

## The Benefits of Time-Stamped Echo Sounder Data

*How the CEESCOPE™ and CEE ECHO™ enhance data quality by using precise PPS and GNSS time stamps that are applied to the entire dataset collected.*

Timing is a critical component in hydrographic surveys. As the boat is moving, the position of the GNSS or GPS updates and the echo sounder pings is not exactly coincident. During the survey process, software is used to interpolate the location of soundings between GNSS position updates. Many echo sounders have no means to present data with the time of the sounding as they do not have an external GNSS input to provide any time information; in this case the time of the sounding is simply assigned as the time that the outputted data reaches the survey PC. That time may be slightly different to the time when the sounding was actually completed.

Simultaneously, GNSS position data is received by the PC through a separate data interface subject to its own potential timing errors, and both data streams are then brought together in the mapping process. As a result of the discrepancy in actual measurement times versus the recorded measurement times for echo sounder and GNSS data, the latency of the system must be measured, recorded, and entered into the survey acquisition software. The test involves a somewhat laborious process running reciprocal lines along a sharply sloped gradient. The latency between a GNSS receiver and echo sounder are typically consistent on a given day, the variation coming from constellation available and positioning method (correction type). The survey PC itself can add a second layer of latency that is typically not a constant value, making it more difficult to remove in processing a final result.

The CEESCOPE™ and CEE ECHO™ systems practically eliminate or greatly reduce the latency between the GNSS, echo sounder and PC by recording and outputting a precisely time-stamped survey file containing all of the survey data. The CEESCOPE uses ultra-precise 1PPS timing, and the CEE-ECHO uses very precise GNSS message timing to insert a time stamp on every separate data point – critically at the source of the data not at the destination (the PC). Acquisition software designed to handle this special data stream uses the time stamp for all future calculations instead of PC time. The information supplied to a data logger (usually the computer) will typically be stored on a “time received” basis rather than “time measured”. The CEESCOPE and CEE ECHO handle the data merge inside the echo sounder before it is sent out in real time via the various communication options. This removes any variations that may come about for buffering in network transmission of data or other processes being run in the background.