

WinFrog Device Group:	GPS
Device Name/Model:	INTUICOM MASTER
Device Manufacturer:	Intuicom, Inc. 1880 South Flatiron Ct., Suite R Boulder, CO 80301 USA Tel. 303-449-4330 ext223 Fax. 303-449-4346 Email: tfoley@intuicom.com
Device Data String(s) Output to WinFrog:	\$--GGA with leading device code \$--HDT
WinFrog Data String(s) Output to Device:	\$--GGA with leading device code and heading
WinFrog Data Item(s) and their RAW record:	POSITION 303 TX-POSITION

DEVICE DESCRIPTION:

Requires TCP/IP to be installed.

CAUTION: WinFrog was tested with a system that had built in GPS cards at the slaves. These cards were model Allstar manufactured by BAE. Although a different internal card should behave the same and thus be compatible with this device driver, the use of external GPS receivers at the slaves require testing and may require special configuration or a driver modification.

In the hardware configuration for which this driver was designed for there will be a master communicator and up to a maximum of 10 slaves. Each slave contains a GPS card but the master does not. Other than to setup, the slaves can exist as stand alone units (neither WinFrog nor any other PC base software is required). But only the master WinFrog will be able to display all the slaves' locations. The master requires a software program "NavLink 2.4", provided by Intuicom, to facilitate communications with WinFrog. The NavLink program will output each slave's GGA message on a TCP/IP port prefixed with the seven-digit serial number of the slave.

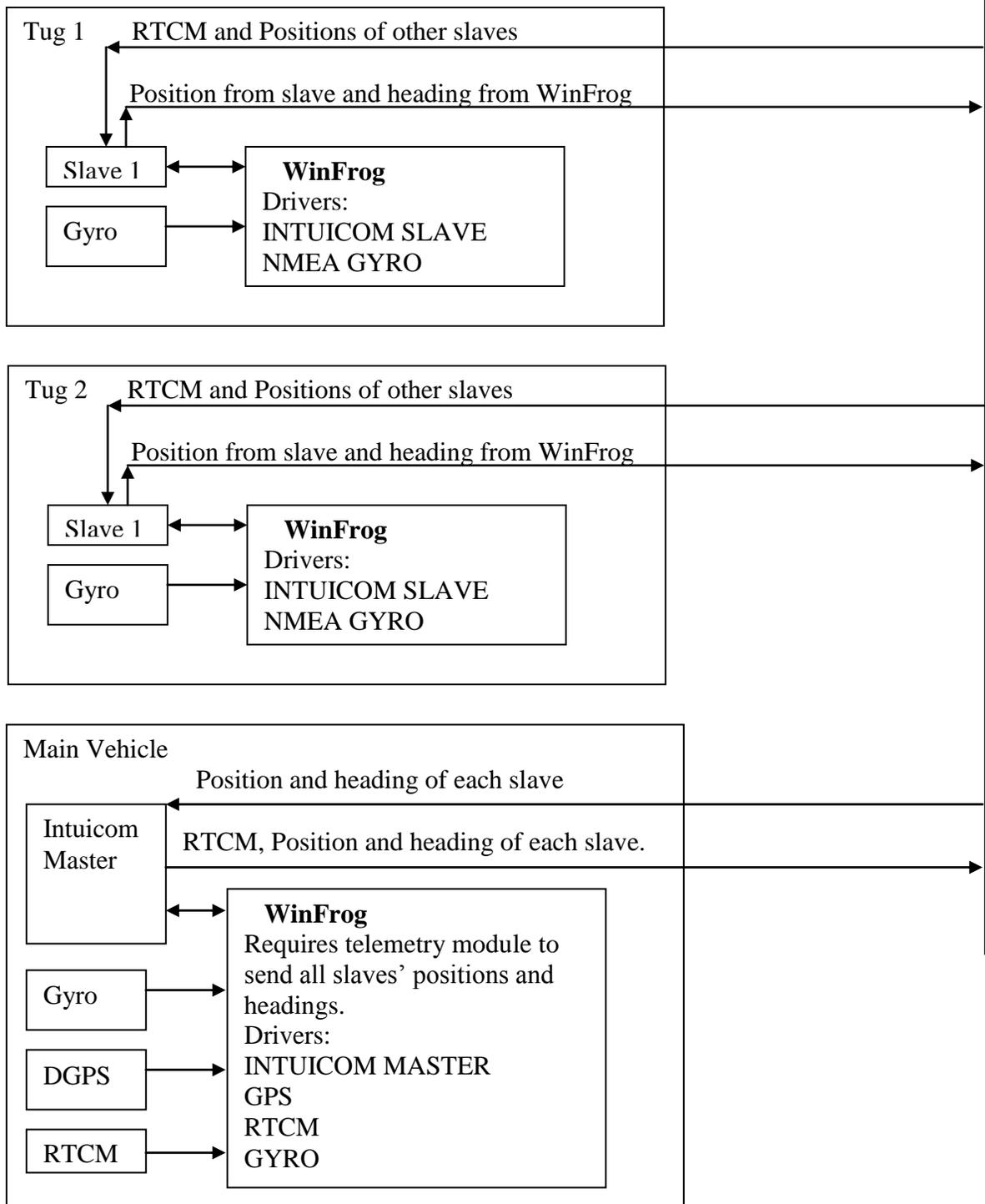
WinFrog can also send RTCM to the master communicator, which it will distribute to the slaves.

