

The World's Most Advanced Real Time Sonars -

First Real Time 5-Dimensional (“5D”) and 6-Dimensional (“6D”) Sonars.



Multiple Parallel 4D Data Sets Simultaneously for Different Requirements of Underwater Operations in Real Time

Coda Octopus’ 5D and 6D Echoscope PIPE® sonar series (“PIPE” sonars) significantly advances its existing real time 3D sonar technology with several new and revolutionary innovations. At the heart of the 5D and 6D sonars is our new Parallel Intelligent Processing Engine (“PIPE”) which is designed to allow independent users within the same underwater operations access in real time to multiple parallel and sequential 4D Imaging Outputs to match their individual requirements, all of which can have different acoustic parameters (such as different frequency, range and processing) providing a true multi-sensor platform from a single sonar deployment. The PIPE Processing engine can capture, display and process in real time significantly higher data density with multiple parallel outputs including 3D full time-series data for the first time with the ability to process up to 40 million points to generate 4D images with typically several 100Ks 4D points per ping (depending on the insonified scene) than our previous generations of real time 3D sonars.

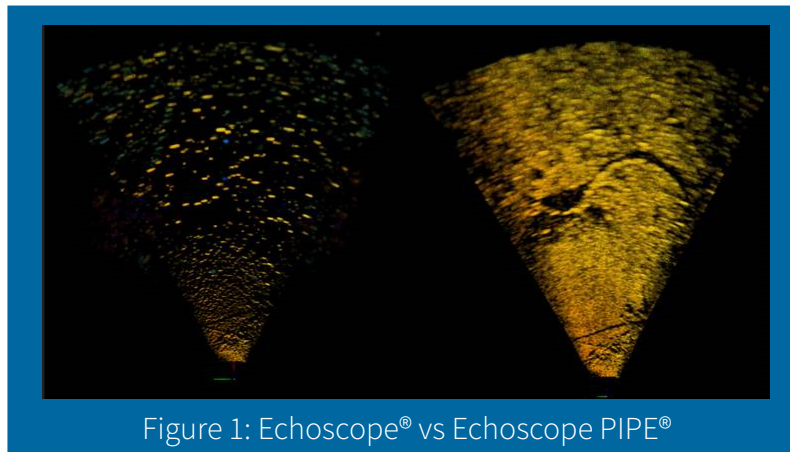


Figure 1: Echoscope® vs Echoscope PIPE®

Figure 1 which is a single ping from our Echoscope® shows the increased density of data from PIPE compared to our previous generation of sonars.

Coda Octopus’ PIPE Sonars are 5D and 6D sonars because:

- 🌀 PIPE sonars can capture and process the full time series backscatter 4D acoustic data (128x128x2,500 data points) thus providing 5D data
- 🌀 PIPE sonars can capture and process multiple 5D images in parallel with different processing parameters thus providing 6D data

PIPE Features

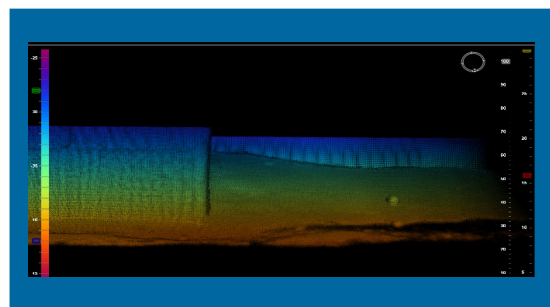
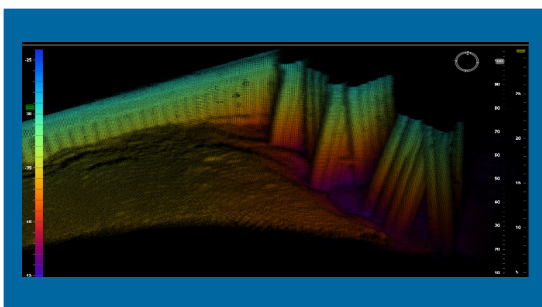
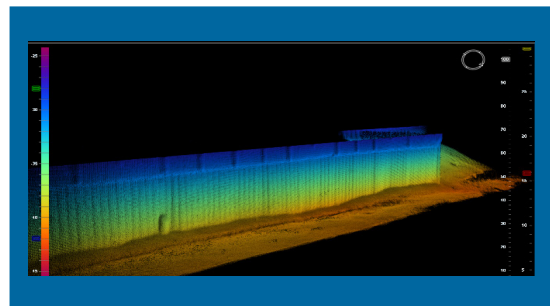
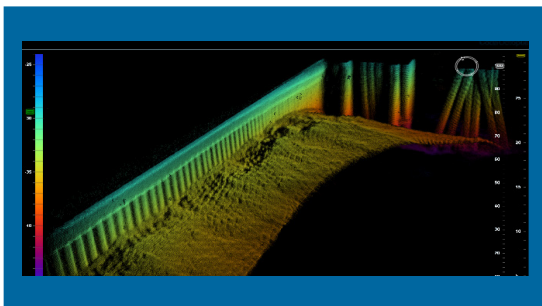
The features of PIPE sonars are designed to increase productivity for underwater operations. Some of the new and innovative PIPE Features are:

