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QL40-ABI-2G
ABI40-GR-2G

Acoustic borehole imager

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The QL40-ABI-2G and ABI40-GR-2G are the latest generation of acoustic televiewers based on over 20 years of experience and market leadership. The tool benefits from new 2G telemetry protocol optimizing logging speed on long single or multi-conductor wirelines.

The acoustic borehole imager records a 360° unwrapped and 3D images of the borehole wall. The tool emits an ultrasonic beam towards the formation and records amplitude and travel time of the reflected signal. Amplitude records are representative of the impedance contrast between rock and fluid. Travel time is used to determine accurate borehole diameter data, which makes the tool ideal for borehole deformation description - stress field analysis and casing inspection.
A built in high precision orientation package incorporating a 3 axis fluxgate magnetometer and 3 accelerometers allows orientation of images to a global reference and determination of borehole azimuth[1] and inclination. Sophisticated algorithms and real time processes are also implemented to extend tool applications for casing thickness measurement, corrosion evaluation and measurement behind a PVC casing.

QL40-ABI-2G tool is a bottom sub in the Quick Link (QL) product line and can be combined with other QL40 tools to form a tool string or it can be run as a standalone tool.
The ABI40-GR-2G is a standalone tool integrating a built in natural gamma sensor.

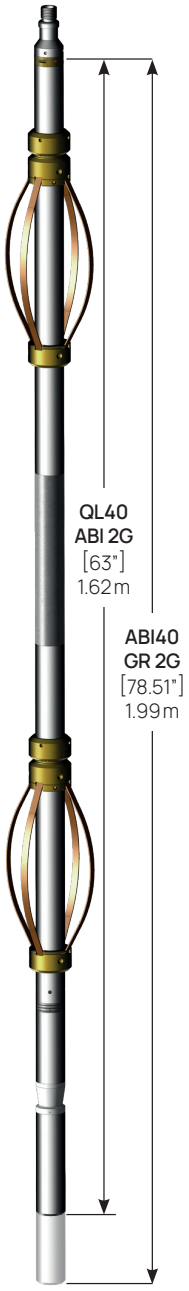
Application

OPEN HOLE

- Detailed and oriented caliper and structural information
- Borehole deformation (stress field analysis)
- Fracture detection and characterization
- Breakout analysis
- Lithology characterization (Detection of thin beds, determination of bedding dip)
- Rock strength and fabric

CASED HOLE

- Casing inspection and corrosion evaluation
- Steel casing thickness



Tool

Diameter : 40mm (1.6")
Length (min/max) : 1.62m (63") / 1.99m (78.51")
Weight (min/max) : 6.7kg (14.7 lbs) / 8.0Kg (17.6lb)
Temp : 0 - 70°C (32 - 158°F)
Max. Pressure : 200bar (2900psi)

Acoustic sensor

Acoustic sensor : Fixed transducer and rotating focusing mirror
Focusing : Collimated acoustic beam
Frequency : 1.2 MHz
Rotation speed : Up to 35 revolutions per second - automatic
Caliper resolution : 0.08mm (0.003")
Samples per revolution : 72, 144, 216, 288 and 360

Orientation sensor

3 axis fluxgate magnetometer – 3 accelerometers

- Inclination accuracy : +/- 0.5 degree
- Azimuth accuracy : +/- 1.2 degree

Natural gamma sensor

- 0.875" (22.2mm) x 3" (75.6mm) NaI (Ti) scintillation crystal
- Integrated (ABI40-GR) or in line sub (QL40-GR)

Operating conditions

Cable type : Mono, multi-conductor, coax
Compatibility : Scout Pro / Opal (Scout / Bbox / Matrix)
Digitaldata transmission Telemetry : Variable baudrate telemetry according to cable length/type & surface system
Logging speed : Variable - function of image resolution, borehole diameter, wireline and surface system model.
Centralisation : Required
Borehole fluid : Water, water based mud, brine, oil (oil based mud not applicable)
Measurement range :
Open hole : 2.5" to 20"
(64 to 500mm) depending on mud conditions
Cased hole[2] : 5" to 20" (127 to 500mm)
minimum thickness 5 mm

