and click on OK.

Side Numbers Dialog Box



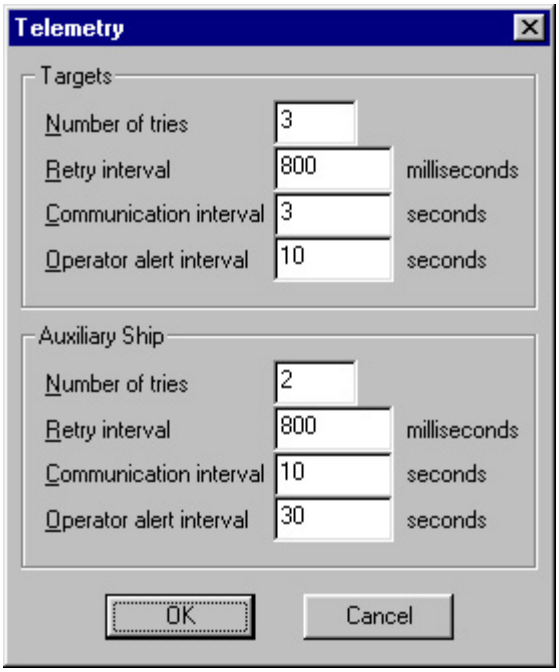
The Side Numbers Dialog Box sets the side numbers for the vehicles at the start of a mission.

The side number for the command ship, which is assumed to carry the ROS and its GPS, should be entered in the edit box at top left. If an auxiliary ship is present, check the Present checkbox under Auxiliary Ship, and enter its Side Number and Telemetry Number (corresponding to the onboard telemetry package) in the corresponding edit boxes.

Target 1 must always be present. Click on the checkboxes for any additional targets. Targets must be used in numerical order (for example, Target 2 must be used before Targets 3, 4, 5, etc.) Enter their side numbers in the corresponding edit boxes, which will become active once their checkboxes have been checked.

Click OK when finished. Click Cancel to cancel the mission.

Telemetry Dialog Box



The Telemetry Dialog Box manages telemetry settings. It is strongly recommended that the operator **not** change the telemetry settings from the default values pictured above, with the possible exception of the setting mentioned at the end of this page.

The ROS gets telemetry information from its vehicles by sending telemetry requests to each vehicle in turn, issuing a request once in every *communication interval* under normal conditions. Commands are also sent in response to input from the operator. If the vehicle does not respond to a telemetry request or command, it is repeated for a total *number of tries*, waiting for a *retry interval* between each retry. If the vehicle continues to be unresponsive after an *operator alert interval*, a warning is issued to the operator.

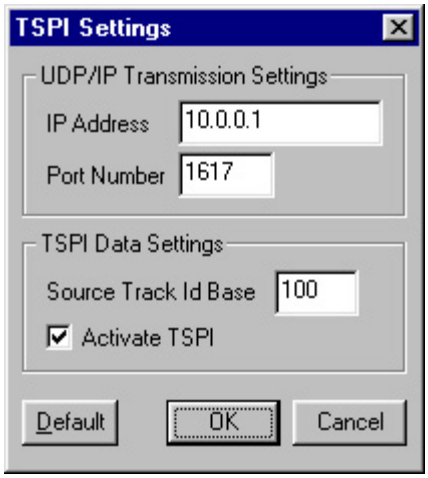
The Telemetry Dialog Box is divided into two parts. The uppermost part of the dialog box deals with communication with the targets. The lowermost part deals with communication with the auxiliary ship. Each part has four values:

1. **Number of Tries**: If a vehicle does not respond to a telemetry request or command, it is sent this many times in total, including the initial try.
2. **Retry Interval**: The amount of time in milliseconds between repeats of a telemetry request or command to a nonresponding vehicle.
3. **Communication Interval**: The amount of time in seconds between telemetry requests for responding vehicles.
4. **Operator Alert Interval**: The period of time in seconds after which the operator is notified that a vehicle is not responding to telemetry requests or commands.

If the number of tries for the auxiliary ship is set to zero and an auxiliary ship is selected in the Side Numbers Dialog Box at the start of the mission, then the auxiliary ship will be simulated instead of having telemetry requests sent to it. If telemetry requests are to be sent to the auxiliary ship, the number of tries should be set to the default value shown in the picture at the top of this page.

Enter the telemetry settings into the edit boxes and click OK.

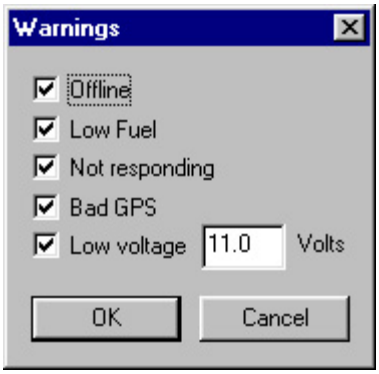
TSPI Settings Dialog Box



(NetROS only) The TSPI Settings Dialog Box manages the TSPI settings. Two edit boxes at the top of the dialog box contain the IP address and port number of the computer receiving the TSPI packets. The third edit box contains the *source track id base*, which is added to the identification number of each vehicle in the TSPI packets. The checkbox is checked if TSPI packets are to be sent (in which case TSPI packets are sent during both simulations and live missions), and unchecked otherwise.

Enter the IP address, port number, and source track id base into the edit boxes. The IP address and port number can be set to default values (IP address 10.2.255.255, port 1617) by clicking on the Default button. Check the Activate TSPI checkbox to activate the TSPI. Click OK when finished.

Warnings Dialog Box

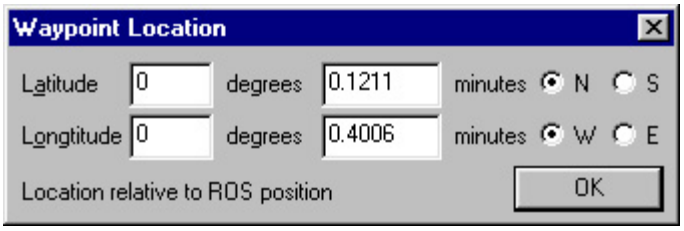


The Warnings Dialog Box allows the operator to choose which conditions the operator will be warned about. There are five warning conditions:

1. **Offline**: A target is not responding to telemetry requests or commands.
2. **Low Fuel**: A target is reporting low fuel.
3. **Not Responding**: A target is not responding to commands.
4. **Bad GPS**: A target is reporting a bad GPS.
5. **Low Voltage**: A target is reporting battery voltage lower than or equal to the voltage value in the edit box.

Check the checkboxes corresponding to the warnings that you wish to receive, enter the low voltage value into the edit box if required, then click OK.

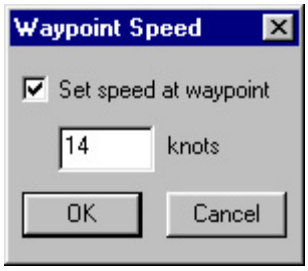
Waypoint Location Dialog Box



The waypoint Location Dialog Box manually sets the location of the current waypoint.

Set the latitude and longtitude of the waypoint using the edit boxes and the radio buttons. If ROS Relative Navigation was checked in the Operation Mode Dialog Box at the start of the mission, then these latitudes and longtitudes will be relative to the position of the command ship containing the ROS, otherwise they will be absolute latitude and longtitude. Notice that a reminder at the lower left side of the dialog box states whether or not the waypoint location is relative to the ROS. Click OK when ready.

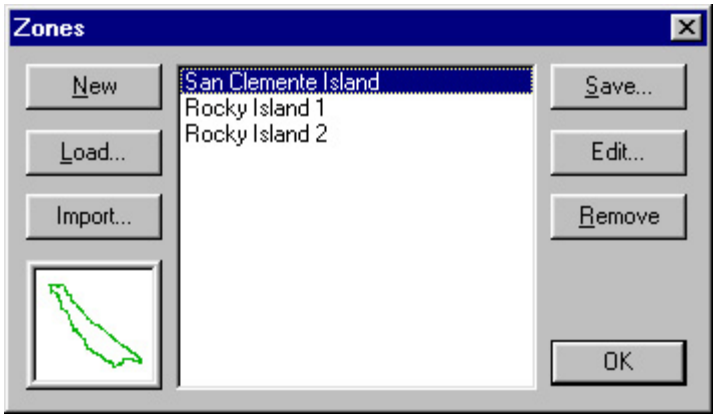
Waypoint Speed Dialog Box



The waypoint Speed Dialog Box sets the speed that the current target is to take on at the current waypoint. The ROS will then automatically issue a Speed Command to this the when it arrives at the waypoint. The checkbox is checked if this function is required, and unchecked if it is not required. The edit box contains the desired speed in knots.