If each slave is attached to a licensed copy of WinFrog, WinFrog can display its location and the location of all the other slaves. To do this, the WinFrog at the master unit must transmit all the desired slave's positions along with an identifying code. In this case, the WinFrog at the master requires the Telemetry module. The WinFrogs connected to the slaves do not require the Telemetry module.

Each slave's vehicle heading can also be distributed. See the device descriptions: INTUICOM SLAVE and NMEA Gyro.

Example Layout

Spread spectrum RF



NOTE:

See the associated driver documents INTUICOM SLAVE and NMEA Gyro for their setup details.

DEVICE CONFIGURATION INSTRUCTIONS

This device driver does not communicate directly with the master communicator, rather it communicates with an application called NavLink version 4.2 using TCP/IP. The NavLink application communicates with the master via serial port.

NavLink gets all its parameters from a HML file called config.hml; it has no dialogs. An example HML file is shown below for a master and two slaves. This file also references the XSD file config.xsd. Both of these files are part of the Intuicom software installation.

Config.xml

```
<?xml version = "1.0" encoding = "UTF-8"?>
<configuration xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance" name =
"DGPS Test" xsi:noNamespaceSchemaLocation = "config.xsd">
  <debug enabled = "false"/>
  <control port = "19000" enabled = "false"/>
<inputs>
  <input name = "Fugro Pelagos Demonstration Network" input_number = "1">
    <input.serial port = "COM11" speed = "115200" parity = "none" databits = "8"
stopbits = "1" flowcontrol = "ctsrts"/>
    <network>
      <network.ptmp/>
    </network>
  </input>
</inputs>
<services>
  <service name = "GPS Tracking Port">
    <service.mux port = "11000"/>
  </service>
  <service name = "DGPS RTCM104 Input Port">
    <service.broadcast port = "13000" remote_port = "A" navigators = "true"/>
  </service>
  <service name = "Position Broadcast Port">
    <service.broadcast port = "14000" remote_port = "B" navigators = "true"/>
  </service>
  <service name = "Navigator Bridge">
    <service.navigator>
      <navigator port.a = "10011" port.b = "10012" port.gps = "10013"
id = "9073204" name = "Slave2"/>
    </service.navigator>
  </service>
</services>
</configuration>
```

```

    <navigator port.a = "10001" port.b = "10002" port.gps = "10003"
      id = "9073197" name = "Slave1"/>
  </service.navigator>
</service>
</services>
</configuration>

```

This can be viewed in Internet Explorer. To edit it requires an XML editor or you can change the extension to txt and use Notepad, then change the extension back to XML. For complete details on setting up the Intuicom hardware see the Intuicom manuals.

In the above XML file, remote port A is setup on each slave to receive RTCM and remote port B is setup to receive whatever WinFrog transmits to it. In the case of this driver, WinFrog will transmit all the slaves' positions and headings. The slaves must also be set accordingly.

The important parts that you will have to read in order for this driver to function properly are:

1. The COM port that the Master will connect to is on the line:

```
<input.serial port = "COM11" speed = "115200" parity = "none" databits = "8"
stopbits = "1" flowcontrol = "ctsrts"/>
```

This can be changed as necessary, but the other parameters must match the settings in the Intuicom master.

2. To enable WinFrog to broadcast the position and headings of each slave to all the slaves the following service must be present:

```

</service>
  <service name = "Position Broadcast Port">
    <service.broadcast port = "14000" remote_port = "B" navigators = "true"/>

```

Take note of the service.broadcast port number (in this case 14000) for remote port B as this needs to be entered into WinFrog. If these lines are not present enter them at this location choosing a port number not already used.

