

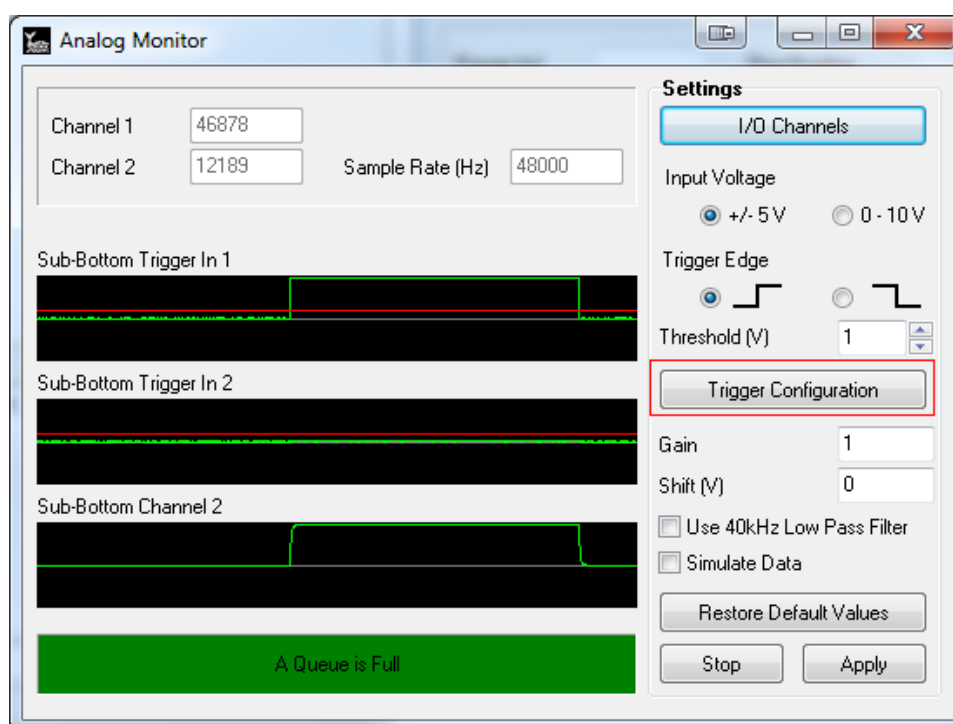


Advanced Analog Triggering

By Dave Maddock

Support for analog side scan sonars has been a standard feature in SIDE SCAN SURVEY for years and drivers for collecting analog sub-bottom data have been included in the package since HYPACK® 2012. But did you know that HYPACK® can run both simultaneously by making the sub-bottom trigger a divisible of the side scan trigger? Or collect two sub-bottom channels if given an external trigger source? Both configurations are already possible in HYPACK® 2014 and we are hard at work making further improvements to these features. More powerful trigger configuration tools are now in development, including support for generating dual sub-bottom triggers.

FIGURE 1. Click "Trigger Configuration" to Access the New Features.

