

# Technical Specification

## PERFORMANCE

Frequency	375kHz (Standard)	500kHz (Optional)	250kHz (Optional)	150kHz (Optional)
Number of beams	128 x 128 (16,384 total)	128 x 128 (16,384 total)	128 x 128 (16,384 total)	128 x 128 (16,384 total)
Range*	200m (660ft)	150m (500ft)	200m (660ft)	250m (825ft)
Range resolution	1cm	1cm	5cm	10cm
Update rate (ping rate)	up to 20Hz	up to 20Hz	up to 20Hz	up to 20Hz
Minimum range	1m (3ft)	1m (3ft)	1m (3ft)	1m (3ft)
Angular coverage	50° x 50°	30° x 30°	50° x 50°	50° x 50°
Beam spacing	0.39°	0.23°	0.39°	0.39°

## PHYSICAL

Dimensions (h x w x d)	380mm x 300mm x 152mm (15" x 11.8" x 4.4")
Weight	22kg (44lb) in air, 12kg (26lb) in water
Power consumption	6.5A at 24Vdc
Depth rating	600m (2,000ft) standard, 3000m (10,000ft) optional - special order

## INTERFACES

Communications	10BaseT Ethernet between Echoscope head and interface unit (NB interface unit can be sub-sea or surface located)
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## AUXILIARY SENSORS

Tilt sensor	Internal heading and tilt sensor Heading accuracy <1° Pitch and roll accuracy <0.5°  Optional precision attitude and position sensor (Octopus F180)
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## DATA FORMATS

Echoscope ES2 format
(x, y, z) range data relative to sonar in world co-ordinates
(x, y, z, i) target strength (intensity)
XTF formatted data for export to other systems

## SOFTWARE

Windows XP/2000 compatible

- Comprehensive real-time display and control software, including:
- Full control of viewing angle, transmit power, receive amplification
  - Ability to position viewpoint and centre of observed volume arbitrarily in 3D space
  - Ability to create pixel, grid, contour or sun illuminated views of 3D space
  - Ability to generate movies of real-time 3D data
  - User defined colour palette
  - Automated mosaicing of sonar data, using external motion sensors
  - Import of VRML 1.0 or 2.0 3D models (e.g. of known infrastructure)

\* Typical range: Dependent on pulse length, target size and target strength.

## KEY APPLICATIONS:

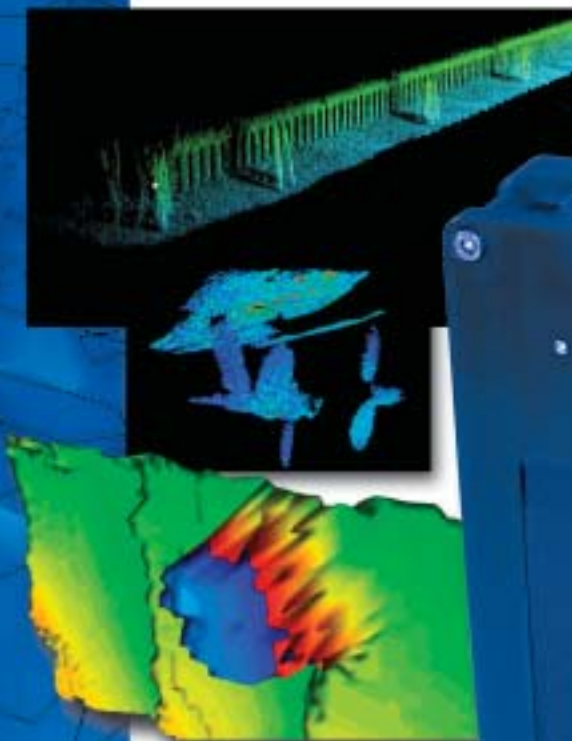


Harbor surveillance, hull inspection, swimmer detection

Obstacle avoidance, navigation

Construction, pipeline inspection, rock dumping, bridge inspection

# ECHOSCOPE II



Real-time 3D  
acoustic imaging sonar

- unique technology
- real-time 3D
- compact & portable
- rapid deployment
- 24/7/365 support

www.codaoctopus.com  
sales@codaoctopus.com  
tel: USA: 1 888 340-2627 Worldwide: +44 131 553 1380  
fax: USA: 1 281 966 6990 Worldwide: +44 131 554 7143  
24hr Technical Support – USA: 1 888 340 CODA Worldwide: +44 131 553 7003

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Advanced 3-D Sonar Solutions

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# ECHOSCOPE II

Unique real time 3D imaging sonar

## Taking sonar to the next dimension

The Coda Echoscope is a unique 3D imaging sonar that builds on the extensive knowledge gained in the development of the successful Mk1 Echoscope from Omnitech of Norway. Ensonifying the whole viewing volume with a single ping, Echoscope uses phased array technology to generate over 16,000 beams simultaneously, resulting in a three-dimensional sonar image. Capable of up to 20 updates per second, the instantaneous co-registered 3D imagery from each ping allows visualization of the whole scene in real-time.

