

Integrating Analog Sub-bottom Systems with HYPACK®

By David Maddock

A new HYPACK® driver provides for the acquisition of analog sub-bottom data using an analog-to-digital (A/D) converter card made by National Instruments (NI). The A/D card allows us to send a trigger pulse to the sub-bottom and digitally sample the analog signal return as a 12-bit number (between 0 and 4096). We support two input channels and one output trigger.

Data is logged to a proprietary BIN file and can be loaded into our sub-bottom processing program to digitize layers and output to SEG Y (in development).

Device Setup

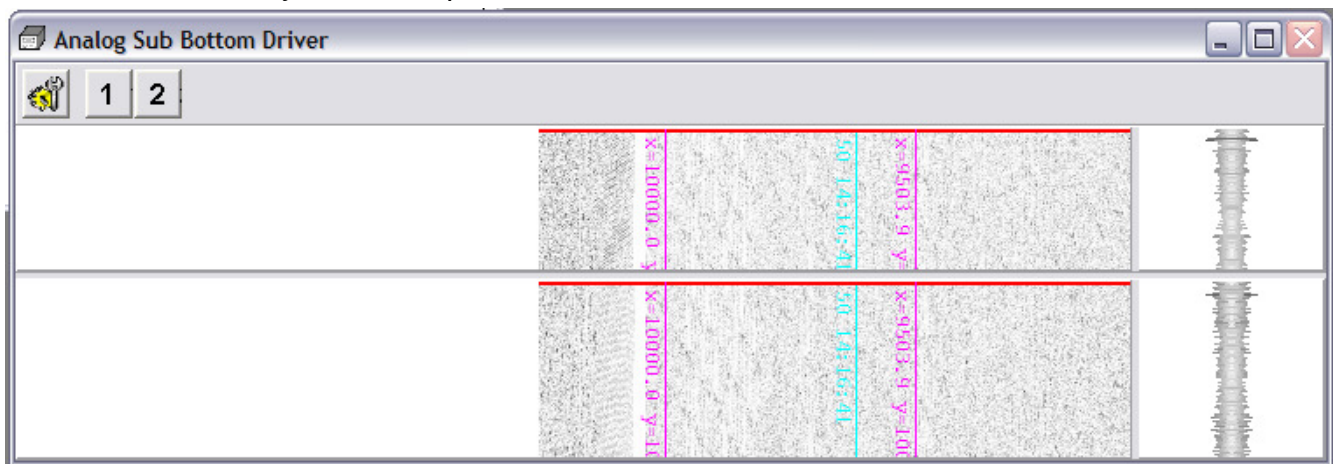
To set up the device, first add the driver (AnalogSB.dll), to your HYPACK Hardware configuration. The main device tab has little that needs changing from the defaults—since we are using the NI A/D card, leave Connect at None. The three provided options should remain checked to allow data polling, logging, and annotation. Clicking the “Setup...” button will display a form (right) to allow you to change the A/D card settings.

The driver can sample either +/- 5V or 0-10V input signals. It will output a 5V trigger at the specified interval. Sampling of the analog signal is controlled with the Start and Stop parameters. The driver will only sample within the window specified to minimize CPU load and allow you to ignore the water column.

The remaining options—grid step, color settings, and amplitude colors—affect visualization during acquisition. Depth, water line, and specified grid will be drawn as horizontal lines across the scrolling display. Marked targets and events will be drawn as vertical lines. Finally, the color palette used

The Setup Form dialog box contains the following sections:

- Color Settings:** A list of color-coded categories: Depth (red), Water (blue), Grid (green), Annotation (cyan), and Target (magenta). Below this is a button labeled "Amplitude Colors".
- Input:** Two radio buttons for selecting the input voltage range: ☒ +/- 5V and ☐ 0 - 10 V.
- Trigger:** Two radio buttons for the trigger direction: ☐ Low -> High and ☒ High -> Low. Below these is a dropdown menu for "Interval (ms):" set to 500.
- Sampling Parameters:** Three input fields: "Start Sampling (ms):" set to 0, "Stop Sampling (ms):" set to 500, and "Grid Step:" set to 500.
- Buttons:** "Apply" and "Close" buttons at the bottom right.



for the amplitude colors can be modified as well, and is stored as a HYPACK® color file (AnalogSB.hcf in the project folder). Instead of applying to depth, the colors apply to the amplitude value. The same palette can be used during post-processing.

HYPACK® Survey

HYPACK Survey can display the sub-bottom data during acquisition. Each frequency has a panel that shows the latest signal and a panel that scrolls the history. Either frequency can be hidden by clicking the associated button on the top menu. Grid, depth, and tide lines as well as target and event markers will be overlaid on the history. The above example is from an office simulation and shows depth, two targets, and an event.

Our sub-bottom processing program enables you to digitize the layers and output EDT files. We intend to add high- and low-pass filters and TVG in the future.

Note: National Instruments has chosen not to provide drivers for the PCMCIA A/D cards on Windows Vista. They have a USB version which we will be experimenting with as an alternative if you are using Vista.
