



VideoRay Sonar CoPilot

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# VideoRay Sonar CoPilot

This chapter of the user manual provides a general product overview and explains how to install and operate the VideoRay Sonar CoPilot unit and its pilot interface.

## Scope and Purpose

This manual provides the following:

* an overview of the VideoRay Sonar CoPilot hardware unit configuration and connectivity;
* a general description and specification of VideoRay Sonar CoPilot pilot interface; and
* operating instructions for VideoRay Sonar CoPilot and equipment.

## Targeted Audience

This manual is designed and developed for operators of the VideoRay Pro 4 MicroROV with a BlueView Sonar who are required to operate the VideoRay remotely operated vehicle (ROV) systems using VideoRay Sonar CoPilot.

# General Overview

VideoRay Sonar CoPilot V1.1 provides the latest generation of SMART software tools in a simple to use, pilot-friendly form. Training using VideoRay Sonar CoPilot is painless and the intuitive tools help novice users tackle even the most complex operations.

Pilots normally control a VideoRay ROV using thruster inputs to follow a desired course and speed. Constant adjustments are required to correct the course and account for water current and tether drag. Using VideoRay Sonar CoPilot, operators are able to identify objects suitable for tracking and can then maintain a stable heading and range to the target as desired, without the concern of current and tether drag. Pilots using the Pro 4 ROV equipped with VideoRay Sonar CoPilot will be able to:

* hold position and heading at the touch of a button;
* visualise current field of view as captured by the sonar;
* track and hold position relative to a selected target;
* alter the colormap of the interface to suit personal preference and current conditions;
* concentrate on the operations and not the actual action of piloting.

## Requirements

VideoRay Sonar CoPilot requires that the Pro 4 ROV is equipped with a BlueView P900 Sonar

## Dynamic Positioning System

A dynamic positioning (DP) system allows the ROV to automatically hold a requested position. A DP system mimics automatically what a pilot would do in adjusting the thrusters to keep the desired position.

VideoRay Sonar CoPilot enables object relative station-keeping and approach; the system will maintain a constant range to target whilst keeping the target at the centre of the sonar field of view. The user can then perform object-relative advances / retreats (reduce or increase range to target); or change depth/altitude while keeping a constant distance from the target.

## VideoRay Sonar CoPilot Core Features

The core features of VideoRay Sonar CoPilot are:

* **Pilot Interface**: The VideoRay Sonar CoPilot pilot interface offers the visual aid of real-time monitoring of the field of view. Its non-intrusive dark background enhances the display on screen and allows the user to extract vital real-time information for tracking.
* **Tracking:** VideoRay Sonar CoPilot allows the user to track, monitor and classify multiple targets simultaneously using the simple Pilot Interface
* **Compatibility**: VideoRay Sonar CoPilot is compatible with the latest version of the BlueView P900 Sonar devices.

### Tracking Module

The tracking module is a navigation tool that augments the operation of the dynamic positioning system. This tool works by using sonar input, analysing the images produced by the sonar and identifying trackable targets within the sonar field of view. If a target has been selected, the user is able to reliably and safely move the vehicle relative to the target, provided it remains within the field of view of the sonar. The tracking module has applications in sub-sea operations, such as riser tracking, that allow the vehicle to easily maintain a constant visual of the selected target.

# Pilot Interface Overview

The VideoRay Sonar CoPilot pilot interface presents the user with a visual of the ROV’s current environment, depicting possible targets within the sonar field of view. The overall look of the pilot interface is designed to be easy to read and intuitive to use.

Figure 1 – VideoRay Sonar CoPilot User Interface

The VideoRay Sonar CoPilot pilot interface comprises five main elements:

* **Position Information Display** - The position information display is the column on the top left side of the interface. It provides the pilot with summary information on the current location and status of the ROV. Further status information is located in the panel at the bottom on the interface.
* **Sonar Tracking Display** - The sonar tracking display is the main panel in the pilot interface. It allows the user to monitor the sonar field of view in real-time, identifying and classifying possible targets.
* **Water Column Display** - The water column display is positioned on the right side of the interface, next to the sonar tracking display. It allows the pilot to monitor and alter the depth of the ROV. A left-button trackball click in this display generates a new depth request for the ROV. A right-button trackball click has no effect in this display.
* **Range Toolbar** – The range toolbar allows the user to control the position of the vehicle relative to a chosen target, to set a chosen start/stop distance for the vehicle when tracking and to alter the sonar range visible on the sonar tracking display.
* **Pilot Interface Toolbar** - The pilot interface toolbar, located along the top of the interface, allows the user to access the additional functionality of the system.

