

NASNet®

THE UNDERWATER NAVIGATION, POSITIONING AND DATA COMMUNICATION SYSTEM

The Nautronix Acoustic Subsea Network (NASNet®) is an integrated, multi-user position reference, navigation and communications solution for all survey, drilling and construction operations. At the heart of this new system is the advanced Nautronix Acoustic Digital Spread Spectrum (ADS²) technology. This is the culmination of an intensive development programme undertaken over a 6 year period. The system is based on parallel defence applications incorporating similar Nautronix technologies that are used to precisely navigate, track and transmit data, over very long ranges, to and from naval vessels.

OPERATING PRINCIPLE

The NASNet® system is very similar in concept to GPS, and permits an unlimited number of users both on and below the surface, to obtain precise navigational data, due to the use of a broadcast technique for the acoustics. However, unlike GPS, NASNet® is capable of providing this, not only at the surface but, all the way through the water column to the sea floor, regardless of the working depth.

A number of Stations, typically a network of 6, are placed on the sea floor and their positions ascertained using Box-in or Top Down calibration methods. These Stations, which can be either battery powered or powered from local external sources, transmit information on a regular basis (usually between once per second to once every six seconds). The information transmitted includes very accurate time, error correction, station information, etc. When a Receiver, in the form of a hydrophone assembly, picks up signals from three or more Stations the processing software derives its accurate position. Unlike transponder systems where an interrogation signal has to be transmitted NASNet® Receivers only have to "listen" and hence cross talk and multi-frequency problems are wholly overcome. In addition the broadcast method enables a faster update rate of position solutions for all the users.

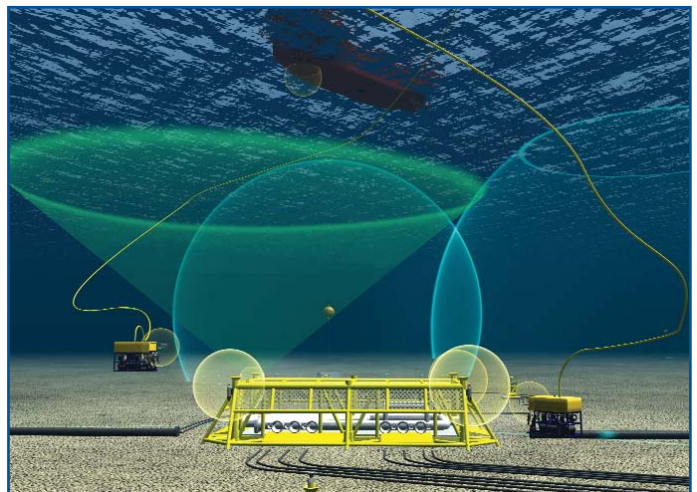
This means that NASNet® is the first true unlimited Multi User system giving accurate position for surface vessels, ROV's, AUV's and the positioning of underwater structures. The command and control telemetry is also capable of a limited data capacity which is exploited to provide the User with associated sensor data using transmission slots within each network.

TYPICAL APPLICATIONS

NASNet® is a multi-role positioning and tracking system capable of many concurrent operations. The following are a selection of typical operations that can benefit from NASNet®:

- Surface vessel and vehicle positioning
- Deep water survey operations
- Seismic and Hydrographic surveys
- Drilling operations
- Subsea construction operations
- Pipeline inspection and maintenance
- Work-over and intervention
- Tracking of Remotely Operated Vehicles (ROV's)
- Tracking of Autonomous Underwater Vehicles (AUV's)
- Data Telemetry of critical sensor data

When operating in deep water, variations in sound velocity will often deflect or bend sonar signals, transmitted at the sea floor, upwards to the sea surface. The engineers at Nautronix have reduced this effect with the unique design of NASNet® Stations that incorporate the ability to float the transmitting transducer above the main Station body. By using this arrangement a part of the sonar signal is transmitted towards the sea floor and will continue along it for some distance and at the same time completely fill the water column. The advantage of this arrangement is that the Stations can be placed considerable distances apart and hence fewer Stations are required to cover an extensive area. Ocean currents will move the transducer head relative to the main Station body which is overcome by using an in-built short baseline system that calculates the offset, thus ensuring high overall accuracy is maintained.



KEY BENEFITS

The NASNet® system uses ADS² technology to good advantage by allowing relatively low power transmissions to be used, while still maintaining a high immunity to signal interference.

- Very large area coverage capability (six (6) Stations can cover up to 100 km²).
- Single acoustic position reference providing positioning and tracking capability from surface to seabed.
- Long battery life for transmitting Stations (in excess of 4 years)
- Permanent grid that does not require extensive re-calibration.
- Coherent datum eliminates skew of reference between surface and underwater.
- Can be accessed simultaneously by unlimited numbers of Users, including surface vessels, ROVs, AUVs, seismic streamers, etc.
- Supports construction and engineering tasks through use of the flexible and mobile MTRx's.
- Supports secondary data communications.
- Interfaces to existing systems without significant modifications.

SPECIFICATIONS

Relative Positioning Accuracy

- < 0.5 m RMS

Frequency

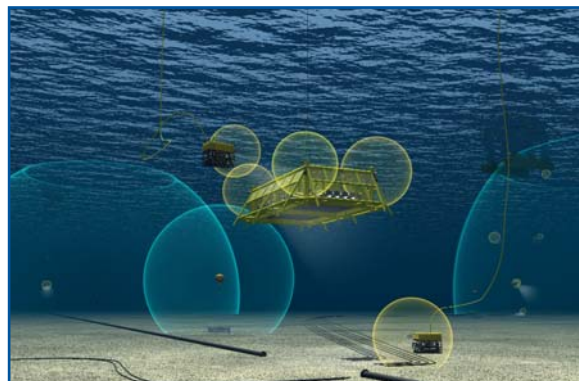
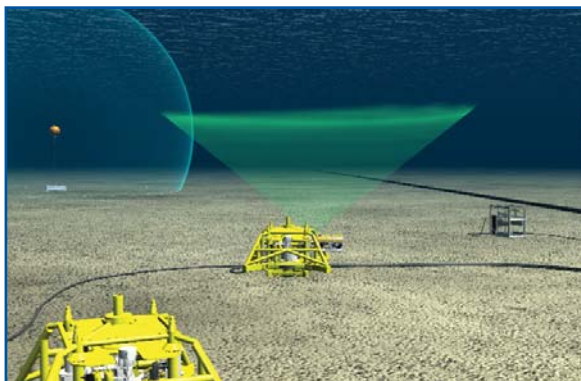
- LF: 10 kHz ± 1.5 kHz spread spectrum.

Depth

- NASNet® Stations 2,500 m (standard)
3,000 m (optional)
- NASNet® MS 3,000 m

Range

- In excess of 5 km depending on sound velocity profile.



Illustrations of NASNet® during subsea operations



NASNet® equipment being deployed - deployment photos courtesy of Subsea 7

Global Leaders in Through Water Communication and Positioning Technology for the Offshore Industry

All information contained herein is subject to change and does not form the basis of any contractual obligations

Revision 13

<p>ABERDEEN:</p>	<p>Nautronix House, Howe Moss Avenue, Kirkhill, Dyce, Aberdeen, AB21 0GP, Scotland T +44 (0)1224 775700 F +44 (0)1224 775800 E info@nautronix.com</p>
<p>LONDON:</p>	<p>67 Devon Road, Sutton, Surrey, England, SM2 7PE T +44 (0) 1224 775700 F +44 (0) 1224 775800 E info@nautronix.com</p>
<p>HOUSTON:</p>	<p>1291 N. Post Oak Rd, Suite 180, Houston, TX 77055, USA T +1 (713) 880 2848 F +1 (713) 457 0591 E info@nautronix.com</p>