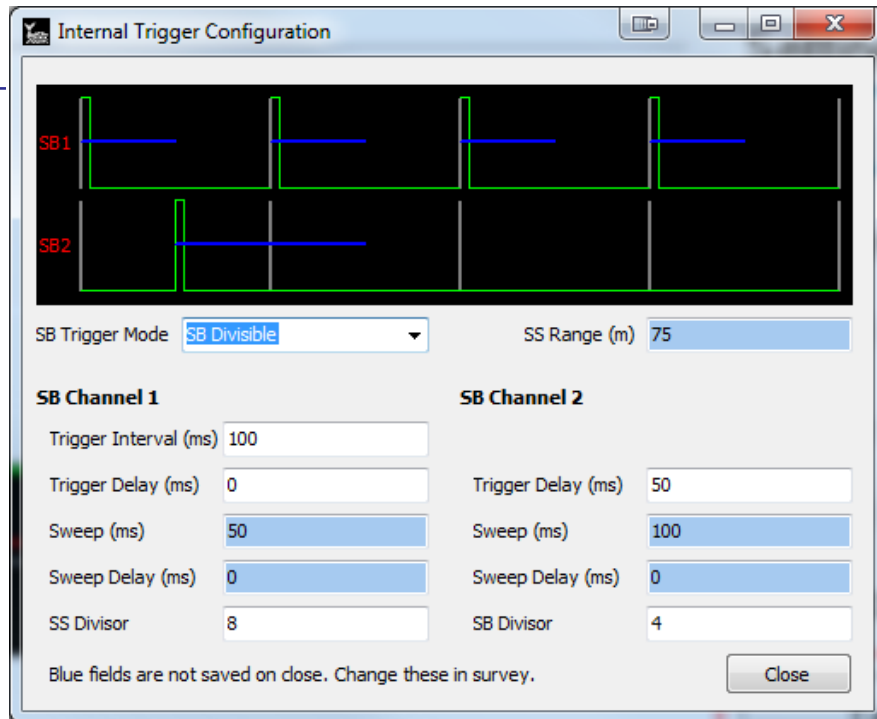


THE NEW GRAPH VIEW

To give you more control over your trigger configuration and make it easier to visualize, a new window has been added to the Analog Monitor. The Trigger Configuration window will graph the trigger loop so you can see exactly how the trigger channels will interact with each other.

FIGURE 2. *Output Triggers Can be Viewed as Graphs During Setup*

Every variable that affects the trigger is viewable on this window and instantly updates the graphs when changed. The green line represents the trigger signals themselves, similar to how they are displayed on the main Monitor window. In advanced modes, two signals are drawn: the primary trigger—the duration of which is controlled by either the side scan range or sub-bottom



trigger interval—and the secondary trigger, which is always a divisible of the primary. The "sweep" is drawn as a blue line. This shows the period of time that will be logged as a ping. When a divisible mode is enabled (as in Figure 2), the primary trigger is repeated so as to show one full cycle of the slower secondary trigger. Before showing how to set up each mode, let me explain how each setting affects the trigger signal.

THE COMPONENTS OF A TRIGGER

SB Trigger Mode—There are four ways to handle sub-bottom triggers:

- *External*: triggers come from outside HYPACK. Analog Monitor only listens.
- *Internal*: creates only one sub-bottom trigger
- *SS Divisible*: side scan is primary trigger, sub-bottom channel 1 is the divisible
- *SB Divisible*: two channels of sub-bottom, sub-bottom channel 2 is the divisible

Trigger Interval—The rate in milliseconds that the sub-bottom will fire if it is primary.

Trigger Delay—The time in milliseconds to wait before firing if the channel is secondary.

SS Divisor—How to divide the side scan trigger if sub-bottom channel 1 is secondary.

SB Divisor—How to divide the primary trigger if sub-bottom channel 2 is secondary.

These fields control the shape of the green trigger lines. The remaining fields control the start and duration of the signal which will be logged on the input channels.

SS Range—Side scan range as reported by SIDE SCAN SURVEY.

Sweep Delay—How long to wait after a trigger before logging. This is useful for ignoring the water column.

