WinFrog Device Group:	**GPS**
Device Name/Model:	**TRACS TDMA**
Device Manufacturer:	Thales Tracs Ltd. Compass House Davis Road, Chessington Surrey, U.K. KT9 1TB Tel: +44 (0) 870 601 0000 Fax: +44 (0) 181 391 1672 Email: contact@thales-tracs.com
Device Data String(s) Output to WinFrog:	User Configurable
WinFrog Data String(s) Output to Device:	User Configurable
WinFrog Data Item(s) and their RAW record:	POSITION 303 DATA OUTPUT 450 HEADING 910

DEVICE DESCRIPTION:

The Tracs TDMA is an intelligent radio data network system that operates at UHF and VHF frequencies. It also incorporates either an 8 or 12 channel GPS receiver to provide standard DGPS or RTK positioning.

This device allows the transmission of positional and gyro data from multiple remote units, differential GPS corrections across the network, as well as user configurable ASCII messaging between units. Each message contains a tag identifying the originating and destination units. This device also allows you to acknowledge the reception of an emergency fix transmission.

DEVICE OVERVIEW:

WinFrog interfaces directly to the TRACS Controller and/or GPS Pod using a single interface (control data) cable for the following purposes:

- uploading RTCM corrections for rebroadcast to all GPS Pods and Controller, typically at a Controller (provides improved control of stations used and eliminates the need for multiplexing the input typical of a direct feed and computer interface using the same connection)
- uploading position data for re-transmission using the open message time slot
- uploading gyro data for inclusion in the GPS Pods/Controller's own telegram
- uploading ASCII messages for transmission to other GPS Pods and Controllers

WinFrog also interfaces to the TRACS GPS Pods using the NMEA cable as a standard NMEA GPS input to WinFrog.

Note that whenever WinFrog requires a code or ID, the ID assigned to the respective TRACS unit is to be used. Do not use IDs greater than 99

Typical Application:

- Controller Site
    - RTCM sources are interfaced to WinFrog in the usual manner. The appropriate RTCM data source and reference station are selected to be uploaded to the Controller (All is more than is required and requires too many time slots). The broadcast interval should be no less than the update rate from the RTCM sources, but not faster than the TRACS time slot will support. The default is based upon SkyFix update rates and originates from the WinFrog Telemetry. Note: it is important that the remote GPS units are configured to accept RTCM data from any reference station.
    - The TX-POSITION data item is assigned to the local vessel. The GPS Card in the Controller typically cannot be configured to use the RTCM for its own DGPS solution. Therefore, other positioning sources are used for the Controller vehicle. The TX-POSITION allows WinFrog to send the CRP position for the respective vehicle to the assigned destination ID. Setting the Destination Id to 0 tells all other TRACS units to receive, decode and download the telegram to WinFrog.
    - Assign the POSITION and HEADING data items to those vehicles representing remote vehicles, assigning the appropriate code in the POSITION data item configuration. Note that this is done regardless of whether the position from a given TRACS unit originates from the TRACS itself or WinFrog. Offsets must be relevant to the correct point, i.e. if the TRACS unit is transmitting its own telegram, this is the position of the GPS antenna. If WinFrog is sending the position, it is the WGS 84 position for the vehicle's CRP.
- Remote (GPS Pods) Site
    - Assign the DATA OUTPUT data item to the local vehicle. This is how the vehicle's heading is passed to the TRACS unit for inclusion in its telegram.
    - Assign the POSITION and HEADING data items to those vehicles representing remote vehicles, assigning the appropriate code in the POSITION data item configuration. Note that this is done regardless of whether the position from a given TRACS unit originates from the TRACS itself or WinFrog. Offsets must be relevant to the correct point, i.e. if the TRACS unit is transmitting its own telegram, this is the position of the GPS

antenna. If WinFrog is sending the position, it is the WGS 84 position for the vehicle's CRP.

- Assign the POSITION data item associated with the local TRACS unit's NMEA device (NMEA interface cable) to the local vehicle.

