

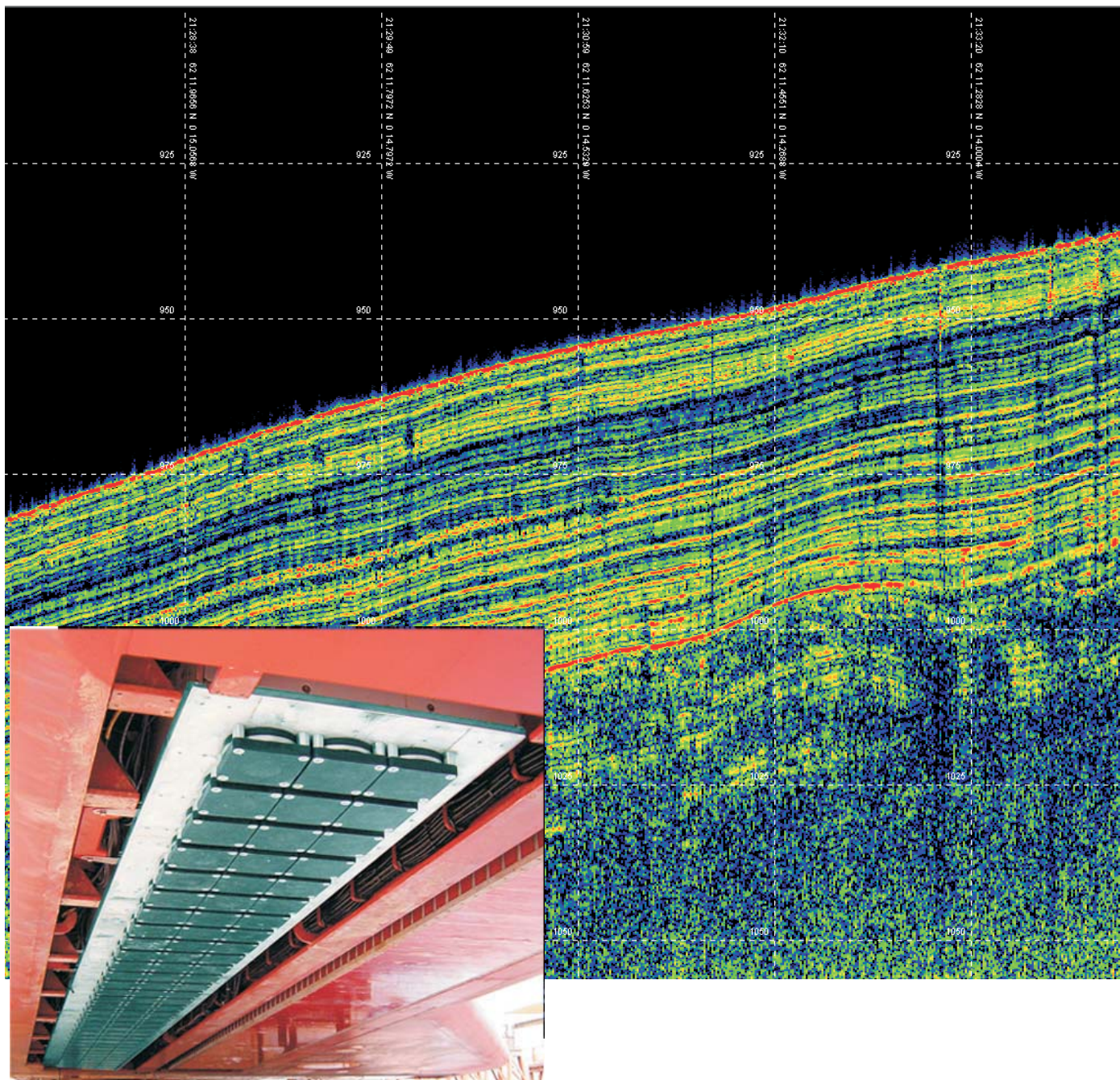
SBP 300

Sub-Bottom Profiler



KONGSBERG

Multiple simultaneously stabilised beams
Excellent penetration - full ocean depth operation



Introduction

The SBP 300 Sub-Bottom Profiler is an optional extension to the highly acclaimed **EM 302** Multibeam Echo Sounder. The receive transducer hydrophone array used by the EM 302 is wideband, and by adding a separate low frequency transmit transducer and appurtenant electronic cabinets and operator stations, the EM 302 may be extended to include the sub-bottom profiling capability provided by the SBP 300.