If a speed change is required, check the checkbox and enter the desired speed in knots into the edit box. If a speed change is not required, uncheck the check box. Click OK when finished.

Zones Dialog Box



The Zones Edit Dialog Box is used to load, save, delete, create, and edit zones. The large window at the center of the dialog box shows the currently loaded zones. The highlighted zone is the *current zone*. The current zone can be selected by clicking on it with the left mouse button. The small window at the lower left of the dialog box shows the current zone as it will appear on a map window.

Creating a New Zone

To create a new zone, click on the New button. The newly created zone, which will contain no points and therefore be invisible, will appear under the name Unnamed Zone and become the current zone. The operator must then edit the zone (see below) to insert points in it.

Loading a Zone from a File

To load a zone from a file, click on the Load button. The Load Zone Dialog Box will appear. The successfully loaded zone will appear after the Load Zone Dialog Box has been completed.

Importing a Zone

To import a zone from a text file, click on the Import button. The Import Zone Dialog Box will appear. The successfully imported zone will appear under the name Imported Zone after the Import Zone Dialog Box has been completed. It will have a default color (grey) and fill style (crosshatched). The operator may edit the zone (see below) to change its name, color, and fill style. We recommend that the operator save the zone (see below) to avoid having to re-enter its name, color, and fill style every time it is used.

Saving a Zone to a File

To save the current zone to a file, click on the Save button. The Save Zone Dialog Box will appear.

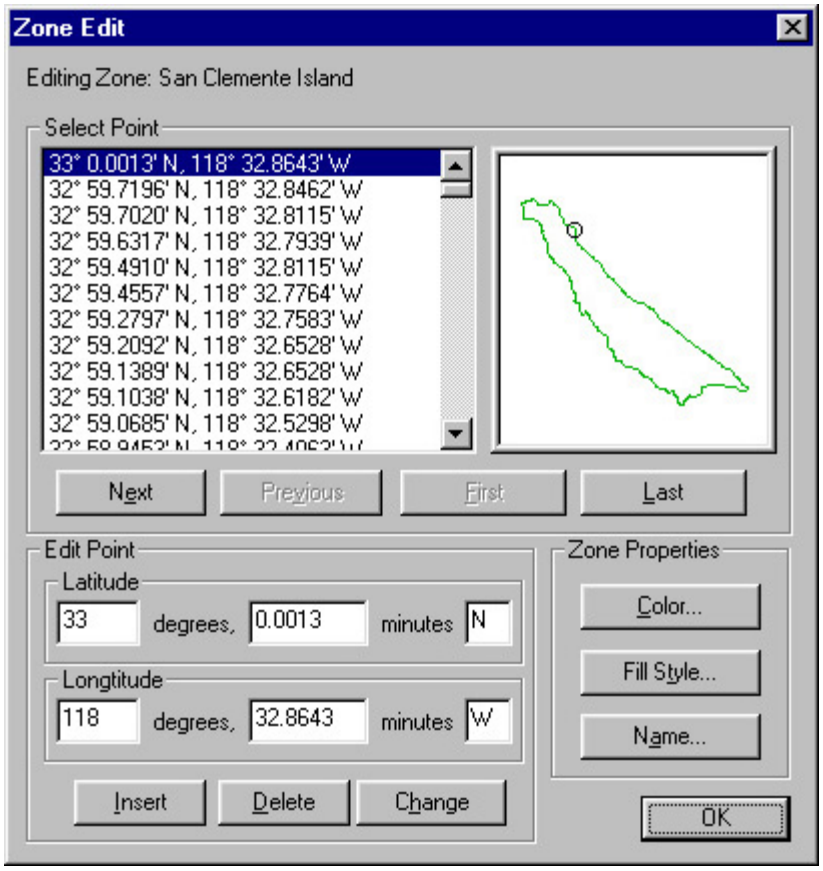
Editing a Zone

To edit the current zone, either double-click on it, or click on the Edit button. The Zone Edit Dialog Box will be displayed.

Deleting a Zone

To delete the current zone, click on the Remove button.

Zone Edit Dialog Box



The Zone Edit Dialog Box is used to edit zones. The large window at upper left shows the latitude and longtitude of points on the perimeter of the zone. The highlighted point, which can be selected by clicking on it with the left mouse button, is the *current point* in the current zone. The large window at upper right shows the zone as it will appear on a map window. The black circle in this window indicates the location of the current point.

The buttons at the center of the Zone Edit Dialog Box can be used to view the points in the current zone more precisely than using the mouse. The lower left portion of the dialog box (the area labeled "Edit Point") is used to view, delete, create, and edit the points in the current zone. Buttons in the lower right portion of the dialog box (the area labeled "Zone Properties") can be used to edit the current zone's color, style, and name.

Editing the Zone Color

To edit the current zone's color, click on the Color button. The Color Dialog Box will be displayed.

Editing the Zone Name

To edit the current zone's name, click on the Name button. The Edit Zone Name Dialog Box will be displayed.

Editing the Zone Style

To edit the current zone's style, click on the Style button. The Zone Style Dialog Box will be displayed.

Viewing the Points

The current point in the current zone appears in the edit boxes. To view the points in the order in which they are drawn, use the Next and Prev buttons. The First button will jump to the first point, and the Last button will jump to the last point. If the current point is the first point, the Prev and First buttons will be disabled (as in the image at the top of this page). If the current point is the last point, the Next and Last buttons will be disabled.

Deleting a Point

To delete the current point, click on the Delete button. The next point will become the current point.

Inserting a New Point

To insert a new point, click on the Insert button. A new point with the latitude and longtitude from the edit boxes will be inserted before the current point. This new point will become the current point. (Although it is impossible to append a point after the last point, inserting it before the first point will have the same effect.)

Changing a Point

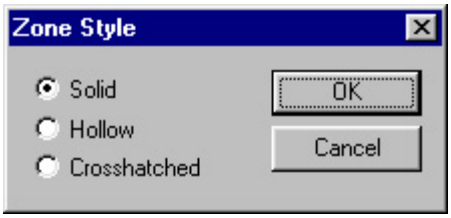
To change the current point, enter new values into the edit boxes and click on the Change button. The current point will be modified to make it identical to the values in the edit boxes.

Edit Zone Name Dialog Box

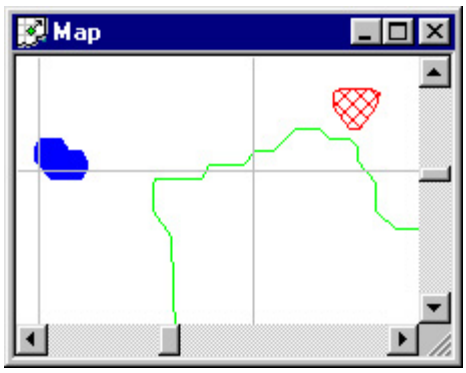
The Edit Zone Name Dialog Box is used to set the zone name. The zone name will appear in the list of zone names in the Zones Dialog Box.

Enter the name into the edit box and click OK.

Zone Style Dialog Box



The Zone Style Dialog Box is used to set the zone drawing style. A zone may be solid, hollow, or crosshatched. For example, the following map shows a solid blue zone, a portion of a hollow green zone, and a crosshatched red zone.