DEVICE CONFIGURATION INSTRUCTIONS

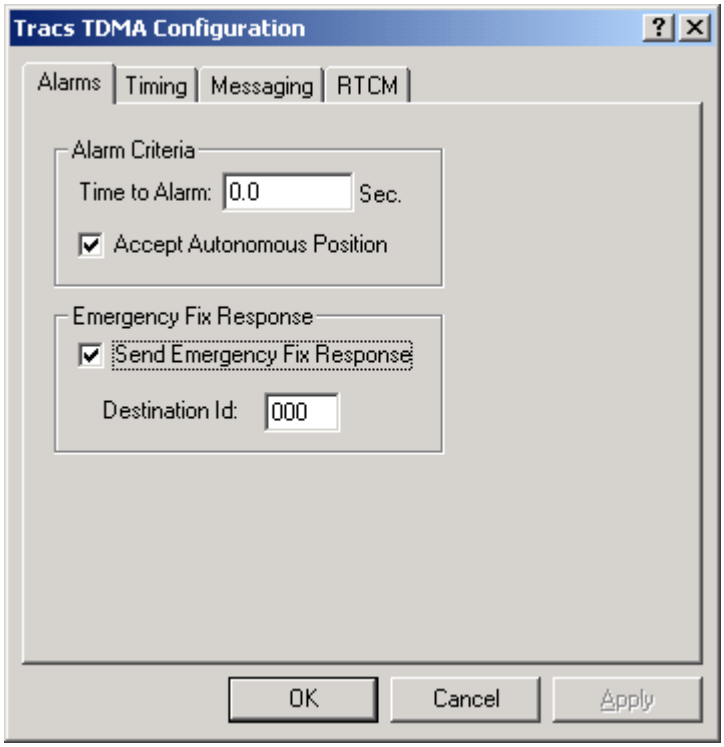
WINFROG I/O DEVICES > EDIT I/O:

Serial
Configurable Parameters

WINFROG I/O DEVICES > CONFIGURE DEVICE:

This device must be configured at the I/O Device window level. In the I/O Devices window, click on the device name to select it, right-click, select Configure Device and the Tracs TDMA Configuration dialog box opens. The Tracs TDMA Configuration dialog consists of four tabs, as seen below.

Alarms tab:



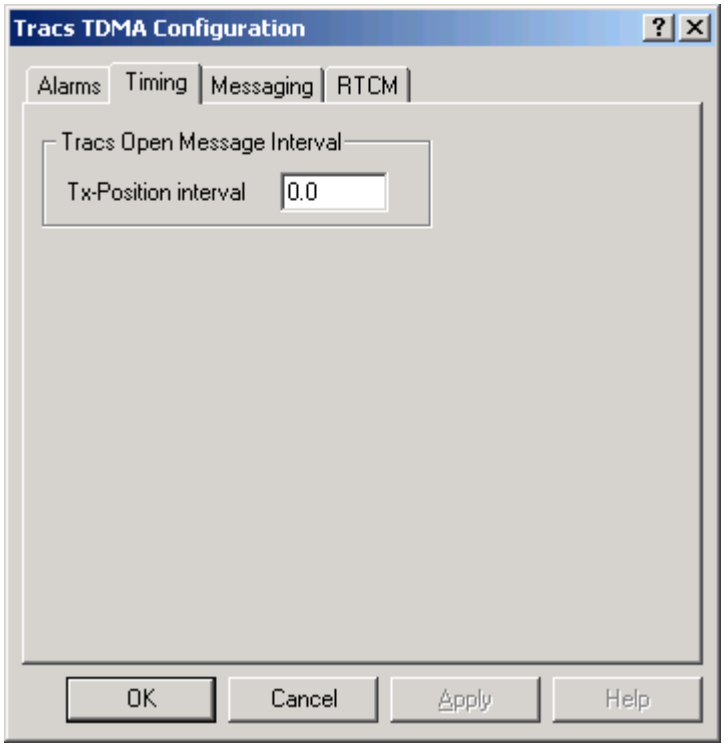
The Alarms tab allows you to specify the maximum acceptable age of the GPS Pod's data. If the age of the data exceeds this value, the GPS Pod's data, viewed in

the Decoded Data tab in the I/O Devices window, will change color from black to magenta.

The 'Accept Autonomous Position' option allows WinFrog to accept a single point GPS position in case of loss of DGPS position.

