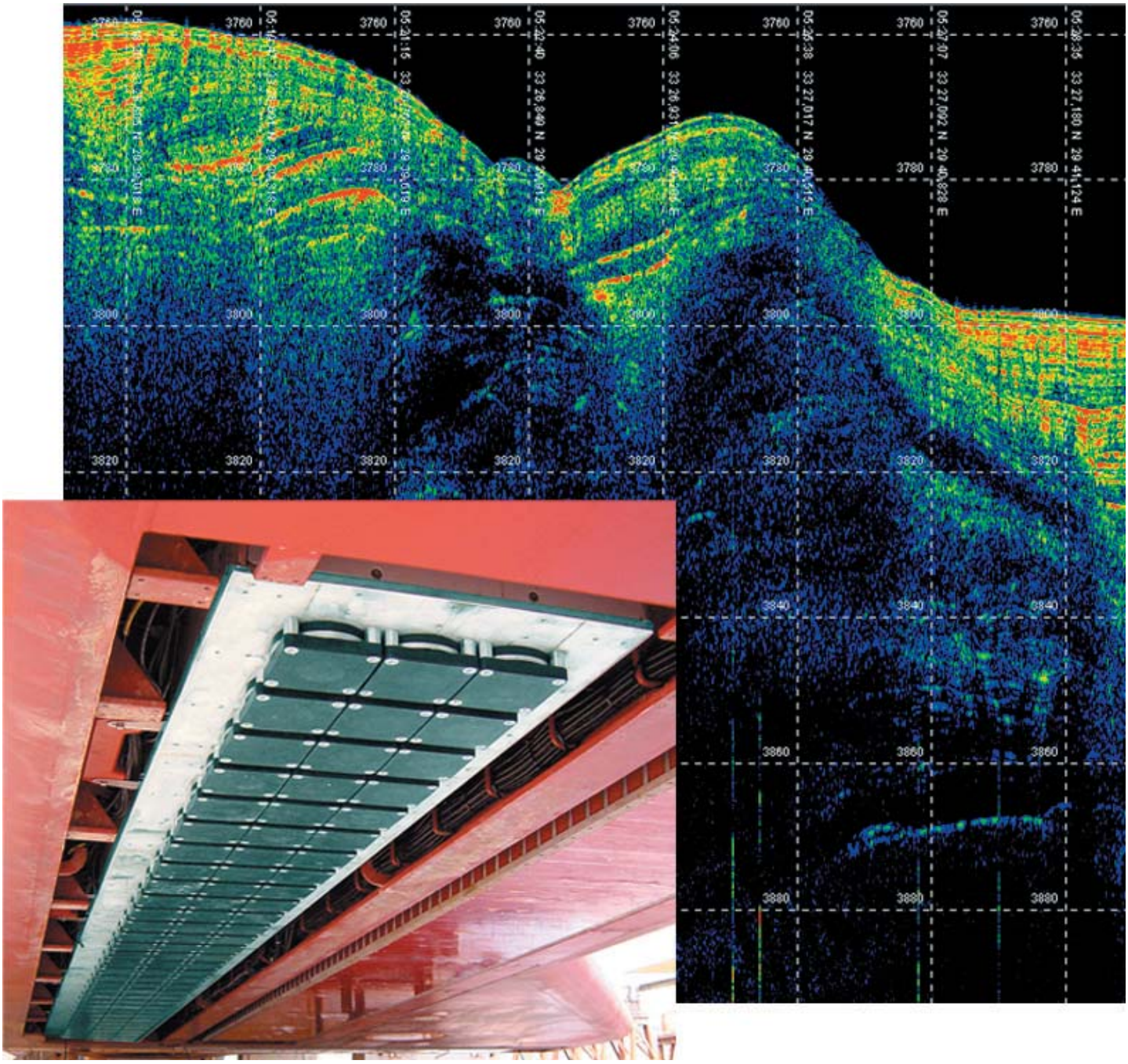
SBP 120 Sub-Bottom Profiler

KONGSBERG

Multiple simultaneously stabilised beams

Excellent penetration - full ocean depth operation



(855-164773 / Rev.B / June 2005)

Introduction

The **SBP 120** Sub-Bottom Profiler is an optional extension to the highly acclaimed **EM 120** Multibeam Echo Sounder.

The receive transducer hydrophone array used by the EM 120 is wideband, and by adding a separate low frequency transmit transducer and appurtenant electronic cabinets and operator stations, the EM 120 may be extended to include the sub-bottom profiling capability provided by the SBP 120.

