

**NAVIPAC**

**ROV TRACKING**

Last update: 06/11/2019  
Version: 4.2

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# 1 Introduction

This document describes how to perform an ROV tracking job with one or more transponders involved in NaviPac version 4.

## 2 Definition

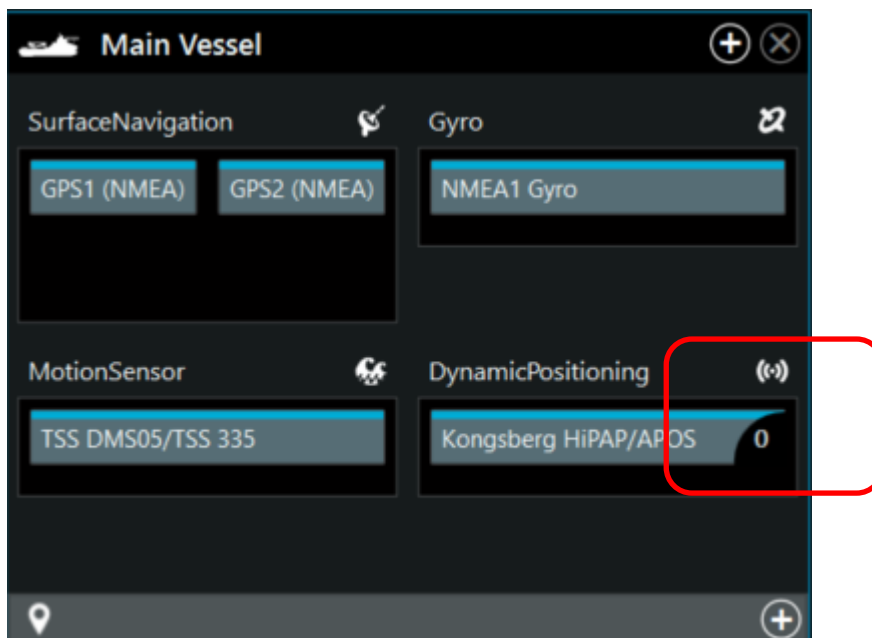
A 'Dynamic Positioning' (USBL) driver must be added to the 'Main Vessel' object and an ROV object must be created.

## 3 Workflow

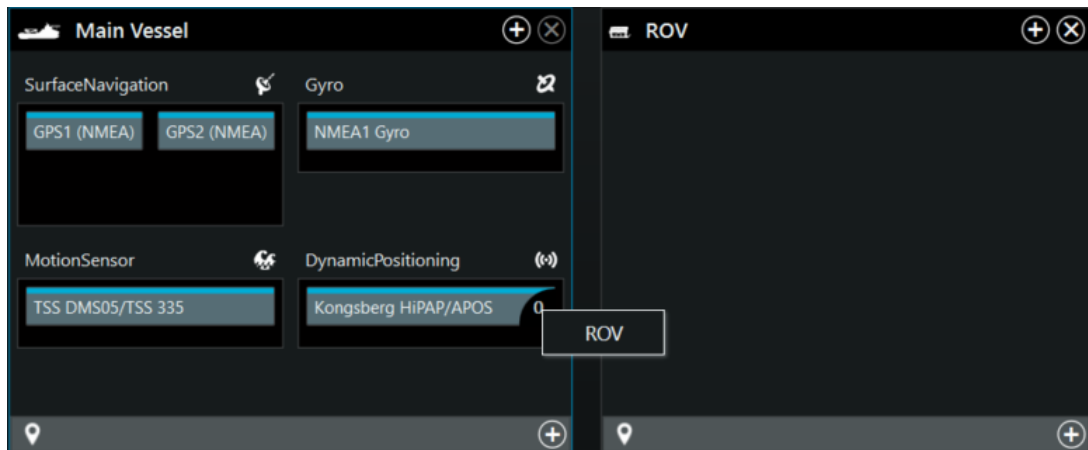
A description of how to add and switch between transponders.

