

600 kHz DVL Lake Trial Report

Model: DVL-600K

This report presents lake trial results of a 600 kHz Doppler Velocity Log (DVL), evaluated at Xianghongdian Reservoir. Using high-precision differential GPS as ground truth, multiple power-cycle tests verify speed measurement accuracy, consistency, and stability for marine and inland water applications.

1. Test Equipment Installation

The transducer of the 600 kHz Doppler Acoustic Phased-Array Velocity Log (DVL) was mounted on a tripod and installed on the side of the test vessel.

The transducer was rigidly fixed to the vessel, ensuring a stable connection without vibration or relative movement, as shown in Figure 1.

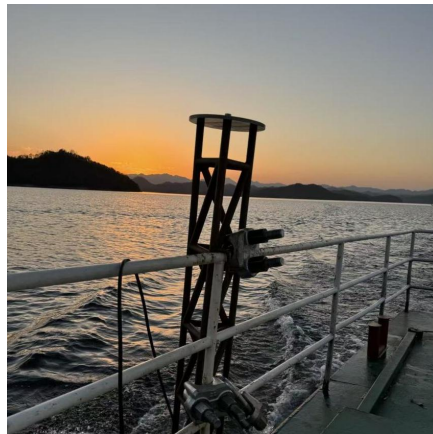


Figure 1. Schematic Diagram of Equipment Installation

2. Test Site

The trial was conducted at Xianghongdian Reservoir, Jinzhai County, Anhui Province, China. The reservoir has an average water depth of approximately 30–40 m. To ensure the velocity measurement accuracy of the equipment, an open water area with relatively flat terrain was selected as the navigation route for this trial.

3. Test Equipment

The equipment used in this lake trial included:

- (1) One set of Acoustic Phased-Array Doppler Velocity Log (DVL), consisting of an electronics unit

(Figure 2) and a transducer (Figure 3).

(2) One set of high-precision differential GPS (DGPS) (Figure 4);

(3) One 24 V power supply (Figure 5).

For this trial, power was supplied by a 220 V portable power unit (“Dianxiaor”).



Figure 2. DVL Electronics Unit



Figure 3. DVL Transducer



Figure 4. Differential GPS (DGPS)



Figure 5. +24 V Power Supply

4. Test Content and Results

The primary objective of this trial was to evaluate the consistency of velocity measurement accuracy of the 600 kHz Doppler Velocity Log (DVL) across multiple power cycles.

The velocity measured by the high-precision differential GPS (DGPS) was used as the ground truth. The velocity measurement accuracy was calculated as the difference between the average DVL-measured velocity (after velocity calibration) and the average true vessel speed, divided by the true speed.

During this trial, the equipment underwent six power cycles, with each run lasting approximately 10 minutes. The vessel speed was maintained at approximately 3 m/s.

The first trial segment was used to calibrate the DVL scale factor, which was determined to be 0.9963. The subsequent five segments were used to verify the measurement accuracy after each power cycle. The entire trial procedure is illustrated in Figure 6.

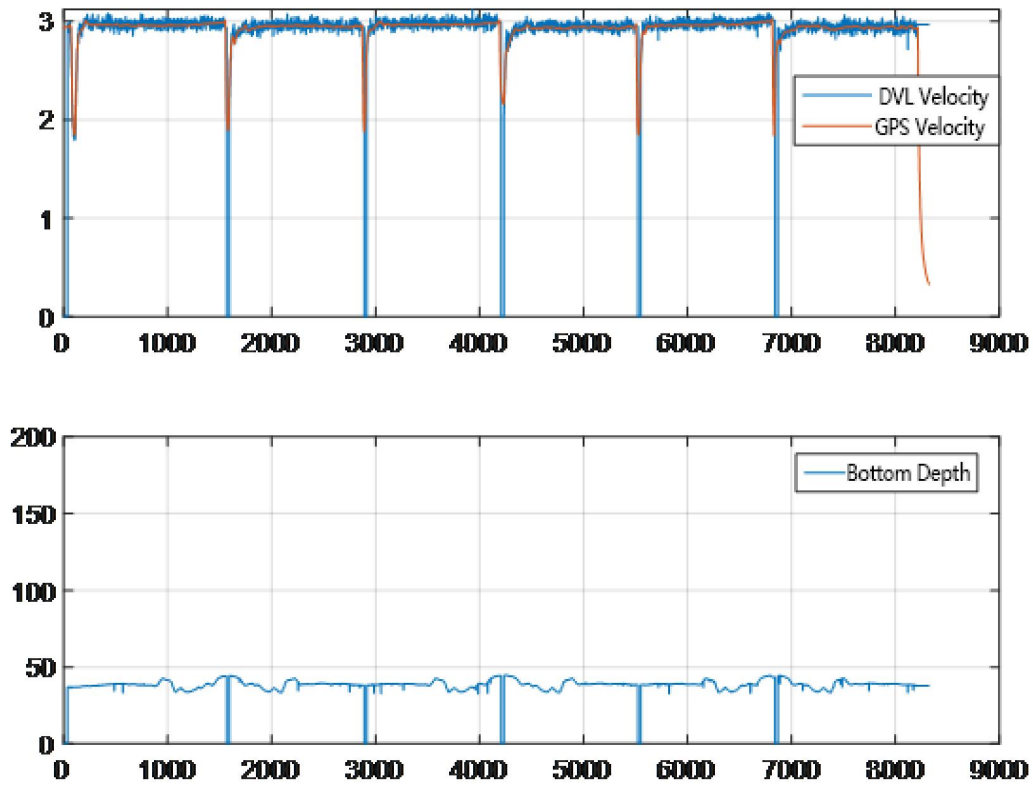


Figure 6 Calibration Segment and Verification Segment 1

The velocity measurement accuracy for the five verification trial segments, calculated as described above, is shown in Table 1.

No.	Verification Segment	Accuracy (%)
1	Segment 1	0.2993
2	Segment 2	0.5278
3	Segment 3	0.9377
4	Segment 4	0.1817
5	Segment 5	0.9626

Table 1. Velocity Measurement Accuracy