Figure 2 – VideoRay Sonar CoPilot Interface Explained

# Position Information Display

The **Position Information Display** is located at the top left of the user interface provides the user with the current position data for the ROV.

The **Status Indicators** located across the bottom of the user interface comprises many user-friendly elements, including the current navigation information, status indicators and flight mode.

## Position Information

This position information panel provides the user with the following ROV information: heading (**H**) and depth (**D**)

Figure 3 – Position Information

## Status Indicators

The status indicators on the pilot information display across the bottom of the user interface allow the user to monitor the status of the ROV.

Figure 4 – Status Indicator

### The DP Status Indicator

This indicator displays the status of the DP system:

* The indicator is **green** when the DP system is running.

Figure 5 – DP System Running

* The indicator will not beilluminatedwhen the DP system is not running. In this instance, the sonar will not be able to find or lock to a target.

### The Position Status Indicator

This indicator is illuminated when the ROV is within the tolerance range (typically a few meters) of its target position. The indicator is not displayed when the ROV is not in position.

Figure 6 – Position Status Indicator

### The Joystick Indicator

This indicator is displayed when the system receives a command from the joystick. The indicator is not displayed when the joystick is not considered to be in use.

Figure7 – Joystick Indicator

### The Navigation Status Indicator

This indicator can have four different displays, depending on the accuracy of navigation system and the ROV’s global reference:

|  |  |
| --- | --- |
| **Indicator Appearance** | **Status** |
| Figure 8 – Navigation Indicator | The navigation system is in its “RUNNING” mode, and operating correctly, and the system can calculate relative positions to target. |
| Figure 9 – Position Indicator | The navigation system is not operating at an adequate level of accuracy and is no longer reliable. Only the MANUAL flight mode is accessible. |
| Figure 10 – Nav Fault Indicator | The navigation system has failed. Only the MANUAL flight mode is accessible. |

# Sonar Tracking Display

The **Sonar Tracking display** is focussed on displaying the data captured by the sonar within the current field of view. The Sonar Tracking Display will present the user with possible targets, each depicted by a yellow box. To select and lock to a target, the user must simply click on the preferred target which, once lock is achieved, will be depicted by a green box. The ROV position, relative to the target, is estimated by VideoRay Sonar CoPilot’s navigation system.

To control the vehicle, the user may select one of two options from the Tracking Buttons located to the left of the Sonar Tracking Display.

Figure11 – Tracking Buttons

Selecting Stop (Hand Icon) will instruct the vehicle to stop and hover at its current location whilst remaining locked to a selected target at a range depicted using the Range Toolbar (See section 7 – Range Toolbars). Selecting Release (Joystick Icon) will allow the vehicle to fly manually

**Note**: When the DP is in standby, the only mode enabled is MANUAL and the rest of the buttons are disabled in the pilot interface.

# Water Column Display

The **water column display** allows the user to view the area above and below the ROV in the water column. The ROV remains in the centre of the display at all times.

NOTE: since there is no altitude sensor on the BV equipped VideoRay, the height above seabed cannot be shown.

The sea surface icon is displayed in cyan. The **current** depth is represented by an arrow the same colour as the ROV.

Figure 12 – Water Column Display

## Alarm Panel

The **alarm** **panel** is displayed across the bottom of the pilot interface. It displays the current status of each software component that allows VideoRay Sonar CoPilot to run smoothly.

If a software component fails, its name is illuminated in the alarm panel situated along the bottom of the pilot interface.

In normal operation, the bar illustrated below should have no alarms illuminated (GREYED OUT); when a failure is detected the appropriate alarm will be indicated in RED.

Figure 13 – Alarm Panel

**Caution**: If the any alarm is activated, the CoPilot system will automatically switch back to MANUAL, and display the warning “DP Standby”; the pilot must take immediate control of ROV from this point.

# Range Toolbars

## Sonar View Range Sliders

The sonar range sliders (along the immediate left side of the interface) allow you to change both the start and stop range. The Stop Range selects how far out the sonar is looking, whereas the Start Range selects the point where the sonar starts acquiring data. By using both controls you can zoom in on a target. However, note that zooming in too far can create a degraded picture because not enough data is available to fill the screen pixels, resulting in pixilation.