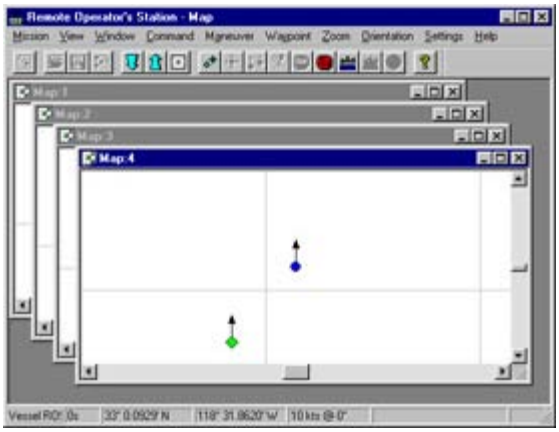


Click on the radio button corresponding to the desired style, then click OK.

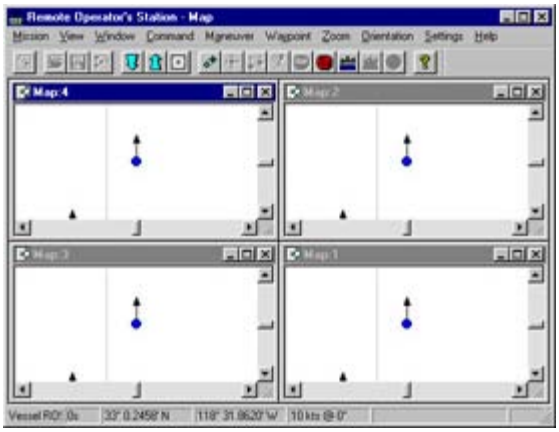
Window Menu

The Window Menu is accessible from the Mission Menu Bar. It has four fixed selections:

1. **New Map**: Display a new map window.
2. **Cascade**: Cascade the map windows so that they overlap.



3. **Tile**: Tile the map windows so that none overlap.



4. **Arrange Icons**: Arrange any minimized map windows neatly at the bottom of the ROS window.

The Window Menu also has a variable number of numbered selections corresponding to map windows. These will be numbered Map:1, Map:2, etc. Checking one of these will cause it to be the current window.

It is possible to have multiple map windows open, of different sizes and different zoom levels, centered on different vehicles.

Command Menu

The Command Menu is accessible from the Mission Menu Bar. It has eleven selections:

1. **Engine**: Display the Engine Dialog Box (this function is also available from the Engine Button on the toolbar). This menu selection is enabled only when there is a current target selected.
2. **Stop**: Send a Stop Command to the current target, which will stop its engine (this function is also available from the Stop Command Button on the toolbar). This menu selection is enabled only when there is a current target selected.
3. **All Stop**: Send a Stop Command to all targets (this function is also available from the All Stop Command Button on the toolbar and by pressing the Esc key on the keyboard).
4. **Direction**: Display the Direction Dialog Box (this function is also available from the Direction Button on the toolbar). This menu selection is enabled only when there is a current target selected.
5. **Formation**: Display the Formation Dialog Box. This menu selection is enabled only when there is a current target selected.
6. **MROS**: Display the MROS Dialog Box. This menu selection is enabled only when there is a current target selected.
7. **Camera**: Display the Camera Dialog Box (this function is also available from the Camera Button on the toolbar). This menu selection is enabled only when there is a current target selected.
8. **Auxiliary**: (NetROS only) Display the Auxiliary Command Dialog Box (this function is also available from the Auxiliary Command Button on the toolbar). This menu selection is enabled only when there is a current target selected.
9. **Select**: Display the Command/Select Menu.
10. **Ship Data**: Display the Ship Data Dialog Box (this function is also available from the Ship Data Button on the toolbar).
11. **Aux Ship Data**: Display the Auxiliary Ship Data Dialog Box, which is identical in content to the Ship Data Dialog Box (this function is also available from the Aux Ship Data Button on the toolbar). This menu selection is enabled only when there is an auxiliary ship on the current mission.

Maneuver Menu

The Maneuver Menu is accessible from the Mission Menu Bar. It has three selections:

1. **Load**: Display the Load Maneuver Dialog Box (this function is also available from the Load Maneuver Button on the toolbar and by selecting Load Maneuver from the Maneuver Floating Menu). This menu selection is enabled only when there is a current target selected.
2. **Save**: Display the Save Maneuver Dialog Box (this function is also available from the Save Maneuver Button on the toolbar and by selecting Save Maneuver from the Maneuver Floating Menu). This menu selection is enabled only when there is a current maneuver selected.
3. **Rotate**: Display the Rotate Maneuver Dialog Box (this function is also available from the Rotate Maneuver Button on the toolbar and by selecting Rotate Maneuver from the Maneuver Floating Menu). This menu selection is enabled only when there is a current maneuver selected.

Waypoint Menu

The Waypoint Menu is accessible from the Mission Menu Bar. It has four selections:

1. **Speed**: Display the Waypoint Speed Dialog Box (this function is also available by selecting Speed at Waypoint from the Waypoint Floating Menu). This menu selection is enabled only when there is a current waypoint selected.
2. **Delete**: Delete the current waypoint (this function is also available by selecting Delete Waypoint from the Waypoint Floating Menu). This menu selection is enabled only when there is a current waypoint selected.
3. **Insert**: Insert a new waypoint in front of the current waypoint (this function is also available by selecting Insert Waypoint from the Waypoint Floating Menu). The new waypoint becomes the current waypoint, and may be moved to the correct position by using drag-and-drop or selecting Position from the Waypoint Menu. This menu selection is enabled only when there is a current waypoint selected.
4. **Position**: Display the Waypoint Location Dialog Box (this function is also available by selecting Location of Waypoint from the Waypoint Floating Menu). This menu selection is enabled only when there is a current waypoint selected.

Zoom Menu

The Zoom Menu is accessible from the Mission Menu Bar. It has five selections, each of which modify the zoom level on the map displayed in the current window:

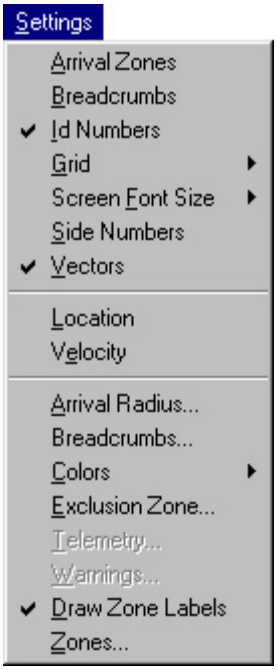
1. **Zoom In**: Double the size of the map. (this function is also available from the Zoom In Button on the toolbar and by selecting Zoom In from the Default Floating Menu).
2. **Zoom Out**: Halve the size of the map. (this function is also available from the Zoom Out Button on the toolbar and by selecting Zoom Out from the Default Floating Menu).
3. **Min Zoom**: Zoom out to the minimum zoom level.
4. **Max Zoom**: Zoom in to the maximum zoom level.
5. **Zoom To**: Display the Zoom/Zoom To Menu.

Orientation Menu

The Orientation Menu is accessible from the Mission Menu Bar. It has four selections:

1. **Lock On**: Display the Orientation/Lock On Menu.
2. **Recenter**: Recenter the map in the current window to its current map lock (this function is also available from the Recenter Button on the toolbar and by selecting Recenter from the Default Floating Menu).
3. **Up Is**: Display the Rotate Map Dialog Box.
4. **Compass**: Display the Orientation/Compass Menu.

Settings Menu



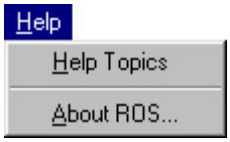
This version of the Settings Menu is accessible from the Mission Menu Bar (there is a more limited version of this menu in the Pre-mission Menu Bar). It has seventeen selections:

1. **Arrival Zones**: Checking this selection will draw waypoint arrival zones.
2. **Breadcrumbs**: Checking this selection will draw breadcrumbs behind moving vehicles. Breadcrumbs are small colored circles that show approximately where the target has been. Their color may be changed from the Setting/Colors Menu below.

