

Limpet Mine Imaging Sonar (LIMIS)

Diver-Held or ROV-Mounted Acoustic Flashlight

For more information, contact Ed Belcher at (425) 488-1331

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LIMIS allows divers to clearly image objects in water with zero visibility. It has 0.7" resolution at a 10-foot range. The image displays on a mask-mounted video monitor. The sonar updates the image 10 times/s for ranges up to 30 feet. This "acoustic flashlight" is operated with one hand and gives the diver a clear, dynamic view as he scans hulls or looks for objects on the bottom.

Specifications

Cross-range resolution:	1.6 cm at a 3-m range
Beamwidth:	0.35° horizontal by 9° vertical
Number of beams:	64
Field of View:	19.2°
Range settings:	3-15 m, 1.5-8 m, 1-3.6 m, 0.6-2 m
Down-range resolution:	2.5 cm, 1.25 cm, 0.6 cm, or 0.3 cm depending on range setting
Frame rate:	5.5, 11, or 12.5 images/s, depending on range setting
Source level:	207 dB re 1 μ Pa at 1 m
Operating Frequency:	2 MHz
Power consumption:	25 W (1.75 A at 14.4 V)
Power Options:	Internal batteries, nominal 3-hour duration

	External battery pack, 1.5-hour duration per pack
	Cabled power, indefinite duration
Weight:	7.7 kg in air, including internal batteries; and 100 g positive in seawater
Dimensions:	17.8 cm wide, 20 cm high, and 35 cm long, including a 10-cm handle.
Output format:	NTSC video on a mask-mounted video monitor and/or cabled topside.
Control:	Switches on back of unit or an RS-232 downlink.
Uplink:	RS-232 to transfer up to 50 "digital snapshots" stored in sonar.

Hand-Held Sonar Displays Almost Photographic Images

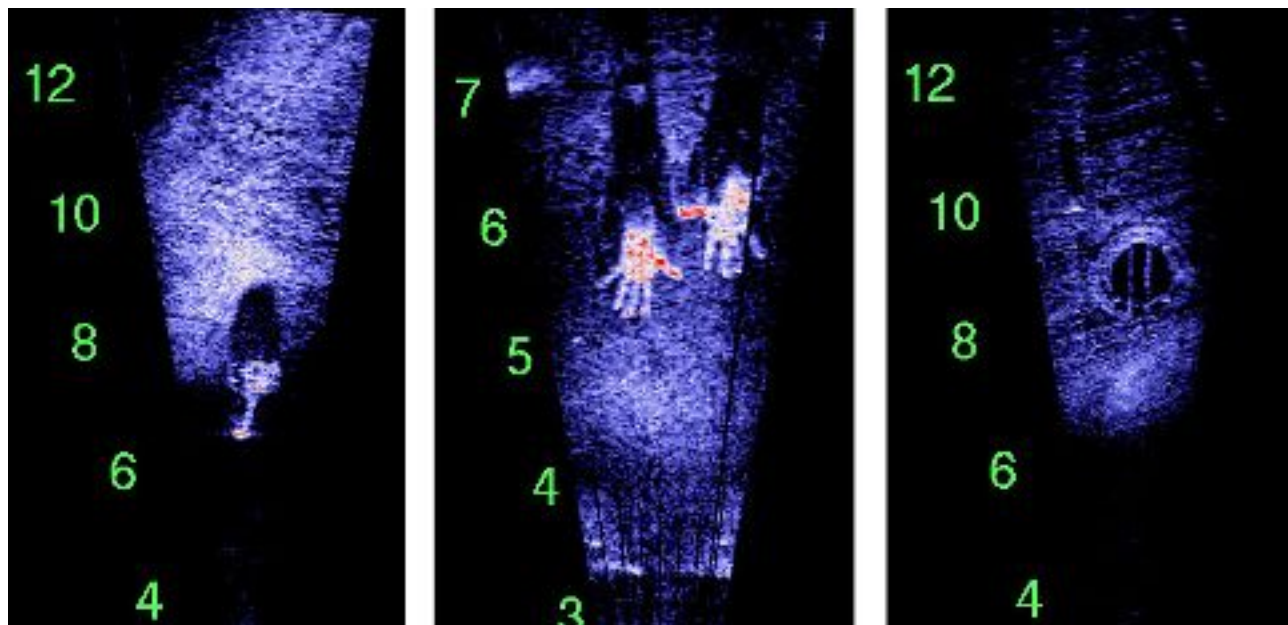


A diver views a sonar image through the mask-mounted display.



The acoustic lenses are housed in an upper rectangular compartment. The electronics are in a lower cylindrical housing. The mask-mounted display allows the diver to see a clear image in zero-visibility water.

LIMIS uses four plastic lenses and one fluid lens to form the 64 narrow beams. The front two plastic lenses (left side of photo) are separated with 3 cu. in. of an inert fluid, Fluorolube. When the sonar is immersed, water conducts sound between all the exposed lens surfaces to and from the linear PZT array placed at the back of the sonar (right side of photo).



Three sample images taken with LIMIS. The left image shows a limpet mine on the hull of a ship 7 feet from the sonar. The center image shows two hands. The right image shows an intake on the hull of a ship. The intake is approximately 18 in. in diameter and is 9 feet from the sonar. The left and right images were taken in Chesapeake Bay in water with 6-in. visibility.

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