



MARPORT

**Acoustic Solutions for
Undersea Intelligence,
Surveillance and
Reconnaissance**

Welcome

With more than 40 years of experience in the design, development and manufacture of Omni Sonar® systems, Marport C-Tech continues to demonstrate our capability for innovation, performance and customer satisfaction.

Our proven expertise in naval sonar applications has made us a preferred supplier and partner to the Canadian Navy, international naval forces and major defence contractors.

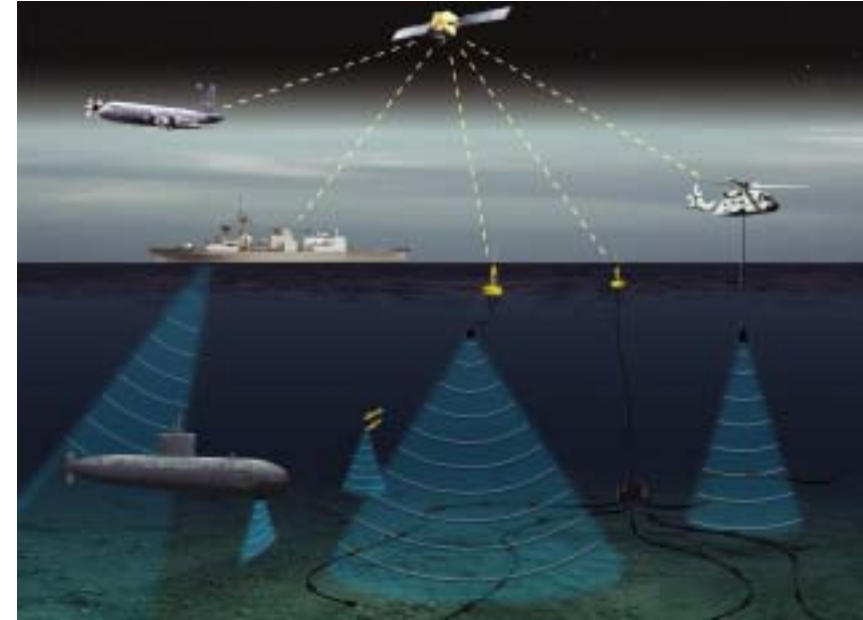
We maintain significant and consistent investment in research and engineering to develop new signal processing techniques, transducer designs and underwater acoustics technology. Our award-winning Software Defined Sonar® platform replaces conventional, hardware-centric sonar systems with one common platform controlled by software. This improves tactical functionality, enhances signal processing techniques and reduces costs, all while eliminating heavy racks of obsolete sonar equipment.



Undersea Intelligence, Surveillance and Reconnaissance

No maritime nation can afford to lose control of its territorial waters to hostile powers. Underwater threats can strike with impunity if they are not located and challenged. In particular, the threat of stealthy submarines, sea mines and underwater improvised explosive devices, potentially deployed by terrorists in ports and inland waterways, requires new sonar systems optimized to counteract such threats. As the naval battlespace migrates from the high seas to the littorals, the significance of underwater Intelligence, Surveillance and Reconnaissance in shallow coastal waters will continue to grow.

We provide the world's navies with modern sonars needed to satisfy current and future requirements for advanced detection capabilities, excellent reliability and enhanced operational performance in an easy to maintain system. We offer a wide range of acoustic solutions designed and developed for the network-centric underwater battlespace.



Solution	Application
Hull Mount Sonar	Anti-Submarine Warfare, Mine Detection, Obstacle Avoidance
Variable Depth Sonar	Anti-Submarine Warfare, Mine Detection & Avoidance
Harbour Surveillance Sonar	Detection of Underwater Intruders
Underwater Navigation Systems	Echo Sounders, Speed Logs, Current Profilers, Sensors
Undersea Acoustic Communications	Tactical Communications, Networking & Navigation
Unmanned Underwater Vehicles	Intelligence, Surveillance and Reconnaissance



World Leaders in Software Defined Sonar®

Many sonar systems are obsolete and cannot support the changes needed to adapt to new threats. Solutions to obsolescence typically involve replacing rather than modifying the existing systems, which is an expensive option. To lower this risk and expense, Marport C-Tech has designed and developed Software Defined Sonar - a multimode sonar technology that uses reconfigurable embedded signal processors to provide the features needed for next generation underwater surveillance and communications.

Being a genuine broadband, multimode system, Software Defined Sonar is not restricted to operation on a single frequency or proprietary transducers. As such, it can serve a wide variety of legacy sonar applications and can support rapid development and deployment of novel sonar solutions.

Unlike fixed function hardware designs, the software-centric architecture can be dynamically reconfigured for multimode sonar functions. Significant amounts of acoustic signal processing, including adaptive beam-forming, are done in software rather than dedicated hardware.

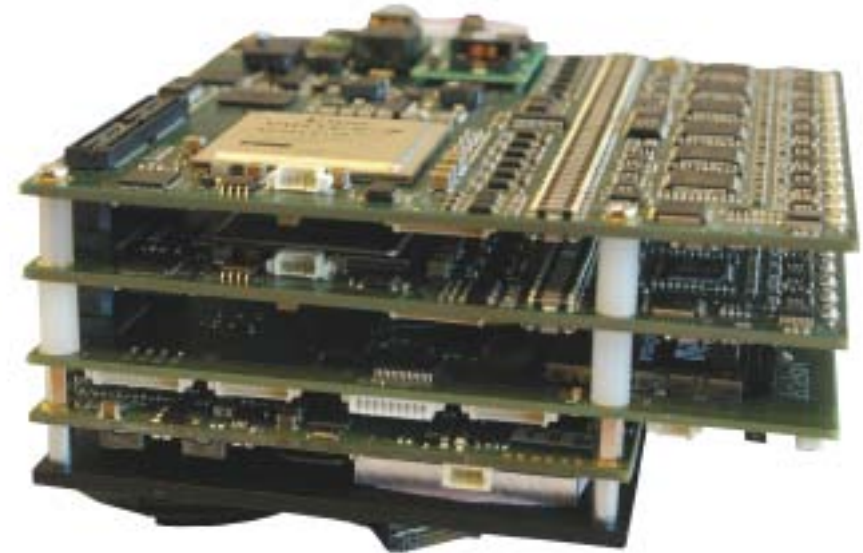
The system increases underwater tactical capability, improves functionality, enhances signal processing and substantially reduces costs - all while replacing racks of legacy sonar equipment.