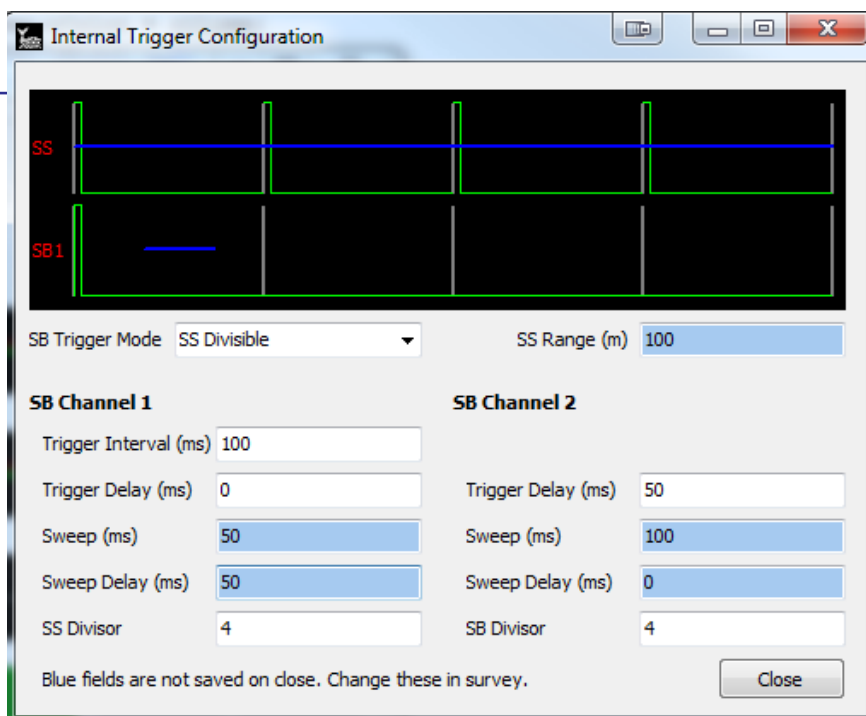
Sweep—How long to listen for data per ping.

These fields are displayed with a blue background to indicate that they are for display only on this form. To change the side scan or sub-bottom range, use the controller in the SURVEY program.

SUB-BOTTOM TRIGGERING AS A DIVISOR OF SIDE SCAN TRIGGERING

FIGURE 3. Example Side Scan Triggering with a Secondary Sub-bottom.

Figure 3 shows a simple configuration of SS *Divisible* mode. The side scan has been set to a 100 meter range scale in SIDE SCAN SURVEY. The sub-bottom channel is configured to trigger every 4th side scan ping (SS Divisor = 4). It is important that the sub-bottom triggers early enough after the side scan so that the bang pulse falls into the water column of the side scan record and not over the useful side scan imagery. The first 50ms of the sub-bottom sweep is ignored, then the next 50ms will be logged to SEG Y.



Note: The sub-bottom sweep can be extended over several side scan pings if desired, although the side scan pinging will introduce noise into the sub-bottom imagery in that case.

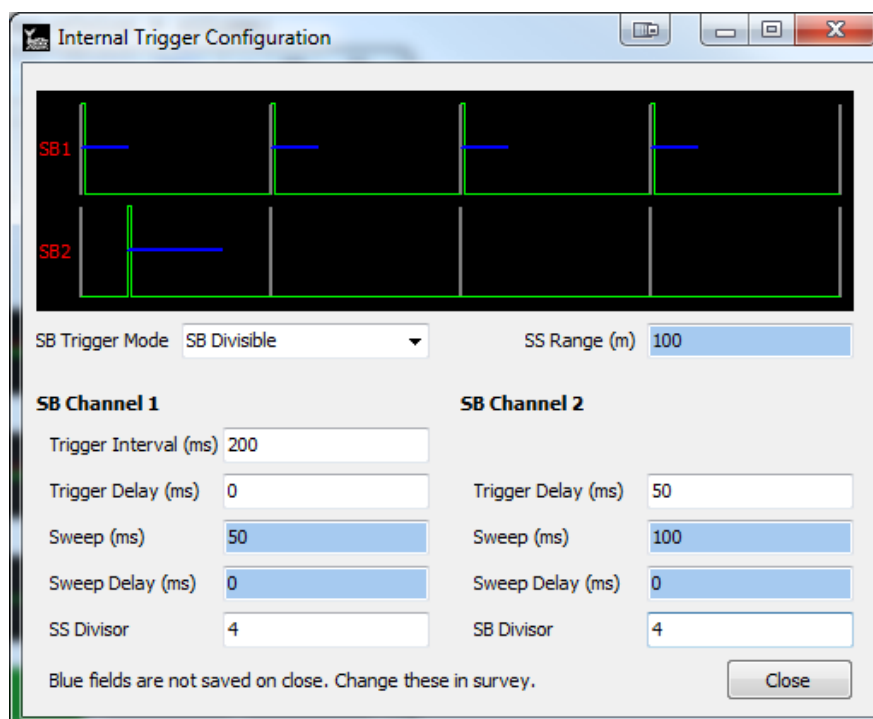
Most National Instruments A/D boxes provide only two analog output channels, including the USB-6221 recommended by HYPACK, and therefore sub-bottom channel 2 is ignored in this mode.

