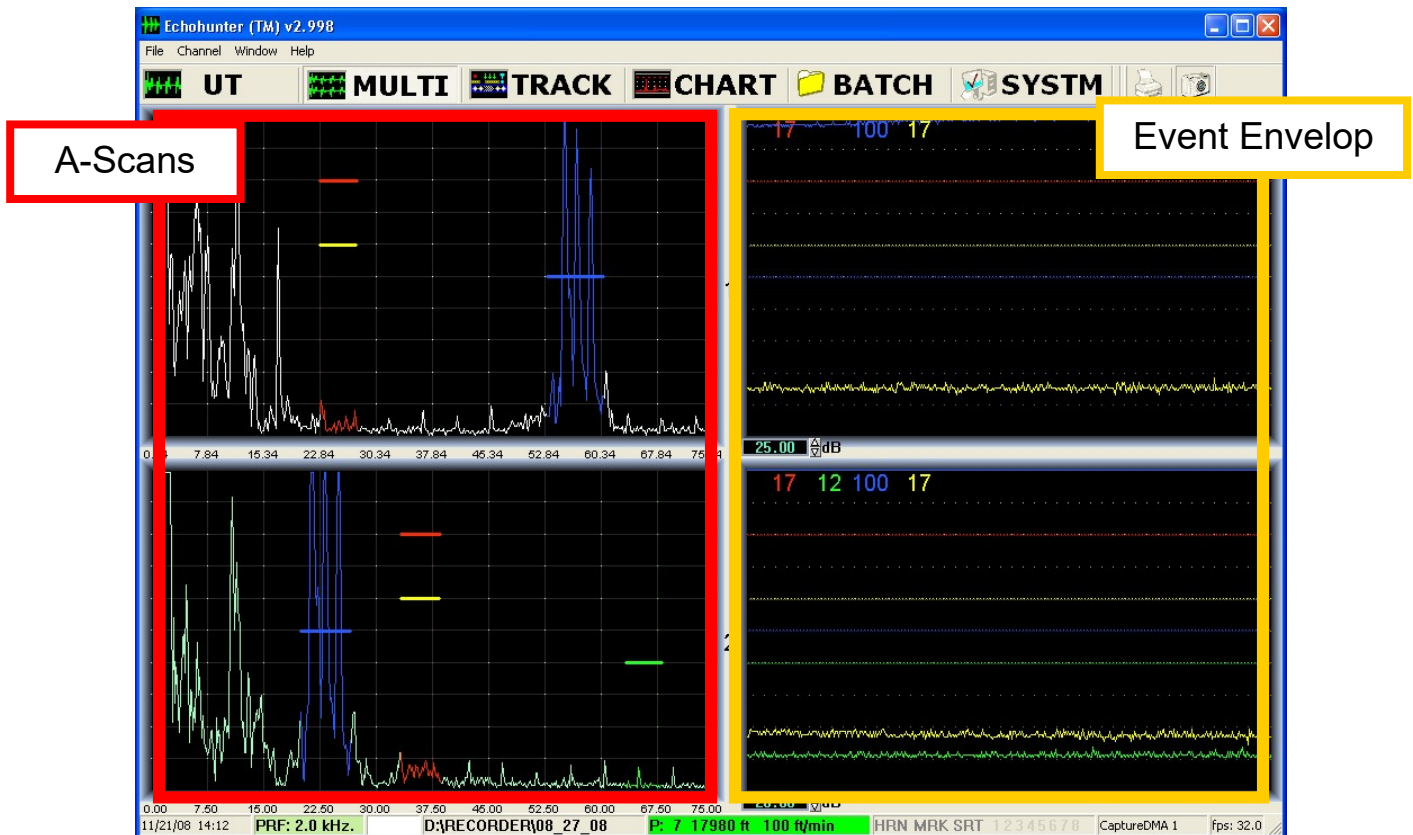


## Ultrasonic Instrumentation

### Screen Summary

The operating screen of the instrumentation for this Western Instruments Multichannel Ultrasonic Testing Systems for Welded Tube and Pipe is illustrated below. The Screen can be divided into 2 sections; A-Scans on the Right and Event Envelops on the left.

The A-Scan Graph shows the travel of the Ultrasonic Waves thought the Pipe Wall. The Signals on the extreme left of the A-Scan is the “Noise” created in the Transducer, as the Ultrasound is produced and as it enters the outside surface. We refer to this noise as the IP (Initial Pulse), as we can not readily distinguish between the actual IP and the Surface Signals.



The Event Envelop is simply a Digital Chart Recorder, that show Defects that have been detected by the system. The Event Envelop operates in two ways, by time and by mill speed. The software changes the reference to Time, when the system is in Calibration Mode, and to Mill Speed (via the encoder) while the mill is running. The green highlighted area, in the Task Bar shows the speed of the mill based on encoder pulses.

