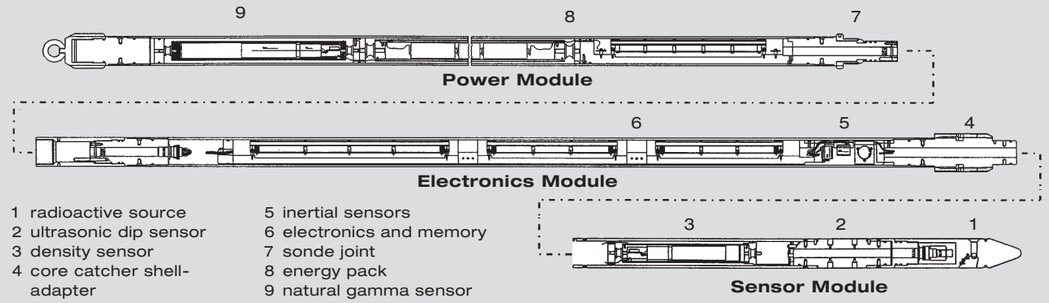
AEGIS Instruments

Supplier of Geophysical Equipment to the Earth Science and Engineering Sectors

Coal-Combi-Shuttle



1 radioactive source
2 ultrasonic dip sensor
3 density sensor
4 core catcher shell-adapter
5 inertial sensors
6 electronics and memory
7 sonde joint
8 energy pack
9 natural gamma sensor

Sensors

Dip/Caliper: A 12 channel ultrasonic transducer head, working in impulse-echo method, senses the amplitude and traveltime of the acoustic beam, reflected from the borehole wall.
Inclination/Roll: Three-axis accelerometer sensors allow reading of the actual inclination, the roll position, and the movement of the sonde.
Gamma-Gamma-Density: A radioactive source emits gamma-rays into the formation. The receiver is located at 50 cm distance, 20“ Long Space Density, and senses the scattered gamma-rays.
Gamma: The gamma sensor is located in the upper part of the sonde. A NaJ-photocounting unit senses the naturally radioactivity of the formation.
Depth measurement: During logging a Drill-String-Recorder with attached rope-sensor is mounted at the derrick.

Technical Data

length mounted	5,34 m
length of sensor part	0,95 m
diameter	60 mm
weight	61 kg
temperature	70 °C
pressure approx.	200 bar
mission time approx.	10 h
logging intervall approx.	1200 m
logging speed recom.	200 m/h
inner core barrel type	HQ, CHD101, SK4 1/4