Purpose

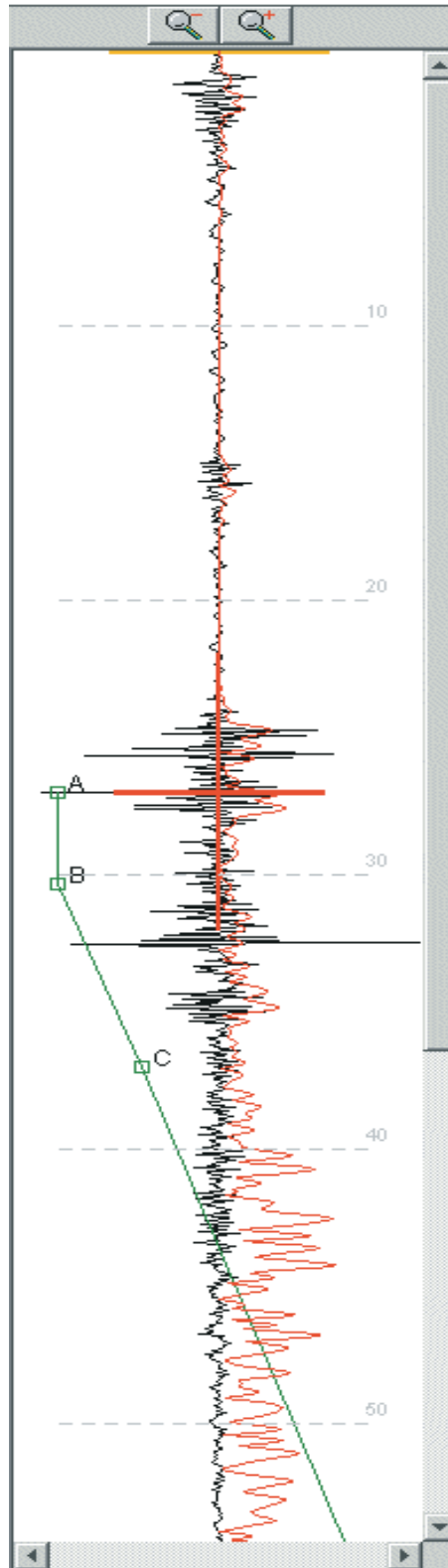
The primary application of the SBP 300 is to do imaging of sediment layers and buried objects. Image quality is influenced by:

- The spatial resolution of the system; its ability to distinguish objects separated in angle and range. The spatial resolution is given by two separate system properties
 - The angular resolution is given by the array geometry.
 - The range/time resolution is given by the signal bandwidth.
- The ping rate relative vessel speed. Dense probing alongtrack makes it easier to identify weak layers in sediments with high volume reverberation.
- The angle of incidence of the transmit beam. The echoes received are essentially caused by specular reflections at interfaces between layers of different acoustic impedance.

Key specifications

The SBP 300 has a much narrower beamwidth than a conventional subbottom profiler with correspondingly lesser smearing. It thus provides deeper penetration into the bottom, and higher angular resolution. The normal transmit waveform is a linear FM pulse. The outer limits for the start and stop frequencies of the FM pulse are 2.5 kHz and 6.5 kHz, providing a maximum vertical resolution of approximately 0.3 milliseconds.

In addition to linear chirps, the system offers CW pulses, hyperbolic chirps and Ricker pulses. SBP 300 is offered with a three, six and twelve degree transmitter. For the three degree transmitter, the frequency dependent source level is above 220 dB re 1 μ Pa @ 1m between 3.5 kHz and 6.5 kHz. The peak electrical power consumption is below 8 kW.



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Multiple stabilised beams

The SBP 300 beams are electronically stabilized for roll and pitch. It can also be steered to take into account bottom slope, and the generation of several athwartship beams is possible.

Ping rate

In the transmit mode “normal”, the SBP 300 pings once and then waits to collect the return signal. Maximum ping rate is 5 Hz. In the transmit mode “burst”, the system allows a number of pulses to be launched into the water before the first return signal. In the “unsynchronized burst” mode, the system is set to ping at a constant rate: The transmit and receive periods are interlaced so that a high constant ping rate can be maintained even in deep waters.

The SBP 300 can be synchronized to the EM 302 or other external equipment by selecting external trigger. During synchronized operation the rule is that the SBP 300 can ping only while waiting for the first bottom return. In transmit mode “burst”, this means we will achieve a piecewise dense sampling of the bottom.

