Using the CEE ECHO™ with an External GPS or RTK GNSS Receiver

How the CEE ECHO™ accepts RTK position and elevation data from an external GPS or GNSS receiver and merges this with echo sounder data to produce a single time-stamped data stream that is used in hydrographic surveying software.

The CEE ECHO™ is a portable echo sounder designed to accept position data from connected external GPS or GNSS receivers outputting NMEA0183-format messages through a cabled serial RS232 or wireless Bluetooth connection. The echo sounder measures soundings at up to 20 Hz and these soundings are merged with the GNSS position data, plus any ancillary measurements fed into the CEE ECHO such as heave, pitch, and roll. Each discrete measurement is precisely time-tagged using GPS time and then recorded on the CEE ECHO internal memory. Simultaneously, the combined data are outputted to an acquisition PC or tablet via an Ethernet, Bluetooth, Wi-Fi or RS232 serial connection. The GNSS receiver should be set to output $GPGGA (position and elevation), $GPVTG (velocity and heading), $GPGST (position error) and $GPZDA (time and date). In RTK mode, the precise antenna elevation data from the receiver may be used to compute accurate bottom elevations in addition to sounding depths. This allows the CEE ECHO system to be used without any separate measurement of water level throughout the survey such as by a tide gauge or periodic manual GNSS checks.

Figure 1. CEE ECHO™ setup with external GNSS.

The CEE ECHO requires position data from the receiver to be in WGS84 format and will display UTM grid coordinates and WGS84 lat / long on its LCD screen. A survey PC or tablet running a hydrographic acquisition package such as HYPACK®, HydroMagic, QINSy or HydroPro is connected to the CEE ECHO by Ethernet cable, Bluetooth or Wi-Fi and manages all of the geodetic calculations for the survey, converting the data from WGS84 to the desired local coordinate system. In addition to managing geodesy and acquiring the data, the software provides a visual display of the boat position, soundings and ancillary detail such as the planned survey lines.

The CEE ECHO will work with all GNSS receivers able to export a NMEA0183 data stream, and the update rate for the messages should be 5Hz or greater for surveying on a moving boat. If using NTRIP corrections, the CEE ECHO has an RTCM input port that may be connected to a PC serial port set to output the appropriate corrections from a broadcaster.

If desired, the CEE ECHO can be used as a standalone echo sounder with a direct Bluetooth connection to a field data collector. In this case, the GNSS receiver is connected directly to the data connector and not the echo sounder. The output format of the CEE ECHO should be set at $SDDBS, and the data collector external echo sounder input "Generic NMEA" should be similarly set to $SDDBS. The draft of the transducer below the waterline must be entered into the CEE ECHO.