

Correcting for Radar Misalignment in SPx Server

How to adjust the radar video input within SPx Server to compensate for radar misalignment; for both stationary radars and radars mounted on moving platforms

Summary

In radar processing, azimuth alignment is the process of ensuring that the orientation of the radar video matches the real-world.

Introduction

When using SPx Server, it is sometimes necessary to adjust the orientation of the radar video so that the returns align with the corresponding physical objects (for example: coastline, buildings, bridges, ships, aircraft, etc.)

On a moving platform, frequent adjustments to the orientation are necessary in order to compensate for the ship's heading and stabilise the video to a North-up picture, which is required for target tracking. For both static and moving platform installations, a fixed azimuth offset may be required in order to compensate for the radar being physically mounted with a rotational offset.

Misalignment of the radar video typically occurs due to physical installation of the radar not being aligned to the bow on a moving platform or true North on a static installation. This means that the zero (0) azimuth doesn't coincide with the ship's heading or with North.

SPx Server allows for both a fixed azimuth rotation to be applied, as well as frequent heading updates.



Figure 1: Example of radar misalignment – orange radar video is not well-matched to the physical features shown in the map underlay.



Figure 2: Example of good radar alignment – orange radar video is rotated to correspond with physical features shown in the map underlay.

Setting the Azimuth Reference Mode (on Static Location Platforms)

By default, this setting should already be set correctly for a static platform. Verify this is correct by following the below steps.

1. Open the **SPx Server GUI**.
2. Select **Preprocess > PIM > Configure...**
3. Ensure that **Moving Platform > Reference Mode** is set to **North from Input**

Setting the Azimuth Reference Mode (on Moving Platforms)

On a moving platform, SPx Server can compensate for changes in heading by continuously applying a variable azimuth offset, based on received heading data. The setting below assumes that the Navigation Data input is enabled and receiving heading data messages at a suitable rate.

1. Open the **SPx Server GUI**.
2. Select **Preprocess > PIM > Configure...**
3. Ensure that **Moving Platform > Reference Mode** is set to **North from Heading**

Setting the Fixed Azimuth Offset

The setting to apply a fixed rotation to the radar video is accessed via:

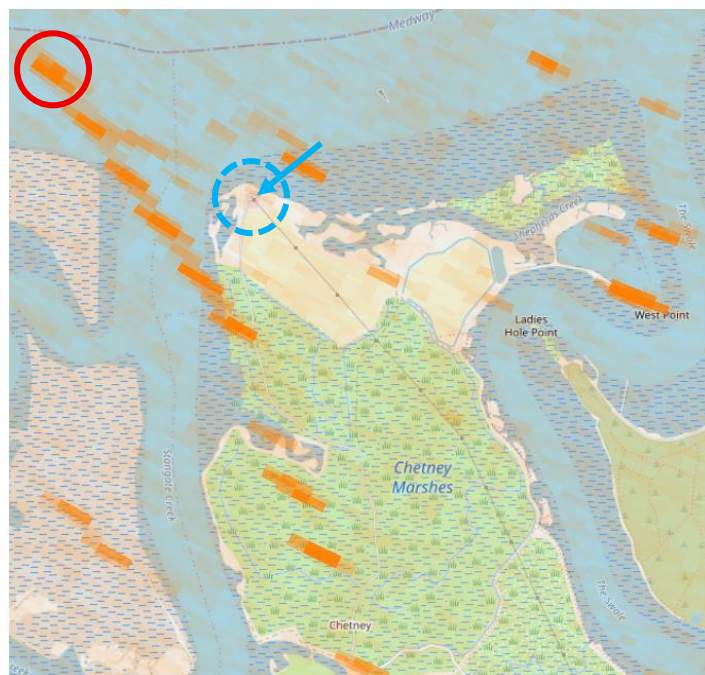
1. Open the **SPx Server GUI**.
2. Select **Preprocess > PIM > Configure...**
3. Locate the **Azimuth Offset (°)** parameter. Enter a **Positive value** to shift video clockwise or a **Negative value** to shift video counter-clockwise.
4. Observe the change in the PPI preview window and adjust the offset value as required (see below).

Calibration Procedure

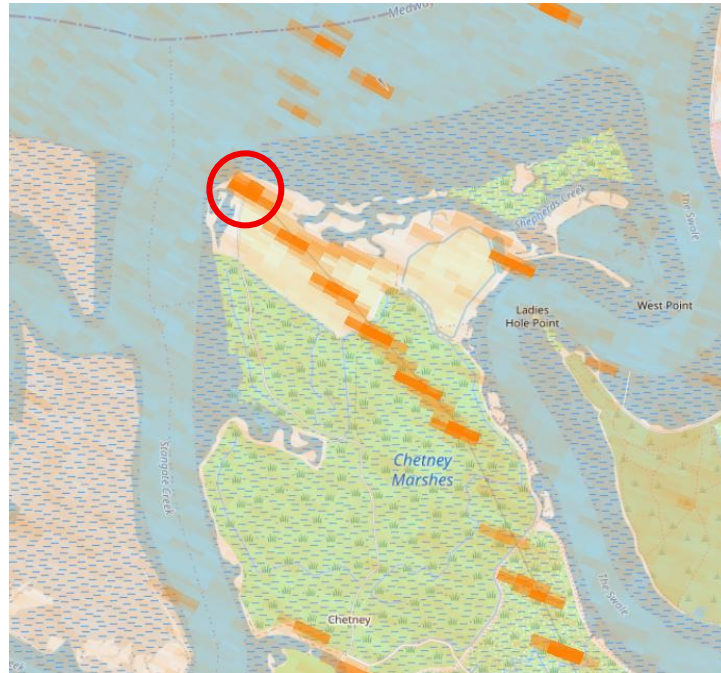
To determine the appropriate fixed correction value required for the radar video, follow these steps:

<u>Step</u>	<u>Action</u>	<u>Description</u>
1	Identify Landmark or Feature	Find a known fixed object (e.g., a lighthouse, wind turbine, bridge, church) visible on radar.
2	Measure Bearing	Use the cursor in SPx Server to measure the current bearing to that feature, as it appears in the radar video, then find the bearing to the feature in the map underlay.
3	Calculate the Delta	Calculate the difference in bearing of the feature in the radar video compared to the feature on the map.
4	Apply Offset	Enter this delta into the Azimuth Offset field.
5	Tweak the Value	Apply small changes to the azimuth offset in order to bring the video into alignment with the map.

For example, the radar video return below circled in red is measured in SPx Server to be at a bearing of 245°. However, the physical feature that it corresponds to (an electricity pylon in this case), is measured in SPx Server to be at a bearing of 240°.



Therefore, an offset of $240^\circ - 245^\circ = -5^\circ$ is appropriate and applying it then brings the radar video and features into good alignment.



Moving Platforms & NMEA 0183 Integration

When a radar is installed on a moving vessel, the heading may change relative to North. To maintain a stable **North-up** display, SPx Server applies real-time heading data to radar returns continuously. SPx Server receives standard NMEA0183 "HDG" or "HDT" sentences for its heading input.

For high-speed vessels, ensure heading data is delivered at **10Hz or higher** to prevent lag in the stabilised radar video.

For agile vessels, a minimum heading data rate of **25 Hz** or even **50 Hz** where possible is appropriate.

The Role of Heading Data:

Without heading input, the server will be heading-relative. Integrating **heading data** allows for:

- **Target Tracking:** Maintaining consistent tracks regardless of manoeuvres.
- **Chart Overlay:** Accurate alignment over S-57/ENC digital charts.

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