3. **Id Numbers**: Checking this selection will draw target identification numbers (numbered 1, 2, etc.) in target icons. This menu selection is enabled only when there is more than one target in the current mission.
4. **Grid**: Display the Settings/Grid Menu.
5. **Screen Font Size**: (NetROS only) Display the Settings/Font Size Menu.
6. **Side Numbers**: Checking this selection will draw vector arrows on vehicle icons in the current window only. The font size of the side numbers in the current window can be adjusted (NetROS only) by selecting Screen Font Size above.
7. **Vectors**: Checking this selection will draw side numbers near vehicle icons in the current window only.
8. **Location**: Checking this selection will draw location information near vehicle icons in the current window only. The font size of the locations in the current window can be adjusted (NetROS only) by selecting Screen Font Size above.
9. **Velocity**: Checking this selection will draw speed and heading information near vehicle icons in the current window only. The font size of the velocities in the current window can be adjusted (NetROS only) by selecting Screen Font Size above.
10. **Arrival Radius**: Display the Arrival Radius Dialog Box.
11. **Breadcrumbs**: Display the Breadcrumbs Dialog Box.
12. **Colors**: Display the Setting/Colors Menu.
13. **Exclusion Zone**: Display the Exclusion Zone Dialog Box.
14. **Telemetry**: Display the Telemetry Dialog Box. This menu selection is enabled only on live missions.

15. **Warnings**: Display the Warnings Dialog Box. This menu selection is enabled only on live missions.
16. **Draw Zone Labels**: (NetROS only.) Checking this selection will draw zone labels.
17. **Zones**: Display the Zones Dialog Box.

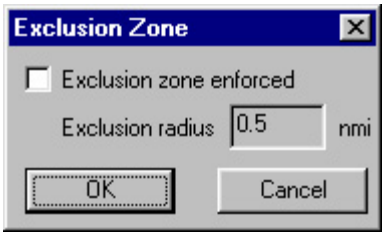
Help Menu



The Help Menu is accessible from the Pre-mission Menu Bar and the Mission Menu Bar. It has two selections:

1. **Help Topics**: Display this help file (this function is also available from the Help Button on the toolbar).
2. **About ROS**: Display the About ROS Dialog Box, which contain information about the ROS version number, and contact information for the vendor.

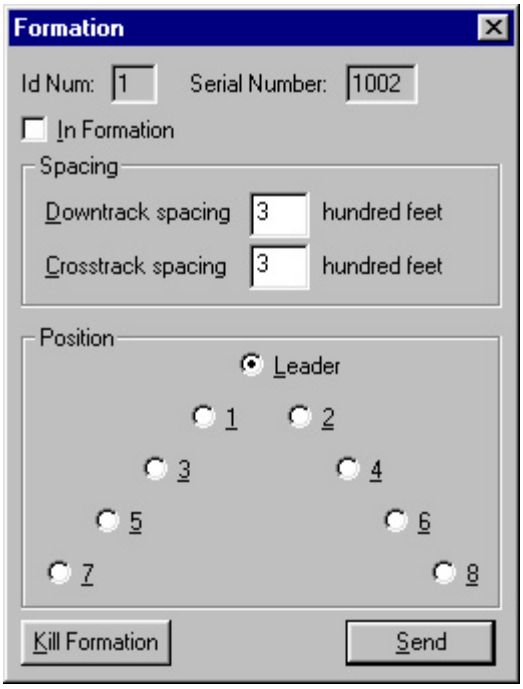
Exclusion Zone Dialog Box



The Exclusion Zone Dialog Box manages a circular exclusion zone around the ships in the mission.

Check the Exclusion Zone Enforced checkbox to enforce the exclusion zone. Enter a radius for the exclusion zone in nautical miles into the edit box. Click OK when ready.

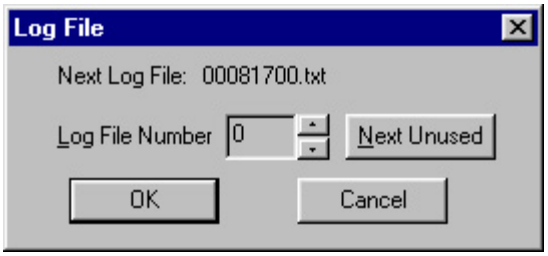
Formation Dialog Box



The Formation Dialog Box sends Formation Commands to the current target. The Identification Number and Side Number (Serial Number) of the current target are displayed at the top of the dialog box. The remainder of the fields will reflect the formation state of the current target as far as it is known by the ROS.

Check the In Formation checkbox to add the current target to the formation. Uncheck it to remove the current target from the formation. Enter the downtrack spacing and crosstrack spacing in hundreds of feet. Click on the radio button corresponding to the desired position of the current target in the formation. Click on the Send button to send the Formation Command to the current target. Click on the Kill Formation button to kill the formation, that is, to remove all targets from the formation.

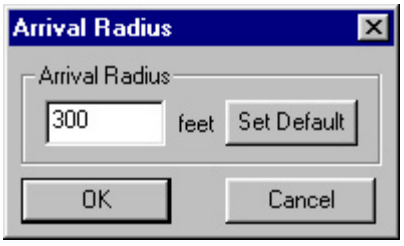
Log File Dialog Box



The Log File Dialog Box manages log files. It should only be used after the ROS or its computer hardware or software has malfunctioned.

The name of the log file to be used for the next mission is shown at the top of the dialog box. The last two digits of the log file name are the *log file number*, that is, the number of live missions that have been carried out today.
Occasionally there may be a need to adjust the log file number manually. This can be done either by clicking on the up and down arrows next to the Log File Number edit box, or by clicking on the Next Unused button, which advances the log file number to the next unused log file number.

Arrival Radius Dialog Box



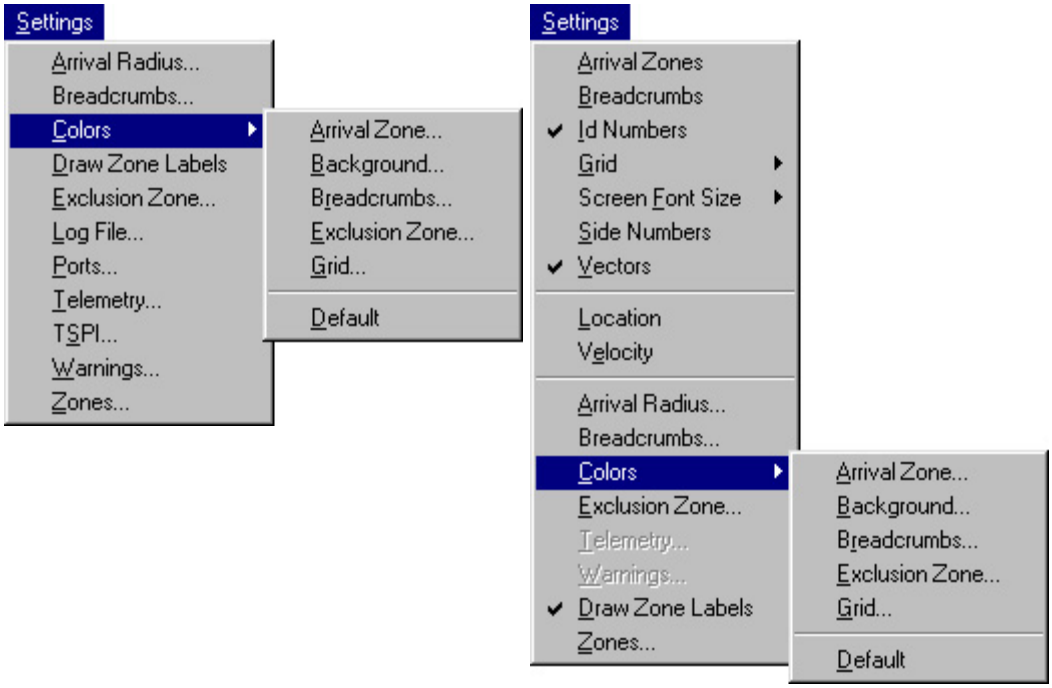
The Arrival Radius Dialog Box sets the *arrival radius*, which is the distance from the center of a waypoint in a maneuver at which a target is deemed to have arrived at the waypoint. Enter the desired arrival radius in feet in the edit box and click OK. Click on the Set Default button to set the default recommended arrival radius. Making the arrival radius smaller will not make the navigation more accurate, as the target vehicle will always aim for the center of the waypoint.

Color Dialog Box

The Color Dialog Box selects a color.