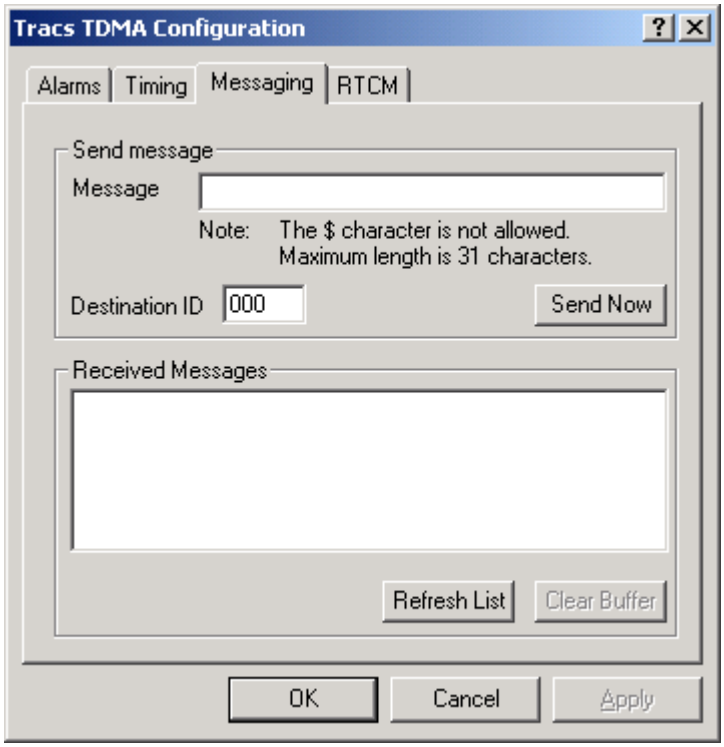
The 'Send Emergency Fix Response' option allows you to send an acknowledgement that the Emergency Fix (position) message has been received. The 'Destination ID' identifies which GPS Pod to send the Emergency Fix Response to.

Timing tab:



TRACS Open Message Interval:
TRACS supports an open message in its configuration of timeslots. WinFrog uses this to transmit messages and position data to other GPS Pods and controllers when the position generated by the GPS Pod or the controller is not desired. The Tx-Position interval setting allows you to configure how often WinFrog will attempt to transmit these messages.

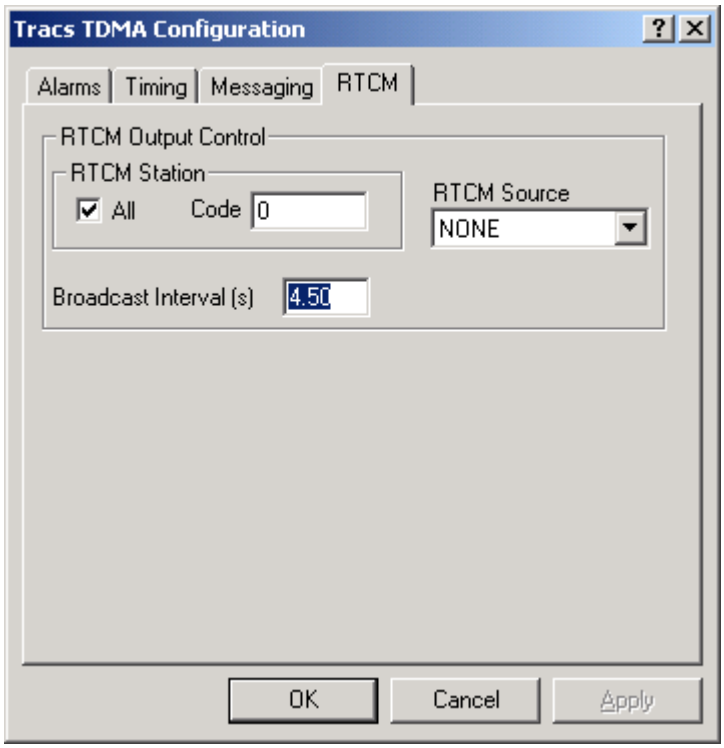
Messaging tab:



The Messaging tab allows you to send text messages via the telemetry network. You simply type in a message, (maximum message length is 31 characters and the $ character is not allowed), specify the Destination ID of the intended GPS Pod and click 'Send Now'. Note that a Destination ID of zero will cause the message to be sent to all of the GPS Pods on the network. The message is sent without having to exit this dialog box. The WinFrog system on the receiving end of the message will have a pop up message box appear on the screen informing the operator that a message has been received and includes the ID code of the source of the message. The operator can then go to the Messaging tab to view the message in the Received Messages area. If another message is received while this dialog box is still open the pop up message appears on the screen but the operator must click on the Refresh List button to display the new message.

All messages received are displayed in this window and stored in memory until the Clear Buffer button is clicked.

