

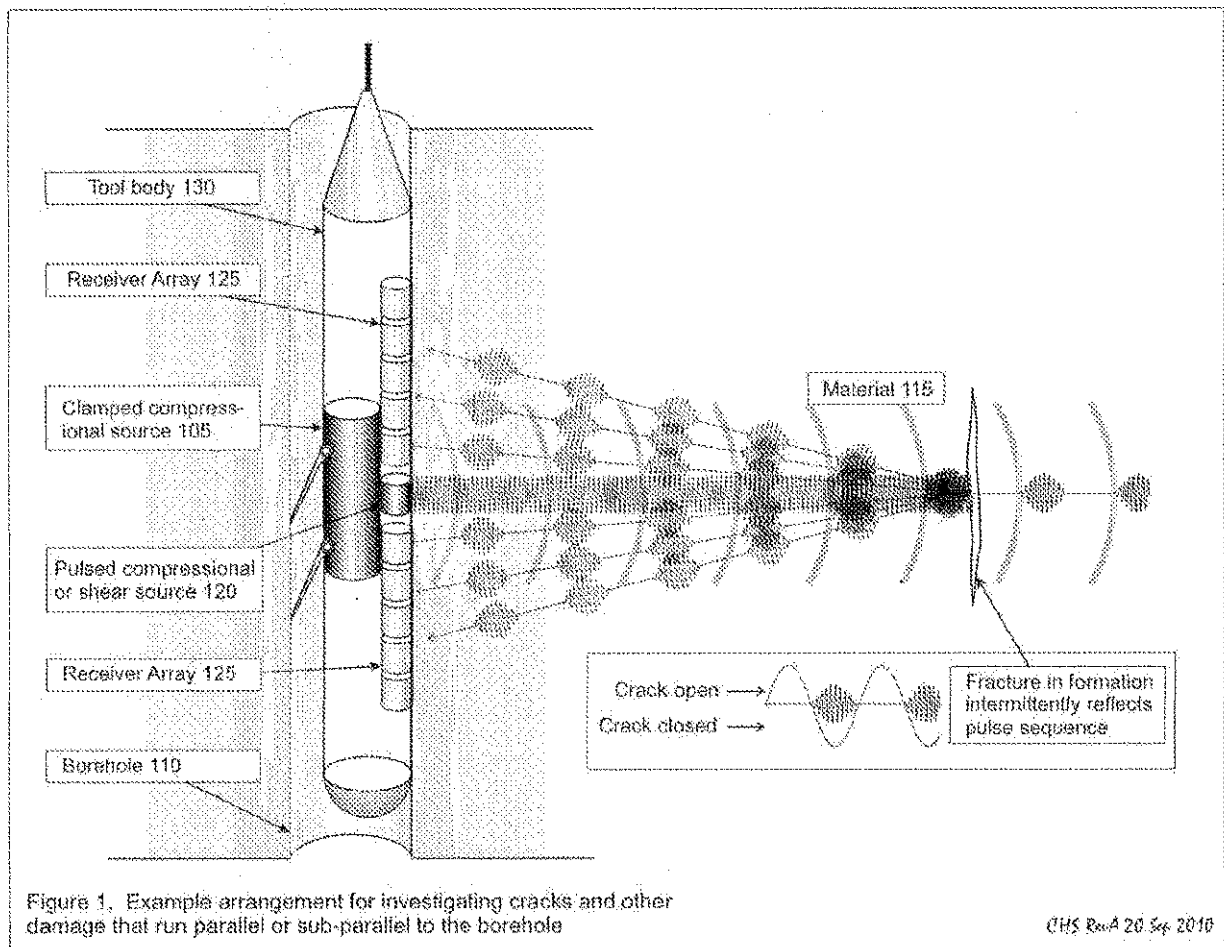


Figure 2a, Received Pulses from Void or Interface (Linear Response)

