How does Heading affect you and your Data ?

By Joe Burnett

Under most circumstances, a Heading Device is not required for performing a hydrographic survey, especially one as basic as a normal singlebeam survey. all that is required for this type of survey is a positioning device, a depth device, and some sort of recording device. For you Old-timers, this could be a tag-line, a lead-line, and a field book; having a heading device wouldn't even cross your mind. However, with the advancements of electronics, most of us now use GPS for positioning, an acoustic echosounder for our depths, and HYPACK® for recording and processing. This is where a heading device can be of great assistance and accuracy.

If you are fortunate enough to be able to locate your GPS antenna directly above your transducer, a heading device is not necessary to increase the accuracy of the sounding positions though it could help keep the sanity of your boat captain. If you have gone to the trouble of creating a boat shape to represent your vessel on the survey map, no doubt you have seen the boat shape spin when your vessel is stationary. This is because you do not have a heading device to correctly orient your vessel or boat shape. With a heading device, you could keep this from happening.

Heading devices come in several shapes, sizes, and costs. The three (3) main types of heading devices are:

1) Flux-gate (magnetic) compass ($ 150 to $ 500 USD)

2) Gyro-compass (approx. $ 20,000 USD)

3) Dual antenna GPS system ($ 4000 to $ 5000 USD)

NOTE A flux-gate compass, because it is magnetic in nature, can become significantly compromised when it is in the vicinity of large steel or iron structures or vessels. A flux-gate compass is not recommended for the use with multibeam echosounders, and should be evaluated when used in conjunction with a single beam echosounder, when surveys with certain specifications are being performed.

Adding any one of these will keep the boat shape from spinning. They can also be added to increase the accuracy of the positions of your soundings. This is especially true when your GPS antenna is not located directly above your transducer.

in order to accurately position your soundings when your GPS antenna and your transducer are offset:

- You must enter these offsets within your HYPACK® HARDWARE setup.

- You will need a heading device.

In Figure 1 and Figure 2, there are location offsets between the GPS antenna and the transducer. If you use the GPS course over ground heading, your sounding positions will be plotted based on the heading of the track line (calculated from one GPS position to the next), instead of the actual boat heading (orientation).

NOTE *This will cause INCORRECT positioning of your sounding data.!*

FIGURE 1. *Vessel Heading vs Track Line Heading*

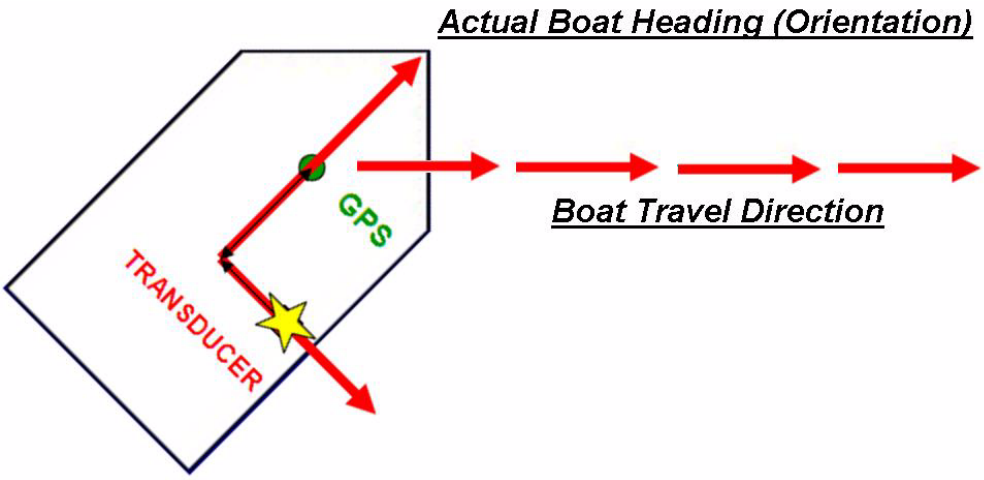
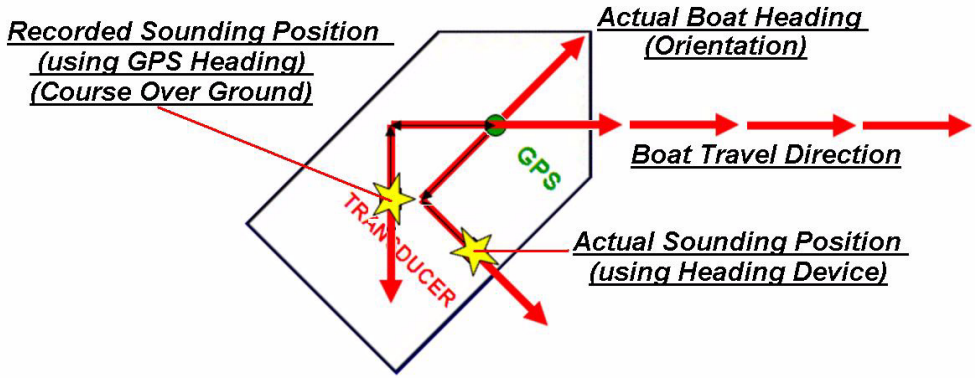


FIGURE 2. *Sounding Positions Based on Vessel Heading vs Track Line Heading*



The error of the positions of your soundings, based on this situation, is significant no matter what the offset distances are, but can become grossly significant, if the distances are large.

Therefore, if you do NOT have a heading device, do everything possible to put the GPS antenna directly above the transducer, and the positional accuracies of your soundings will not be an issue. If you can't align the GPS above the transducer, the purchase of an appropriate heading device will do the job.