

Inspect and Backup  
**ISONIC 2005**  
Portable Digital Ultrasonic Flaw Detector  
and Recorder



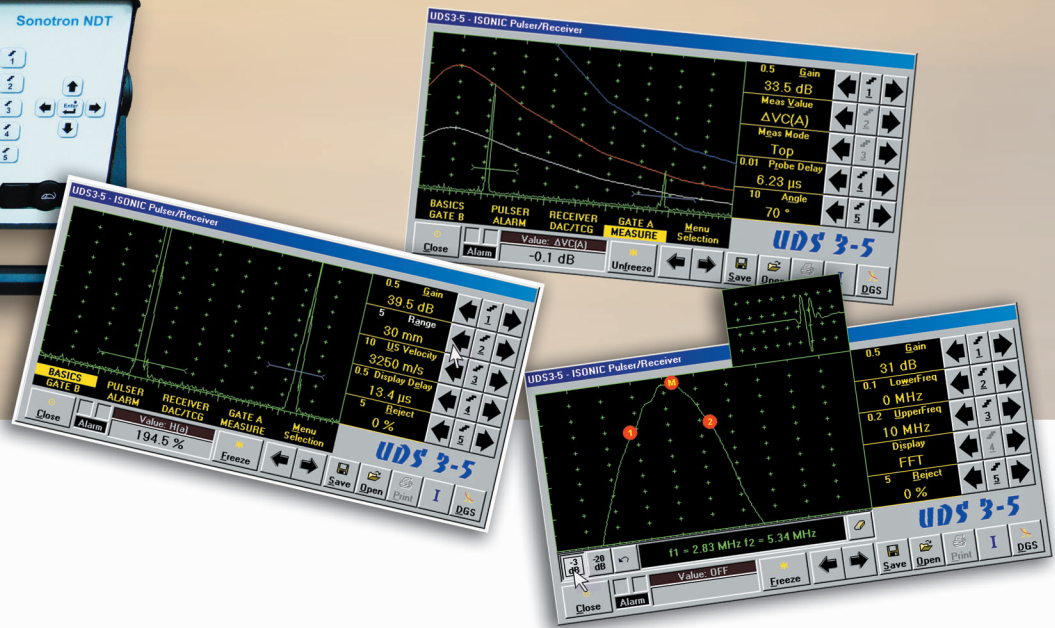
- Large Bright High Resolution Color Touch Screen
- Built-In Encoder Interface
- USB, LAN, VGA outputs
- Huge Data Storage Capability
- Longitudinal, Shear, Guided, and Surface Waves
- A-Scan, B-Scan, CB-Scan, and TOFD

- Corrosion Profiling and Flaw Imaging
- Up To 20m Length of One Line Scan Record
- Playback A-Scans for recorded Images
- Enhanced Signal Evaluation - Live and Frozen A-Scans
- Defect Sizing and Pattern Analysis
- Compliance with ASME and RBIM Procedures



**Sonotron NDT**

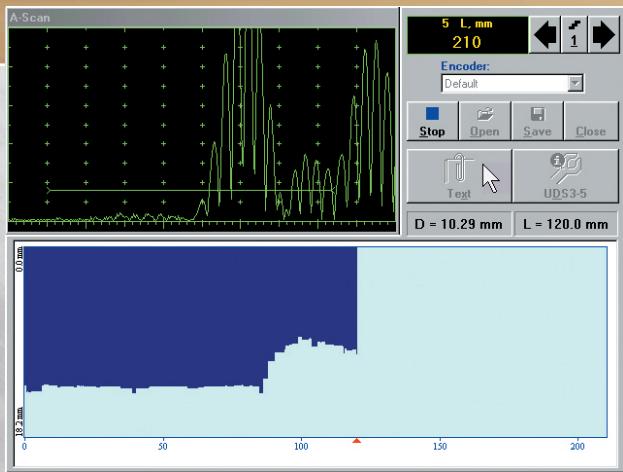
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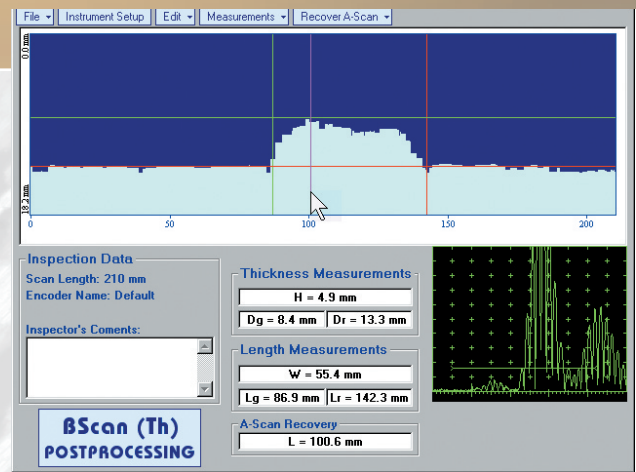
## ISONIC 2005 uniquely combines functionality and mobility of high performance portable digital ultrasonic flaw detector with recording, imaging, and data processing capabilities of smart computerized inspection system