Click on one of the Basic colors, then click on OK to select that color. If you wish to use a color that does not appear in one of the Basic colors, click on the Define Custom Colors button to display the Custom Color Dialog Box.

Settings/Colors Menu



The Settings/Colors Menu is accessible from the Settings Menu in the Mission Menu Bar and the Settings Menu in the Pre-mission Menu Bar. It has six selections.

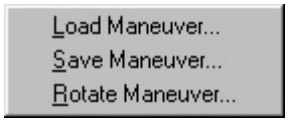
1. **Arrival Zone**: Display the Color Dialog Box to select a color for the arrival zone.
2. **Background**: Display the Color Dialog Box to select a color for the background.
3. **Breadcrumbs**: Display the Color Dialog Box to select a color for the breadcrumbs.
4. **Exclusion Zone**: Display the Color Dialog Box to select a color for the exclusion zone.
5. **Grid**: Display the Color Dialog Box to select a color for the grid.
6. **Default**: Set the default colors for the above items.

Rotate Maneuver Dialog Box

The Rotate Maneuver Dialog Box rotates the current maneuver clockwise about the current target.

Enter the number of degrees into the edit box and click on OK.

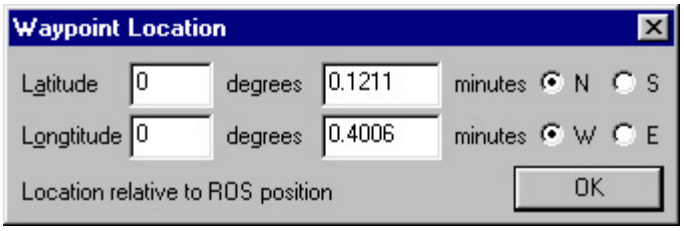
Maneuver Floating Menu



The Maneuver Floating Menu is available by right-clicking on a map window when a current target has been selected, but no current waypoint has been selected. It has three selections:

1. **Load Maneuver**: Display the Load Maneuver Dialog Box (this function is also available from the Load Maneuver Button on the toolbar and by selecting Load from the Maneuver Menu). This menu selection is enabled only when there is a current target selected.
2. **Save Maneuver**: Display the Save Maneuver Dialog Box (this function is also available from the Save Maneuver Button on the toolbar and by selecting Save from the Maneuver Menu). This menu selection is enabled only when there is a current maneuver selected.
3. **Rotate Maneuver**: Display the Rotate Maneuver Dialog Box (this function is also available from the Rotate Maneuver Button on the toolbar and by selecting Rotate from the Maneuver Menu).

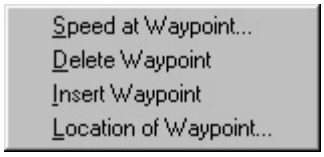
Waypoint Location Dialog Box



The waypoint Location Dialog Box manually sets the location of the current waypoint.

Set the latitude and longtitude of the waypoint using the edit boxes and the radio buttons. If ROS Relative Navigation was checked in the Operation Mode Dialog Box at the start of the mission, then these latitudes and longtitudes will be relative to the position of the command ship containing the ROS, otherwise they will be absolute latitude and longtitude. Notice that a reminder at the lower left side of the dialog box states whether or not the waypoint location is relative to the ROS. Click OK when ready.

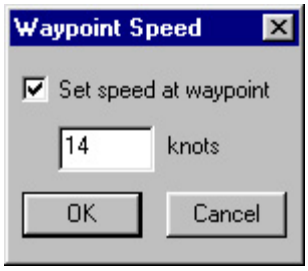
Waypoint Floating Menu



The Waypoint Floating Menu is available by right-clicking on a map window when a current waypoint has been selected. It has four selections:

1. **Speed at Waypoint**: Display the Waypoint Speed Dialog Box (this function is also available by selecting Speed from the Waypoint Menu).
2. **Delete Waypoint**: Delete the current waypoint (this function is also available by selecting Delete from the Waypoint Menu).
3. **Insert Waypoint**: Insert a new waypoint in front of the current waypoint (this function is also available by selecting Insert from the Waypoint Menu). The new waypoint becomes the current waypoint, and may be moved to the correct position by using drag-and-drop or selecting Position from the Waypoint Menu.
4. **Location of Waypoint**: Display the Waypoint Location Dialog Box (this function is also available by selecting Position from the Waypoint Menu).

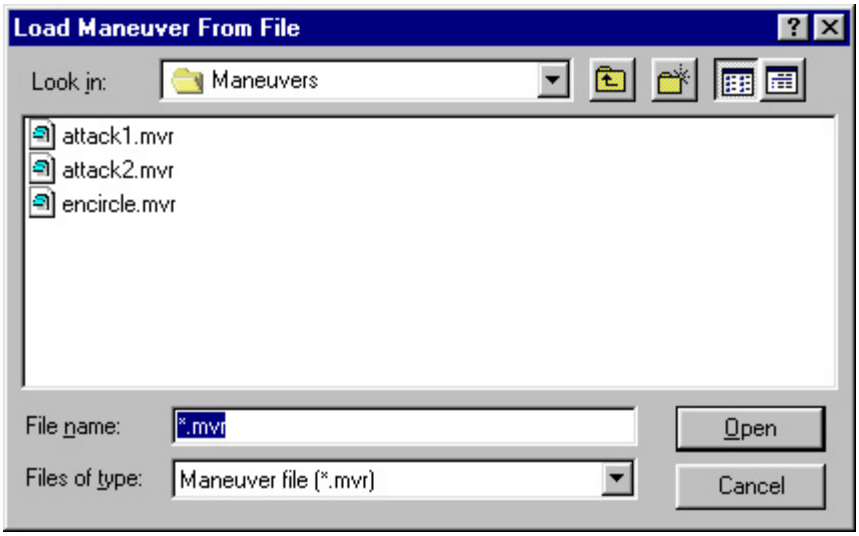
Waypoint Speed Dialog Box



The waypoint Speed Dialog Box sets the speed that the current target is to take on at the current waypoint. The ROS will then automatically issue a Speed Command to this the when it arrives at the waypoint. The checkbox is checked if this function is required, and unchecked if it is not required. The edit box contains the desired speed in knots.

If a speed change is required, check the checkbox and enter the desired speed in knots into the edit box. If a speed change is not required, uncheck the check box. Click OK when finished.

Load Maneuver Dialog Box

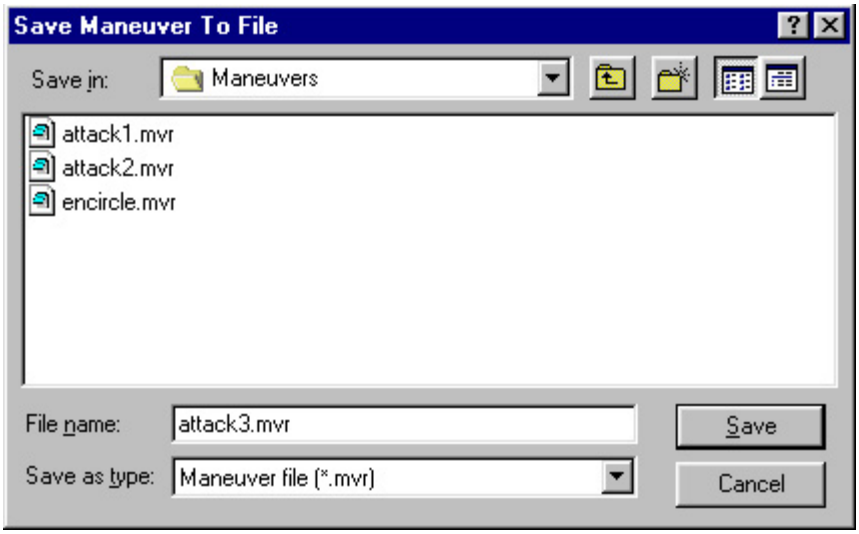


The Load Maneuver Dialog Box loads a maneuver from a file to the current target.

The large window will show all available maneuvers. Select one by either double-clicking on it, or by clicking on it and then clicking on the Open button, or by entering its name into the File Name edit box and clicking on the Open button.

