

ABOT Acoustic Sonar Fluid Level System

The System consists of a computer connected to a high performance sonar detection microphone and a 12 cubic inch gas storage chamber, which is connected directly to either the tubing or casing. A solenoid valve releases nitrogen gas from the gas gun volume chamber into the well. Creating the "Sonar Sound Event" - the solenoid is operated automatically from the computer. The acoustic sonar pulse travels through the well-bore gas. A high resolution sonar microphone converts the acoustic sonar signal from down-hole into an electrical signal that is fed to the computer. The sonar microphone is a piezoelectric crystal that has a capacitance of approximately 40 nanofarads. The amplifier/recorder simultaneously processes and filters the signal through two channels and records the sonar sound events. One channel accents collars, nipples, packers, etc., and the other channel calculates the liquid level by acoustic velocity.

ABOT Acoustic Pulse Generation

The acoustic sonar pulse is generated by 2 methods referred to as explosion/implosion utilizing gas charged guns routinely used in hazardous locations.

Explosion method is the instantaneous release of 300 psi +/- of gas "N² or CO²" from the gas gun volume chamber into the well.

Implosion method with wellhead pressures above 1500 psi. is the instantaneous implosion of 300 psi +/- of gas from the well-bore into the gas gun volume chamber. When gas expands, the gas cools. So a hot gas mixture is not introduced into the well gas. The gas gun pulse generation is intrinsically safe.

Through-Tubing /Drill Pipe or Casing Annulus Fluid Level Surveys

Acoustic fluid level surveys can be undertaken through tubing as well as through the annulus. The ABOT computer provides processing options that can locate the depth to the gas/liquid interface. When the tubing or workstring exhibits even minor internal upsets, the automatic collar counting processing is easily undertaken. In those instances where the tubing is internally flush, the other processing options include: using acoustic velocity corrected for temperature and pressure, etc., to provide the necessary information to determine fluid level and make BHP calculations. A broad range of experience has been accumulated by Reservoir Data Engineers in this type of unconventional fluid level detection and testing of low & high pressure wells.