Improved and greater dynamic range incorporating full floating-point processing resolution.
Improved Image Processing with greater control and capability over image processing, greater selection of noise suppression, user selected sidelobe rejection filter and extensive array shading
Improved Beam Detection processing utilising full floating-point precision and filtering
Ability to process up to 40 million points to generate 4D images with typically several 100Ks 4D points per ping (depending on the insonified scene) and providing more than 25 times 4D data than our previous generations of real time 3D sonars.
Ability to swap configuration sets instantly ping-to-ping to achieve dynamic frequency, field of view and other capture and processing functions
Multiple real time 4D images with different capture and process parameters which can be accessed and displayed in independent views of the survey operations in real time
Ability to create a sequence of up to 10 different parameter sets for acoustic capture and processing including different frequencies allowing hands free operation for different processing requirements in a single sonar system
Parallel Processing and Display of Real Time Images
Sequential Processing and Display of Real Time Images
Availability of Full Time Series 3D Backscatter Range and Intensity Data comprising up to 40 million data points per acoustic ping (128x128x2,500)
Ability to capture and record raw 3D Full Time Series Data- 40m data points per acoustic ping (128x128x 2,500)
Ability to process offline raw 3D Full Time Series Data
Live Real Time XYZ data point output without using Coda Octopus top end software
Includes Smart Ping Manager that allows a wide range of Frequency, Field of View or Filtering Parameters adaptable in real time

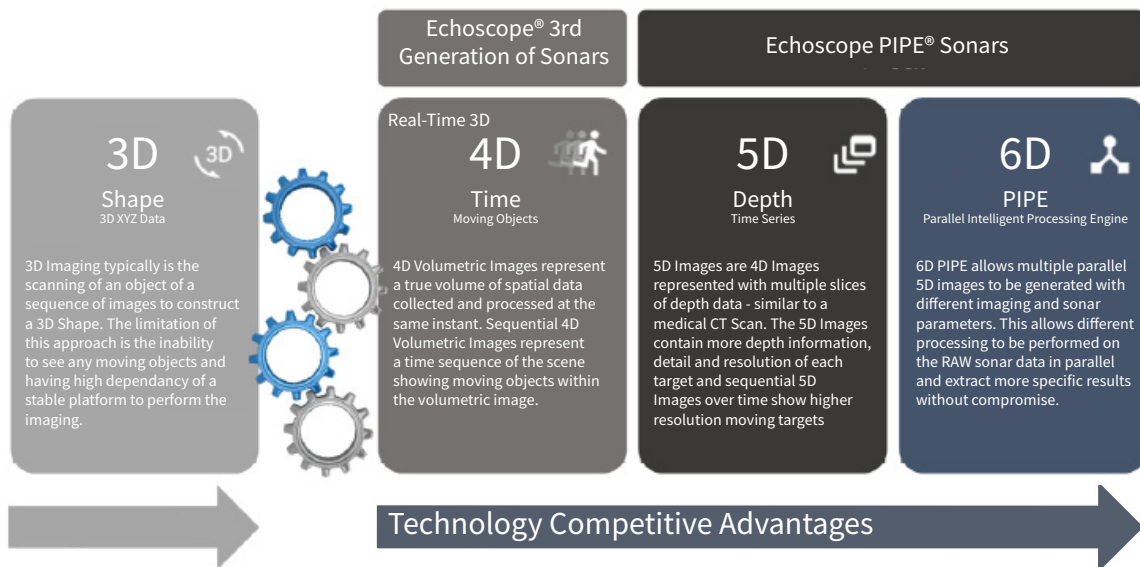
PIPE® sonars are available in a number of different models including:

Type	Frequency	Angular Coverage
Dual Frequency Options	315kHz - 425kHz 550kHz - 700kHz	61°x61° - 43°x43° 33°x33° - 25°x25°
Triple Frequency Options	220kHz - 280kHz 315kHz - 425kHz 550kHz - 700kHz	102°x51° - 71°x35° 61°x61° - 43°x43° 33°x33° - 25°x25°