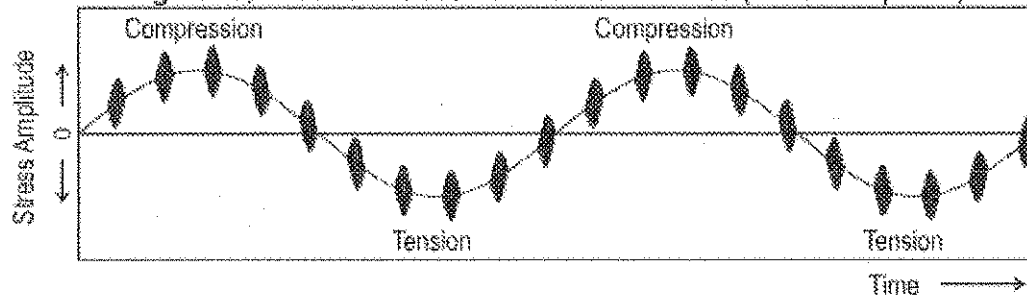
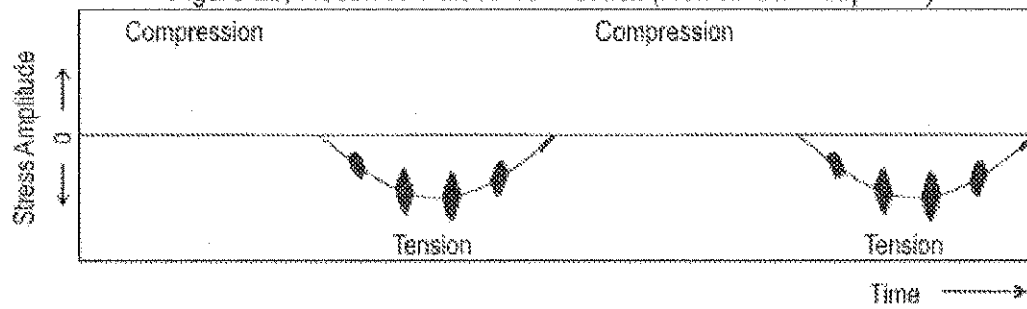


Figure 2b, Received Pulses from Crack (Non-Linear Response)



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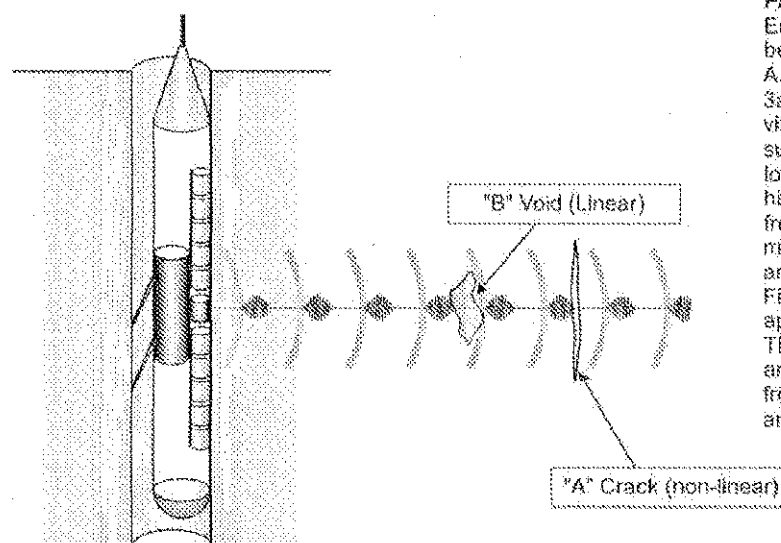


Figure 3a, Tool Hardware and Borehole Configuration of Figure 1

Figure 3. Envelope detector (used to distinguish between linear and non-linear scatterers). A crack is located at position A. Figure 3a shows the reflected low frequency vibration with the high pulses superimposed in the upper panel. The lower panel shows the same signal after high pass filtering to eliminate the low frequency wave. An envelope detector may be used to delineate the absolute amplitude trend versus time. Figure 3b shows the same procedure applied to the reflection from a void at B. There is no modulation of the pulse amplitude with phase of the low frequency wave and a constant amplitude is measured by the envelope

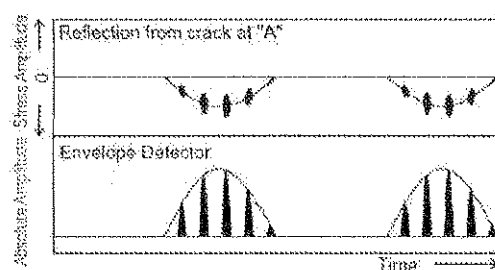


Figure 3b, Detection of Non-Linear Scatterer with Envelope Detector

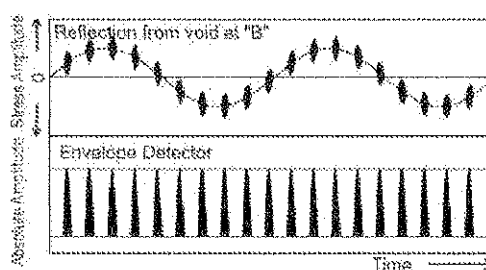


Figure 3c, Detection of Linear Scatterer with Envelope Detector