Software Centric Architecture

The electronics package incorporates transceiver modules called "sonar blades". The base module has 16 transmit (TX) and 16 receive (RX) channels and can be expanded to hundreds of TX/RX channels. The base module measures 12L x 12W x 16H cm, with each additional sonar blade measuring 12L x 12W x 5H cm. Multiple sonar blades can be operated synchronously to support a significantly higher number of channels.

The broadband transceiver can be dynamically tuned from 1 kHz to 1.25 MHz. The modular design significantly reduces the size, weight, power and cost of electronics on both legacy and future sonar platforms. The electronics utilize the latest FPGA and DSP technologies and are designed with commercial-off-the-shelf (COTS) components. The transceiver enables frequency-diverse waveform generation integrated to an open architecture signal processor with embedded wideband analog-to-digital converters for real-time data acquisition and processing.

It also interfaces to commercial navigation systems and sensors for vessel motion and attitude compensation. All sonar data can be linked to geospatial information or combat control systems, including undersea battlespace networks, such as Cooperative Engagement Capability.



Xilinx's Virtex-5 family combines DSP, embedded processing and high speed I/O. An ideal combination for high performance sonar applications.

Software Defined Sonar technology offers:

- Broadband, Multi-Function Sonar
- Dynamic Reconfiguration
- 24 bit Resolution
- High Channel Count
- High Bandwidth
- Support for Multiple Operating Systems
- High Precision
- Synchronized Multiple Board Operation
- High Speed Data Flow
- Integrated Signal Conditioning
- Large On-board Data Storage
- Network Centric Capability

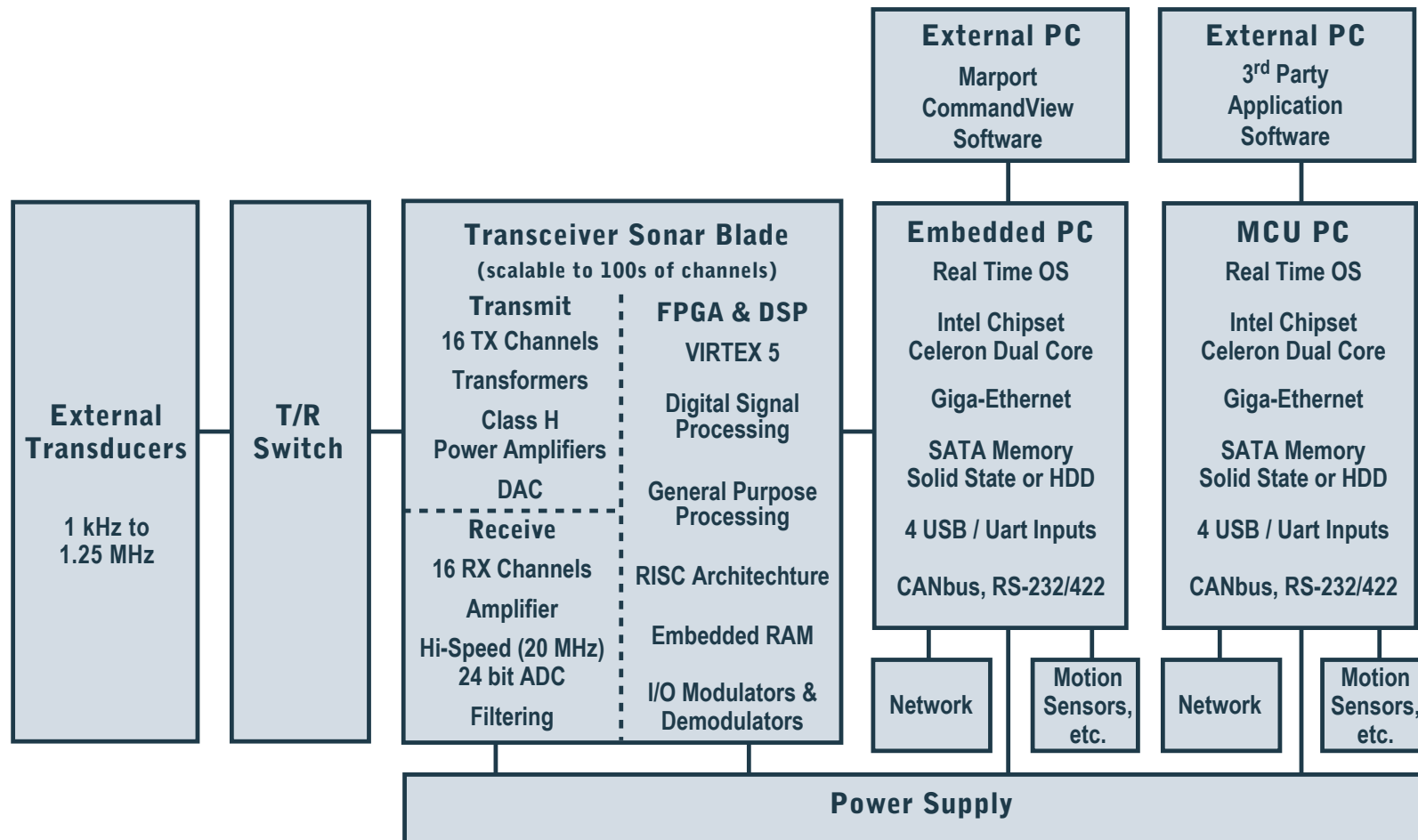
The transceiver features a programmable FPGA for broadband signal processing and filtering in the digital domain. The FPGA core implements high-speed digital up and down conversion, data formatting and time stamping, and high-speed transport between the FPGA and host processor.

Marport uses the latest generation FPGA from the XILINX® VIRTEX 5 family. The FPGA incorporates embedded high performance DSP blocks that are ideal for filtering, FFT, correlation, modulation, etc. The FPGA delivers filtered and prepared data to the embedded PC for mathematical processing. It can also emulate a 32 bit microprocessor, which enables it to run practically any type of firmware. The architecture incorporates a commercial-off-the-shelf embedded PC with a Linux real time operating system to process and store sonar data.

The PC communicates with the FPGA on a Marport developed transport protocol and provides data I/O via TCP/IP networking. The interface provides high speed data flow between analog inputs, processing elements, and analog outputs. The standard provides for multiple interfaces to share the same cable, allowing synchronous data transfer between high channel count (multiple board) data acquisition systems and processing elements.