3. Take note of the port numbers for the RTCM service remote port A

```
<service.broadcast port = "13000">
```
4. Take note of the port where WinFrog will get each slave's position, here 11000.

```
<service.mux port="11000"
```
5. In order to obtain the heading from each slave, also note the port numbers for the navigator ports b and the associated slave serial number or ID. For slave 2 in the above example

```

<navigator port.a="10011" port.b="10012" port.gps="10013" id="9073204"
name="Slave2" />

```

port.b="10012" is the port that WinFrog will receive the slave 9073204's heading on. Intuicom uses the slave's serial numbers on the case as Id numbers.

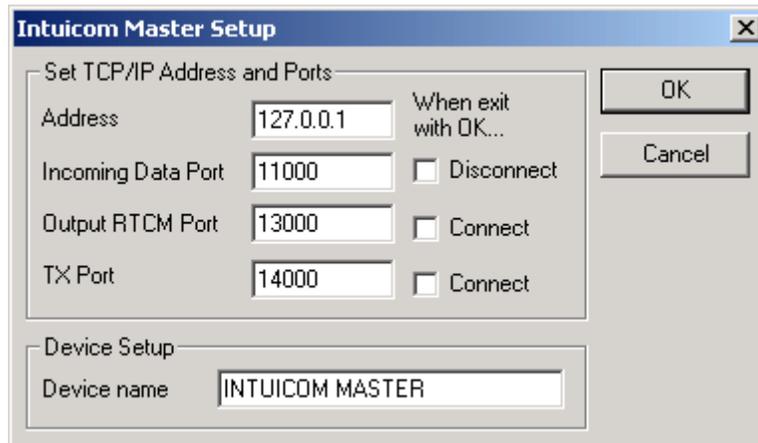
WinFrog also required these numbers.

The table below lists the items required by WinFrog from the XML file above:

Item	Purpose
COM11	Serial port to connect the Intuicom master
11000	TCP/IP port number that WinFrog will receive all the slaves positions
13000	TCP/IP port number that WinFrog will send the RTCM
14000	TCP/IP port number that WinFrog will send all the slave's positions and headings. Associated with port B at the slave.
10012	TCP/IP port number that WinFrog will receive the slave 9073204's heading. Associated with port B at this slave.
10002	TCP/IP port number that WinFrog will receive the slave 9073197's heading. Associated with port B at this slave.
9073204	Slave two's identification number
9073197	Slave one's identification number

WINFROG I/O DEVICES > CONFIGURE DEVICE:

INTUICOM MASTER is added to WinFrog from the GPS device category. This device must be configured at the I/O Device window level, opening the dialog seen below.



Address:

Either enter the built in TCP/IP loop back address or enter the address of your Ethernet card.

Incoming Data Port:

This is the port that all the slaves' data will be sent to. In the XML file above this port was 11000.

Output RTCM port:

This is the port WinFrog will send the RTCM corrections to. In the XML file above this port was 13000.

TX port:

This is the port WinFrog will output the slave's positions and headings to. In the XML file above this port was 14000. The data item associated with this port is TX-POSITION.

Note: To obtain the headings of the slaves, load the NMEA Gyro device driver.

Connect/Disconnect:

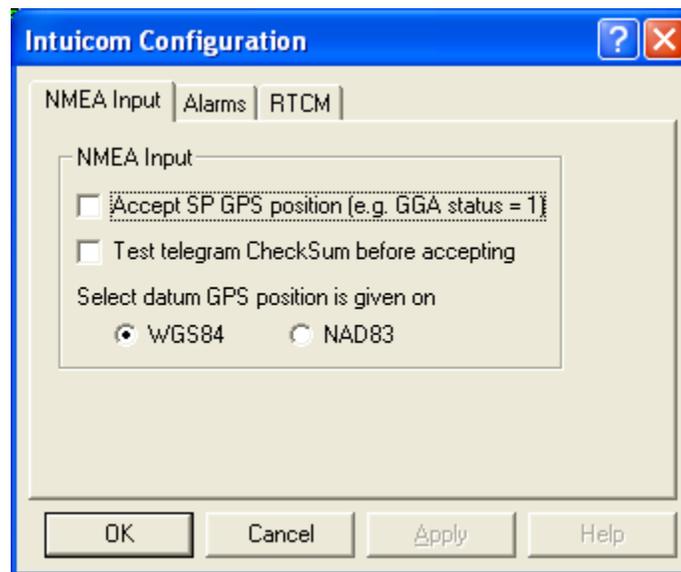
The driver will not automatically connect to the TCP/IP ports. You must select the checkbox and click OK to make the connection. If the connection cannot be made, or is lost at a later time, the display in the I/O Device window will indicate there is no connection.

Device Name:

Enter a unique name for this device.

WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > EDIT OPTIONS:

This device must be configured at the I/O Device window level. In the I/O Devices window, click the device name to select it, then right-click and select Configure Device.

**NMEA Input tab:****Accept SP GPS position:**

If single point GPS is acceptable, select the checkbox. If left unselected, only a position with status 2 and higher will be accepted.

Test Telegram CheckSum before accepting

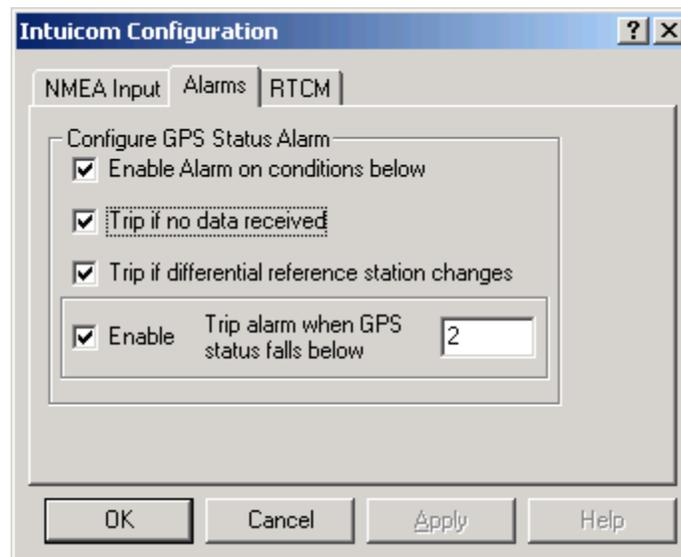
If this checkbox is selected, the check sum will be calculated and compared to the check sum in the telegram. If they are not the same the telegram will be rejected.

Select datum GPS position is given on

Generally, GPS receivers output the position in WGS84, ITRF00 or ITRF05. For WinFrog applications, WGS84, ITRF00 and ITRF05 are considered to be close enough as to be the same. However, there are instances when the output GPS position may be NAD83, which is not the same as WGS84. In this case, it is critical that NAD83 be selected here. WinFrog will then transform the NAD83 position to WGS84 when it is received to normalize it to the ellipsoid that WinFrog uses as the standard for GPS.

An example of when the position may be in NAD83 is when using a USCG beacon as a differential correction source.

Alarms tab:



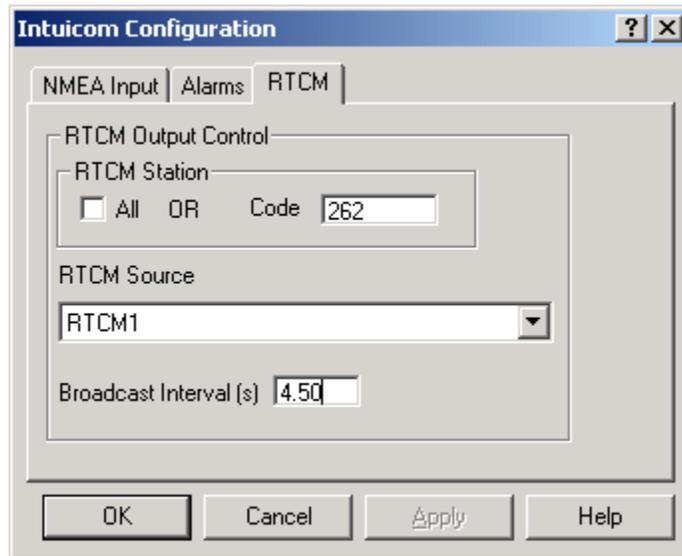
Configure GPS Status Alarm:

Select the Enable Alarm checkbox to enable an audible (beeping) alarm. Note: if a sound card is present the beep is controlled by the Asterisk event in Window's Sound and Media Properties setup found in the Control Panel. With this option enabled, you can define the alarm to sound if the **GPS Status falls below** a certain number, as entered in the provided field. The value to be entered refers to the GGA string status field, defined as follows:

- 0= no GPS signal
- 1= Single Point GPS Positioning Mode
- 2= DGPS Positioning Mode
- 3= GPS PPS Mode
- 99= Simulator Mode
- 10= Simulator Mode Edit

Enable the “Trip if no data received” to detect communications failure. Note: this alarm will not occur upon initial setup; only after data has been received the first time then stops for about 15 seconds will the alarm occur.

Enable the “Trip if differential reference station changes” to detect changes in Multifix if it changes from XP to network or single point.



RTCM tab:

RTCM Station:

All – Output all reference stations received.

Code – Outputs only the reference station entered.

