



Losing GPS Signal? Add a DVL for a Robust Solution

Bottom-Tracking Sonar Supplies High-Quality Stand-In Navigation

Need to navigate where the GPS signal might be blocked or jammed? Consider using a persistent and stationary navigation aid—the seabed. For safe maritime operations, Doppler Velocity Logs (DVLs) can provide an enhancement or replacement when GPS is unavailable—or when redundancy is needed.

Maritime operators recognize there are some environments where GPS is unavailable, especially underwater. They anticipate situations where intended and unintended interference with GPS signals can be problematic. These situations include jamming and spoofing in addition to operating under bridges and near structures.

Teledyne RDI

Based in San Diego, California, Teledyne RDI has an unmatched track record for supplying high-quality sonar technology. Since the early 1990s, Teledyne RDI DVLs have been a go-to resource for modernizing subsea navigation because they improved positioning and navigation.

Operators of underwater vehicles rely on the high precision and fast update rates of our velocity sensors. These same capabilities are available for surface vessels—and can provide backup navigation for times when GPS is unavailable.

DVL Navigation

DVLs provide dead-reckoning (DR) navigation. They estimate relative location from a last position fix to map a vehicle’s movements. The DVL also reports water depth below the vessel when the seabed is in acoustic range.



Minehunter fleets are planning ahead for GPS-denied situations caused by intentional interference, such as jamming and spoofing.

Credit: UK Ministry of Defence

Pioneer family of DVLs. Available at various frequencies and depth ratings, these products can serve many applications.

Teledyne RD Instruments

Instruments

Product:

Doppler Velocity Logs:
Pathfinder, Pioneer

Application:

Navigating Submerged Vehicles

Project:

Boosting bottom-tracking
range of DVLs

Doppler Velocity Log:

A DVL is a sonar system that measures motion under water. DVLs emit sound bursts along beams angled downward in various directions. Echoes that are scattered off the seabed are returned. Because the DVL sonar is aboard a moving vehicle, returning echoes carry a change in pitch; this is the Doppler Effect. Combining these readings tells how fast the vehicle is moving and in what direction.



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Owing to Teledyne RDI's broadband signal technology, the DVL data are low-noise and available at a high data rate. In addition, the new XRT technology adds 60% more bottom-tracking range. Small-sized Pathfinder DVLs can operate to the edge of the continental shelf. And lower-frequency Pioneer DVLs can reach much deeper.

Current speeds often diminish with depth. For operating beyond acoustic range to the seabed, the DVL can switch to a second option. Here it tracks vehicle motion relative to a much deeper (and slower) water layer. Many deep-water operators prefer knowing this relative velocity to no input at all.

Integrated DVLs

To improve the performance of an inertial navigation system (INS) when longer integrations are required—or when GPS might dropout—operators opt for a combined solution: inertial measurement units, gyrocompasses, and DVL. This combination reduces position drift ten-fold in the solution output by the INS. As well as a lower error bound, the additional independent DVL input offers a more robust solution.

Of course, there is no free lunch. Combining outputs from different hardware adds complexity. Most operators use variants of the ubiquitous Kalman filter to stitch the complementary data into a navigation solution.

Flexible Configurations

Teledyne RDI DVLs can operate either stand-alone or as part of an INS. Moreover, for situational assessments, the highly versatile DVL can also measure water current profiles (ADCP) while the vessel is underway.

Phased Array and Extended Range

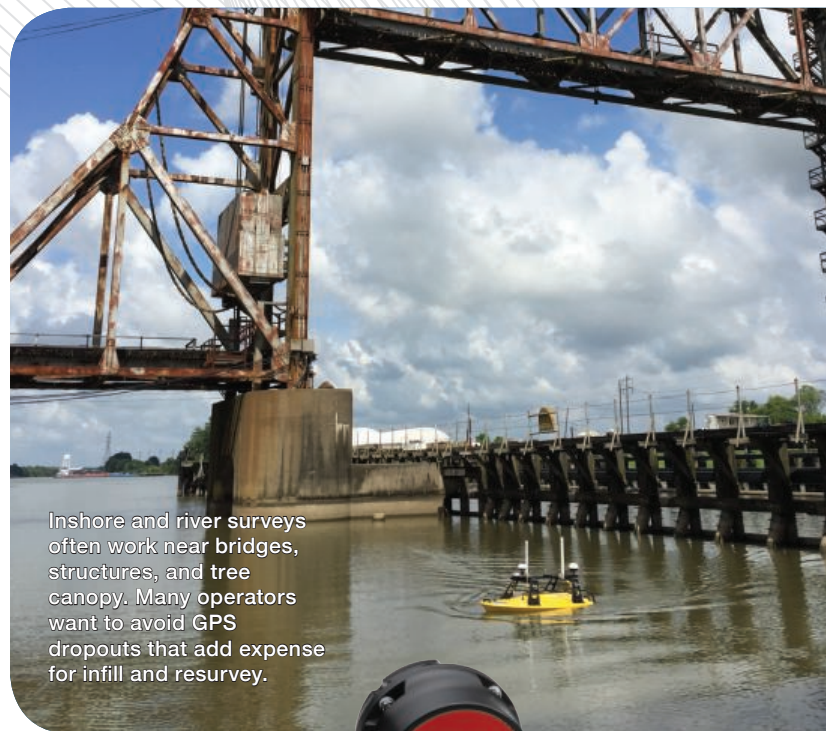
Phased array technology allows surface vehicles to carry compact low-frequency DVLs to reach longer ranges. Teledyne RDI's new XRT technology multiplies this advantage by extending the DVL's operating range an additional 60%. Meanwhile, the DVL still provides reliable, low-noise velocity measurements at high update rates.

Why wait? Ask about adding a DVL for a robust solution where GPS signals are not available. Call Teledyne RDI today!

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Inshore and river surveys often work near bridges, structures, and tree canopy. Many operators want to avoid GPS dropouts that add expense for infill and resurvey.



Highlight:

Packaged for small vehicles, Pathfinder DVL provides best-in-class performance and maximal operating range.

For more information, contact:



TELEDYNE
RD INSTRUMENTS

14020 Stowe Drive
Poway, CA 92064 USA
Tel: +1 858.842.2600
rdi.sales@teledyne.com

www.rdinstruments.com