The PC incorporates Giga-Ethernet and USB for interfacing to other 3rd party sensors. The design also includes a spare embedded PC for external applications such as a Mission Control Unit for actively controlled underwater vehicles.

Software Defined Sonar System Architecture

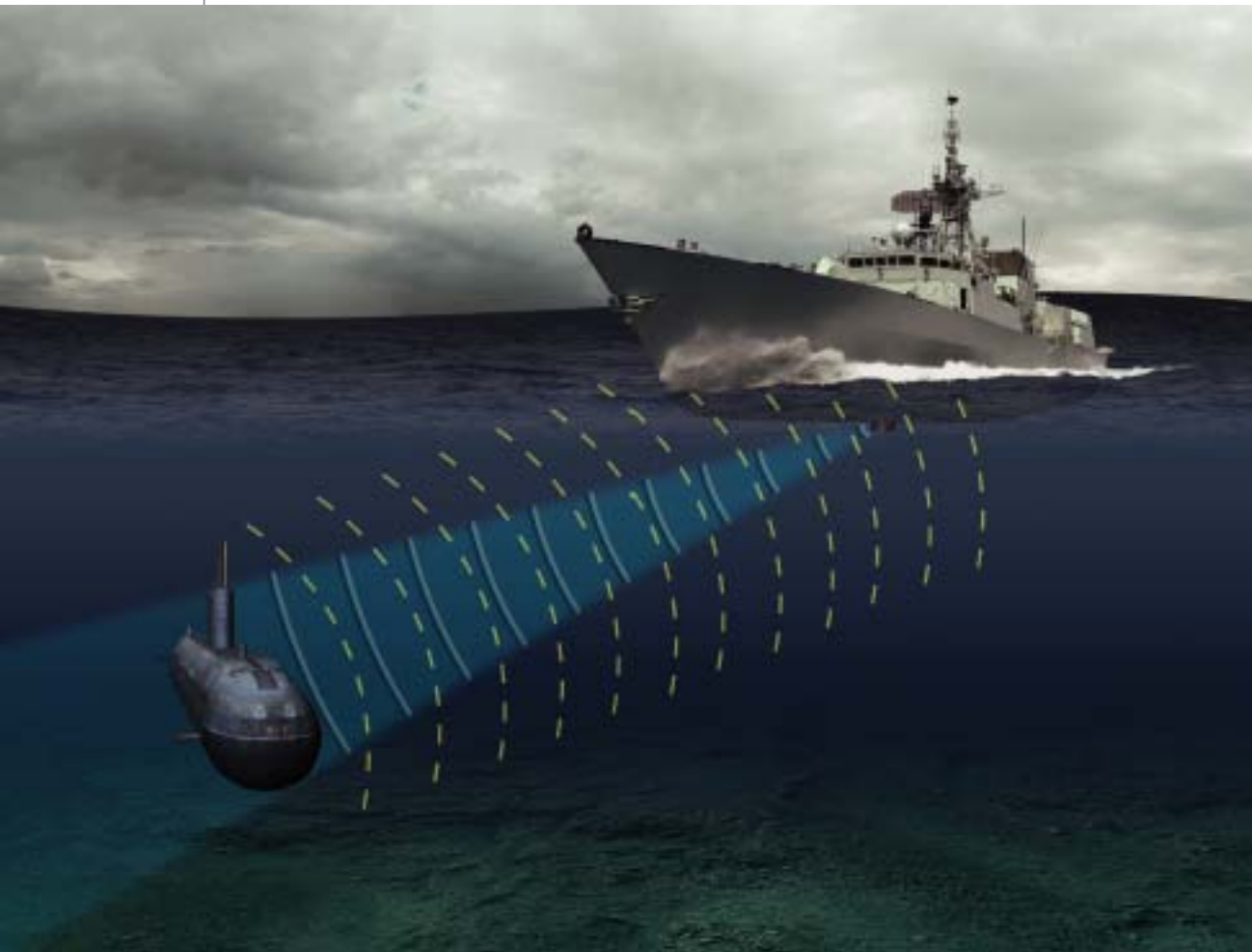


Software Defined Sonar technology is an ideal platform for upgrading legacy sonar electronics used for anti-submarine warfare, mine-countermeasures, underwater acoustic communications and integrated sensing systems.



Hull Mount Sonar CTS-24

The CTS-24 is a medium-frequency (24 kHz) omni sonar designed for navies operating in shallow as well as deep water. The narrow beams maintain excellent performance in shallow water, while the operating frequency provides extended detection ranges in deep water. It integrates the hull mounted transducer with a digital transceiver to provide simultaneous active and passive digital signal processing, display processing and computer-aided target detection and tracking using CW or FM modulation.