The Load Maneuver Dialog Box will open in the default maneuver folder, and it may be navigated to other folders in the usual manner.

Save Maneuver Dialog Box

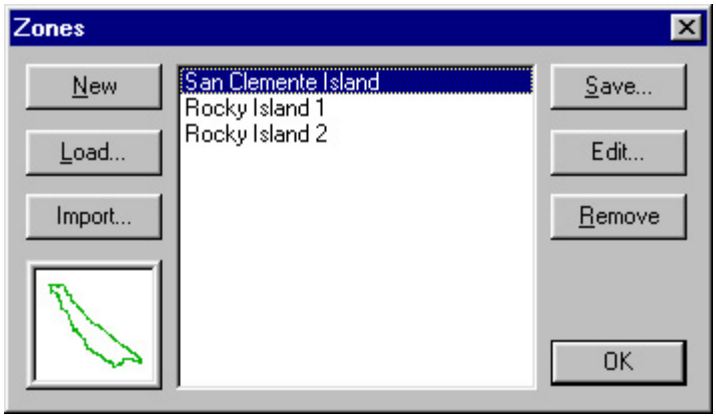


The Save Maneuver Dialog Box saves a maneuver to a file from the current target.

The large window will show all available maneuvers. Select one by either double-clicking on it, or by clicking on it and then clicking on the Save button, or by entering its name into the File Name edit box and clicking on the Save button.

The Save Maneuver Dialog Box will open in the default maneuver folder, and it may be navigated to other folders in the usual manner.

Zones Dialog Box



The Zones Edit Dialog Box is used to load, save, delete, create, and edit zones. The large window at the center of the dialog box shows the currently loaded zones. The highlighted zone is the *current zone*. The current zone can be selected by clicking on it with the left mouse button. The small window at the lower left of the dialog box shows the current zone as it will appear on a map window.

Creating a New Zone

To create a new zone, click on the New button. The newly created zone, which will contain no points and therefore be invisible, will appear under the name Unnamed Zone and become the current zone. The operator must then edit the zone (see below) to insert points in it.

Loading a Zone from a File

To load a zone from a file, click on the Load button. The Load Zone Dialog Box will appear. The successfully loaded zone will appear after the Load Zone Dialog Box has been completed.

Importing a Zone

To import a zone from a text file, click on the Import button. The Import Zone Dialog Box will appear. The successfully imported zone will appear under the name Imported Zone after the Import Zone Dialog Box has been completed. It will have a default color (grey) and fill style (crosshatched). The operator may edit the zone (see below) to change its name, color, and fill style. We recommend that the operator save the zone (see below) to avoid having to re-enter its name, color, and fill style every time it is used.

Saving a Zone to a File

To save the current zone to a file, click on the Save button. The Save Zone Dialog Box will appear.

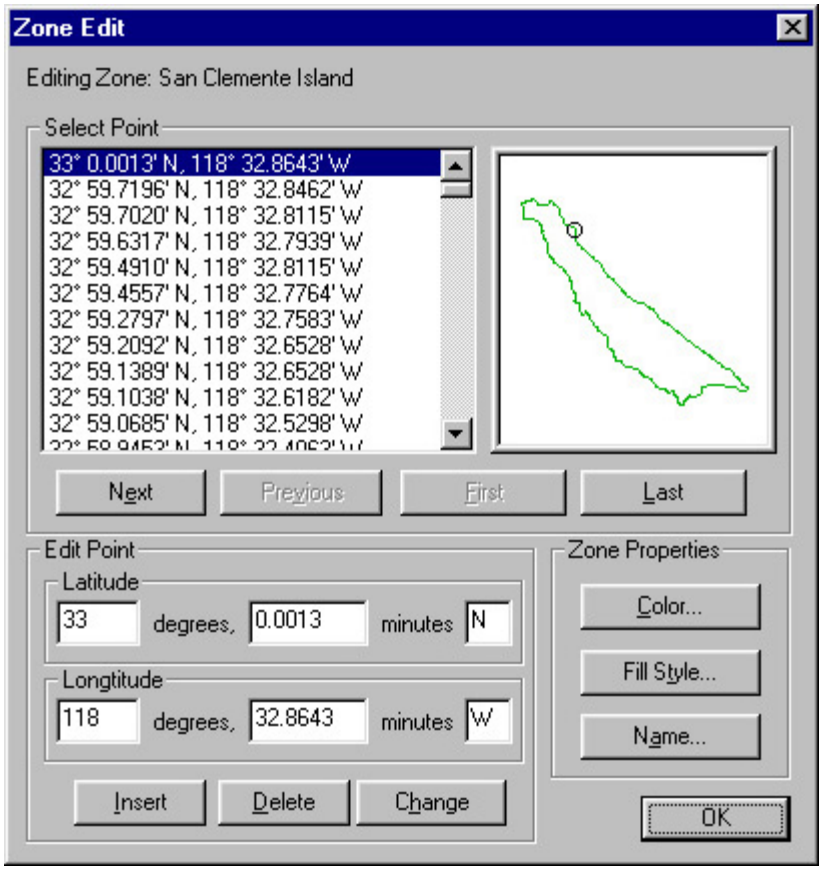
Editing a Zone

To edit the current zone, either double-click on it, or click on the Edit button. The Zone Edit Dialog Box will be displayed.

Deleting a Zone

To delete the current zone, click on the Remove button.

Zone Edit Dialog Box



The Zone Edit Dialog Box is used to edit zones. The large window at upper left shows the latitude and longtitude of points on the perimeter of the zone. The highlighted point, which can be selected by clicking on it with the left mouse button, is the *current point* in the current zone. The large window at upper right shows the zone as it will appear on a map window. The black circle in this window indicates the location of the current point.

The buttons at the center of the Zone Edit Dialog Box can be used to view the points in the current zone more precisely than using the mouse. The lower left portion of the dialog box (the area labeled "Edit Point") is used to view, delete, create, and edit the points in the current zone. Buttons in the lower right portion of the dialog box (the area labeled "Zone Properties") can be used to edit the current zone's color, style, and name.

Editing the Zone Color

To edit the current zone's color, click on the Color button. The Color Dialog Box will be displayed.

Editing the Zone Name

To edit the current zone's name, click on the Name button. The Edit Zone Name Dialog Box will be displayed.

Editing the Zone Style

To edit the current zone's style, click on the Style button. The Zone Style Dialog Box will be displayed.

Viewing the Points

The current point in the current zone appears in the edit boxes. To view the points in the order in which they are drawn, use the Next and Prev buttons. The First button will jump to the first point, and the Last button will jump to the last point. If the current point is the first point, the Prev and First buttons will be disabled (as in the image at the top of this page). If the current point is the last point, the Next and Last buttons will be disabled.

Deleting a Point

To delete the current point, click on the Delete button. The next point will become the current point.

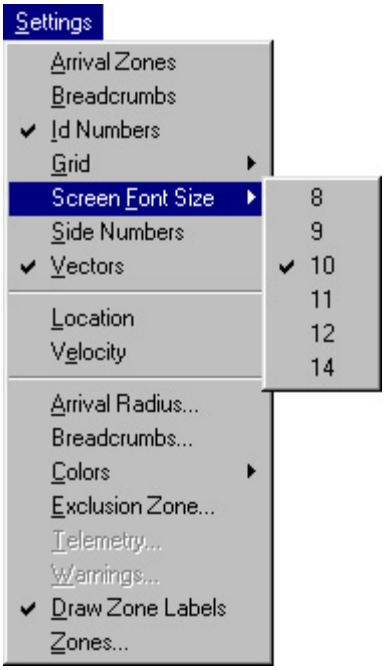
Inserting a New Point

To insert a new point, click on the Insert button. A new point with the latitude and longtitude from the edit boxes will be inserted before the current point. This new point will become the current point. (Although it is impossible to append a point after the last point, inserting it before the first point will have the same effect.)

Changing a Point

To change the current point, enter new values into the edit boxes and click on the Change button. The current point will be modified to make it identical to the values in the edit boxes.

