

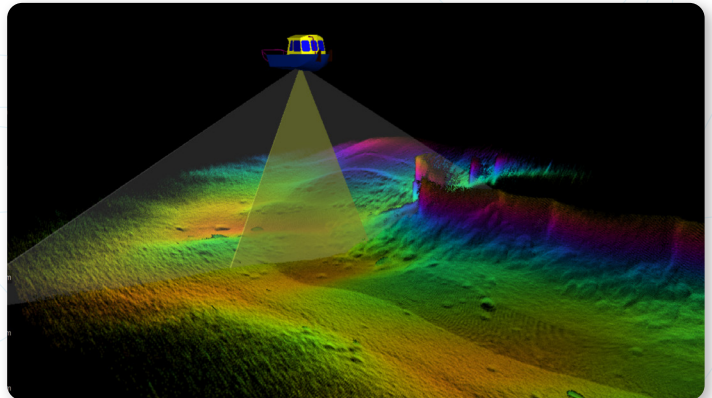
Echoscope PIPE® WAVM

Wide-Area Volumetric Mapping (up to 125° across track x 25°)

The Next-Generation Real-Time Volumetric Mapping and Underwater Spatial Awareness Tool - Transforming Subsea Mapping from Post-Processed Bathymetry into Live Volumetric Spatial Intelligence.

The Echoscope PIPE® Wide-Area Volumetric Mapping technology, available, now on all Echoscope PIPE®, represents the next evolution of real-time 3D volumetric sonar mapping, combining proven Echoscope®-derived technology with ultra-wide-area acoustic mapping capability across swaths of up to 125 degrees across-track x 25 degrees.

Traditional multibeam systems are fundamentally optimized for sequential bathymetric surface acquisition, where the primary objective is to generate a seabed map for later analysis. In contrast, the Echoscope PIPE® WAVM technology is designed to simultaneously monitor a live underwater scene with moving targets in real time while continuously generating true real-time 3D volumetric data across an expanded field of view, enabling simultaneous visualization of vertical structures, subsea infrastructure, water-column targets, and seafloor environments within a single coherent acoustic scene.



This allows operators to move beyond conventional “survey-after-the-fact” workflows and instead interact with a persistent live 3D acoustic representation of the subsea environment as operations are taking place.

This wide-area volumetric imaging and mapping technology can, for example, provide an instantaneous mapped seafloor coverage area of approximately 1,300 m² in only 25 m water depth, while simultaneously maintaining persistent real-time volumetric observation of the full water column and surrounding underwater environment.

The system also incorporates our patented ERSA (Enhanced Resolution Split Aperture) beamforming technology (patent **US12,566,264**), enabling significantly improved beam detection accuracy, angular precision, and target localization performance across the entire swath — including at extreme steering angles where conventional beamforming approaches typically experience degradation in resolution and phase coherence. By utilizing advanced split-aperture processing techniques, ERSA maintains high-fidelity target definition, improved edge-of-swath performance, and enhanced volumetric consistency throughout the full acoustic field of view.

Echoscope PIPE® users can already benefit from our Sequencer technology, which allows them to use a single device for multiple purposes simultaneously. Sequencer allows you to configure multiple sets of acoustic parameters and processing steps, which will be run concurrently and provide separate data streams that can be used for different purposes. WAVM can make full use of Sequencer’s capabilities, allowing the user to collect ultra-wide-angle seabed data while also gathering tightly focussed high-frequency data on a specific area of interest.

In addition to real-time 3D volumetric imaging and mapping, the system provides simultaneously steerable full-time series acoustic data products for:



2D Imaging Sonar Operation



Acoustic Profiling and Cross-Sectional Analysis



Narrow Beam Imaging (NBI)

This enables concurrent acquisition of high-resolution volumetric mapping data together with focused application-specific acoustic views throughout the survey, maintaining persistent full water-column observation without compromising update rate or spatial fidelity.

Leveraging adaptive variable transmit steering, the sonar can dynamically optimize acoustic energy distribution toward mission-critical regions of interest — including vertical assets such as quay walls, monopiles, risers, pilings, vessel hulls, and subsea infrastructure — while simultaneously maintaining wide-swath high-resolution seafloor mapping performance. The steerable architecture allows operators to prioritize target regions and inspection geometries in real time while preserving the high target density, volumetric resolution, and low-latency responsiveness associated with standard Echoscope® systems.

Key capabilities include:



Real-Time 3D Volumetric Mapping and Imaging



Concurrent 2D Imaging Sonar Capability



Up to 125° Across-Track x 25° Wide-Area Swath Coverage



Simultaneous Narrow Beam Imaging (NBI)



ERS (Enhanced Resolution Split Aperture) Beamforming



Integrated Profiling and Cross-Sectional Analysis Modes



Simultaneous Full Water-Column Observation



Adaptive Application-Focused Transmit Steering



Dense Real-Time Acoustic Point-Cloud Generation



Simultaneous Vertical and Horizontal Asset Mapping



Steerable Full Time-Series Acoustic Data Output



Echoscope® - Class Spatial Resolution and Target Fidelity

The platform is designed for advanced subsea operations requiring instantaneous spatial awareness and persistent volumetric observation across complex underwater environments, including:



**Offshore Energy and
Renewables Inspection**



Port and Harbor Security



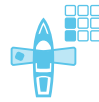
Digital Twin Generation



**Subsea Construction and
Intervention**



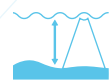
**Hydrographic and Dredging
Operations**