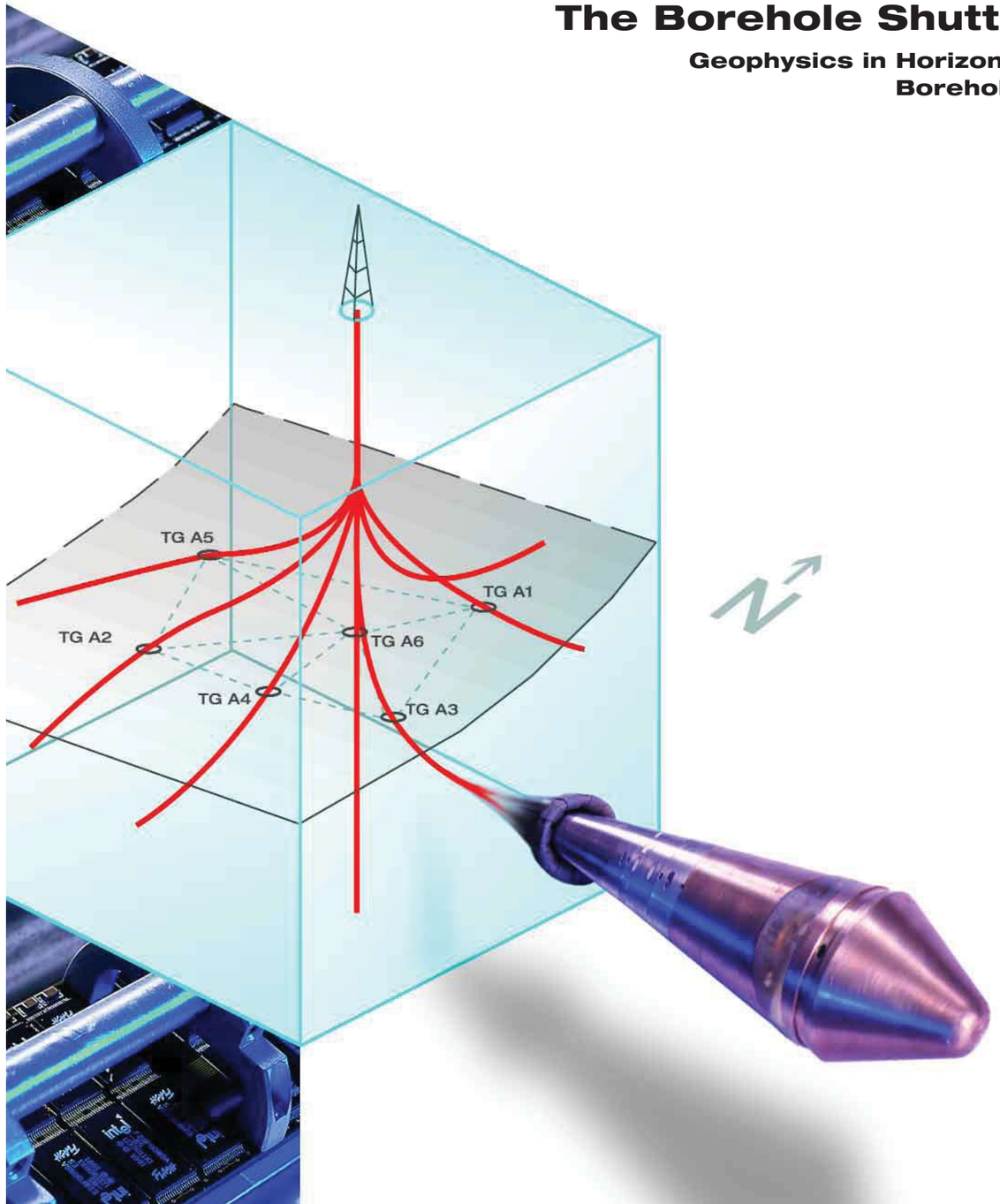
further adaptations are possible.