### Conventional pulse echo and through transmission A-Scan-based inspection

- ◆ 640X480 pixels A-Scan display with physical dimensions 130 x 92 mm (5.12" x 3.62") of working area is largest one for the plurality of portable ultrasonic flaw detectors
- ◆ Combined adjustable spike wave / square wave pulser equipped with variety of probe impedance matching coils provides optimal ultrasound penetration for various materials characterized either by high or low grain, sound attenuation, and the like
- ◆ High frequency probe may not be destroyed occasionally upon connecting to instrument's firing output even if duration of square wave initial pulse is improperly long thanks to probe damage prevention circuit automatically limiting energy transmitted to probe's crystal
- ◆ 46 dB dynamic range 20 dB/ $\mu$ s maximum slope multiple curve DAC/TCG may be created using up to 40 data points to correct distance – amplitude variations of ultrasonic signals
- ◆ Both theoretical and experimental DAC may be activated either through keing in dB/mm (dB/" ) factor or through sequential recording echo amplitudes from variously located equal reflectors
- ◆ DAC/TCG may be applied to rectified A-Scans (positive, negative, and full wave) and to RF A-Scans as well
- ◆ Built-in DGS library for standard probes is unlimitedly expandable
- ◆ Thanks to extended dynamic range signals significantly exceeding A-Scan height (up to 199.9%) may be evaluated without drop of instrument Gain
- ◆ Whilst A-Scan is frozen managing of Gain and Gates settings is still allowed and provides bringing signals to necessary evaluation level and performing required evaluation
- ◆ Dual Ultrasound Velocity Measurement Mode extremely simplifies resolving of sound path distances for dissimilar materials adjacent to each other whereas different values of ultrasound velocity are valid for corresponding signals appearing on the same A-Scan
- ◆ RF display mode combined with frequency domain signal analysis enhances capabilities of the instrument for materials characterization, bond inspection, testing of dissimilar materials, defect pattern analysis, and probes evaluation
- ◆ Optional data logger organizes and manages database files capable to store up to 254745 thickness readings each and organized as 2D matrix. In database every thickness reading is accompanied with corresponding raw data A-Scan and instrument setup. Automatic creating of MS Excel® thickness spreadsheet meets requirements of various *Risk Based Inspection and Maintenance* (RBIM) procedures
- ◆ And more... see the technical data page



On-Line



Off-Line

**Thickness Profile imaging and recording is performed through continuous capturing of thickness readings along probe trace:**

- ◆ Both time-based (real time clock) and true-to-location (built-in incremental encoder interface) modes of data recording are supported
- ◆ Complete sequence of A-Scans is recorded along with thickness profile
- ◆ Off-line evaluation of thickness profile record is featured with:
  - ❑ Sizing of thickness damages at any location along stored image: remaining thickness, thickness loss, and length of damage
  - ❑ Play-back and evaluation of A-Scans obtained during scanning
  - ❑ Reconstruction of thickness profile image for various Gain and/or Gate settings
  - ❑ Automatic conversion of thickness profile B-Scan data into MS Excel® thickness spreadsheet meeting requirements of various *Risk Based Inspection and Maintenance (RBIM)* procedures

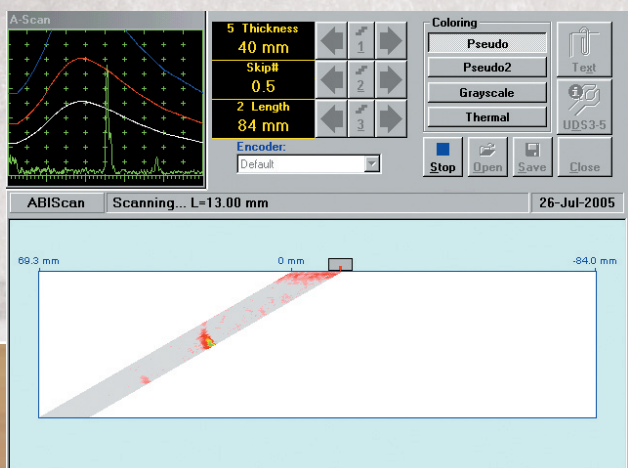
Typical Application: Corrosion detection and characterization

**B-Scan cross-sectional imaging and recording of defects for longitudinal and shear wave inspection is performed through continuous measuring of echo amplitudes and reflectors coordinates along probe trace:**