Applications

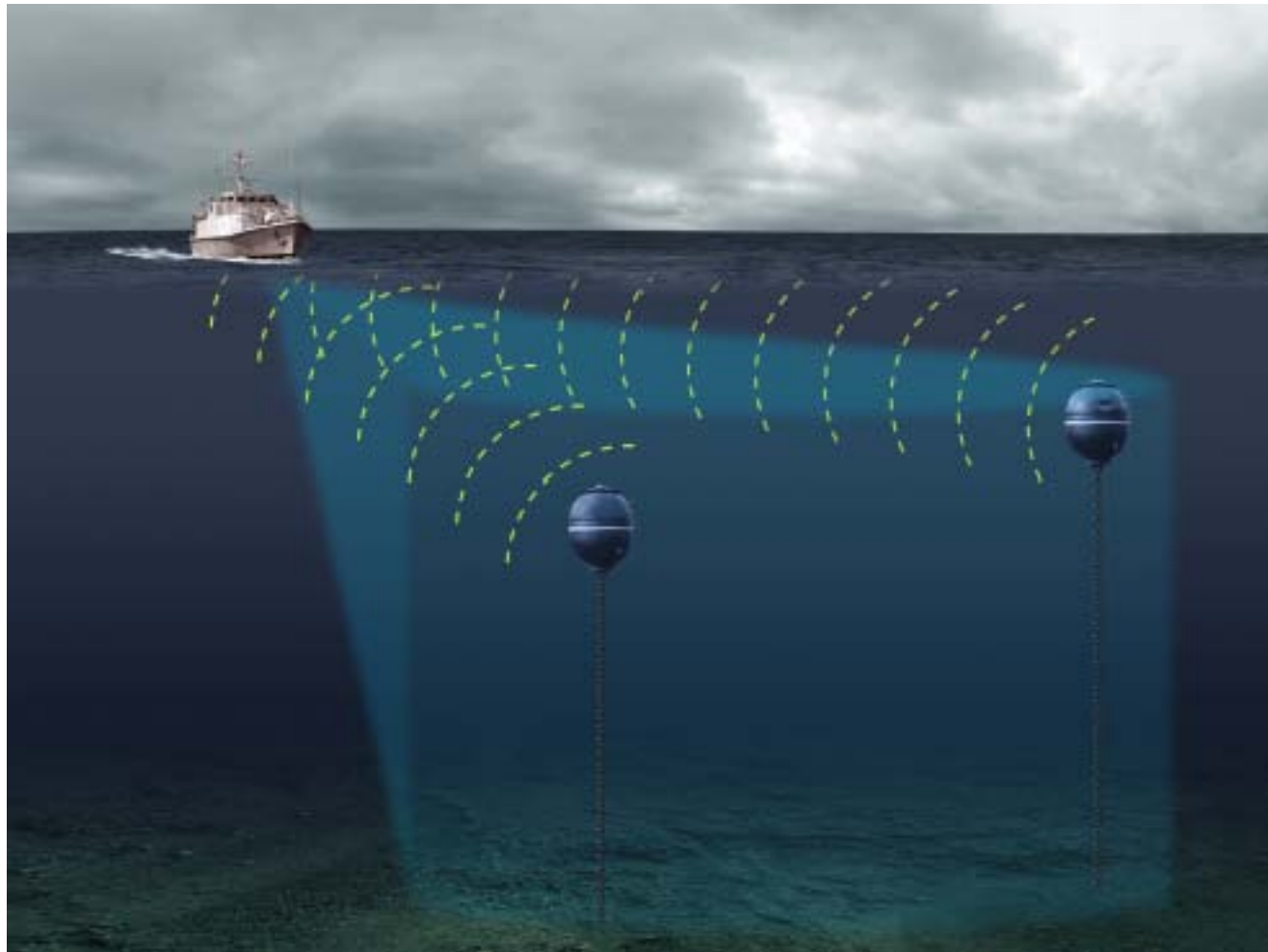
- Shallow and deep water anti-submarine warfare
- Mine detection/avoidance (surface, moored and bottom mines)
- Mine countermeasures
- ROV/AUV tracking
- General surveillance

Hull Mounted Sonar CMAS-36

The CMAS-36/39 (36 – 39 kHz) is designed as a multipurpose hull mounted sonar for shallow water surveillance applications. The multibeam sonar uses narrow horizontal and vertical receiving beams as well as high-speed scanning and digital processing techniques to provide instantaneous detection, classification and target data through a full 360° field of view. Sector transmission is operator selectable in 24° sectors for operation in areas such as harbours or narrow channels.

Applications

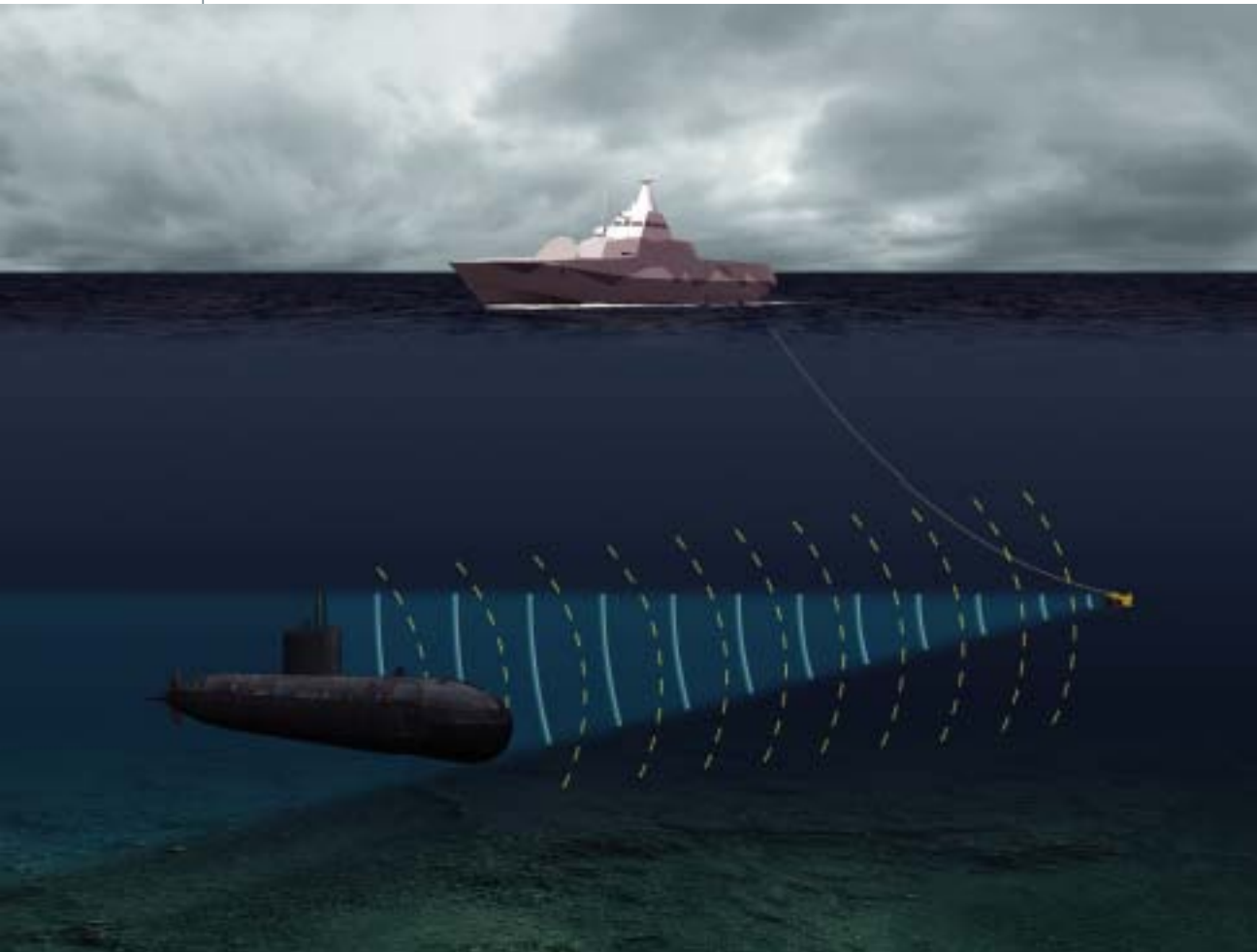
- Coastal patrol
- Navigation aid / obstacle avoidance
- Search and recovery of bottom targets
- Mine countermeasures
- ROV/AUV tracking
- General surveillance





Variable Depth Sonar CVDS-26

To overcome the difficulty of hunting or listening for submarines that take advantage of hiding in shadow zones, a variable depth sonar is often used. The CVDS-26 is a variable depth sonar designed for active or passive operation in either omni or operator selectable sector mode. It is designed to detect, classify, and localize submarines at safe stand-off distances. The transducer array, digital transceiver and various sensors are integrated into a towed body with electronic and display consoles onboard the ship. The towed body is depth rated to 300 metres.