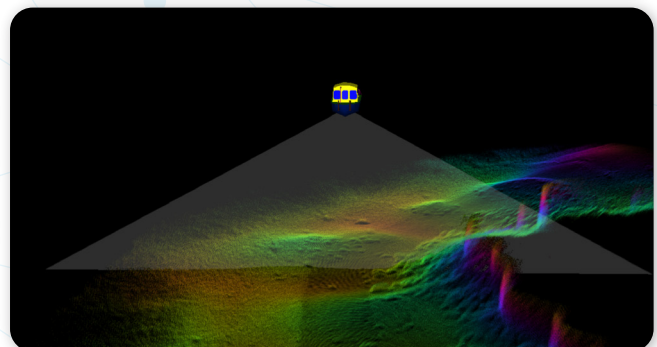
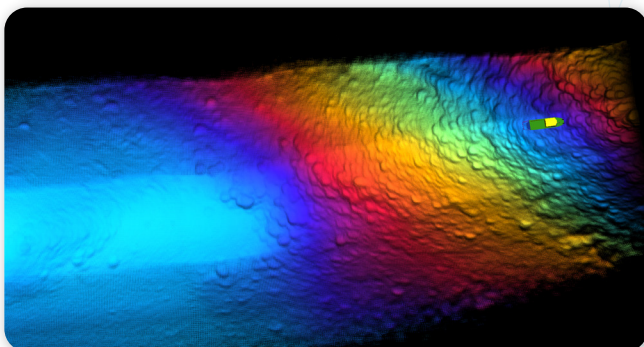
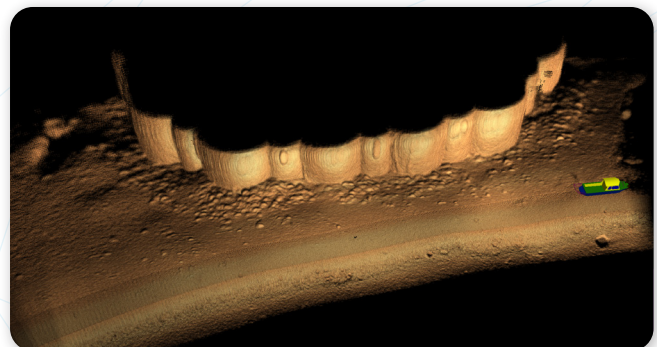
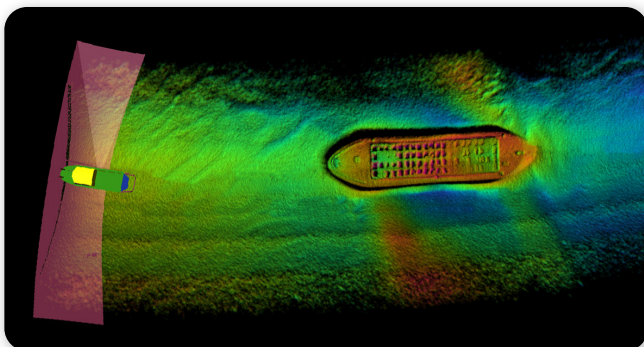
UXO and Object Detection

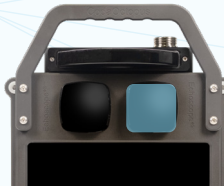
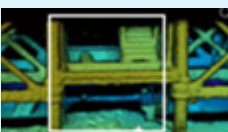
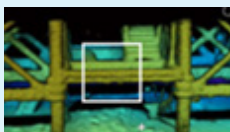


ROV and AUV Navigation



**Water-Column Target
Tracking and Infrastructure
Monitoring**



Description	WAVM	Mid-Frequency	High-Frequency
			
Centre Frequency	345 kHz	375 kHz	630 kHz
Frequency Range	315 kHz - 375 kHz	315 kHz - 425 kHz	550 kHz - 700 kHz
Maximum Range [^]	120 m (394 ft)	120 m (394 ft)	80 m (262 ft)
[^] The actual working range will depend on the target's size, reflectivity, and the level of detail required for the application.			
Transmit (Tx) Field of View	125° x 25° 	52° x 52° 	25° x 25° 
Switchable Coverage (Shapes)	Horizontal - Adaptive Vertical - Fixed	Fixed	Fixed
Acoustic Projectors	WAVM (345 kHz)	Mid Frequency (375 kHz)	High Frequency (630 kHz)
Adaptive Frequency Band	345 kHz : 315 kHz - 375 kHz	375 kHz: 315 kHz - 425 kHz	630 kHz: 550 kHz - 700 kHz
Number of Beams (Density)	Up to 640 x 128	Up to 256 x 256	
Number of Values per Beam	2,500 (Dependent on Features Purchased)		
Maximum Range*	120 m (394 ft) at 375 kHz	120 m (394 ft) at 375 kHz	80 m (262 ft) at 630 kHz
Minimum Range*	0.5 m (1.64 ft)		
*The actual working range will depend on the target's size, reflectivity, and the level of detail required for the application			

Range Resolution		3 cm (1.2 in)			
Angular Resolution (ERSA)		Up to 0.1°			
Update Rate (Ping Rate)		Up to 50Hz			
Angular Beamwidth		Up to 0.6° x 0.6°			
Angular Coverage	315 kHz - 375 kHz	315 kHz - 425 kHz:		550 kHz - 700 kHz:	
	25° x Up to 125°	54° x 54° - 46° x 46°		33° x 33° - 25° x 25°	
Dimensions (H x W x D) (Excluding Handles and Connectors)		368 x 301 x 162 mm (14.2 x 11.9 x 6.4 in)			
Weight in Air	Surface 12.7 kg (28 lbs)		Deepwater 22.3 kg (49.2 lbs)		
Power Consumption		3 - 6 A at 24 VDC **An up to 10 A inrush for less than 2 μs may occur on start up			
Depth Rating	40 m (131 ft)	250 m (820 ft)	600 m (1968 ft)	3000 m (9842 ft)	4000 m (13123 ft)