Figure14 – Sonar Range Sliders

## Vehicle Range to Target Sliders

To change the range of the vehicle to a target, simply click on the orange dot within the far left range slider and drag to your chosen range. The blue dot represents the current vehicle range to target. To see the value of this range, the user can simply hover the mouse over the dot and the value will be displayed. The available maximum and minimum vehicle range to target is governed by the current start/stop Sonar Range

Figure15 – Vehicle Range to Target Sliders

**Note:** If the user changes the vehicle range to target and immediately afterwards changes the operating depth via the waterfall, the change in depth will subsequently overrule the change in range. The result of which will be that the vehicle will operate at the current acting range of the vehicle when the depth was altered.

# Pilot Interface Toolbar

There are further interface options available to users. These options can be found to the **top centre**, above the pilot interface of the interface toolbar. These additional functions include:

1. Reset Sonar Comms Figure 16 - Reset Sonar Comms
2. Log Recording Figure 17 – Log Recording
3. Taking a Screenshot Figure 18 - Screenshot
4. Auto-Intensity On/Off Figure 19 – Auto-Intensity On/Off
5. Intensity/Threshold Figure 20 – Intensity/Threshold
6. Colormap Figure 21 – Colormap
7. Target Size Selector Figure 22 – Target Size Selector
8. Preferences Figure 23 - Preferences

## Reset Sonar Comms

If the user wishes to close any existing connections to the sonar and open a new connection, they can do so by simply clicking on the **Reset Sonar Comms** icon. This function should be utilized in instances when communication with the sonar has been interrupted, for example if the vehicle is restarted or there is a communications failure.

## Taking a Screenshot

A screenshot of the current interface display can be taken by selecting the Screenshot icon. By selecting this icon, a screenshot of the current interface display will be captured and saved to the data directory.

## Log Recording

TTThe Log Recording icon allows the user to record sonar data in BlueView Technologies ProViewer (.son) format Files will be recorded and saved to the data directory. File names are allocated in accordance with the current timestamp.

After selecting the Log Recorder icon, the Log Recorder Icon will flash red to indicate recording status. To stop recording, simply click on the log recording icon.

Note: Pressing the log button on the VideoRay hand-controller will trigger the same effect.

## Auto-Intensity On/Off

By default, VideoRay Sonar CoPilot automatically adjusts the image intensity to produce an optimum image for most situations. However, there are some cases where you may wish to disable this feature. You can do so by un-checking Auto Intensity under the Pilot Interface Toolbar. With auto-intensity disabled, VideoRay Sonar CoPilot shows the horizontal Threshold and Intensity sliders in the toolbar.

## Intensity/Threshold

Lowering the threshold will allow more of the background to be displayed in the image. Increasing the threshold will suppress background noise, increasing the contrast of the image. The intensity control affects the brightness of the image. This is similar to brightness controls on a camera. Setting the intensity too low or too high will make the image dim or blown out respectively, making image details difficult to see.

## Colormap

The colors used in displaying the sonar image are referred to as the colormap. The selected colormap for the image is displayed in a drop down box on the Pilot Interface toolbar. The following list describes the available colormaps and their characteristics. We recommend that you experiment with the different color maps to best understand their individual strengths and weaknesses.

|  |  |
| --- | --- |
| Colormap | Characteristics |
| Cool | Softer colors that work well in low light conditions |
| Copper | Great image definition and contrast. Best general purpose colormap |
| Green | Great image definition and contrast. Best general purpose colormap |
| Bone | Best image definition, but low contrast makes it hard to use in bright sunlight conditions |
| Hot | Good image definition and contrast. Good general purpose colormap |
| Jet | High contrast with low image definition. Jet is ideal for quickly spotting targets in bright light conditions |

## Target Size Selector

The Target Size Selector function allows the user to specify the boundaries of the size of targets highlighted on the sonar display. Size range can be selected by sliding the blue sliders at the top left of the pilot interface to a range of sizes between 0.2 and 15 meters (or the equivalent in feet).

## Preferences

The preferences icon can be located on the top right of your screen, above the waterfall. The preferences icon will allow users to control the measurement units (**metres** or **feet**) associated with the Size Selector, Waterfall and Range toolbars.