### 3.1 Adding transponders

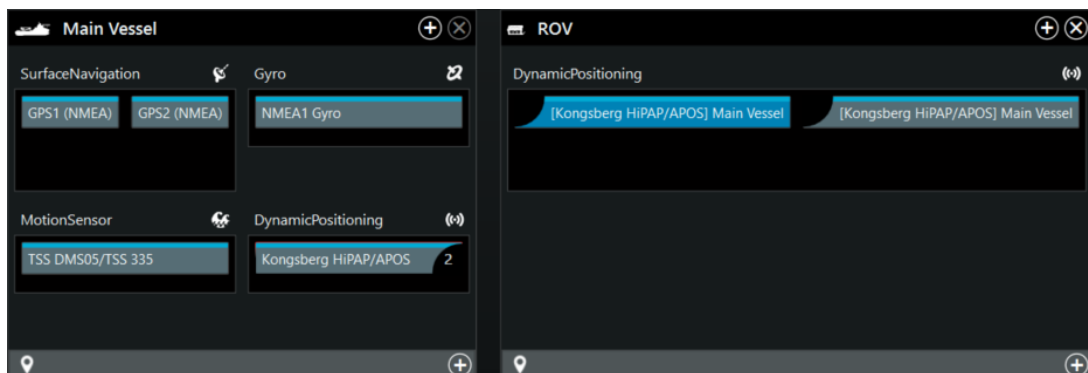
In the lower right-hand corner of the 'USBL' driver, a number indicates how many transponders are linked to this driver.



When hovering the cursor over the number, it will change to '+'. Click the '+' and the available objects will be listed. Select the object to add a transponder.



This operation must be repeated for each transponder on the ROV.



The number in the lower right-hand corner has changed to '2', reflecting the number of transponders linked.

Transponder name, code and offsets can be modified under Properties.

Properties

Instrument

Name	Transponder FWD
System Name	Kongsberg HiPAP/APOS - client
Instrument ID	496
Info	\$PSIMSSB,hhmmss.ss,tp,Status,error,coord,orientati
Setup Id	5
TP Code	26
Kongsberg HiPap...	Normal
Emergency Beacon...	<input type="checkbox"/>
Emergency Beacon...	<input type="checkbox"/>
Transponder X	-1
Transponder Y	0
Transponder Z	1

NOTE: When offsets are applied to the transponder, a gyro and preferably an MRU must also be included in the configuration for an accurate calculation.

ROV

Gyro

Octans gyro (Ixsea)

MotionSensor

Ixsea RPH (B&A Format)