Purpose

The primary application of the SBP 120 is to do imaging of sediment layers and buried objects. Image quality is influenced by:

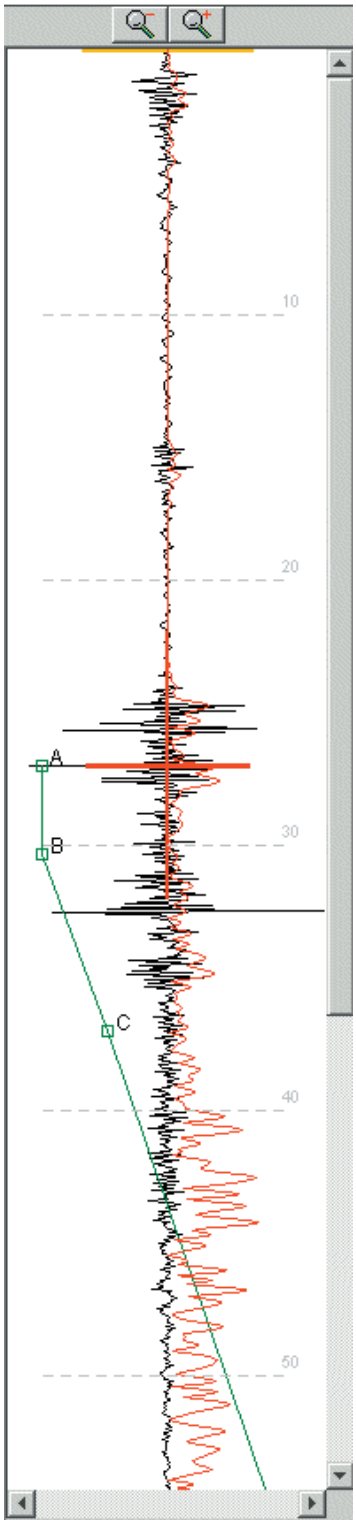
- The spatial resolution of the system; its ability to distinguish objects separated in angle and/or range. The spatial resolution is given by two separate system properties:
  - The angular resolution is given by the array geometry.
  - The range/time resolution is given by the signal bandwidth.
- The ping rate relative vessel speed. Dense probing alongtrack gives smoother pictures.
- 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 120 has a much narrower beamwidth than a conventional sub-bottom profiler with correspondingly lesser smearing. It thus provides deeper penetration into the bottom, and higher angular resolution.

The normal transmit waveform is a linear chirp (which is an FM pulse where the frequency is swept linearly). The outer limits for the start and stop frequencies of the chirp are 2.5 kHz and 7 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 120 is offered as a three, six and twelve degree system. For the three degree system, the frequency dependent (narrowband) source level is above 220 dB re 1 µPa @ 1m between 3.5 kHz and 6.5 kHz. The peak electrical power consumption is below 8 kW.



Multiple stabilised beams

The SBP 120 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 120 pings once and then waits to collect the return signal. Maximum ping rate is 4 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 120 can be synchronized to the EM 120 or other external equipment by selecting external trigger. During synchronized operation the rule is that the SBP 120 can only ping while waiting for the first bottom return. In transmit mode “burst”, this means we will achieve only a piecewise dense sampling of the bottom.

Transducer arrays

The SBP 120 transmit transducer has a physical width of 80 cm, a depth of 35 cm and a length depending on the requested beamwidth. For a symmetrical footprint on the

seabed, the length of the transmitter array must be equal to the length of the EM 120 receive array. 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