Applications

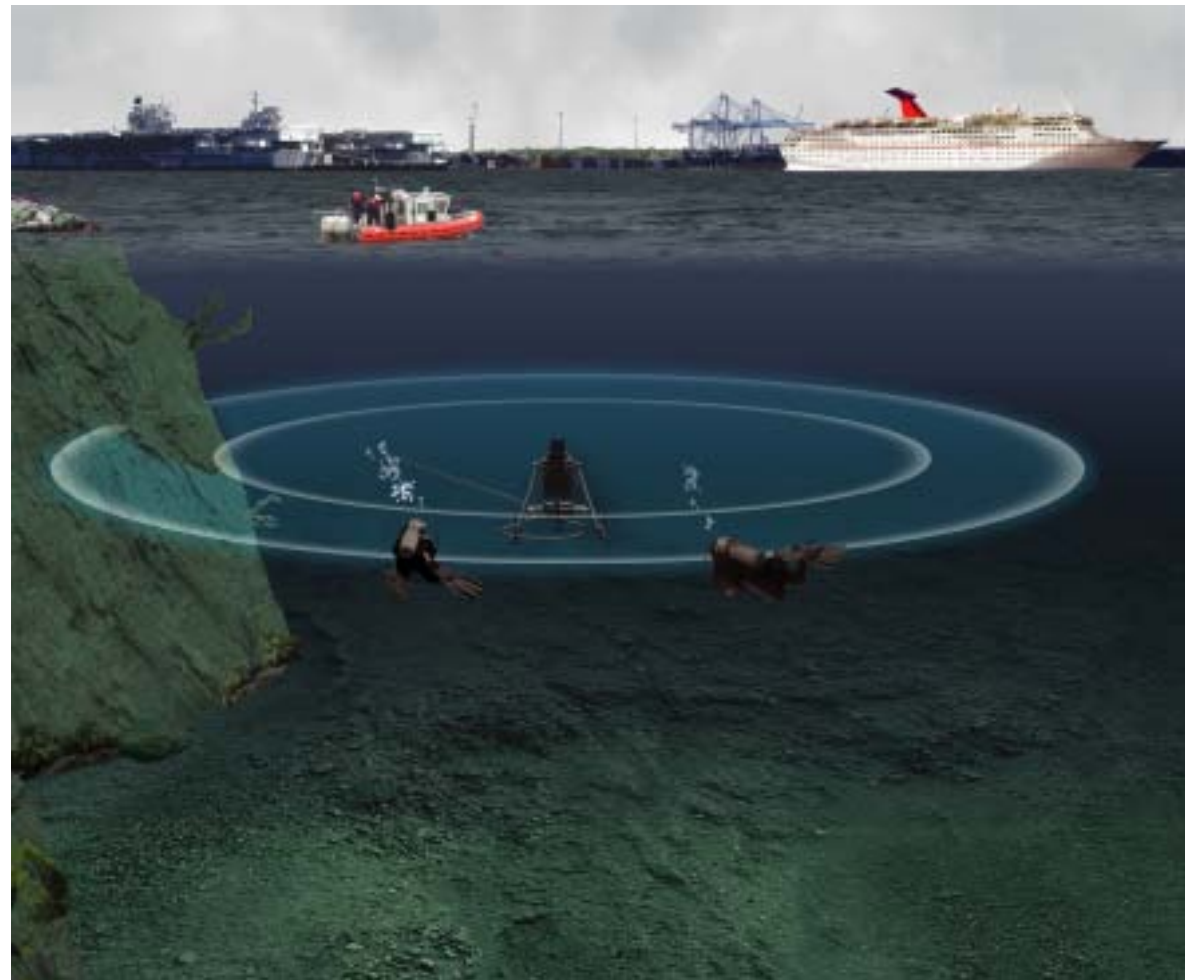
- Anti-submarine warfare in shallow waters with extreme environmental conditions
- Mine detection in shallow waters with extreme environmental conditions

Harbour Surveillance Sonar CSDS-85

The CSDS-85 surveillance sonar is a fifth generation, high-performance, active omni sonar designed for the detection of underwater intruders such as divers using open or closed breathing apparatus, swimmers, swimmer delivery vehicles, mini-submarines and unmanned underwater vehicles. It can be deployed in a single unit configuration for harbour surveillance or can be networked as a series of sonars to maximize area coverage. The sonar can also be deployed from a ship to provide security in high risk locations, such as foreign ports. The sonar can be integrated with other sensors to provide a common operational picture of a designated area.