RTCM Station:

If no RTCM output is desired select None. Otherwise select the device name of the RTCM source.

Broadcast Interval:

Enter the minimum interval at which to send RTCM corrections to the Intuicom master for transmission to the slaves.

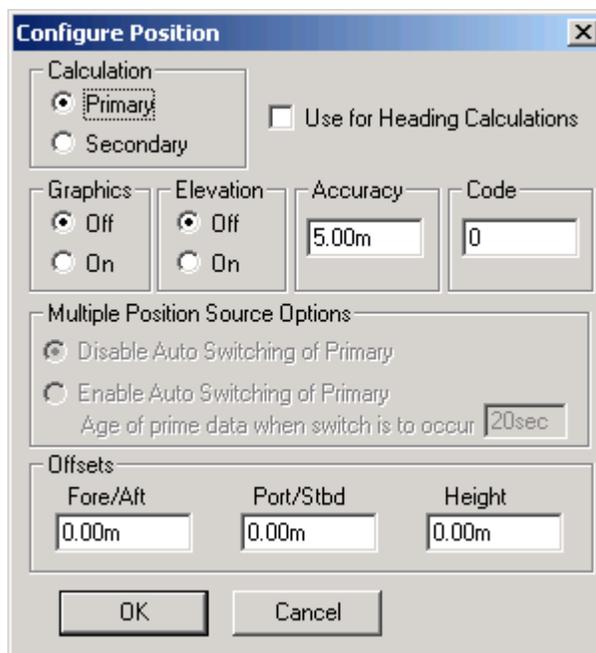
WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:

Adding the INTUICOM MASTER device creates two data items: POSITION, TX-POSITION. Add the POSITION data item to each vehicle that has a slave. Add the TX-

POSITION data item to each vehicle whose position you wish to make available to the slave vehicles. Once the data items have been added to the vehicle, they must be edited.

Data item: **GPS, INTUICOM MASTER, POSITION**

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:

Select this checkbox if the device is to be used in conjunction with another GPS device for determination of the heading of the vessel. The vessel's heading will be derived by the inverse of the GPS antenna coordinates.

Graphics:

If On is selected, a labeled square will show the raw (offset but unfiltered) location of the GPS antenna 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 this vessel. 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:

This field is used to determine which GGA message from the master belongs to this vehicle. The Intuicom places the serial number of each slave in front of the GGA message associated with that slave. Enter the serial number of the slave that is on this vehicle.

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:

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.

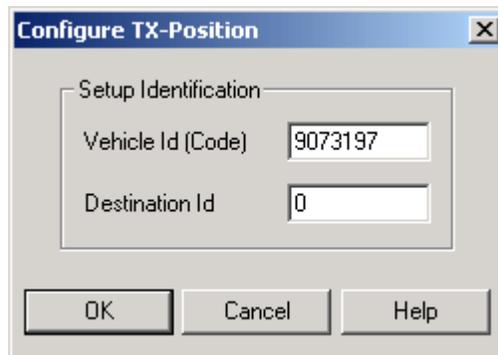
Starboard Offsets are entered as positive values.

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, INTUICOM MASTER, TX-POSITION

Add the TX-POSITION data item whose position and heading you want to transmit to the slave vehicles. Normally a slave cannot get its position from the slave unit itself. It must get its position from the master along with any other vehicles' positions that are desired to be available at the slave vehicle. Highlight the TX-POSITION data item in the vehicle's device list and click the Edit button. The Configure Position dialog box appears as seen below.



Vehicle Id (Code):

Enter the code to be prefixed to the message that contains the position and heading for this vehicle. To avoid confusion it is recommended that the slave's code be used, then at the slave vehicle this same code can be entered to obtain its coordinates. (See INTUICOM SLAVE device driver documentation.)

Destination Id:

This device does not use this parameter.

Troubleshooting and Diagnostics

If the operating system is Windows 2000, Hyperterminal can be used to communicate with the master. At the bottom of the list of COM ports is TCP/IP. Select it and enter a host address of 127.0.0.1 and a port of 11000 (example above). You will see all the position data available to WinFrog from each slave, prefixed with the slave's serial number. If the GGA message is not there then the slave may not be setup to output the GGA message, is out of range or is off.

If WinFrog is at a slave whose heading does not appear in WinFrog, setup Hyperterminal as above but set the port to the particular port assigned to that slave. In the above example, port 10012 or 10002 will contain the heading if WinFrog at the slave is sending it.

If Windows 2000 is not available you can obtain a port redirector from Intuicom or a software house. To make the above tests redirect the TCP/IP data to a COM port, run a cable from that COM port to another COM port and use Hyperterminal.