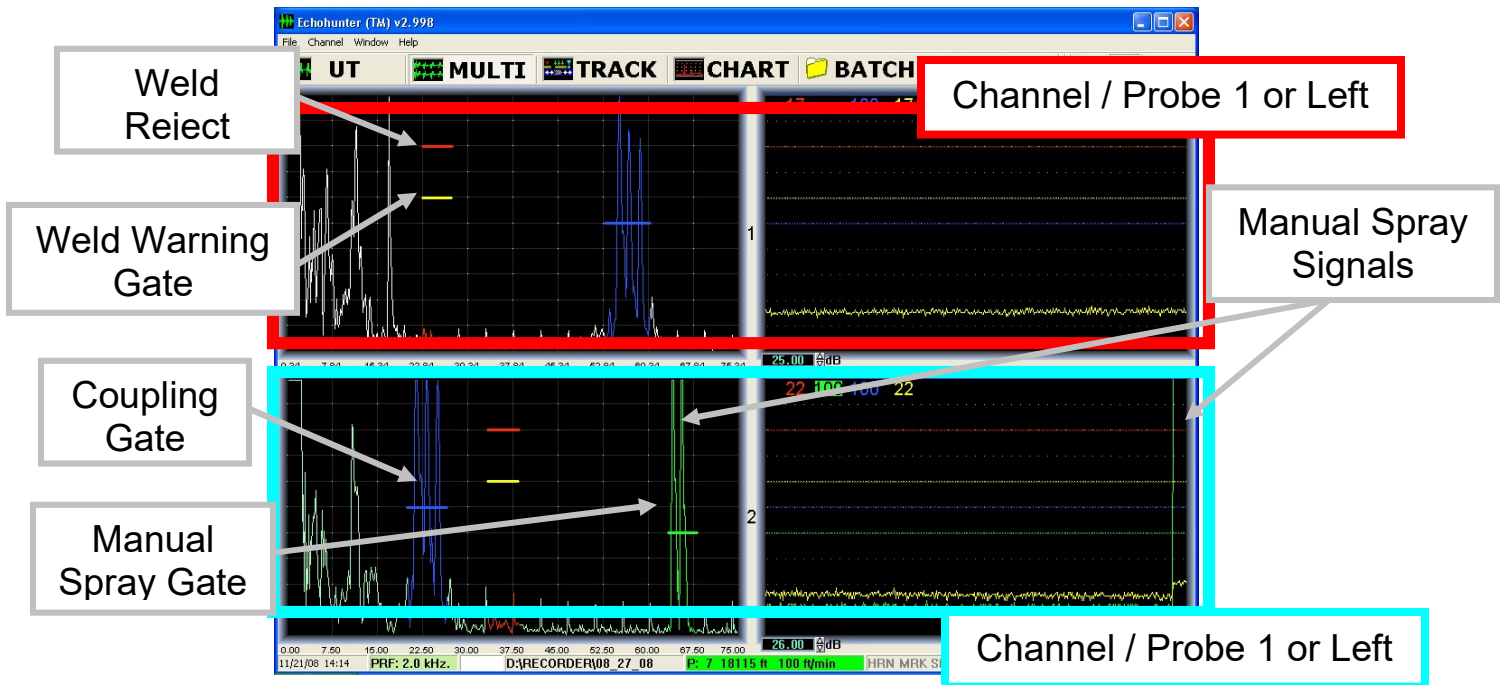
## Gates

Gates or Threshold Levels are displayed as Horizontal Bars on the A-Scans. A Gate can be set to be Positive or Negative. A Positive Gate means that a signal must exceed its level before an Alarm is made. Conversely, a Negative Gate requires a Signal to drop below its level before the Alarm is made. These Gates monitor signals below (or above) their level along the time base A-Scan.

The Red and Yellow Gates are set for Flaws in the weld and are Positive. Therefore when there is a weld defect, we will see a signal come up through the gated area, and will trigger Lights, Horn and Paint Sprayer. Simply by color, Yellow is a warning level (Light only), while Red is Reject (Light, Horn, and Paint Spray). The defects will also be seen traveling from right to left on the Event Envelop, as illustrated below with the Manual Spray Signal

The Blue Gate is set up for Coupling Monitoring, and is a Negative Gate. When the Probes are down on the Pipe, sending and receiving signals, the Blue Signals will be very strong. If there is a loss of Coupling, these will drop below the gate and a Coupling Alarm will be activated (Light)

The Green Gate is set up for a Manual Flaw Alarm and is displayed on the far right side of the Channel 2 A-Scan. A strong manual signal is produced when the operator presses the Manual Spray Button. This signal exceeds the threshold level of this positive gate, causing the Flaw Light, Horn, and Paint Sprayer to be activated.



## Coupling Monitoring

Many industry specifications require UT Systems to monitor Coupling, which simply ensures that sound is actually going into the pipe. An operator “fake”

testing, while in actual fact sound isn't even entering the weld. The Blue Signals on both A-Scans are signals sent by one Probe to the other. Here Channel 1 has receive a signal from Channel 2. We know this because the Blue Signal in Channel 2 is immediately after the IP. This sound has taken time to travel from Probe 2 to Probe 1, so the received Coupling Signal in channel 1 is at the right side of the Time Base.

The sound path will vary with Wall thickness, Diameter, and how many "Skips" the Probes are from the Weld. This illustration shows; 1 skip from the weld, and 2 skips between probes.

