

CARVtech Acoustic / Vibration Anti-collision Warning System.

During kick-off operations on surface installations in mature areas the Operator requires the use of real time anti collision services provided either by the directional drilling contractor, an independent third party or in some instances done themselves with the data acquired from the well site. The need to monitor potential well bore intersection is obvious, however the methods to mitigate these risks are predominantly in-hole survey systems (either MWD or Gyro, or both).

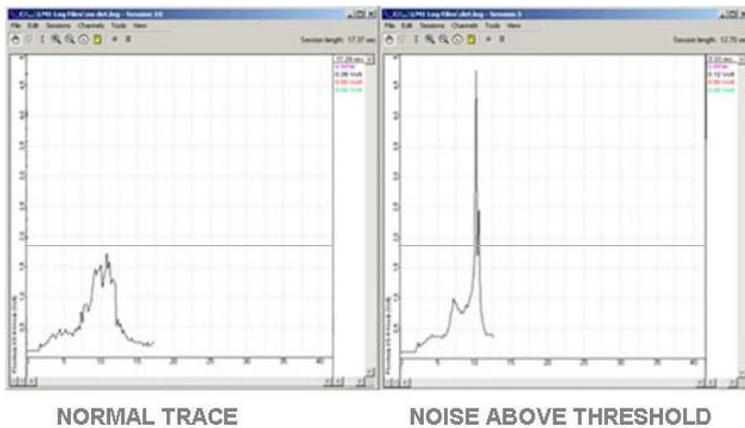
What this paper offers is a practical instrumented method of "listening" to the well bores defined as "at risk" adjacent to the well being drilled and comparing anomalous "noise" to those emitted by the well being drilled either in real time ,depth based or both. The proposed method does not avert or mitigate intersection, this is still the function of the directional anti-collision work, however used in conjunction, the system offers a potentially effective Warning System to the Operator that can be used to avoid a complete breach in well bore integrity at the sub-surface.

System Overview:

The proposed system offers the flexibility of single or a multi channel string of accelerometers placed one on each well. Raw data from each accelerometer is locally processed and can then be transmitted to a designated point (like the MWD Shack) using an analog low voltage DC signal. In addition each accelerometer can be locally monitored with a Headphone by a designated user. A back ground noise level is recorded and a threshold level is set for each accelerometer (well). Frequency adjustment allows for optimization of the threshold setting, however the system floats above and below the set frequency. Once the total system is calibrated (each "at risk" well and the active well bore) the system requires no manual intervention. Digital Signal Processing is real time and data transfer rates configurable up to 100Hz assure that any perceived anomaly is reported immediately (*see attached figure for example presentation of analog output type*).

Anomaly reporting can be visual, audible or both and is tagged to source. On multiple channel configurations the analog outputs can be looked at, time based with millisecond resolution, and compared for the purpose of identifying which well is the source and which is the receiver of that anomaly. Because the reporting and analog out puts are both time-based, the interface to the MWD or Logging Shack can be reformatted to depth-based. This allows the operator to set reasonable zones of risk and alertness based on the directional program on any individual well.

Based on the level of interference created by a mechanical intersection, "noise" will be transmitted up the casing string/s and eventually completely attenuated. The magnitude of the noises transmitted to surface will be a function of the acoustic coupling between casing, cement, well bore fluids, wellhead, and the platform interfaces. Once the back-ground noise levels are established (calibrated) the system will very easily report deviations above the normal set point. Using this information and comparing it to rotary parameters or MWD / LWD shock levels gives a completely independent assessment of potential down hole mechanical issues.



System Components:

- Proven accelerometer based shock / knock detection components for harsh environments, with exceptional reliability.
- Highly portable Frequency Adjustable Signal Processor that is low voltage DC powered. Records and displays peak recordings with real time bar graph display.
- Multi Channel (multi well bore) 0–5vdc Analog output to Time or Depth based interface at the MWD or Loggers Shack.
- On / Off switching Output for visual or audible notification to multiple locations.
- Real Time multi channel Signal Processor and display via PC with data collection.
- High Quality Volume Adjustable Interface from the "detector" to a Headphone that allows the user to listen to both back ground and anomalous noise. Interchangeable between the various well bores.

CARVtech PC is currently looking for partners to prove the effectiveness of our System. We are willing to work with the Operators and their third parties to tailor a system to the specific needs of any project world wide.



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