Echoscope PIPE® Data Gallery



Evolution of 5D and 6D Sonar



Differences between our Standard Echoscope and our new PIPE Sonars

Description	Current Echoscope	PIPE [®] Sonars
Real Time Capability	Yes, 4D Images	Yes, 4D, 5D and 6D
Angular Cover Dual Frequency	50°x50° and 24°x24°	54°x54° - 47°x47° and 32°x32° - 28°x28°
Adaptive Frequency Capability	No	Yes
Ping Rate	Up to 20Hz	Up to 40Hz
Multiple Real Time 4D Images	No, one single Real Time Image	Capable of Multiple Real Time Images
Number of Data Points per Single Ping	Up to 16,386	Up to 40 million
Number of Beams and Values per Beam	128x128x1 Value	128x128xUp to 2,500 (depending on viewing range)
Multiple Sequential Configuration Files to capture data using different parameters	No Capability	Up to 10 Configuration sets for real time capture and display
Full Time Series Raw Data Capture	No Capability	Capture of Raw Data Capture
Full Time Series Raw Data Offline Processing	No Capability	Capable of Raw Data Offline Processing
Multiple Parallel Beamformed Data Output	No Capability	Capable of Multiple Parallel Beamformed Data Outputs
Smart Ping Manager using Frequency, Field of View, Filtering in Real-Time	No Capability	Capable

Technical Specifications for the Echoscope PIPE® Surface

Performance (by Model)	Dual Frequency	Triple Frequency
Frequency	375,630 kHz	240kHz, 375kHz, 630 kHz
Adaptive Frequency Band	375kHz: 315kHz – 425kHz 630kHz: 550kHz – 700kHz	240kHz: 220kHz – 280kHz 375kHz: 315kHz – 425kHz 630kHz: 550kHz – 700kHz
Number of beams	128 x 128 x 2,500	128 x 128 x 2,500
Number of Values Per Beam	2,500 (Except PIPE CORE – Please check your sonar variant)	2,500 (Except PIPE CORE – Please check your sonar variant)
Maximum range*	120m (394ft) at 375 kHz 80m (262ft) at 630 kHz *The actual working range will depend on the target's size, reflectivity, and the level of detail required for the application.	150m (492ft) at 240 kHz 120m (394ft) at 375 kHz 80m (262ft) at 630 kHz *The actual working range will depend on the target's size, reflectivity, and the level of detail required for the application.
Minimum range*	0.5m (1.64ft)	0.5m (1.64ft)
Range resolution	3cm (1.2")	3cm (1.2")
Update rate (ping rate)	Up to 40Hz	Up to 40Hz
Angular coverage	315kHz – 425kHz: 61°x61° – 43°x43° 550kHz – 700kHz: 33°x33° – 25°x25°	220kHz – 280kHz: 102°x51° – 71°x35° 315kHz – 425kHz: 61°x61° – 43°x43° 550kHz – 700kHz: 33°x33° – 25°x25°
Beam spacing	315kHz – 425kHz: 0.48°x0.48° – 0.34°x0.34° 550kHz – 700kHz: 0.26°x0.26° – 0.20°x0.20°	220kHz – 280kHz: 0.80°x0.40° – 0.55°x0.27° 315kHz – 425kHz: 0.48°x0.48° – 0.34°x0.34° 550kHz – 700kHz: 0.26°x0.26° – 0.20°x0.20°
*The actual working range will depend on the target's size, reflectivity, and the level of detail required for the application		
Physical		
Dimensions (h x w x d) (excluding connectors and handles)	328mm x 301mm x 151mm (12.9in x 11.83in x 5.94in)	361mm x 301mm x 162mm (14.21in x 11.83in x 6.36in)
Dimensions (h x w x d) (including Echoscope® Protective Cover)	338mm x 311mm x 154mm (13.29in x 12.22in x 6.07in)	366mm x 311mm x 165mm (14.39in x 12.22in x 6.49in)
Weight in Air	11.6 kg (25.6lbs)	11.6kg (25.6lbs)
Power Consumption	3 – 6 A at 24 V DC **An, up to, 10 A inrush for less than 20 µs may occur on start-up.	3 – 6 A at 24 V DC **An, up to, 10 A inrush for less than 20 µs may occur on start-up.
Depth Rating	We supply Sonars rated from 20m (65ft) up to 4000m (13,123ft) – check your packing list containing your Product Certificate which provides details such as depth rating and weight of the actual system purchased. Failure to keep within this depth rating can irretrievably damage the unit.	We supply Sonars rated from 20m (65ft) up to 4000m (13,123ft) – check your packing list containing your Product Certificate which provides details such as depth rating and weight of the actual system purchased. Failure to keep within this depth rating can irretrievably damage the unit.

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