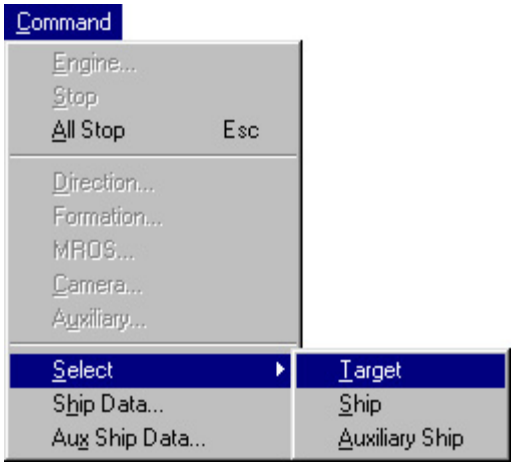
Settings/Font Size Menu



(NetROS only.) The Settings/Font Size Menu is accessible from the Settings Menu. It has six selections, each of which set the screen font size for the current window (this includes data written beside the vehicle icons, zone labels, and grid labels):

1. **8**: Checking this selection will set the font size to 8 points.
2. **9**: Checking this selection will set the font size to 9 points.
3. **10**: Checking this selection will set the font size to 10 points.
4. **11**: Checking this selection will set the font size to 11 points.
5. **12**: Checking this selection will set the font size to 12 points.
6. **14**: Checking this selection will set the font size to 14 points.

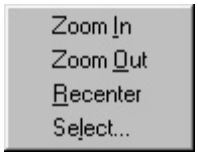
Command/Select Menu



The Command/Select Menu is accessible from the Command Menu. It has three selections:

1. **Target**: Display the Select Target Dialog Box (this function is also available from the Select Target Button on the toolbar and by selecting Select from the Default Floating Menu).
2. **Ship**: Select the ship.
3. **Auxiliary Ship**: Select the auxiliary ship. This menu selection is enabled only when there is an auxiliary ship on the current mission.

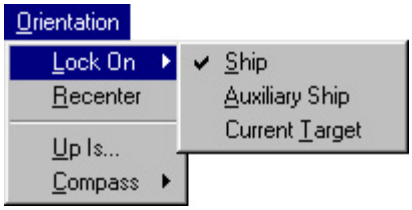
Default Floating Menu



The Default Floating Menu is available by right-clicking on a map window when there is no current target selected. It has four selections:

1. **Zoom In**: Double the size of the map displayed in the current window. (this function is also available from the Zoom In Button on the toolbar and by selecting Zoom In from the Zoom Menu).
2. **Zoom Out**: Halve the size of the map displayed in the current window. (this function is also available from the Zoom Out Button on the toolbar and by selecting Zoom Out from the Zoom Menu).
3. **Recenter**: Recenter the map in the current window to its current map lock (this function is also available from the Recenter Button on the toolbar and by selecting Recenter from the Orientation Menu).
4. **Select**: Display the Select Target Dialog Box (this function is also available from the Select Target Button on the toolbar and by selecting Target from the Command/Select Menu).

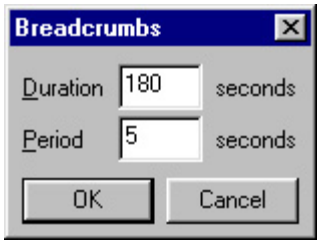
Orientation/Lock On Menu



The Orientation/Lock On Menu is accessible from the Orientation Menu. It has three selections, each of which modify the map lock of the current window.

1. **Ship**: Lock the center of the map on the main ship.
2. **Auxiliary Ship**: Lock the center of the map on the auxiliary ship. This menu selection is enabled only when there is an auxiliary ship on the current mission.
3. **Target**: Lock the center of the map on a target. If a current target is selected, the center of the map locks on to the current target, otherwise the Select Target Dialog Box is displayed.

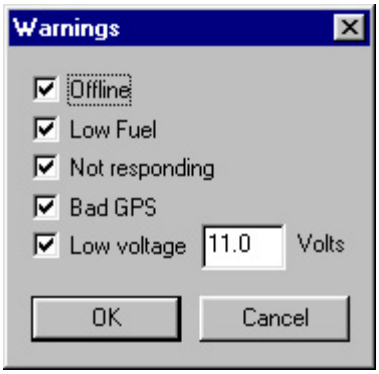
Breadcrumbs Dialog Box



The Breadcrumbs Dialog Box sets the duration of the breadcrumbs (the amount of time that each breadcrumb exists) and the period of the breadcrumbs (the amount of time between the creation of each breadcrumb by an individual vehicle).

Enter the duration and period in seconds into the corresponding edit box, then click OK.

Warnings Dialog Box

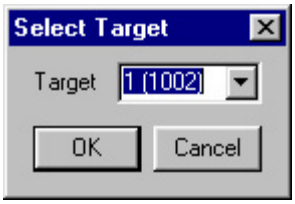


The Warnings Dialog Box allows the operator to choose which conditions the operator will be warned about. There are five warning conditions:

1. **Offline**: A target is not responding to telemetry requests or commands.
2. **Low Fuel**: A target is reporting low fuel.
3. **Not Responding**: A target is not responding to commands.
4. **Bad GPS**: A target is reporting a bad GPS.
5. **Low Voltage**: A target is reporting battery voltage lower than or equal to the voltage value in the edit box.

Check the checkboxes corresponding to the warnings that you wish to receive, enter the low voltage value into the edit box if required, then click OK.

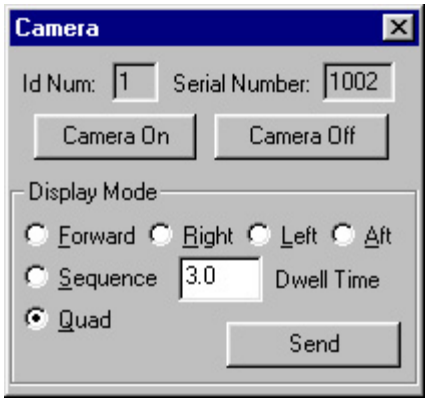
Select Target Dialog Box



The Select Target Dialog Box allows the selection of a target that is not necessarily displayed on any map as the current target. Targets are listed by identification number, with the side number in parentheses.

Select the desired target from the drop-down menu and click on OK.

Camera Dialog Box



The Camera Dialog Box sends commands to the camera mounted on the current target. The Identification Number and Side Number (Serial Number) of the current target are displayed at the top of the dialog box. The current target must contain a camera module for these commands to work.

Clicking on the Camera On button sends a Camera On Command to the current target. Clicking on the Camera Off button sends a Camera On Command to the current target. Click on the radio button corresponding to the required Display Mode then click on the Send button to send a Display Mode command to the camera. Available display modes include:

- **Forward**: Send image from forward camera.
- **Right**: Send image from right camera.
- **Left**: Send image from left camera.
- **Aft**: Send image from aft camera.
- **Sequence**: Send images from each of the four cameras in cyclic sequence. The edit box contains the desired *dwell time*, which is the time interval between camera changes in seconds.
- **Quad**: Split the screen into four quadrants, one for each camera.

Auxiliary Command Dialog Box

(NetROS only.) The Auxiliary Command Dialog Box sends an Auxiliary Command to the current target. The Identification Number and Side Number (Serial Number) of the current target are displayed at the top of the dialog box. There are nine possible auxiliary commands that can be sent to the target. The action taken by the target in response to an auxiliary command will depend on what hardware is on board. Each Auxiliary Command has an On mode and an Off mode.

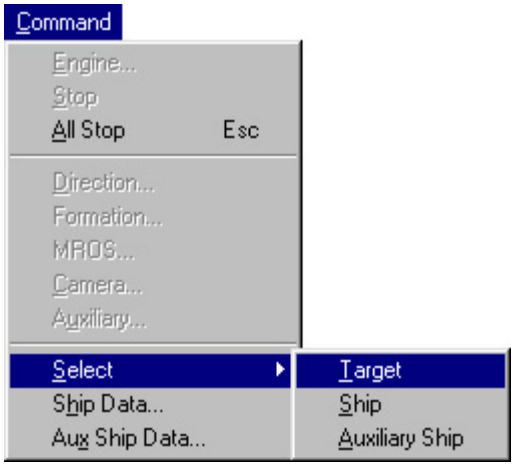
Click on a radio button to select one of the nine auxiliary targets. Click on the Send On button to send an Auxiliary Command On, and click on the Send Off button to send an Auxiliary Command Off. Click on the Assign Name to Command button to display the Auxiliary Command Name Dialog Box. Once commands have been named, their names will appear here next to the corresponding radio buttons.

