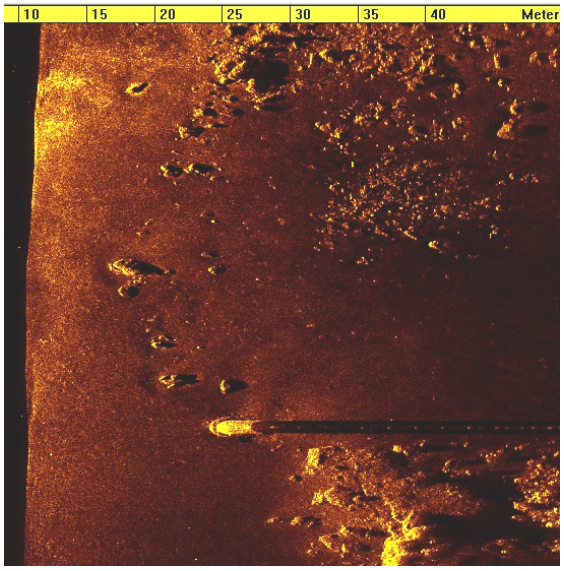
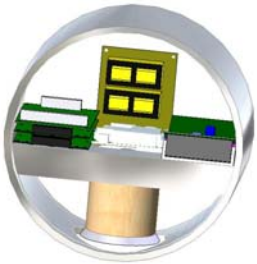
2200-S

SURVEY QUALITY SONARS FOR SMALL AUVs

The best in side scan sonar and sub-bottom imaging for small, limited payload AUVs.



Portable PC with DISCOVER Side Scan Sonar and DISCOVER Sub-Bottom Profiler Software



4-24 kHz Sub-Bottom Profiler, Full Spectrum Electronics

100/400 kHz or 300/600 kHz Dual Frequency or 850 kHz Dynamically Focused Side Scan Sonar

Features:

- **Side Scan Sonar** Dual Frequency CHIRP (100/400 kHz) or (300/600 kHz) or 850 kHz CHIRP Dynamic Focus
- **Sub-Bottom Profiler** 4-24 kHz CHIRP
- Completely autonomous operation
- Controllable from AUV or acoustic link
- Less Than 30 watts power consumption
- Very low in-water weight
- Topside Display Processor Software
- Customized for AUV Mounting

Applications:

- Geo-hazard surveys
- Geological/geophysical surveys
- Buried pipeline and cable location
- Route Surveys
- Archeological surveys
- Search and recovery

The ***EdgeTech 2200-S Sonar System*** is designed for the constraints of a small one-man portable AUV. This includes careful attention to weight, size, and power consumption. A 2200-S system consists of drop in payload module that contains the sonar electronics, a built in sub-bottom profiler transmitter and side scan sonar arrays with integrated sub-bottom profiler hydrophones. A software package for display and printing of the data "DISCOVER" is included.

In some cases the electronics are collocated with the AUV electronics, in other cases they reside in their own pressure housing and attached to the AUV.

A large capacity hard drive is used to store sonar data or the data can be stored by the AUV mission controller. The average data flow is dependent on the sampling frequency, on the data window size, on the ping rate of the sub-bottom profiler, and on the range scale setting of the side scan sonar.

Careful attention has been paid to keeping the power consumption low for the 2200-S. The amplifiers are turned off between transmissions. The amplifier power output can be controlled and the ping rate can be adjusted via the payload control interface.

On the surface, a portable PC with EdgeTech's DISCOVER software displays and prints the sonar data that is offloaded from the AUV.

The system can be ordered as a side scan sonar or sub-bottom profiler only. It can be upgraded later by adding an electronics kit and sonar arrays.

The system is also available as a combined side scan sonar and sub-bottom profiler. Integration between the two sonars permits them to be triggered in such a way as to eliminate or minimize acoustic interference between the two.