RTCM tab:



The RTCM tab allows you to specify RTCM control. In the RTCM Output Control the 'All' option allows WinFrog to either scroll through and transmit corrections from all available RTCM stations or to specify the ID of a specific station in the **Code** dialog box. It should be noted that to specify an individual station, the **All** checkbox must be disabled (unchecked).
The RTCM Source option allows you to select the desired RTCM source from the drop down menu.
The 'Broadcast Interval (s)' field allows you to specify the interval of time, in seconds, in which to send the RTCM data out over the network. It should be noted that too short an interval would interfere with the transmission of position and target broadcast messages.

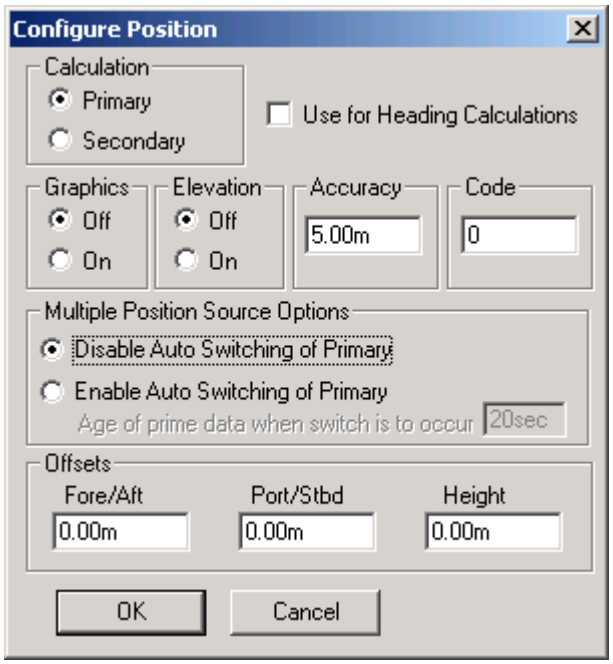
WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:

Adding the TRACS TDMA device creates four data items: POSITION, HEADING, TX-POSITION, and DATA OUTPUT. Once the data items have been added to the vehicle, they must be edited to suit the application.

Data item: GPS, TRACS TDMA, POSITION

The GPS, TRACS TDMA, POSITION data item is added to the devices list of each vehicle (GPS Pod) in WinFrog for which a position is received. This will apply the received position(s) to each remote vehicle. Note that it is vital to determine the source of the position transmission (i.e. TRACS unit or WinFrog). Refer to the Offsets section below for more details.

The Position data item must be edited once it is added to a vehicle's device list. Highlight the POSITION data item in the vehicle's device list and click the Edit button. The Configure Position dialog box appears as seen below.



Calculation:
Set the Calculation selection to Primary or Secondary. Devices set to Primary calculation are used to provide a vessel position. Note that more than one Primary positioning device can be added to a vehicle's device list; data from these devices will be combined in a weighted mean solution. (See the paragraph on Accuracy below for more on the weighting of Primary calculation device data).

If the Calculation type is set to Secondary, WinFrog will simply monitor the device's data. WinFrog will not use the data from a secondary device in the final solution of the vehicle's position.

If auto switching is enabled (see below) a secondary may automatically become a primary should all the primaries fail.

Use For Heading Calculations:
This device does not use this option.

Graphics:
If On is selected, a labeled square will show the raw (offset but unfiltered) location of the position source, either the TRACS GPS antenna or the remote vehicle's CRP, in the Graphics and Bird's Eye windows. This provides a means of comparing raw device and filtered vehicle positions.

Elevation:
Setting the Elevation option to On will result in the elevation determined by GPS to be used as the elevation of the vessel referencing the GPS (WGS84) Ellipsoid. The sounder data recorded in WinFrog's .RAW data files will not be affected.
This option is meant only for those applications where there is no fixed vertical reference (i.e. mean sea level), such as on a river. For acceptable results, this option requires the use of high accuracy "RTK" GPS data.

Accuracy:
The Accuracy value entered provides WinFrog with the expected accuracy of the position from this device. This value is used in the weighting of this device compared to other positioning devices that may be added to the vehicle's device list. The smaller the value entered, the more accurate it is considered to be, and hence the more weight that will be applied to the device's data. The Accuracy parameter can be changed from the suggested values; changes should be made with caution, however, as they will affect the final filtered position of the vehicle.

Code:
Enter the ID code for the GPS Pod or TRACS Controller.

Multiple Position Source Options:
This group box allows you to enable automatic switching of a secondary to primary should the data from all POSITION and PSEUDORANGE data items set to primary timeout. The **Age** entered is the length of time that the secondary will wait in the absence of data from all primaries, before taking over as primary. This age is only entered for the secondary.