MROS Dialog Box

The MROS Dialog Box sends MROS Commands to the current target. MROS commands tell the target vehicle whether to respond to ("enable") or ignore ("disable") commands from the MROS. At power up the vehicle will always be in MROS enabled mode, and will respond to the MROS. All normal operations should leave it enabled, and the MROS should simply be turned off when not needed. The ROS command to disable the MROS should only be used for multiple vehicle operations when the operator wishes to use the MROS on a second or subsequent vehicle without affecting vehicles already under ROS control.

Click on the Enable button to send an MROS Enable command to the current target, which places it under MROS control. Click on the Disable button to send an MROS Disable command to the current target, which removes it from MROS control.

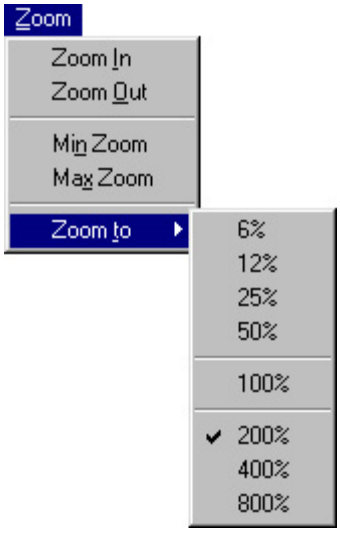
Command/Select Menu



The Command/Select Menu is accessible from the Command Menu. It has three selections:

1. **Target**: Display the Select Target Dialog Box (this function is also available from the Select Target Button on the toolbar and by selecting Select from the Default Floating Menu).
2. **Ship**: Select the ship.
3. **Auxiliary Ship**: Select the auxiliary ship. This menu selection is enabled only when there is an auxiliary ship on the current mission.

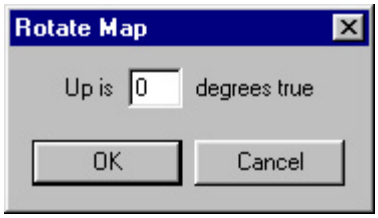
Zoom/Zoom To Menu



The Zoom/Zoom To Menu is accessible from the Zoom Menu. It has eight selections, each of which set the zoom level on the map displayed in the current window:

1. **6%**: Zoom to one-sixteenth normal size.
2. **12%**: Zoom to one-eighth normal size.
3. **25%**: Zoom to one-quarter normal size.
4. **50%**: Zoom to half normal size.
5. **100%**: Zoom to normal size.
6. **200%**: Zoom to twice normal size.
7. **400%**: Zoom to four times normal size.
8. **800%**: Zoom to eight times normal size.

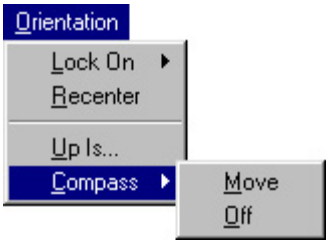
Rotate Map Dialog Box



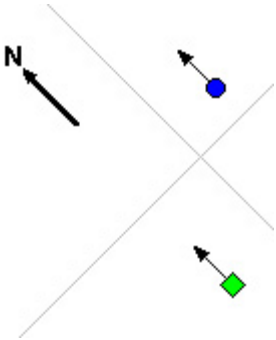
The Rotate Map Dialog Box is used to rotate the maps in the ROS window. This operation applies to all maps.

Enter the number of degrees clockwise from true North that is to be up in the new map orientation, then click OK.

Orientation/Compass Menu

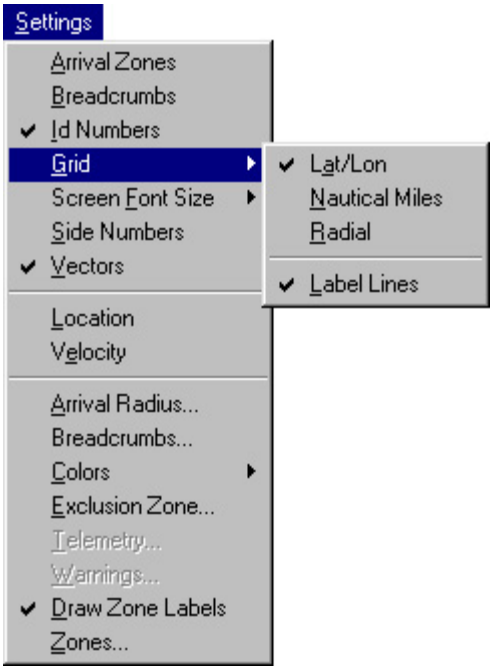


The Orientation/Compass Menu is accessible from the Orientation Menu. It has two selections:



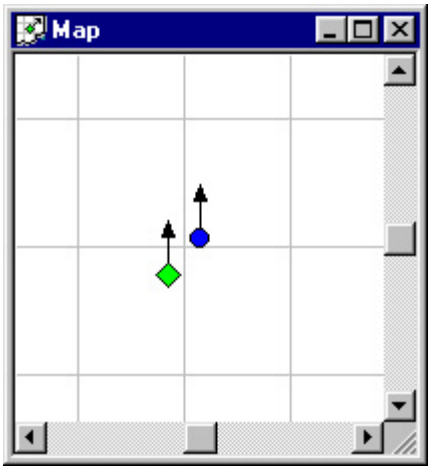
1. **Move**: Move the compass on the current window (creating one if there is not one currently displayed). When this menu item is selected, the mouse cursor will be replaced by a set of crosshairs. Click with the left mouse button at the place in the current window where you wish to have a compass displayed. An arrow will be drawn at this location indicating the direction of true North on the current map.
2. **Off**: Remove the compass from the current window. This menu selection is enabled only when there is a compass drawn on the current window.

Settings/Grid Menu

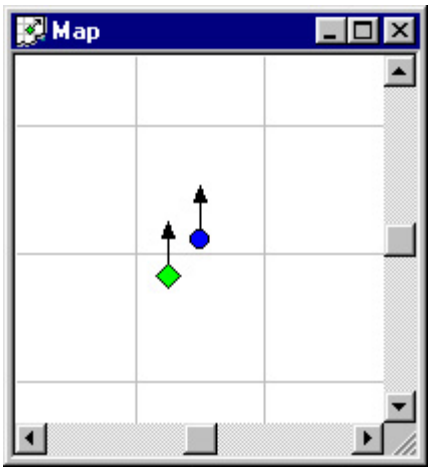


The Settings/Grid Menu is accessible from the Settings Menu. It has four selections:

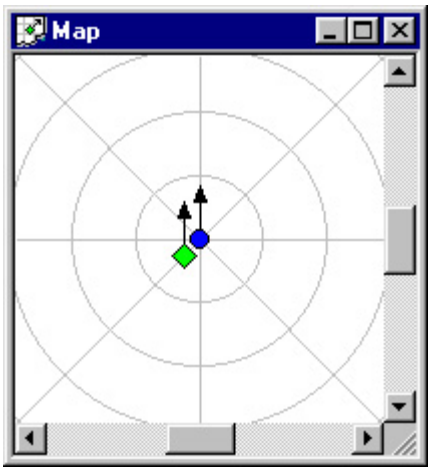
1. **Lat/Lon**: Checking this selection will draw grid lines at minutes of latitude and longtitude.



2. **Nautical Miles**: Checking this selection will draw grid lines in nautical miles.



3. **Radial**: Checking this selection will draw circles around the command ship icon at radius intervals of one nautical mile with radial lines at 45 degree intervals.



4. **Label Lines**: Checking this selection will draw labels on the grid lines. When Lat/Lon is selected, labels will show latitude and longtitude of the grid lines. When Radial is selected, labels will show the distance from the command ship. The font size of the grid labels can be adjusted (NetROS only) using the Settings/Font Size Menu.