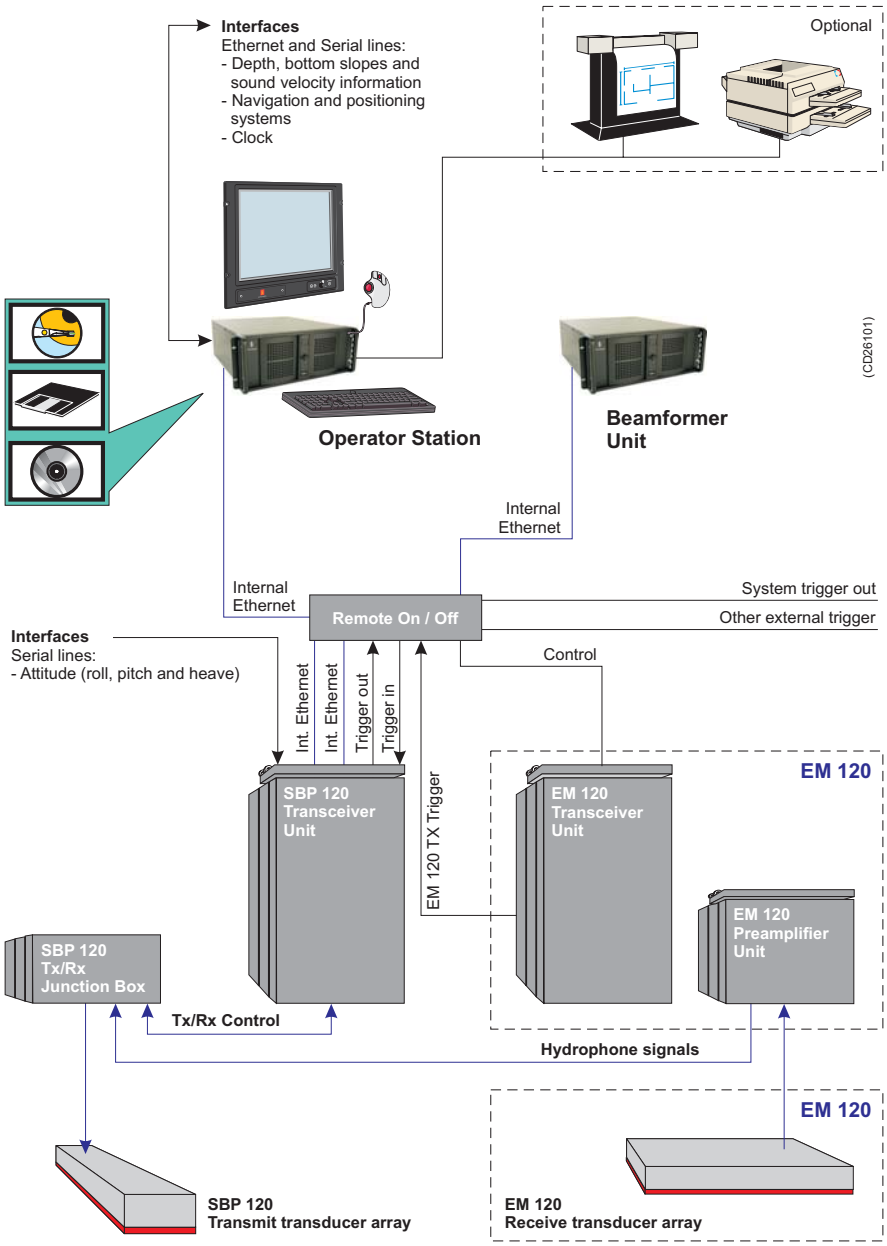
The data produced by SBP 120 is logged in the Topas raw format or in the SEG-Y format that allows post-processing by standard seismic processing software packages.

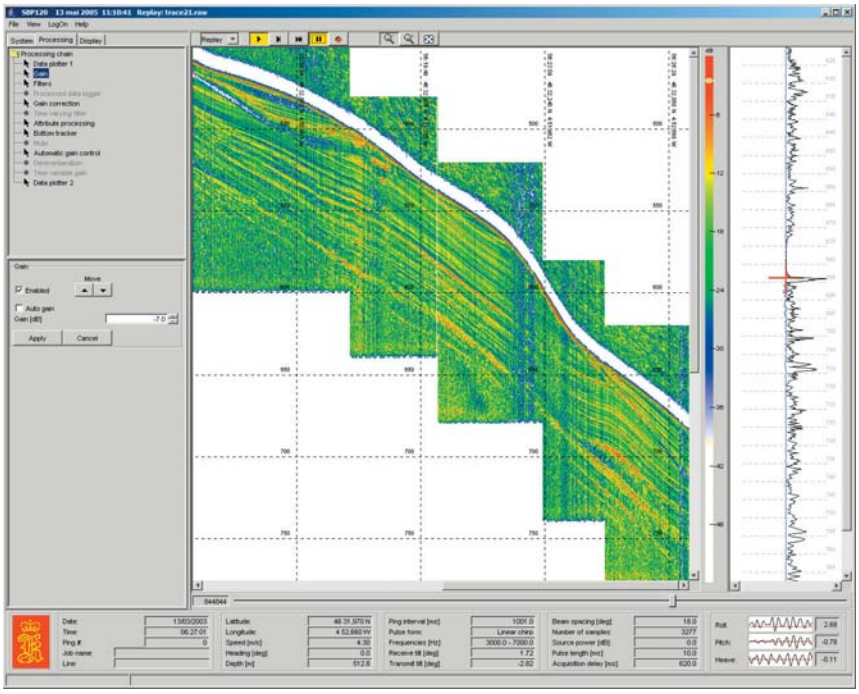
Cabinets and Operator Station

The transmitter and receiver electronic circuitry required for the SBP 120 is housed in a separate cabinet of the same size as the EM 120 Transceiver Unit.

The EM 120 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.





Above: Typical system configuration

Left: Typical display window

Operational specifications

Frequency sweep range ..... 2.5 to 7 kHz
Number of beams per ping ..... Maximum 11
Maximum ping rate ..... 4 Hz
Beamwidth, 4 kHz (along x across):
- Transmit ..... 3/6/12 x 35 degrees
- Receive ..... 80 x 3/6/12 degrees

Beam spacing ..... ≤ 15 degrees
Fan width ..... ≤ 30 degrees
Pulse length ..... 0.4 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

External sensors

- Position
- Heading
- Motion sensor (Pitch, roll and heave)
- External clock
- Depth, bottom slope angles and sound velocity information (from the EM 120)

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).

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