Transducer arrays

The SBP 300 transmit transducer has a physical width of 80 cm, a depth of 35 cm and a length depending on the requested beamwidth. For a close to symmetrical footprint on the seabed,

the length of the transmitter array must be equal to the length of the EM 302 receive array, but arrays of different lengths may be combined.

System description

The transmit array is mounted in parallel with the vessel's keel (normally side by side with the multibeam echo sounder's transmit transducer).

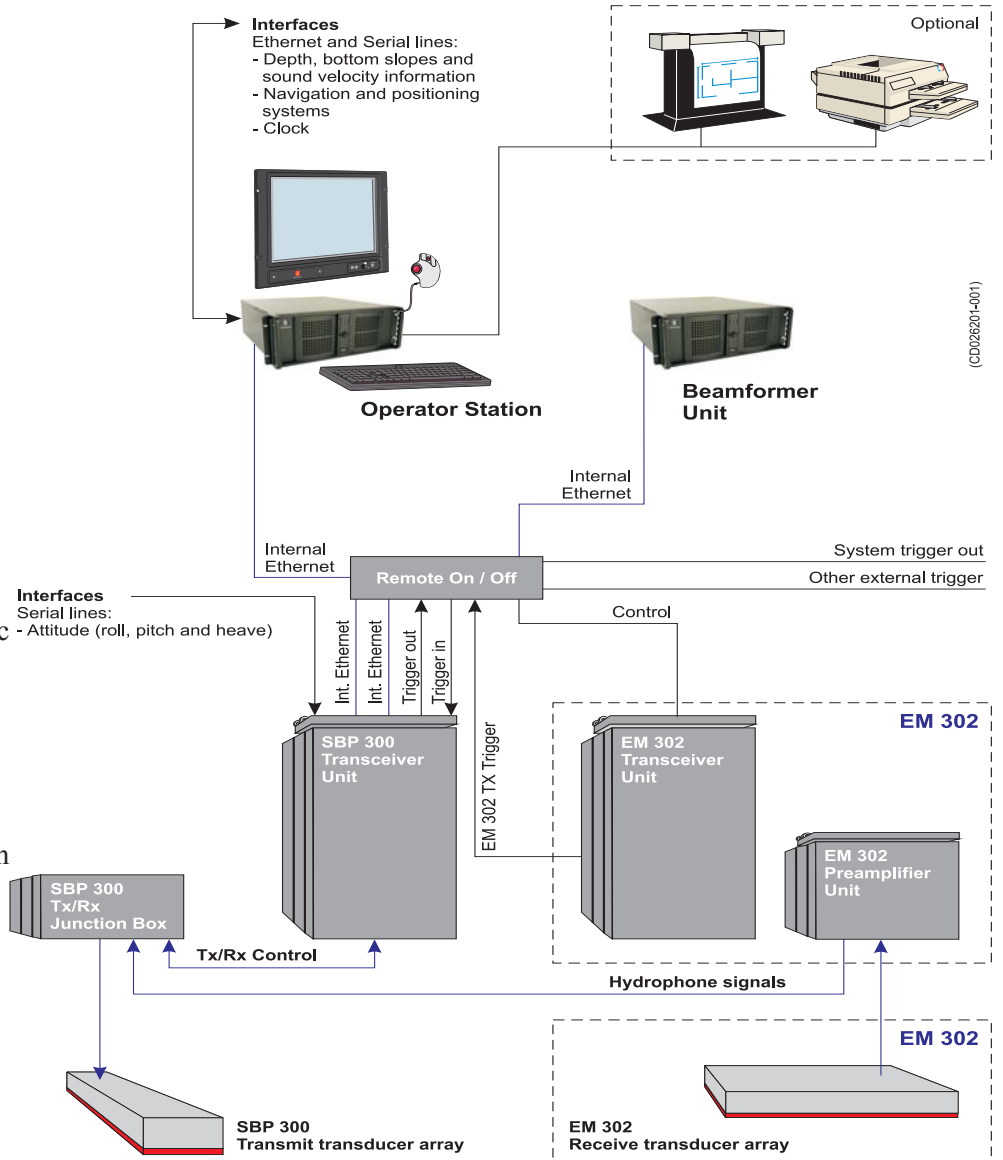
Data logging and real-time processing

The data produced by SBP 300 is logged in the Topas raw format or in the SEG-Y format that allows post-processing by some standard seismic processing software packages.