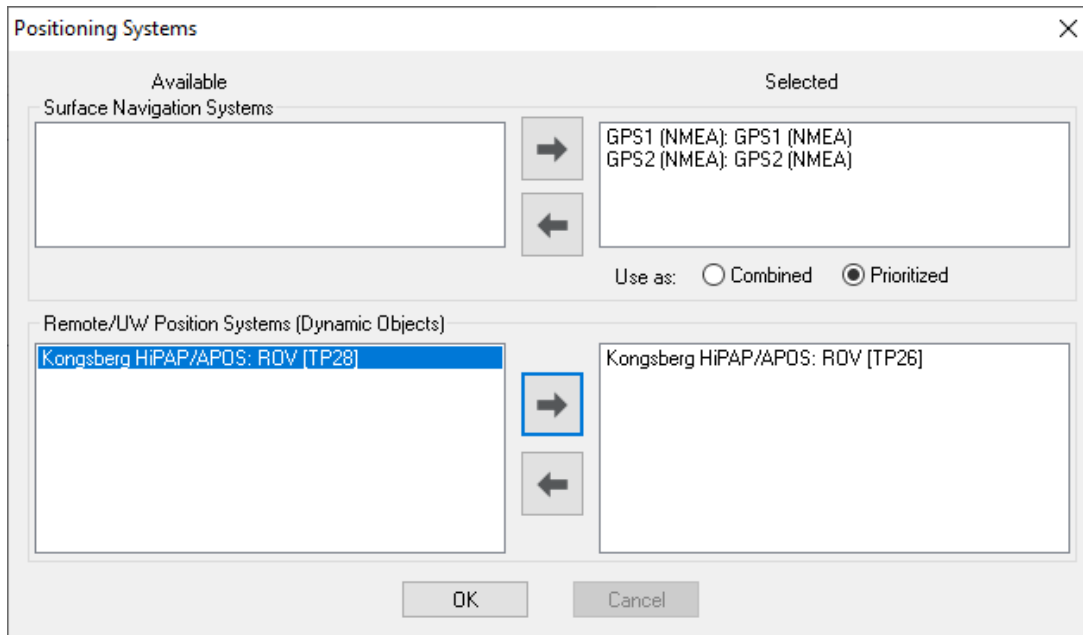
DynamicPositioning

Transponder FWD

Transponder AFT

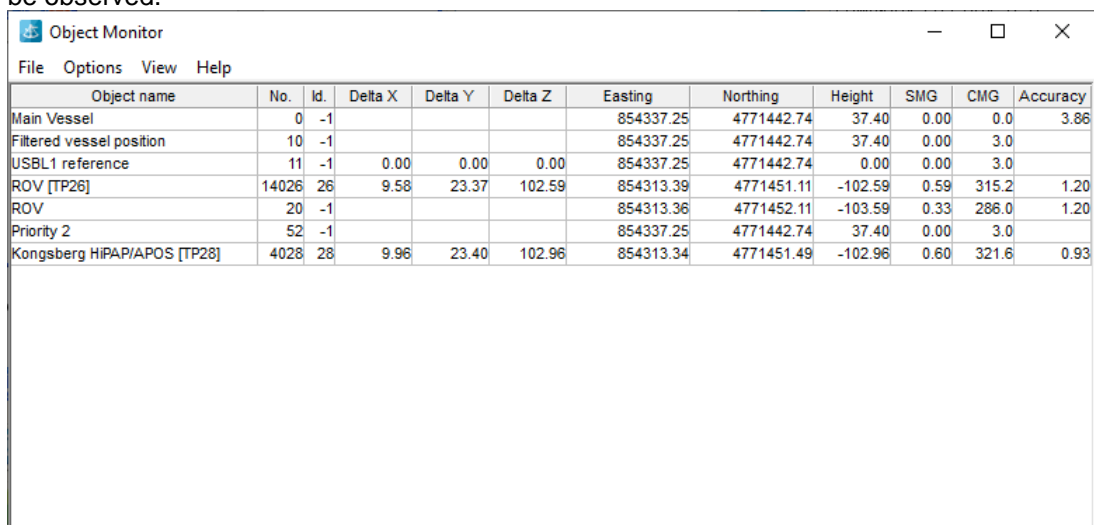
## 3.2 Going online

When going online, one or more of the transponders must be selected.



The 'Positioning Systems' dialog box is divided into two main sections: 'Available' and 'Selected'. The 'Available' section contains two sub-sections: 'Surface Navigation Systems' and 'Remote/UW Position Systems (Dynamic Objects)'. In the 'Surface Navigation Systems' section, there are two empty boxes with arrows pointing between them. In the 'Remote/UW Position Systems (Dynamic Objects)' section, the 'Kongsberg HiPAP/APOS: ROV [TP28]' is listed in the 'Available' box and has been moved to the 'Selected' box. Below the 'Selected' box, there are radio buttons for 'Use as: Combined' and 'Prioritized', with 'Prioritized' being selected. At the bottom of the dialog are 'OK' and 'Cancel' buttons.

In the 'Object Monitor' view the position of the 'ROV' and the transponder (ROV [TP26]) can be observed.



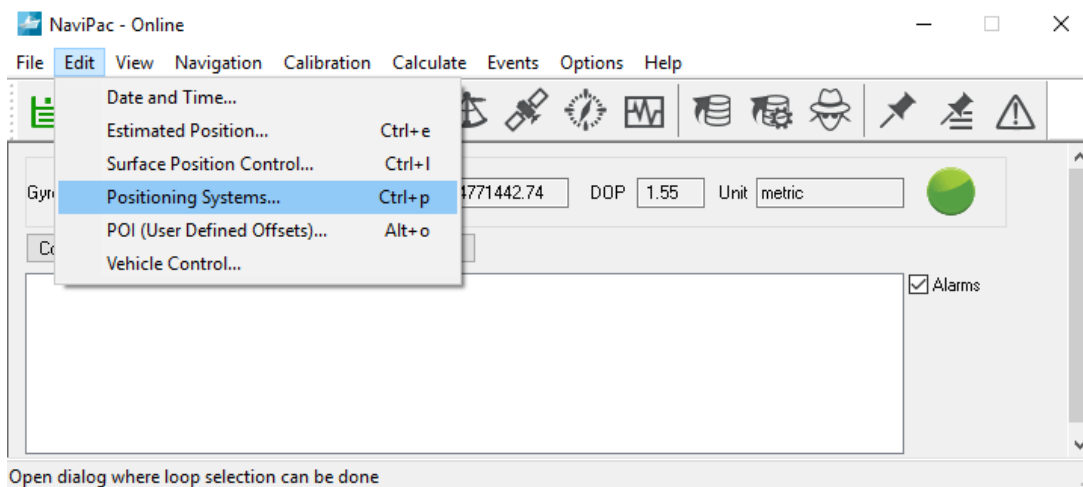
The 'Object Monitor' window displays a table of objects and their positions. The table has columns for Object name, No., Id., Delta X, Delta Y, Delta Z, Easting, Northing, Height, SMG, CMG, and Accuracy. The objects listed are Main Vessel, Filtered vessel position, USBL1 reference, ROV [TP26], ROV, Priority 2, and Kongsberg HiPAP/APOS [TP28].

