

# QL40, ABI-2G acoustic borehole imager

## ABI40, GR-2G

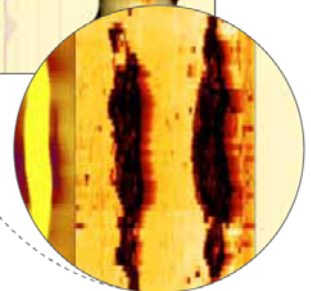
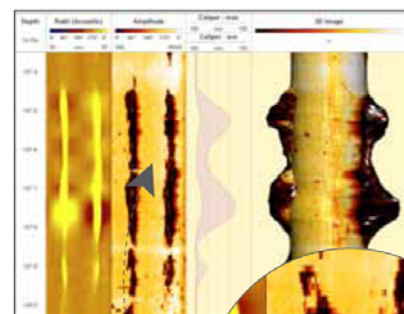
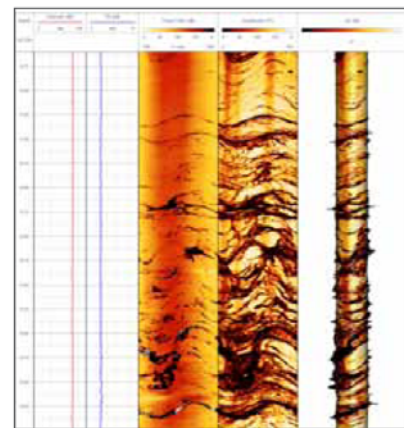
The QL40ABI and ABI40GR are the latest generation of acoustic televiewers based on 20 years of experience and market leadership. The new system consists of a completely redesigned acoustic sensor and new electronics.

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 the amplitude and the travel time of the reflected signal. The amplitude record is representative of the impedance contrast between the rocks and fluid. The 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 the images to a global reference and determination of the borehole's azimuth and inclination. Sophisticated algorithms and real time processes are also implemented to extend the tool applications for casing thickness measurement, corrosion evaluation and measurement behind a PVC casing.

The QL40ABI tool is supplied as a bottom sub of 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 ABI40GR is a standalone tool integrating a built in natural gamma sensor.



### Application

- Detailed and oriented caliper and structural information
- Borehole deformation (stress field analysis)
- Fracture detection and evaluation
- Breakout analysis
- Detection of thin beds
- Determination of bedding dip
- Lithology characterizations
- Rock strength
- Casing inspection and corrosion evaluation
- Steel casing thickness



## Principle of measurement

The ABI produces images of the borehole wall which are based on the amplitude and time of travel 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. The 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. The magnitude of the wave energy is measured in dB, a unit less ratio of the detected echo wave amplitude divided by the amplitude of the transmitted wave.

## Measurements / Features

### Open hole mode

- 360° unwrapped and orientated 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

### Cased Hole mode

- 360° unwrapped image of the steel casing based on travel time and amplitude records : caliper, amplitude, thickness and score image logs

### 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

## Operating Conditions

- Borehole filled with water or water based mud.
- Open & cased hole
- Tool centralization required.
- PVC casing centralization required for "Behind PVC" operating mode
- Logging speed: variable – function of image resolution, borehole diameter, wireline and acquisition system model. i.e. 8m/min in 7" diameter borehole with 144 azimuthal resolution - 4mm vertical sampling rate @ 250kbps baud rate.

## Technical Specifications

- Diameter : 40mm (1,575")
- Length (min/max): 1.61/2,12 m (63/83").
- Weight (min/max): 6, 7/8,7 kgs (14,7/19,2 lbs).
- Max temp : 70°C
- Max pressure : 200 bar
- Electronic architecture :  
*16 Bit (96db) / 10Msps Analog to Digital converter  
150Mflops Digital Signal Processor*

### Acoustic sensor

- Fixed transducer and rotating focusing mirror
- Focus optimized for 6" borehole (152mm).
- Frequency : 1.2 Mhz.
- Acoustic beam width : 1.5 mm (-3db) focal distance
- Rotation speed : up to 35 revolutions per second – automatic
- Samples per revolution : 72, 144, 288 user defined.
- Caliper resolution : 0.08mm (0,003")
- Measurement range: 2" to 20" borehole depending on mud conditions

### Orientation sensor

- APS 544 - 3-axis magnetometer – 3-axis accelerometer
- Inclination accuracy : +/- 0.5 degree
- Azimuth accuracy : +/- 1.2 degree

### Natural gamma ray sensor

- 0,875" x 3" NaI (Ti) scintillation crystal