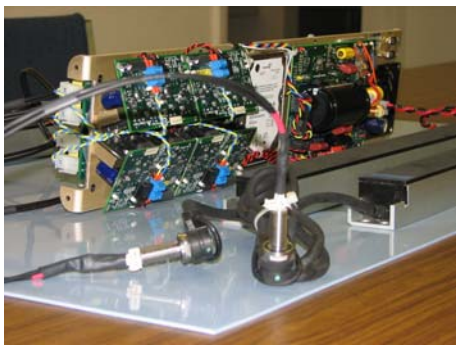
Side Scan Sonar

The 2200-S has a number of side scan frequency options.

Option 1:	Dual frequency Full Spectrum® ("chirp") with frequencies centered around 100 kHz and 400 kHz.
Option 2:	Dual frequency Full Spectrum® ("chirp") with frequencies centered around 300 and 600 kHz.
Option 3:	Dynamically Focused 850 kHz.

EdgeTech's Full Spectrum® ("chirp") side scan sonar benefits are:

- Less interference from side lobes due to the frequency modulated pulse
- Low frequency range is up to 30% greater than conventional systems at the same frequency.
- High frequency range is up to 50% greater than conventional systems at the same frequency.
- Narrow-beam side scan sonar transducers result in sharp, high-resolution along-track sonar imagery.



The dynamic aperture 850 KHz version of the 2200-S side scan sonar adds an additional feature to enhance resolution. The resolution achievable by a conventional side scan sonar is always a compromise between low frequency for long range performance, and array size, which limits the along track resolution. The along track resolution is, at best, equal to the physical array length, and degrades even further with range. Traditional, single element arrays are essentially focused at long range, providing sub-optimal behavior at shorter ranges.

EdgeTech 2200-S installed on an AUV

By utilizing longer arrays comprised of multiple, individually accessible elements, dynamic aperture techniques can overcome this limitation by changing the length and shape of the array during the receive cycle. This provides an along track beam width substantially less than the physical array length. The full array length can then be exploited at long ranges to provide extremely small beam angles for superior long-range resolution. It also changes the shape of the array from a flat plane to one that is curved and focused, in time, over the sonar swath.

Sub-Bottom Profiler

The 2200-S is a 4-24 kHz Full Spectrum® ("chirp") sub-bottom profiler. A number of selectable pulses are available within this frequency range. By changing the center frequency of the pulse it is possible to select the penetration and resolution of the sub-bottom profiler.

The sub-bottom profiler uses a special designed transmitter with low Q wideband characteristics best suited for "chirp" transmissions.

In addition the pulses do not make the transducer ring, so data can be collected close to the bottom without this interference.

DISCOVER Display Processor

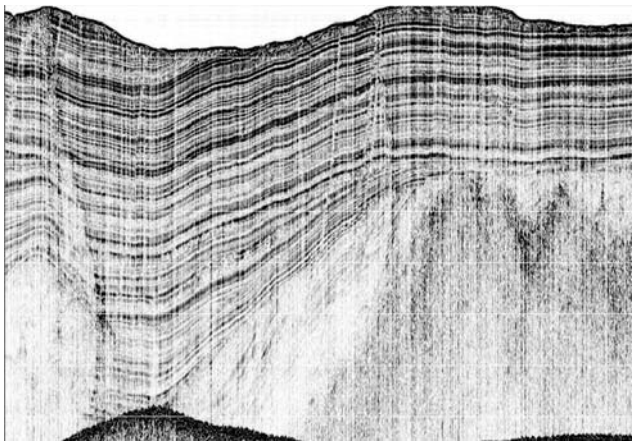
EdgeTech's DISCOVER Sonar Software is a processing software package for the Model 2200-S combined side scan and sub-bottom profiler. It is part of a family of sonar control, image processing, display, storage and printer control for the EdgeTech family of Sub-Bottom Profilers and Side Scan Sonars.