DUAL SUB-BOTTOM TRIGGERING USING A DIVISOR

SB Divisible mode uses the first sub-bottom channel as the primary trigger rather than the side scan. The primary trigger will fire every 200ms, but only the first 50ms will be recorded.

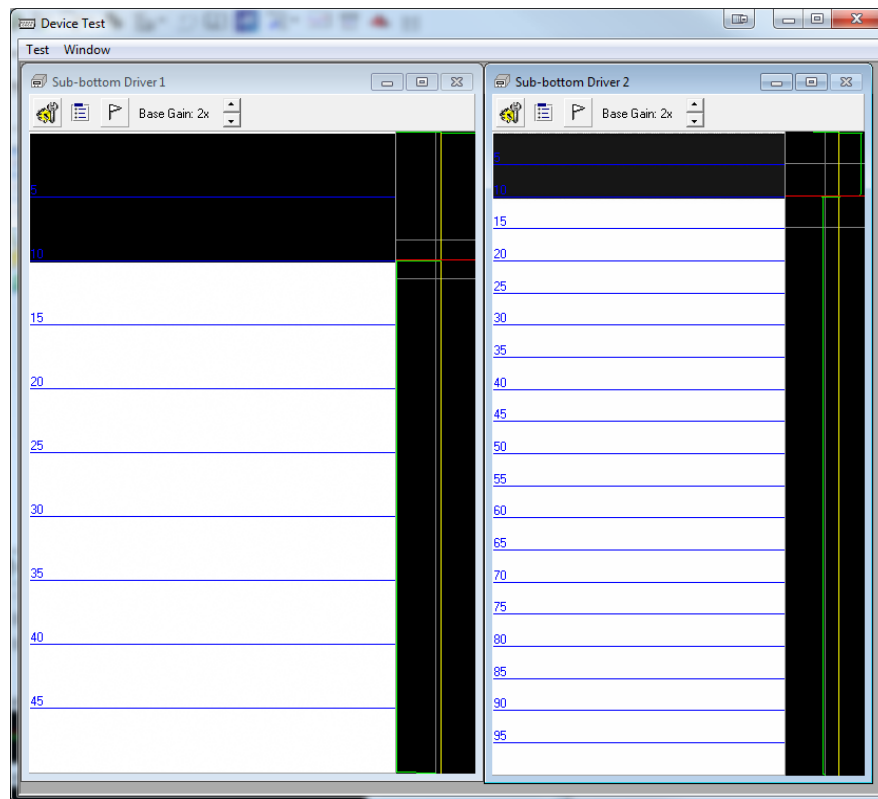
After every fourth ping from sub-bottom channel 1 has finished, sub-bottom channel 2 will fire and log a 100ms sweep.

FIGURE 4. *Two Channels of Sub-bottom Triggering in Tandem.*



To set up dual sub-bottom drivers in HARDWARE, simply add two instances of the subbot.dll to your configuration. For the second instance, check "Use Channel 2" in the setup form.

FIGURE 5. Two Sub-bottom Channels in Simulation. The Triggers Have Been Fed Back into the Data Inputs.



This scenario is ideal for operating pinger and boomer sub-bottoms side by side. The faster, lower energy pinger is configured on channel 1 and the slower, higher energy boomer on channel 2. Also note that the two profilers need not be attached to the same mobile. If one or both are on a towfish, simply add the driver to the appropriate mobile in your **HARDWARE** configuration and layback-corrected position will be logged in the SEG-Y file for that channel.