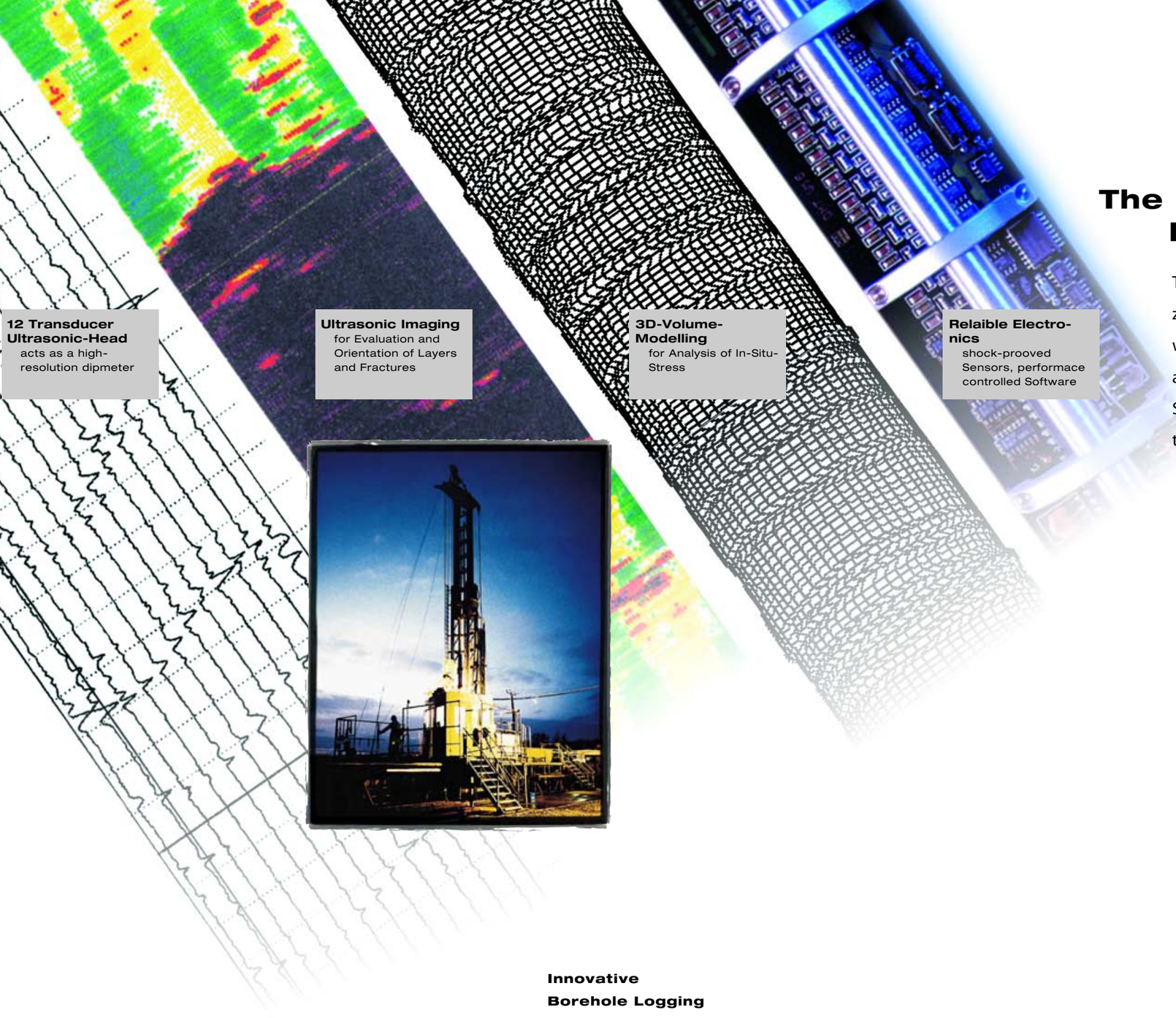
In Development

- Hydrophone-Shuttle (VSP)
- 3-D Seismic-Shuttle (VSP)
- explosion prooved Shuttle for NQ, CHD76 and SK3 1/2
- Optic-Shuttle for dry boreholes
- inertial depth measurements

The Borehole Shuttle

Geophysics in Horizontal Boreholes





Innovative Borehole Logging without Limitation. Wherever you drill, you can log.

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The Borehole Shuttle – The Logging Method for Horizontal Boreholes

The BOREHOLE SHUTTLE is a geophysical logging system for highly deviated and horizontal exploration boreholes. The first shuttle measurements began in the year 1992 within a R&D-Program of Ruhrkohle AG, and since then, shuttle logging became a secure and cost effective method on wireline coring drill rigs. Meanwhile the COAL-COMBI-SHUTTLE, a special configured Borehole Shuttle for coal exploration, is in routine operation within the German coal mining industry.

Logging Principle

A self-contained, cableless logging sonde is equipped with large semi-conductor memory. It is guided to the bottom of the borehole through the drill string of a diamond core drill, using the inner core barrel as a carrier. When this assembly of sonde and inner core barrel, called borehole shuttle, is pumped down, it positions itself in the outer core barrel. The sensors of the sonde protrude the coring bit.

By pulling the drill string out of hole the logging interval is covered. The shuttle detects uphole movements and collects and stores the data downhole with precise time information. A Drill String Recorder measures the length of each withdrawn drillpipe on the rig and stores this depth related information also with a precise time information.

After the measurement the borehole shuttle is pulled out of the remaining drill string by means of an overshot device. Then the formation data is read out of the sonde and is merged with the depth information from the Drill String Recorder.

Advantages of Borehole Shuttle Logging

- Trip time is used to take measurements in a cost effective manner.
- Sonde mobility is possible for all borehole deflection angles, and is also safe in non stable borehole sections.
- There is no risk of loosing a sonde, because it remains almost completely within the drill string.
- Mud flushing and rotation of the drill string is possible every time.
- Logging interrupts the drilling progress only slightly. It can be done efficiently during each roundtrip, checktrip, or core run.
- The tensile strength of the drill string, compared to a logging cable, is excellent to operate high resolution dip measurements.