Applications

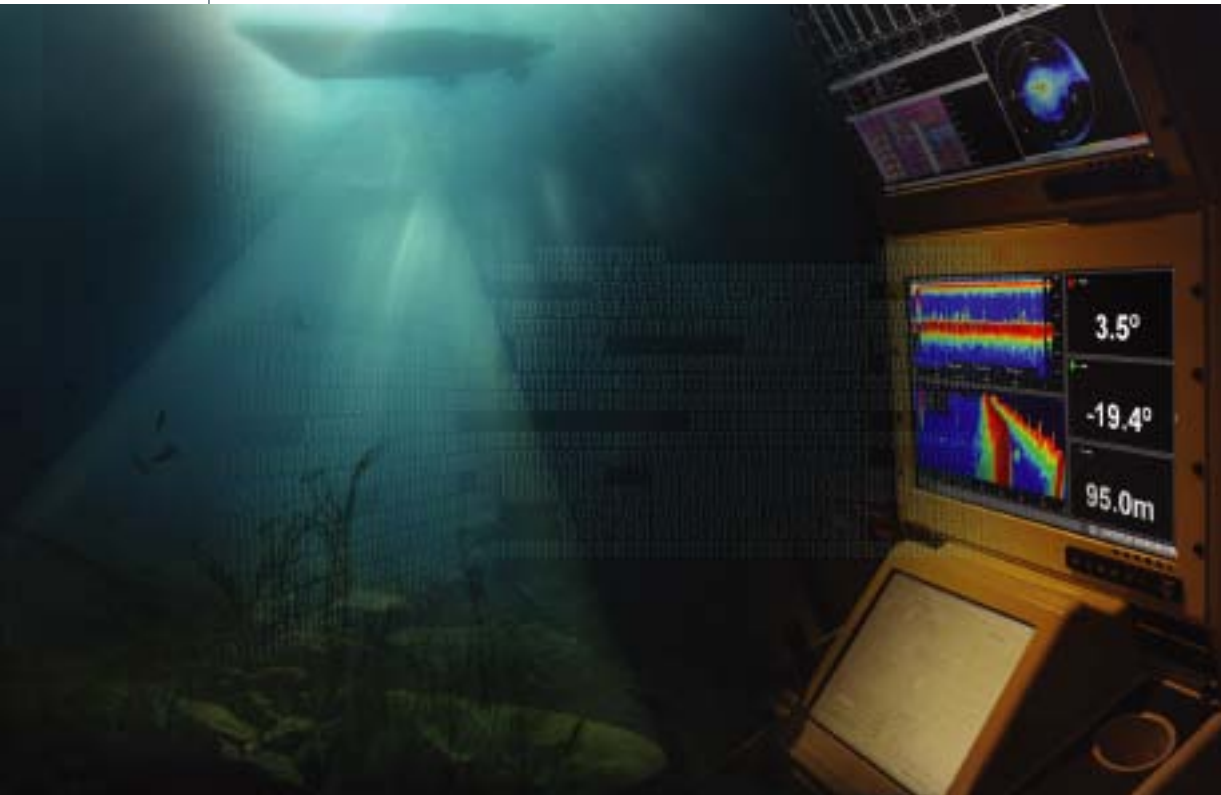
- Harbour surveillance
- Coastal perimeter surveillance - naval bases, power plants, etc.
- Strategic waterway access monitoring
- Protection of high value assets - surface ships, offshore drill rigs, etc.





Underwater Navigation Systems Integrated Acoustics Console

The Integrated Acoustics Console is a multi-function package of acoustic sensors capable of operating as a standalone system or as part of an integrated sonar suite. Designed for both surface warships and submarines, the system consists of phased array transducer(s), a broadband, software defined acoustic transceiver, control console displays and remote displays.



Applications

- Naval Depth Sounder
- Speed Velocity Log
- Doppler Current Profiler
- Sub-Bottom Profiler
- Side Scan Sonar
- Seabed Classification

To improve signal-to-noise ratios, the watertight transceiver can be mounted in proximity to the transducers and networked to the control displays (and existing shipboard tactical systems) via serial interface or Ethernet.

The software defined transceiver can be dynamically tuned from 1 kHz to 2 MHz. The transceiver utilizes advanced modulation and digital signal processing techniques to significantly improve range resolution and target discrimination when compared to conventional fixed-frequency devices. The software defined architecture enables signal processing to be performed in the transceiver's FPGAs that can be reprogrammed "on-the-fly" for desired function, frequency, bandwidth and pulse length. In addition to standard CW modulation, the Integrated Acoustics Console can utilize FM CHIRP.

The system utilizes CommandView software to process and display acoustic sensor data in real time. The software uses extensive pixel shading technology that allows CommandView to produce superb graphics. Other features include a customizable split-screen feature that enables side-by-side displays of any sensor function. This lets users create a display for any configuration they require, offering extensive overlay capabilities. Other functions provide more limited levels of customization, retaining the look and feel of the traditional analog instruments they reflect.



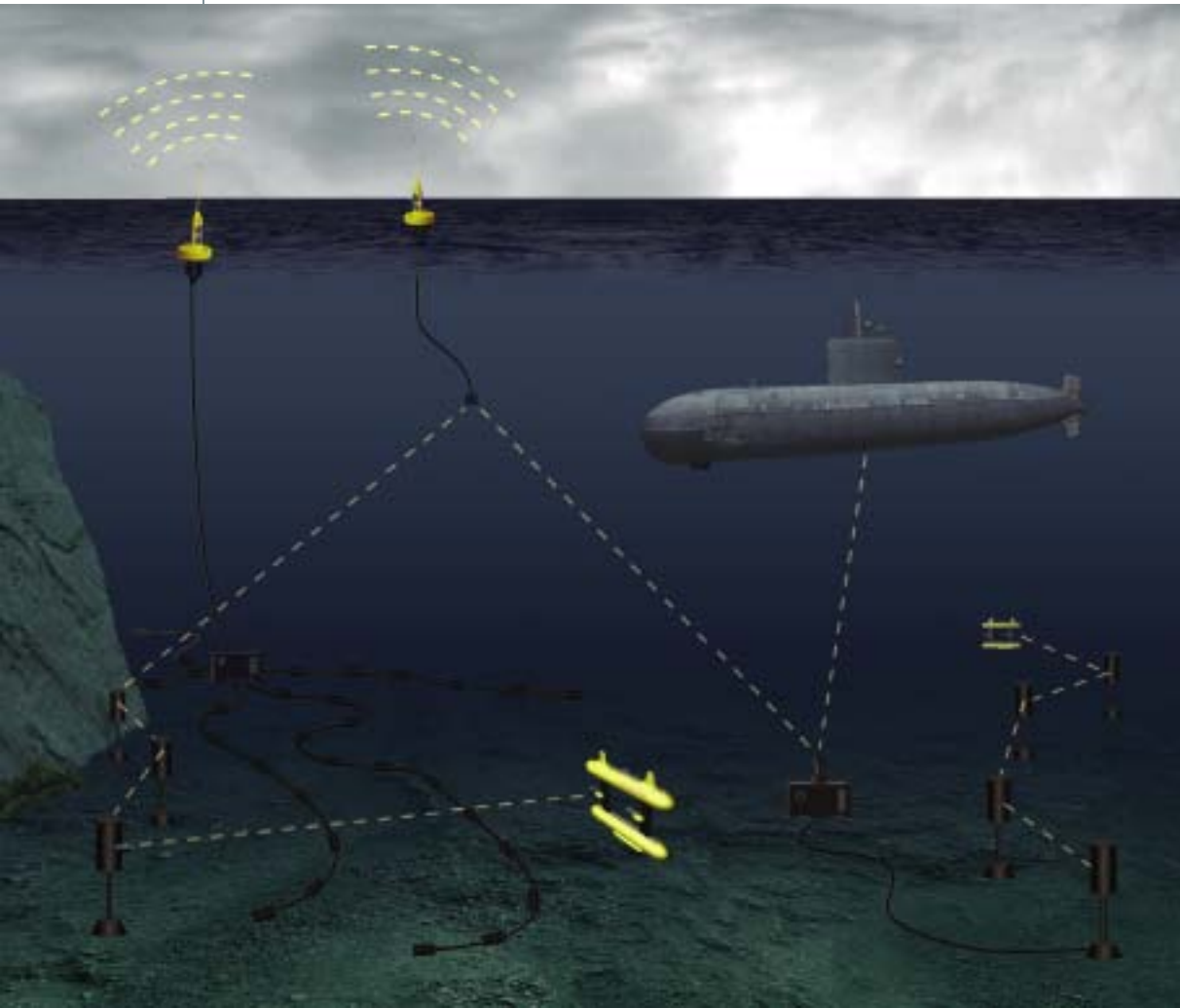
Marport's Software Defined Sonar transceivers will be used to upgrade the depth sounders on the Canadian Navy's Halifax class frigates. The technology insertion program will replace obsolete electronics while maintaining an interface to the original wet-end transducers.