Object name	No.	Id.	Delta X	Delta Y	Delta Z	Easting	Northing	Height	SMG	CMG	Accuracy
Main Vessel	0	-1				854337.25	4771442.74	37.40	0.00	0.0	3.86
Filtered vessel position	10	-1				854337.25	4771442.74	37.40	0.00	3.0	
USBL1 reference	11	-1	0.00	0.00	0.00	854337.25	4771442.74	0.00	0.00	3.0	
ROV [TP26]	14026	26	9.58	23.37	102.59	854313.39	4771451.11	-102.59	0.59	315.2	1.20
ROV	20	-1				854313.36	4771452.11	-103.59	0.33	286.0	1.20
Priority 2	52	-1				854337.25	4771442.74	37.40	0.00	3.0	
Kongsberg HiPAP/APOS [TP28]	4028	28	9.96	23.40	102.96	854313.34	4771451.49	-102.96	0.60	321.6	0.93

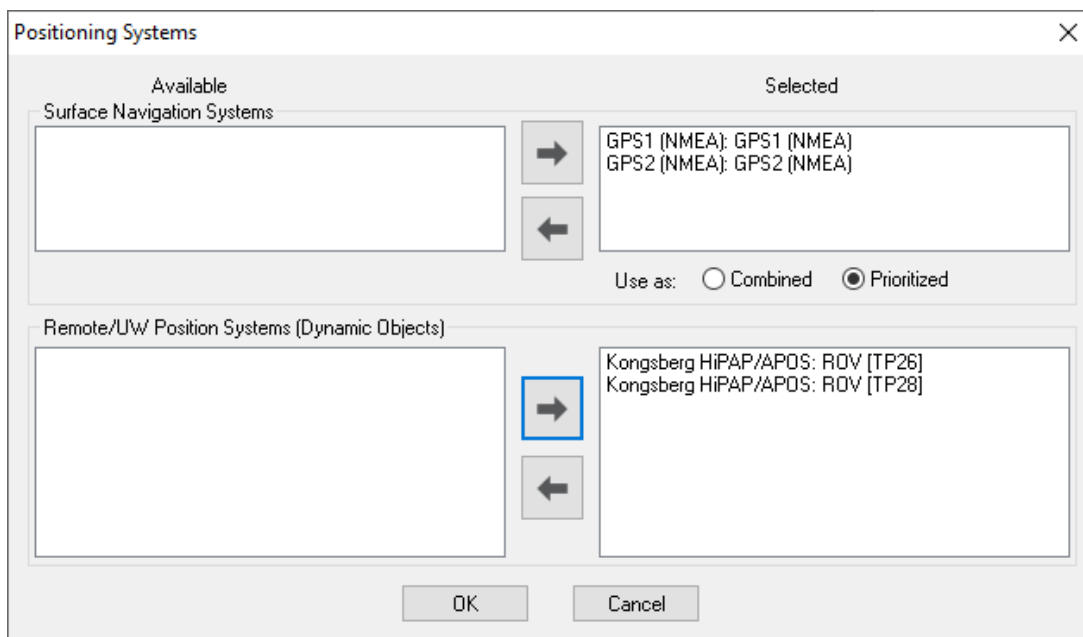
From 'Object Monitor' menu 'View' (View combined vehicle1) detailed information is displayed.