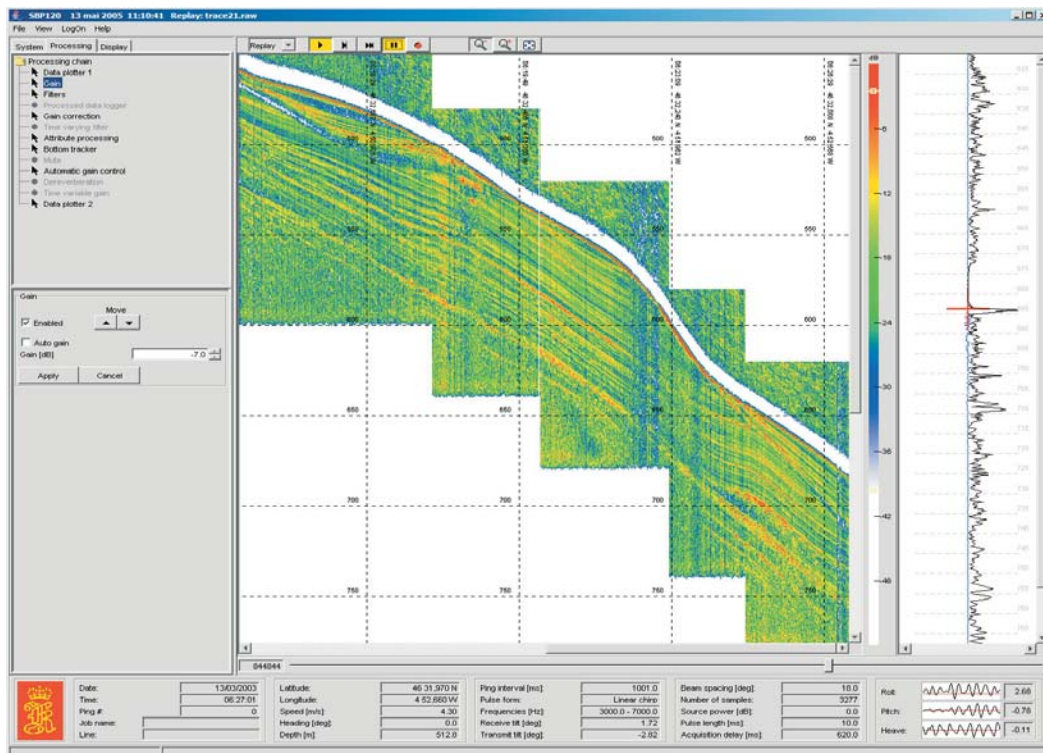
Cabinets and Operator Station

The transmitter and receiver electronic circuitry required for the SBP 300 is housed in a separate cabinet (similar size as the EM 302 Transceiver Unit.)

The EM 302 Preamplifier Unit contains preamplifiers for the common receiver array and frequency splitting circuitry. The operator interface and display system is implemented on a dedicated operator station.



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Above: Typical system configuration

Left: Typical display window

Operational specifications

Frequency sweep range	2.5 to 6.5 kHz
Number of beams per ping	Maximum 11
Maximum ping rate	5 Hz
Beamwidth, 4 kHz (along x across):	
Transmit	3/6/12 x 35 degrees
Receive	120 x 7/14/28 degrees
Beam spacing	≤ 15 degrees
Fan width	≤ 30 degrees
Pulse length	2 to 100 ms
Range sampling rate	20.48 kHz
Pitch stabilisation	Yes
Roll stabilisation	Yes
Heave compensation	Yes
Depth resolution	0.3 ms
Transducer geometry	Mills cross

Operational specifications

- Position
- Heading
- Motion sensor (Pitch, roll and heave)
- External clock
- Depth, bottom slope angles and sound velocity information (from the EM 302/EM 710)

Dimensions and weights, main units

Element:	
Length	184 mm
Width	184 mm
Height	270 mm
Weight	12.5 kg
Frame (3 degrees):	
Length	7450 mm
Width	800 mm
Height (including elements)	350 mm
Weight	1150 kg
Cable Connection Unit:	
Weight	45 kg
Weight, four units	180 kg
Total weight (3 degrees system)	2530 kg

Transceiver Unit:

Width	600 mm
Height	1400 mm
Depth	630 mm
Weight	Approximately 170 kg



Please note: Kongsberg Maritime is engaged in continuous development of its products and reserves the right to change specifications without notice. Survey results have been used with the permission of Service Hydrographique et Océanographique de la Marine (SHOM).

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