Undersea Acoustic Communications SeaFire® - Software Defined, Broadband Modems

Transformation of the underwater battlespace will result from continued deployment of network-centric sensors that collect and communicate large amounts of data. This data is converted to a common operational "picture" of the underwater battlespace. The ability to generate the intelligence for successful missions hinges on advanced acoustic communication systems that link together undersea combatants and their associated sensor systems.

Our SeaFire® series of acoustics modems uses reconfigurable embedded processors to enable robust, covert wireless communications among ships, submarines, seabed sensor systems and unmanned underwater vehicles.



Applications

- Data and Telemetry Communications
- Positioning & Navigation
- Remote Sensing
- Underwater Surveillance
- Tactical Oceanographic Data
- UUV Command and Control

SeaFire® modems have been designed to provide efficient wireless data transmission in harsh undersea environments.

The software defined architecture is cognitive and adaptive to the active acoustic channel enabling both low and high data rates to meet demanding undersea communication challenges. Advanced DSP techniques overcome the undesirable effects of multipath and Doppler spread. Vertical configurations or channels with reduced multipath complexity can communicate at high speeds using OFDM modulation. For applications requiring long distance transmission range or noisy acoustic channels a very robust MFSK modulation scheme can be used for improved signal-to-noise ratio.

We have a recognised track record in underwater acoustic communication systems and can offer a range of services including system design, development, proof-of-concept trials and technology demonstrations.

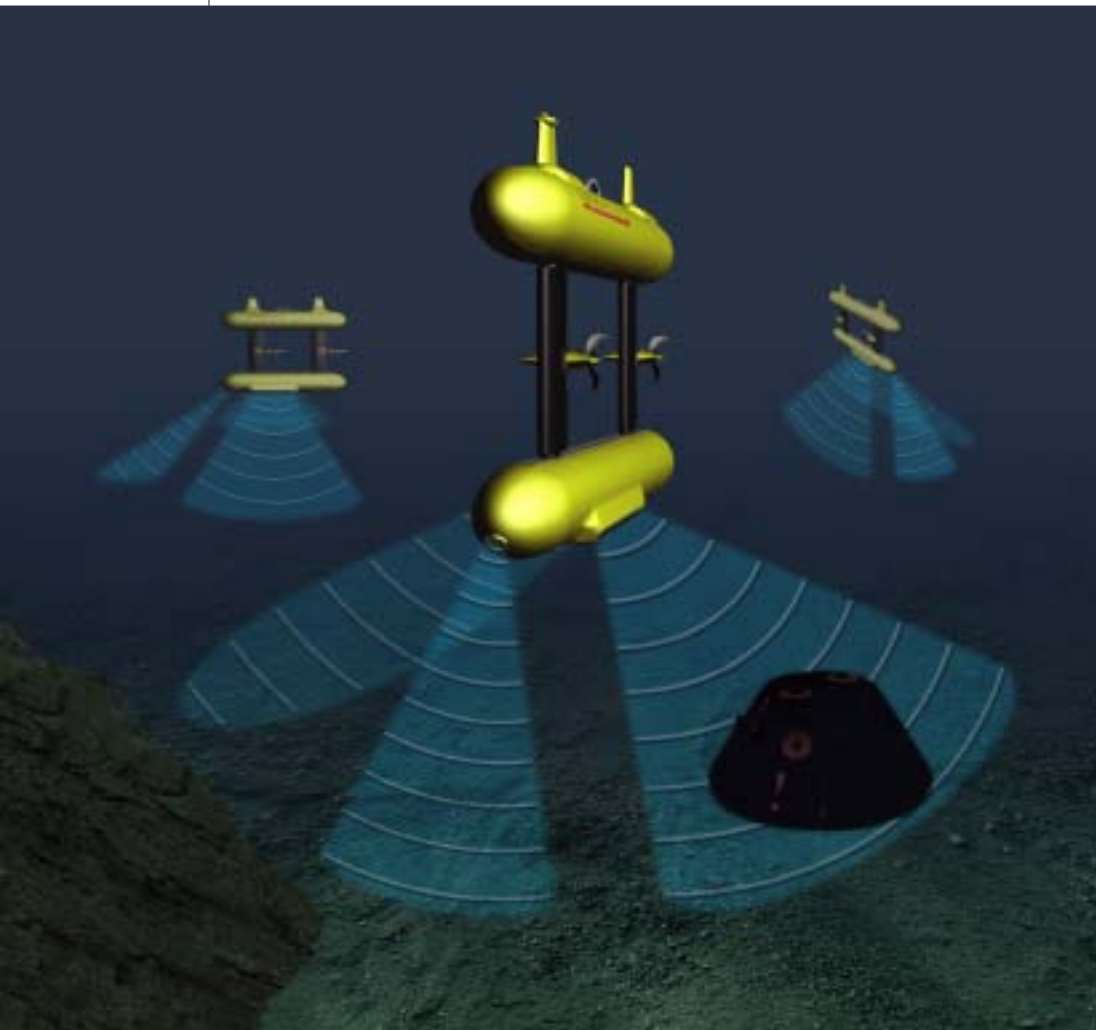


The SeaFire® acoustic modem is a robust underwater communication system designed to meet demanding requirements for undersea ISR. In addition to underwater telemetry, the compact electronics module incorporates a SDHC card data logger as well as onboard sensing capabilities such as 3-axis inclinometer, temperature, depth, humidity including direct interfaces to external sensors.