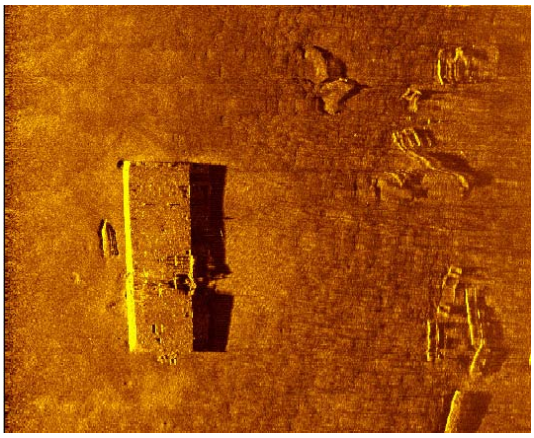
DISCOVER runs on a portable PC running Microsoft's Windows Operating System. Sonar data are stored on a high capacity hard drive on the AUV and are offloaded from the drive via an external Ethernet connection. Data is stored in EdgeTech's native ".jsf" format. DISCOVER has the facility to convert this data to industry standard formats such as XTF for the side scan data and SEG-Y for the sub-bottom data.

DISCOVER can replay the sonar data and process the data with a number of features including:

video gains	speed correction	channel balancing	printer control
colorize	altitude correction	file conversion	zoom

In addition there are two feature rich enhancements. The first is a coverage map that displays the sonar coverage from the track of the sonar. This permits holidays in the data collection to be filled. The second enhancement is a target logger. When a sonar target is identified, the logger can conduct target mensuration, zoom in on the target, and store the target image along with mensuration information and geographic location.





2200-S SMALL AUV SONAR SYSTEM

Key Specifications

Power In	24 VDC (others optional)		
Power Consumption	Less than 30 watts with both sonars operating		
Interfaces	TTL level Clock Sync (typically one PPS), Ethernet for commands and control and access to sonar data, Limited RS-232/NMEA support.		
Side Scan Sonar	100/400 kHz	300/600 kHz	850 kHz
Pulse Type & Technology	FM CHIRP	FM CHIRP	FM CHIRP Dynamic Focus
Pulse Bandwidth	12/40 kHz	30/60 kHz	85 kHz
Pulse Width	1 to 2 ms depending on range selection		
Array Size (without faring) Length Width Depth	 43 cm (17”) 3.8 cm (1.5”) 3.2 cm (1.25”)	 42.5 cm (16.6”) 2.0 cm (0.8”) 2.2 cm (0.85”)	(estimated) 51 cm (20”) 2.0 cm (0.8”) 2.2 cm (0.85”)
Weight	Neutrally buoyant in saltwater		
Side Lobes One Way Two Way	 < -17 dB < -34 dB	 < -17 dB < -34 dB	 < -13 dB < -26 dB
Beam Width One Way Two Way	 100 kHz: 0.96° 400 kHz: 0.3° 100 kHz: 0.68° 400 kHz: 0.2°	 300 kHz: 0.7° 600 kHz: 0.35° 300 kHz: 0.56° 600 kHz: 0.28°	(expressed as resolution) 10 cm to 25 meter range increasing to 15 cm at 50 meter range.
Swath Range	100 kHz: 800 meters 400 kHz: 300 meters	300 kHz: 400 meters 600 kHz: 200 meters	100 meters
Sub-Bottom Profiler			
Frequency Range	4-24 kHz		
Pulse Type	Frequency Modulated		
Pulse Bandwidths	4-24 kHz / 10 ms 4-20 kHz / 10 ms 4-16 kHz / 10 ms (custom pulses available)		
Vertical Resolution	4 cm / 4-24 kHz 6 cm / 4-20 kHz 8 cm / 4-16 kHz		
Penetration (typical) In coarse calcareous sand In clay	 2 meters 40 meters		

Other EdgeTech Products

✓ Side Scan, Sub-bottom, Integrated and Modular Imaging Systems for Deep Towed, AUV, ROV and Other Applications utilizing Full Spectrum, MultiPing or Synthetic Aperture Acquisition and Processing Techniques.

EdgeTech
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