For example, if the POSITION or PSEUDORANGE data items associated with two GPS receivers were set to primary and the POSITION or PSEUDORANGE data item of a third GPS receiver was set to secondary, both primary GPS receivers must time out before the secondary will become the primary. Upon the recovery of either of the original primary data items, the original primary will be reset to primary and the original secondary will be reset to secondary.

Note for the auto switching feature to work, there must be at least one primary and one secondary enabled. For example, given two data items, one set to primary with the auto switching disabled and the other set to secondary with the auto switching enabled, if the primary fails the secondary is not set to primary and the vehicle positioning stops until the primary data item recovers.

Disable Auto Switching of Primary:
If this data item is not to be involved in the auto switching process, check this box. As stated above, this data item is then not involved in the auto switching process in any way.

Enable Auto Switching of Primary:
If this data item is to be involved in the auto switching process, either as a primary or a secondary, check this box. If set to secondary, enter the Age of data the primary data items must reach before this secondary is switched to act as the primary.

In order for this option to be effective you must have at least one primary and one secondary. If there are multiple secondary data items that are enabled for switching, the first one to receive data will become primary.

Note: This option is not enabled unless WinFrog determines that there is more than one POSITION and/or PSEUDORANGE data item associated with the respective vehicle. The exception to this is the case of a WinFrog with the Remote module operating as a Controlled Remote being configured remotely from the Controller. In this case, the option is always enabled even though it may not be applicable. The operator must be aware of what is available on the Remote and configure the data item accordingly.

Note: This option is not available in the WinFrog Remote package.

Note: This option is not available for USBL based POSITION data items.

Offsets:
Before offsets are applied to any position received it is important to know the source of the position transmission. If the TRACS unit is transmitting it's own telegram the position transmitted will be that of the GPS antenna. If WinFrog is transmitting the position the position will be the WGS84 position of the vehicle's CRP. Once the source of the transmitted position is determined the offsets can be applied as described below.

Offsets are required to associate the GPS antenna position with the vessel's Common Reference Point (CRP). The offsets are applied *from* CRP (of the vehicle) *to* the GPS antenna location.
Forward Offsets are entered as positive values.

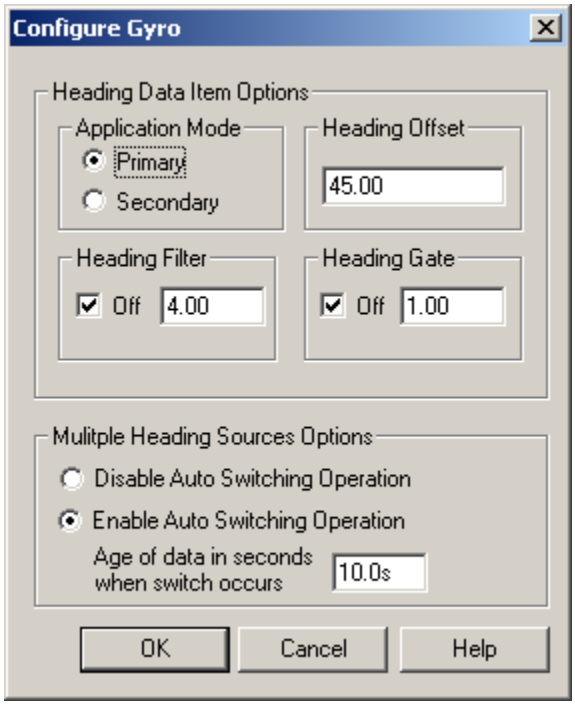
Aft Offsets are entered as negative values.
Starboard Offsets are entered as positive values.
Port Offsets are entered as negative values.
Height Offsets are positive upwards. (It is suggested that the vessel's Height origin should be at the water line.

Data item: GPS, TRACS TDMA, HEADING

The GPS, TRACS TDMA, HEADING data item is added to the Devices list of each vehicle (GPS Pod) in WinFrog for which a position is received. This will apply the received heading data to each remote vehicle.

The Heading data item must also be edited once it is added to a vehicle's device list. Highlight the HEADING data item in the vehicle's device list and click the Edit button. The Configure Gyro dialog box appears as seen below.

It is important to note that in order for the HEADING data from the device to be correctly associated with a vehicle, the respective POSITION data item must also be assigned to the vehicle and the appropriate Code assigned.



Heading Data Item Options:
Application Mode(Primary/Secondary):
Set the type of calculation to Primary or Secondary by selecting the appropriate radio button. Devices set to Primary are used to provide the vehicle heading information. Devices set to Secondary are simply monitored, and are not used in the vehicle's calculations.