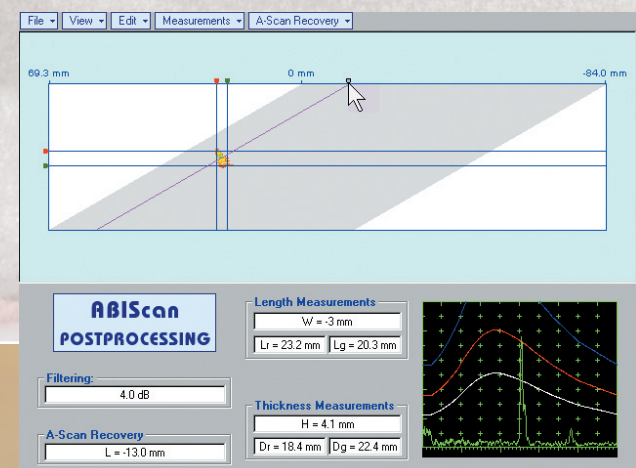
- ◆ Both time-based (real time clock) and true-to-location (built-in incremental encoder interface) modes of data recording are supported
- ◆ Complete sequence of A-Scans is recorded along with B-Scan defects images
- ◆ Off-line evaluation of B-Scan record is featured with:
  - ❑ Sizing of defects at any location along stored image – coordinates and projection dimensions
  - ❑ Play-back and evaluation of A-Scans obtained during scanning
  - ❑ Defects outlining and echo-dynamic pattern analysis
  - ❑ Reconstruction of B-Scan defects images for various Gain and/or Reject settings
  - ❑ DAC / DGS B-Scan normalization

Typical Applications: Pulse echo inspection of welds, composites, metals, plastics, and the like

On-Line



Off-Line

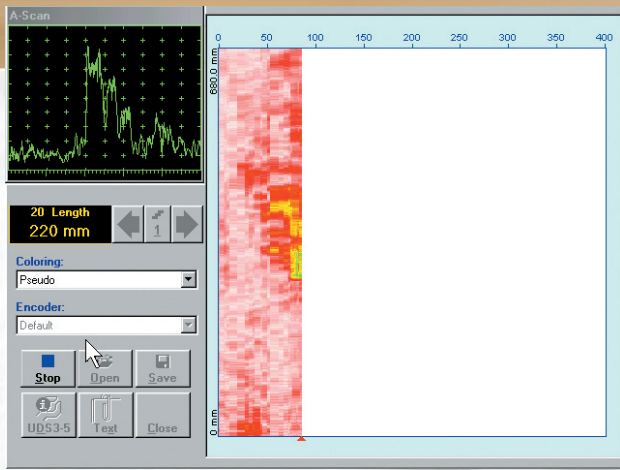




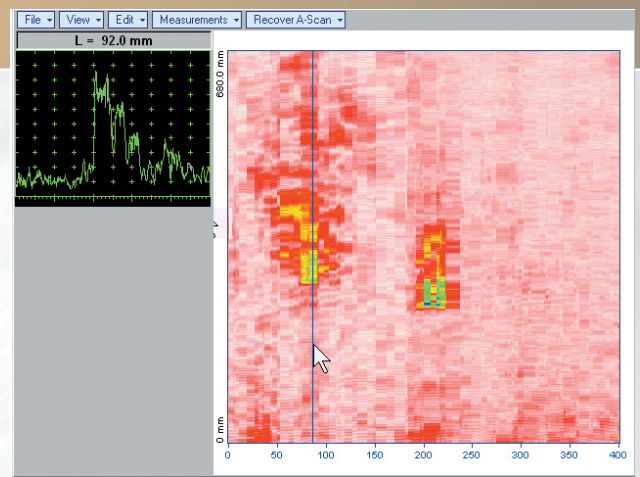
# ISONIC 2005

**Routine and Secondary Inspection  
Defects Recording and Characterization  
Comprehensive Off-Line Analysis  
Outstanding Documenting Features**





On-Line



Off-Line

**CB-Scan horizontal plane-view imaging and recording of defects for shear, surface, and guided wave inspection is performed through continuous measuring of echo amplitudes and reflectors coordinates along probe trace:**

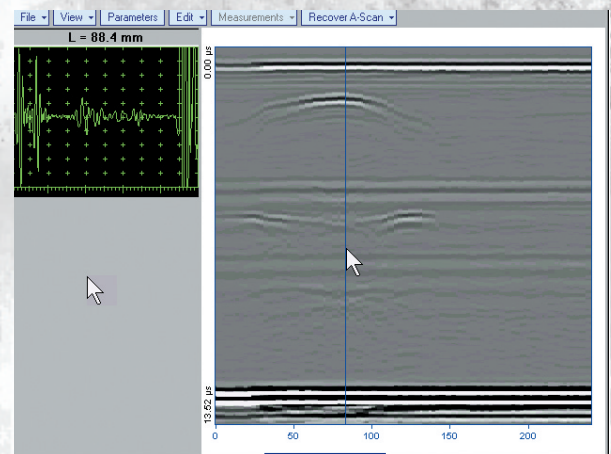
- ◆ Both time-based (real time clock) and true-to-location (built-in incremental encoder interface) modes of data recording are supported
- ◆ Complete sequence of A-Scans is recorded along with CB-Scan defects images
- ◆ Off-line evaluation of CB-Scan record is featured with:
  - Sizing of defects at any location along stored image – coordinates and projection dimensions
  - Play-back and evaluation of A-Scans obtained during scanning
  - Defects outlining and echo-dynamic pattern analysis
  - Reconstruction of CB-Scan defects images for various Gain and/or Reject settings
  - DAC/DGS CB-Scan normalization