[1] Only applicable in non magnetic environment

[2] Scrap casing before operation

Principle of measurement

The ABI produces images of the borehole wall which are based on the amplitude and travel time of an ultrasonic beam reflected from the formation wall. The ultrasonic energy wave is generated by a specially designed piezoelectric ceramic crystal and has a frequency of around 1.2MHz. On triggering, an acoustic energy wave is emitted by the transducer and travels through the acoustic head and borehole fluid until it reaches the interface between the borehole fluid and the borehole wall. By careful time sequencing, the piezoelectric transducer acts as both transmitter of the ultrasonic pulse and receiver of the reflected wave. Travel time for the energy wave is the period between transmission of the source energy pulse and the return of the reflected wave measured at the point of maximum wave amplitude. Magnitude of the wave energy is measured in dB, a unitless ratio of the detected echo wave amplitude divided by the amplitude of the transmitted wave.

Measurement features

Open hole mode

- 360° Unwrapped and oriented image of the borehole wall based on travel time and amplitude records : caliper and amplitude image logs
- Deviation parameters : azimuth, tilt, tool relative bearing, magnetic field, gravity
- 3 Accelerometer calibrated components, 3 Magnetometer calibrated components

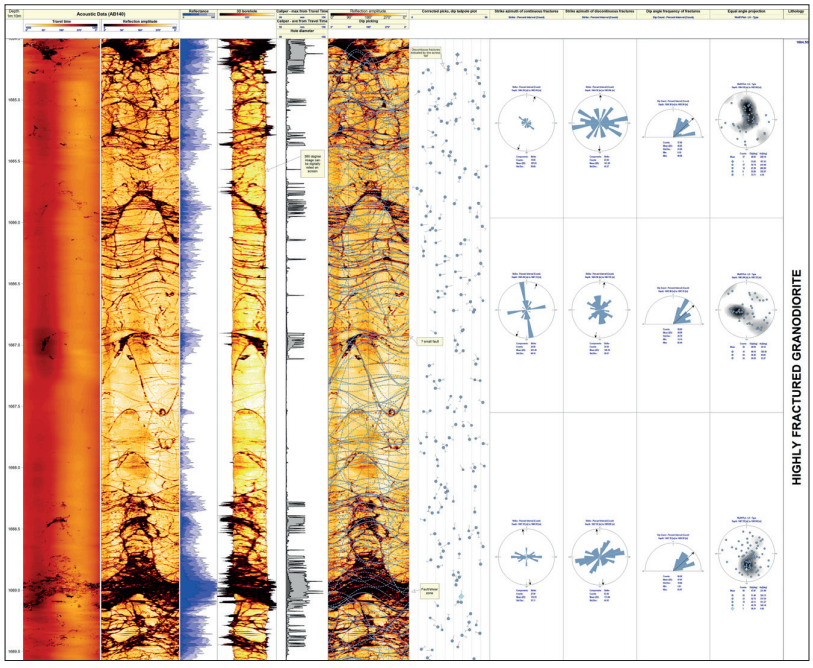
Behind PVC mode*

- 360° Unwrapped and oriented image of the PVC casing and borehole wall based on travel time and amplitude records : caliper and amplitude image logs
- Deviation parameters: azimuth, tilt, tool relative bearing, magnetic field, gravity
- 3 Accelerometer calibrated components, 3 Magnetometer calibrated components

* PVC must be centered in borehole

Cased hole mode

- 360° Unwrapped image of the steel casing based on travel time and amplitude records : caliper, amplitude, thickness and score image logs
- Deviation parameters : tilt, tool relative bearing, gravity
- 3 Accelerometer calibrated components, 3 Magnetometer calibrated components



Processing with WellCAD image and structure interpretation module

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