Note that WinFrog supports automatic switching from a designated Primary to a Secondary in the event that data from the Primary fails (see Multiple Heading Sources Options).

Heading Offset:
A correction value (as determined from a gyro calibration) can be input in the Heading Offset box. This value is added to the heading value from the NMEA Gyro to provide a corrected heading for the vehicle. Note that positive or negative values can be entered.

Heading Filter/Heading Gate:
The Heading Filter is used to “smooth” heading values used by the vehicle. The value entered in the Heading Filter indicates the number of headings that will be used to predict the next heading value. The larger the value entered, the “heavier” the filter will be – i.e. the slower the vehicle’s heading will respond to changes.

The Heading Gate defines a tolerance value to limit the use of anomalies in gyro readings. If the next observed gyro value received falls outside the specified range of predicted values (i.e. plus or minus the entered value), the value will not be used.

Multiple Heading Sources Options:
WinFrog supports automatic switching from a designated Primary source to an alternate Secondary source in the event that the Primary fails. The first Secondary source to receive data after the Primary has failed becomes the alternate Primary providing the heading for the vehicle. When the designated Primary is detected as active again, the alternate Primary source reverts to Secondary and the designated Primary provides the heading data to the vehicle.

If an alternate Secondary fails and there are additional Secondary sources, it in turn is detected by the first of the remaining operational Secondary sources to receive data after the failure, at which time this Secondary becomes the alternate Primary.

Note that this option is only available if more than one HEADING source is associated with the respective vehicle. Changes made to the Auto Switching options for any one of the HEADING data items are automatically assigned to the others upon exiting this dialog with OK. If the Auto Switching option is enabled and the respective HEADING source has been set to Primary, all others are automatically set to Secondary. The exception to this is when configuring a WinFrog Controlled Remote (WinFrog with a Remote module) from a Controller. In this case, changes made to one HEADING source are not automatically made to other HEADING sources. The operator must explicitly make them for each HEADING source.

This option is not available in the WinFrog Remote package.

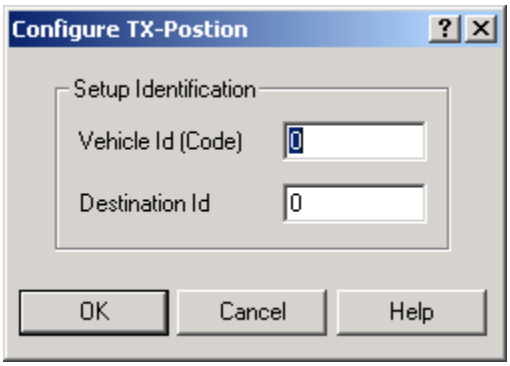
Disable/Enable Auto Switching Operation:
Select the mode you wish to operate WinFrog.

Age of data in seconds when switch occurs:
Enter the age of data that is permitted before the source is considered to have failed.

Data item: GPS, TRACS TDMA, TX-POSITION

The GPS, TRACS TDMA, TX-POSITION data item is assigned to the devices list of the vehicle that the Controller is located on. Typically, the GPS card in the Controller cannot be configured to accept RTCM corrections and therefore cannot generate its own DGPS position. Therefore, other positioning sources are used for the Controller vehicle. The TX-POSITION data item allows WinFrog to send the CRP position for the respective vehicle to the assigned destination ID. Setting the Destination ID to 0 tells all other TRACS units to receive, decode and download the telegram to WinFrog.

The TX-POSITION data item must be edited once it is added to a vehicle's device list. Highlight the TX-POSITION data item in the vehicle's device list and click the Edit button. The Configure TX-Position dialog box appears as seen below.



This data item allows you to transmit the current ship's CRP position to a specified unit on the telemetry network. You enter the local TRACS unit's ID number as assigned during the TRACS network setup in the Vehicle Id (Code) field and then specify the unit that is to receive the positional data in the Destination Id field. As mentioned above, leaving the Destination Id at the default of 0 will instruct all other TRACS units to receive, decode and download the telegram to WinFrog.

Data item: GPS, TRACS TDMA, DATA OUTPUT

The GPS, TRACS TDMA, DATA OUTPUT data item is added to the devices list of the remote vehicles with the GPS Pods. This allows the vehicle's heading to be sent to the TRACS unit for inclusion in its telegram. Note that there is no configuration required for this data item for this application. Any configuration attempted will not affect the output to the TRACS system.