Object Monitor				
File Options View Help				
Base object	Accuracy	Weight	Measured	Error
Obj.No: 20 Position E: 854315.70 N 4771455.95 Z: -104.82 Std.Dev: 1.20				
<b>ROV</b>				
ROV [TP26]-dx	1.20	0.69	854315.73	-0.02
ROV [TP26]-dy	1.20	0.69	4771454.95	-0.00
ROV [TP26]-dz	1.20	0.69	-103.82	-0.00

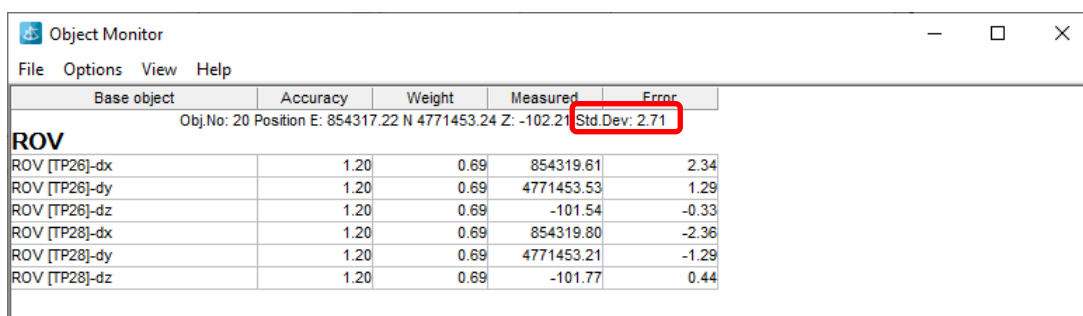
Transponders can be added or removed from NaviPac Online by selecting 'Edit' and 'Positioning System'.



Transponders can be added or removed in a similar way as during the initial start procedure.



When more transponders are selected, the detailed view will show the standard deviation for the calculated ROV position.



The 'Object Monitor' window displays a table of data for a ROV. The table has five columns: 'Base object', 'Accuracy', 'Weight', 'Measured', and 'Error'. The 'Base object' is 'ROV'. The 'Accuracy' column shows values of 1.20 for all rows. The 'Weight' column shows values of 0.69 for all rows. The 'Measured' column shows values of 854319.61, 4771453.53, -101.54, 854319.80, 4771453.21, and -101.77. The 'Error' column shows values of 2.34, 1.29, -0.33, -2.36, -1.29, and 0.44. A red box highlights the 'Std.Dev: 2.71' value in the 'Error' column.

Base object	Accuracy	Weight	Measured	Error
Obj.No: 20 Position E: 854317.22 N 4771453.24 Z: -102.21				Std.Dev: 2.71
<b>ROV</b>				
ROV [TP26]-dx	1.20	0.69	854319.61	2.34
ROV [TP26]-dy	1.20	0.69	4771453.53	1.29
ROV [TP26]-dz	1.20	0.69	-101.54	-0.33
ROV [TP28]-dx	1.20	0.69	854319.80	-2.36
ROV [TP28]-dy	1.20	0.69	4771453.21	-1.29
ROV [TP28]-dz	1.20	0.69	-101.77	0.44

When only one transponder is in use, NaviPac will use the standard deviation from the selected transponder.

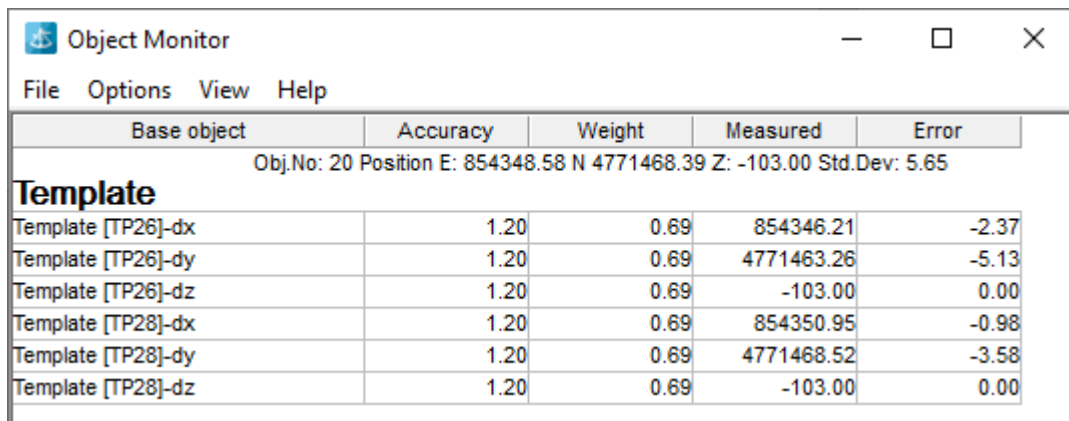


## 4 Simple tracking

For an object with two active transponders, but no gyro attached, NaviPac will automatically calculate a gyro value. The object is configured the same way as shown in the previous section, but without a gyro.