Unmanned Underwater Vehicles

The SQX-500 is a hydro-dynamically stable platform designed for reliable performance and low life-cycle cost. The vehicle's dual-pod design enables exceptional stability and its thrust controllers are tuned for near-hovering capabilities. The vehicle is a significant departure from traditional designs and enables the SQX platform to hover or transit laterally, vertically, forward, and reverse, enabling stealthy low-speed manoeuvres. The vehicle is equipped with Marport's Software Defined Sonar architecture – including advanced sensor and sonar equipment. Modular payloads can also be configured for a wide variety of standard and/or custom sensors to meet unique undersea mission requirements.



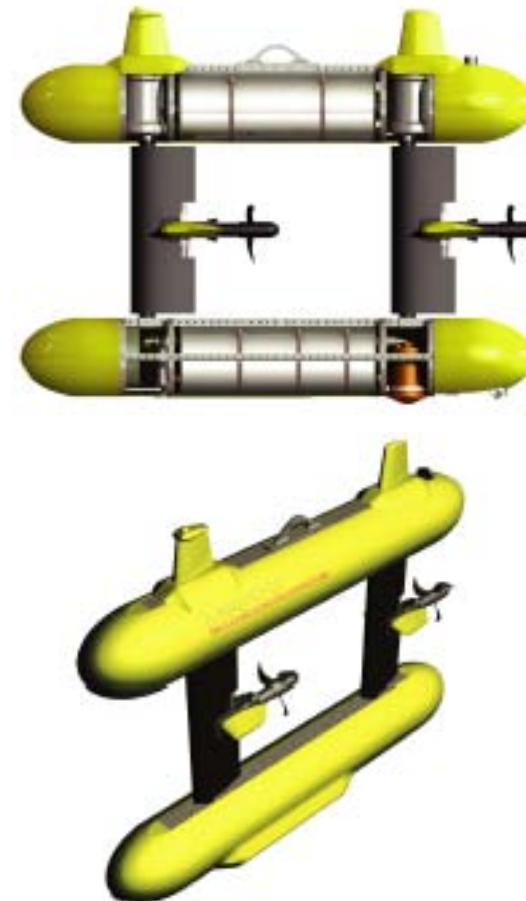
Applications

- Intelligence, Surveillance, Reconnaissance
- Mine Countermeasures
- Expeditionary Warfare
- Tactical Oceanography
- Maritime Reconnaissance
- Undersea Search and Survey
- Explosive Ordnance Disposal

Vehicle Specifications

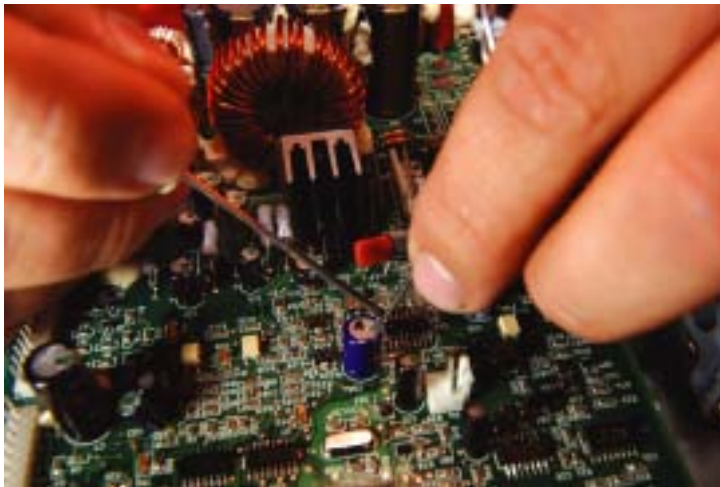
Dimensions:	Length:	160 cm
	Diameter:	25 cm
	Height:	83 cm
Depth:	500 metres (3,000m unit under development)	
Dry Weight:	95 kgs	
Speed:	Min:	0.0m/s (hovering operations)
	Cruise:	2 m/s (4 kts)
	Max:	3 m/s (6 kts)
Near Hover:	Yes	
Propulsion:	Dual thrusters	
Hover Control:	Yaw control surfaces:	2 independent, fore & aft
	Pitch control surfaces:	2 independent, fore & aft
	Thrust vectoring	
Endurance:	8 hours @ cruise speed	

With the increasing threats of broad area denial and the ever decreasing resources, Unmanned Underwater Vehicles (UUVs) provide a promising option for meeting many naval requirements. Integration of the SQX series UUV in a network-centric battlespace will significantly increase the capability and efficiency of a navy's Intelligence, Surveillance and Reconnaissance operations.



Electronic Manufacturing Services

Marport C-Tech's electronic manufacturing services are developed in accordance with customer stated requirements/specifications. We are certified to ISO 9001:2000 and many of our products are compliant to MIL-SPEC standards. We can deliver sub-systems or complete turnkey solutions—starting with fine-tuning the client's specifications, continuing through to design engineering, leading to tooling and fabrication, proceeding with full-scale production and finishing with final product assembly and delivery. We are located in a modern, well-equipped facility that is ideally located close to major transportation routes for both North American and international clients.



Testing

- Electrical / Mechanical / Pressure / Environmental
- Automatic PCB Testing
- High & Low Power Bench Testing
- Thermal & Thermal Shock Testing
- Acoustic Test Tank & Underwater Acoustic Testing

Services

- Build to Print Manufacturing
- Prototyping to Manufacturing
- Design & Production Engineering
- Preparation of Production Drawings
- Total Quality Management to ISO 9001:2000

Production Technologies

- Surface Mount
- Through Hole
- Certified High Reliability Hand Soldering
- Conformal Coating
- Wire Wrap & Wire Harness Assemblies

Customer Service & Support

In today's competitive market space, delivering focused customer service and support is a vital business differentiator in the development of long term relationships.

Naval operations demand a responsive support organization well equipped for dealing with all aspects of system hardware, software, and interface issues. Our support team is backed up by a comprehensive, geographically accessible spares inventory. Training programs cover systems installation, operation, maintenance, and service including varied levels of support adapted to individual customer need.





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