Typical Applications: Long range pulse echo and CHIME inspection of annular plates and pipes for pitting, stress corrosion, etc; weld inspection, surface wave inspection

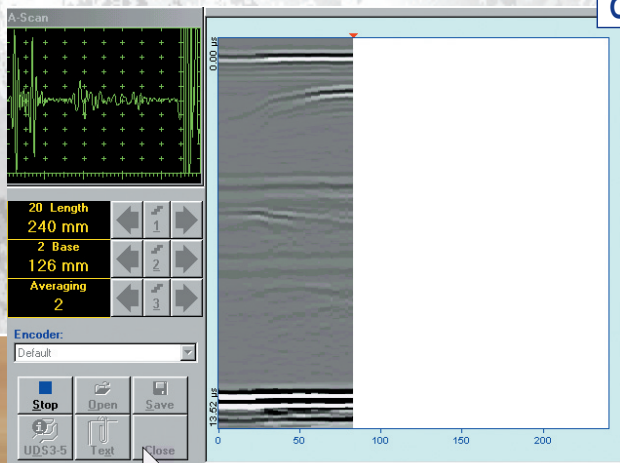
**TOFD Inspection – RF B-Scan and D-Scan Imaging:**

- ◆ Both time-based (real time clock) and true-to-location (built-in incremental encoder interface) modes of data recording are supported
- ◆ Averaging A-Scans whilst recording as per operator's selection
- ◆ Complete sequence of RF A-Scans is recorded along with TOFD map
- ◆ Off-line evaluation of TOFD Map is featured with:
  - Improvement of near to surface resolution through removal of lateral wave and/or back echo record
  - Linearization and straightening
  - Play-back and analysis of A-Scans obtained during scanning
  - Increasing contrast of TOFD images through varying Gain setting and/or rectification
  - Defects pattern analysis and sizing
  - Zoom of TOFD Map and A-Scans

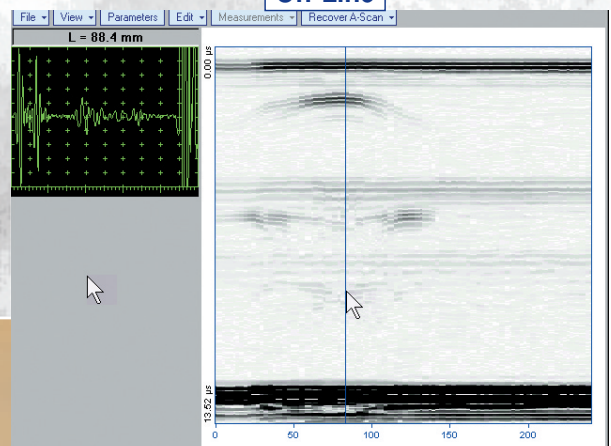
Typical Applications: weld inspection; CHIME inspection



Off-Line



On-Line



## ISONIC 2005 – Technical Data

Pulse Type:	<b>Positive Spike Pulse / Positive Square Wave Pulse</b>
Initial Transition:	<b>≤5 ns (10-90%)</b>
Pulse Amplitude:	<b>Spike pulse - smoothly tunable (18 levels) 50...400 V into 50 Ω at 4 levels of Excitation Energy</b> <b>Square wave pulse - smoothly tunable (18 levels) 50...400 V into 50 Ω</b>
Pulse Duration:	<b>Spike pulse - 10...70 ns for 50 Ω load depending on Energy and Damping setup</b> <b>Square wave pulse - 65...600 ns controllable in 5 ns step</b>
Energy (Spike Pulse):	<b>4 discrete energy values / 40 μJ (min) to 250 μJ (max)</b>
Modes:	<b>Single / Dual</b>
Damping:	<b>17 discrete resistances values / 25 Ω min to 1000 Ω max</b>
Internal Matching Coil – Probe	
Impedance Matching:	<b>16 discrete inductivity values / 2 μH min to 78 μH max</b>
PRF:	<b>0 Hz - optionally; 0...5000 Hz controllable in 1 Hz resolution</b>
Optional Sync Output / Input:	<b>Max +5V, τ ≤ 5 ns, t ≥ 100 ns, