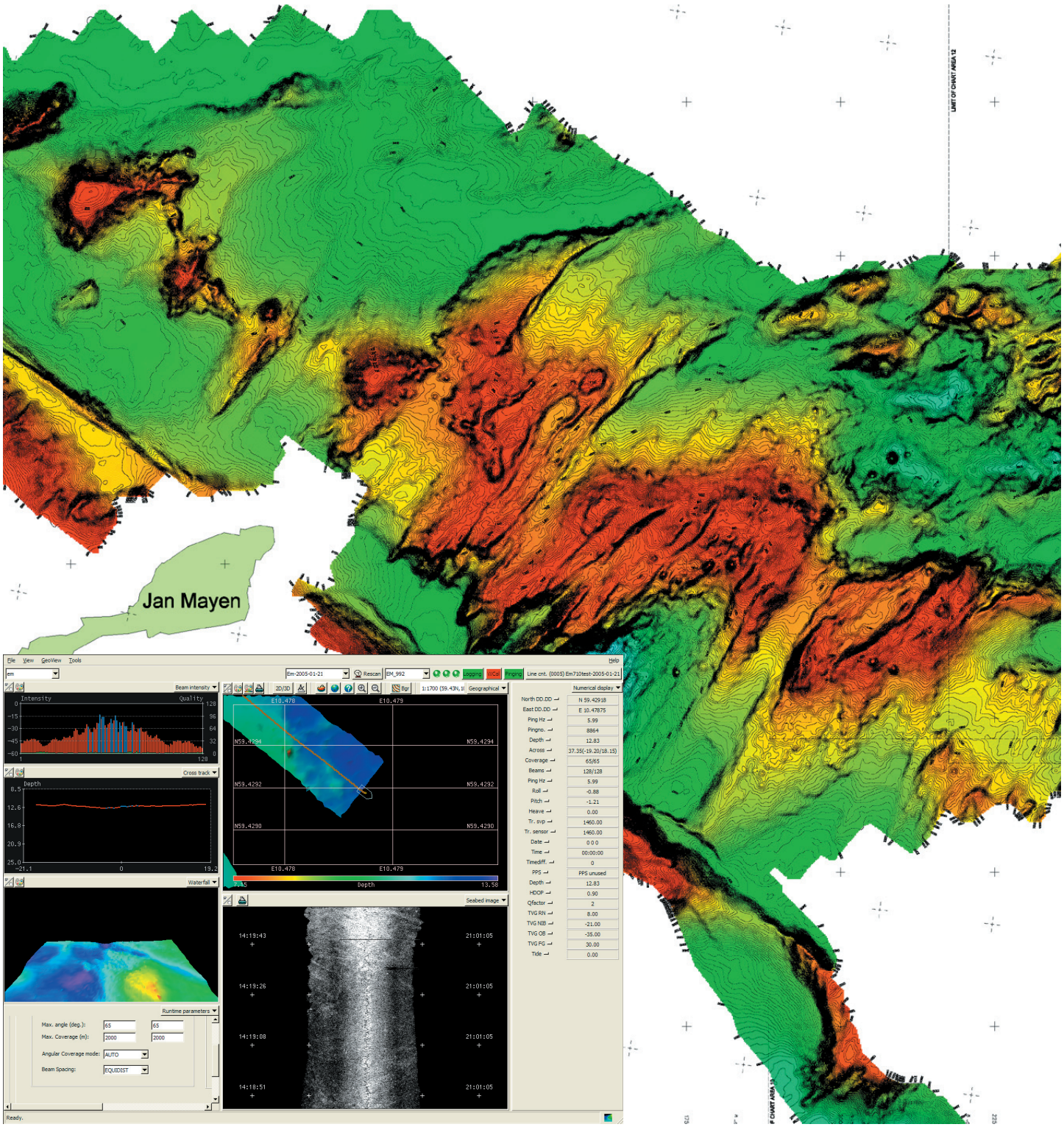
EM 120

KONGSBERG

12 kHz multibeam echo sounder

Seabed mapping to full ocean depth



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System overview

The EM 120 multibeam echo sounder is designed to perform seabed mapping to full ocean depth with an unsurpassed resolution, coverage and accuracy. The system is cost effective, reliable, and easily operated on workstations with familiar operating systems.

The EM 120 is a complete system. All necessary sensor interfaces, data displays for quality control and sensor calibration, seabed visualization, and data logging are a standard part of the system, as is integrated seabed acoustical imaging capability (sidescan).

When including a shallow water multibeam echo sounder with the EM 120 system, the total system solution meets IHO requirements for all depths.

Performance

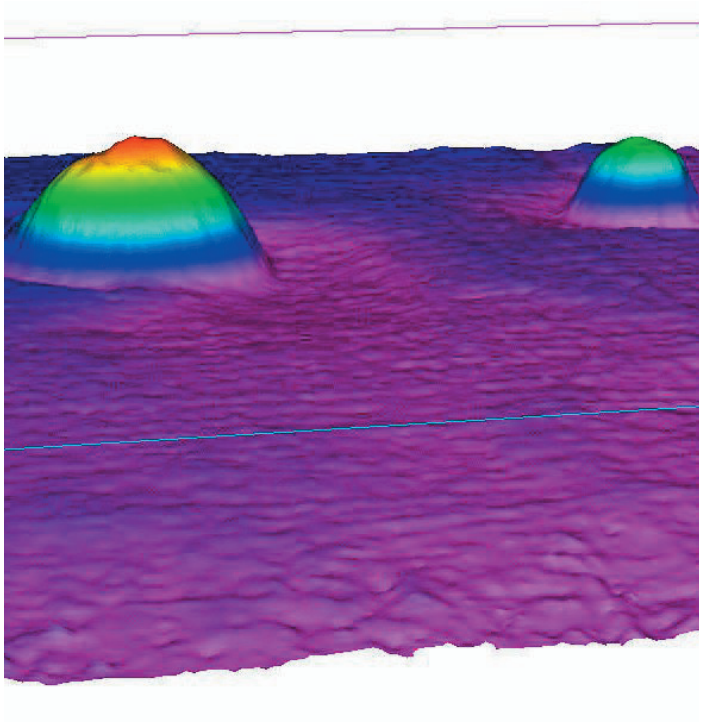
The operating frequency of the EM 120 multibeam echo sounder is 12 kHz. This frequency is standard for deep ocean echo sounding, and gives a good balance between reasonably small dimensions, narrow beams, and good range capability.

The system has 191 beams with pointing angles automatically adjusted according to achievable coverage or operator defined limits. The beam spacing is normally equidistant, corresponding to 1 % of depth at 90 degrees angular coverage, 2 % at 120 degrees and 3 % at 140 degrees. Equiangle beam spacing is also available, as is an in-between spacing.

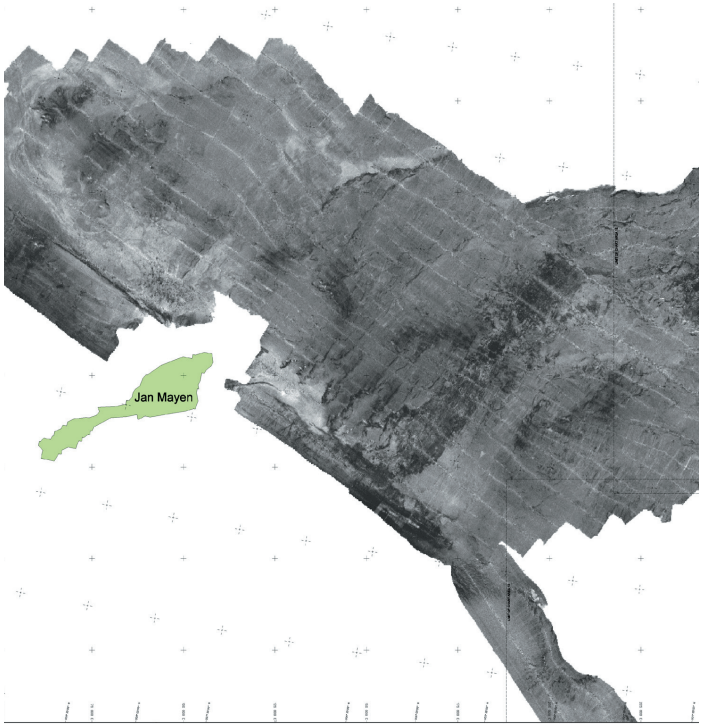
Transmission

The transmit fan is split in several individual sectors with independent active steering according to vessel roll, pitch and yaw. This places all soundings on a "best fit" to a line perpendicular to the survey line, thus ensuring a uniform sampling of the bottom and 100 % coverage.

The sectors are frequency coded, and they are transmitted sequentially at each ping. The sector steering is fully taken into account when the position and depth of each sounding is calculated, as is the refraction due to the sound speed profile, vessel attitude and installation angles.



Survey example from "Roger Revelle". The "mountains" on the seabed are volcanos.



Sonar mosaic, survey example from "Jan Mayen". Courtesy of the Norwegian Petroleum Directorate.

- Full swath width accuracy to the latest IHO standard
- Swath width up to 5.5 times water depth
- Depth range from 20 to 11.000 meters
- Area coverage of a single swath up to 25 km
- 100% bottom coverage even with 10 degrees yaw and pitch
- Real-time ray bending and attitude compensation
- Bottom detection by phase or amplitude
- Seabed image (sidescan) data output

Transducers

The EM 120 transducers are linear arrays in a Mills cross configuration with separate units for transmit and receive. For both arrays 1 and 2 degrees beamwidths are standard options, and 4 degrees beamwidth is available for the receive array. The resulting array lengths are between 2 and 8 m.

The transducer modules are fixed to a frame, either mounted directly on or recessed into the hull, or within sea chests. A fairing will usually be added around the transducers to ensure laminar water flow. A blister or gondola installation will also help in avoiding air bubble blockage of the transducers.

Transceiver Unit

The EM 120 Transceiver Unit contains the transmit and receive electronics and processors for beamforming, bottom detection, and control of all parameters with respect to gain, ping rate and transmit angles.

It has serial interfaces for all time-critical external sensors such as vessel attitude (roll, pitch, heading and heave), vessel position and external clock.

Preamplifier Unit

The EM 120 Preamplifier Unit contains the preamplifiers for the receive signals.

Operator Station

The Operator Station is the HWS 10 high performance dual-processor PC workstation is used as. It is dual bootable to either Linux® or Windows XP®.

The HWS 10 is normally supplied with a 17.4” industrialized LCD monitor with a resolution of 1280x1024 pixels. Support for a second monitor is included. A spill-proof US keyboard and a standard optical mouse is normally supplied.

Tx Junction box

The Tx Junction box serves as an interface routing box for easy transmit transducer cable installation. One or two units must be used depending on the chosen beamwidth.

Operator software

The EM 120 is delivered as a complete stand-alone seabed mapping system.

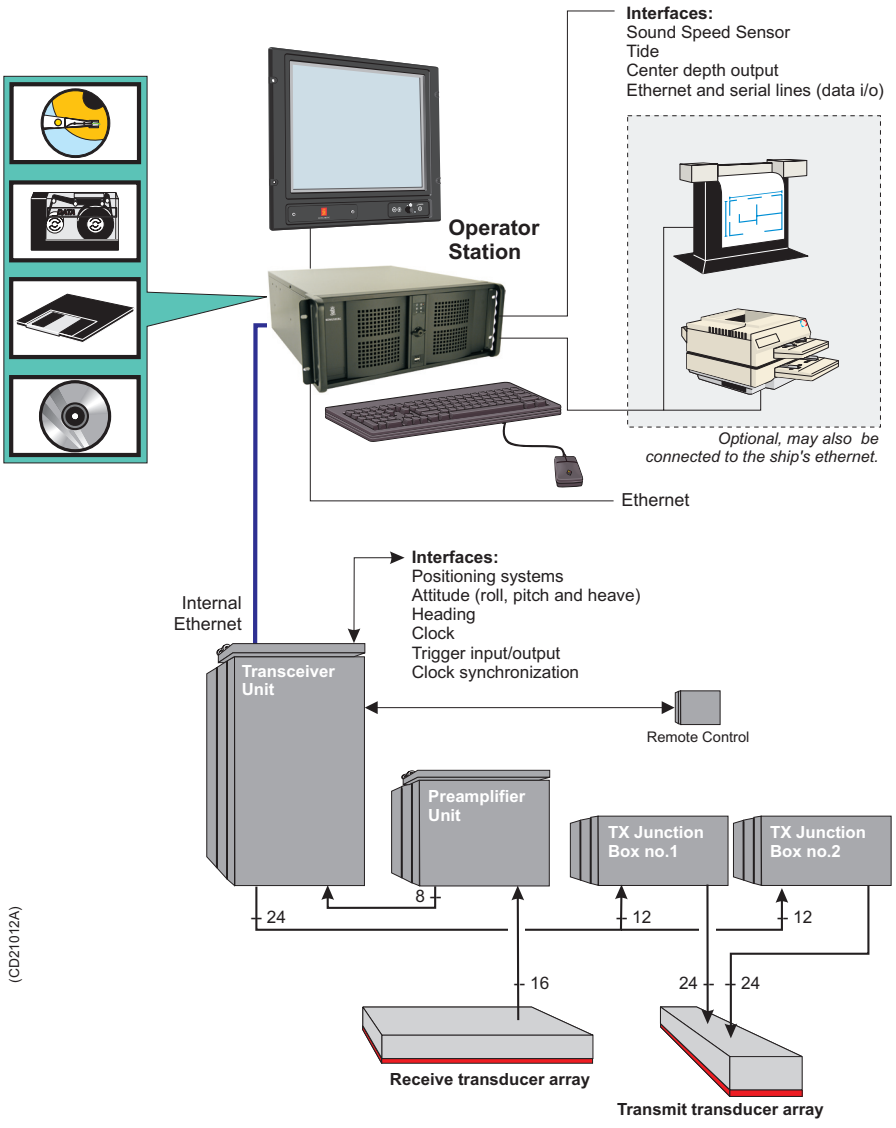
The Operator Station includes the necessary operator controls for setting up and running the system, data logging and system testing.

The Seafloor Information System (SIS) by Kongsberg Maritime also includes an extensive set of graphical displays for data quality control, as well as system calibration and other tools which are required. SIS supports on-line real-time data cleaning to improve the overall survey efficiency.

Post-processing software for the EM 120 is available from both Kongsberg Maritime and third-party suppliers.

Optional sub-bottom profiling

The receive transducer is wideband. In conjunction with a separate low frequency transmit transducer, the EM 120 may optionally be able to deliver sub-bottom profiling capabilities with a very narrow beamwidth. This system is known as the SBP 120 Sub-Bottom Profiler.



Typical system configuration with desktop Operator Station, Transceiver Unit Preamplifier Unit and transducer arrays

Technical specifications

Frequency		12 kHz		
Max ping rate		5 Hz		
Swath coverage sector		Up to 150 degrees		
Depth resolution		10 to 40 cm		
Depth range from transducers		20 to 11.000 m		
Pulse lengths		2, 5 and 15 ms		
Range sampling rate		2 kHz (37 cm)		
No. of beams		191		
Transmit beam steering		Stabilized for roll, pitch and yaw		
Receive beam steering		Stabilized for roll		
Sounding patterns		Equidistant, equiangle or in-betweeen		
Beamwidths	1 x 1°	1 x 2°	2 x 2°	2 x 4°
Transmit array dimensions with frame (L x W x H)	7770 x 780 x 261.5 mm	7770 x 780 x 261.5 mm	4020 x 780 x 249.5 mm	4020 x 780 x 249.5 mm
Receive array dimensions with frame (L x W x H)	7200 x 420 x 177 mm	3600 x 420 x 177 mm	3600 x 420 x 177 mm	1808 x 420 x 177 mm
Transceiver Unit dimensions (W x H x D)		600 x 1760 x 630 mm (including shock absorbers)		
Preamplifier Unit dimensions (W x H x D)		600 x 920 x 630 mm (including shock absorbers)		

A blister for the EM 120 transducer arrays (2x2 degrees system).

This blister was designed for "Commander Jack".

Kongsberg Maritime is engaged in continuous development of its products, and reserves the right to alter the specifications without further notice.

Kongsberg Maritime AS

Strandpromenaden 50
P.O.Box 111
N-3191 Horten,
Norway

Telephone: +47 33 02 38 00
Telefax: +47 33 04 47 53
www.kongsberg.com
E-mail: subsea@kongsberg.com

KONGSBERG