Echoscope accepts motion sensor inputs to allow the data to be positioned accurately in 3D space enabling adjacent pings to be mosaiced on-line, creating whole area visualizations for extremely rapid reconnaissance and inspection.

## Applications

Echoscope has been successfully deployed in all of the following applications:

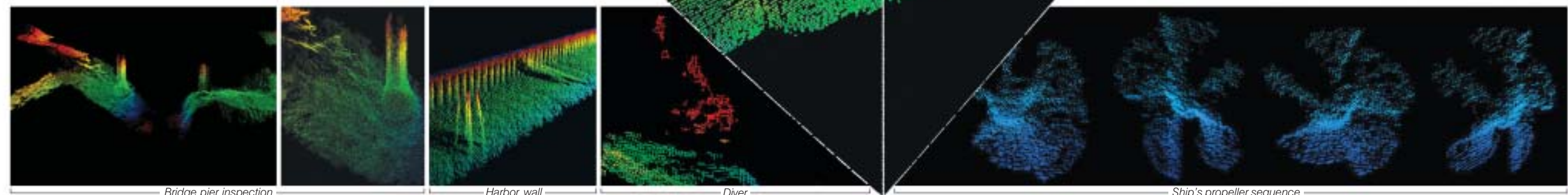
- Mine & mine-like object visualization
- Harbor wall inspection
- Ship hull inspection
- Bridge piling inspection
- Construction – pipeline touchdown and inspection
- Hull-mounted forward looking sonar
- Obstacle avoidance/navigation sonar
- Bathymetry
- Swimmer detection
- Dredging/rock dumping
- Subsea metrology

## FEATURES

- Unique real time 3D imaging
- Multi-perspective visualizations
- Easy deployment over-the-side
- ROV and AUV ready

## BENEFITS

- Visualize a complete scene with one snap-shot
- Rapid deployment on vessels of opportunity
- Unaffected by poor visibility
- More accurate scenario interpretation from a 3D image



Bridge pier inspection

Harbor wall

Diver

Ship's propeller sequence

## Deployment

Echoscope is suitable for over-the-side or bow mounting on vessels of any size or it can be mounted on ROVs and AUVs for deeper subsea work. It is also suitable for long term seabed deployment in harbor surveillance roles. Echoscope is available as a complete turn-key system integrating the F180 precision attitude and position system, custom mountings and ruggedized user interface PC.

## Advantages

### ... over multibeam echosounder

With over 16,000 simultaneous beams, Echoscope can acquire all the data required for an inspection task from a single ping, removing the requirement to co-register the data using survey positioning and motion sensing equipment. This can significantly increase productivity, and makes the Echoscope capable of being deployed quickly and easily from small vessels of opportunity without specialist survey knowledge.

Echoscope can also be deployed from a bow mount for inspection in very shallow water or where access is restricted, such as under rigs or in narrow channels, whilst ensuring good coverage and remaining insensitive to vessel motion. The large overlap between the areas covered by each ping allows very high vessel speeds, whilst maintaining 100% coverage.

### ... over a sector scan sonar

High resolution sector scan sonars, as used by ROVs for target imaging in construction and mine warfare applications, have vertical resolutions that are much poorer than their horizontal resolution making them unsuitable for obtaining range data from a scene as a whole. For conventional sonars, the choice of vertical beamwidth is always a compromise between sufficient coverage and improved vertical resolution. With Echoscope, both excellent angular coverage and excellent vertical and horizontal resolution are achieved simultaneously. An Echoscope deployed looking forward can both acquire accurate range data *and* create detailed images of the scene with each ping.

In naval visualization roles such as mine warfare and swimmer detection, Echoscope provides imagery of sufficiently high quality for the user to be able to identify the target as potentially harmful or benign at longer ranges than would be feasible with a sector scan sonar.

### ... over an underwater video camera

Echoscope can replace video cameras in applications such as dredging or construction that require good workspace visualization, but where excessive turbidity makes visibility too poor for cameras to be used successfully. Echoscope generates high quality data sets in turbid water with poor visibility, allowing visualization of the seabed and the workplace in real-time. As the user's viewpoint can be selected in the Windows software, it is very easy to observe the 3D relationship between objects.

## New in Echoscope Mk II

Echoscope II uses a significantly higher number of receive channels than were available on the original Echoscope Mk1 and is consequently able to achieve a far higher resolution, both in terms of beam angle and range. The new model employs higher resolution A/D conversion, improving signal to noise ratio and overall resolution. Improved transmitters and receiver sensitivity have increased the system range. A comprehensive redesign of the system electronics has led to a significant decrease in the weight and size of the system, whilst retaining the key features of our patented technology.