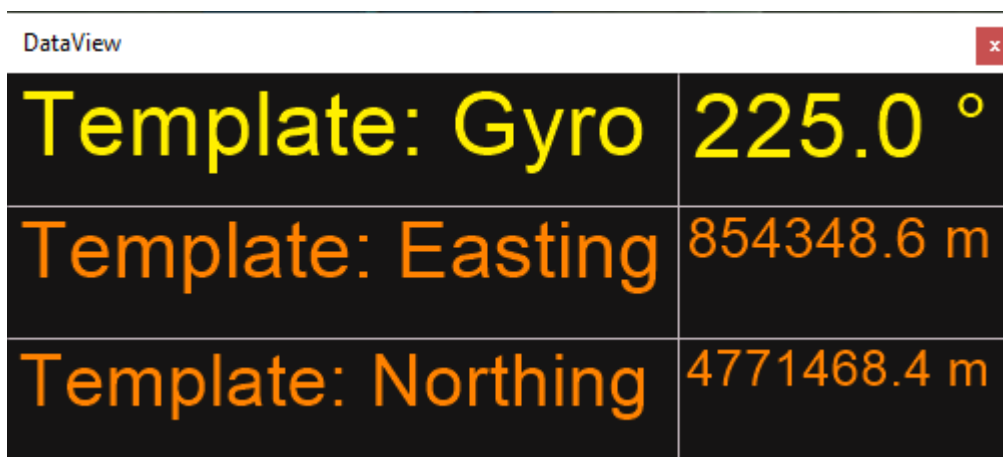
NOTE: The calculation is less accurate than a gyro reading, and the method should only be used for installations that do not require high accuracy. The calculated gyro value is not available for recording.

A detailed position is shown in the 'Object Monitor' view.



Base object	Accuracy	Weight	Measured	Error
Obj.No: 20 Position E: 854348.58 N 4771468.39 Z: -103.00 Std.Dev: 5.65				
<b>Template</b>				
Template [TP26]-dx	1.20	0.69	854346.21	-2.37
Template [TP26]-dy	1.20	0.69	4771463.26	-5.13
Template [TP26]-dz	1.20	0.69	-103.00	0.00
Template [TP28]-dx	1.20	0.69	854350.95	-0.98
Template [TP28]-dy	1.20	0.69	4771468.52	-3.58
Template [TP28]-dz	1.20	0.69	-103.00	0.00

The calculated gyro value is only displayed in the Helmsman's Display.



Template: Gyro	225.0 °
Template: Easting	854348.6 m
Template: Northing	4771468.4 m

## 5 Weighted position

NaviPac 4 has introduced a weighted position calculation option for underwater positioning systems. The method is defined in the Properties of each driver. As default the standard deviation from the source is used for the weighting. If the value is not given as 1\*sigma it can be scaled.

Weighted position	
Automatic from telegram	<input checked="" type="checkbox"/>
Scale	1
Manual deviation	0
Range scale deviation	0

If the source does not provide a standard deviation value, it can manually be defined as a fixed value for the instrument, plus a range-dependant part.

Weighted position	
Automatic from telegram	<input type="checkbox"/>
Scale	1
Manual deviation	0
Range scale deviation	0

In this case the value will be defined as 'Manual deviation' + Range \* 'Range scale deviation'

Object Monitor				
File Options View Help				
Base object	Accuracy	Weight	Measured	Error
Obj.No: 20 Position E: 499956.80 N 6299946.47 Z: -124.31 Std.Dev: 2.21				
<b>Towfish</b>				
Towfish [TP81]-dx	0.34	0.98	499957.54	0.20
Towfish [TP81]-dy	0.34	0.98	6299943.41	-2.23
Towfish [TP81]-dz	0.34	0.98	-50.00	0.00
Towfish [TP82]-dx	0.33	1.00	499957.01	-0.20
Towfish [TP82]-dy	0.33	1.00	6299949.39	2.18
Towfish [TP82]-dz	0.33	1.00	-50.00	0.01

In this case the weighting will be reverse of the accuracy, where the most accurate is set to full weight and the rest reduced depending on the deviation

The solution can be recalculated in NaviEdit where the accuracy can be set for each transponder.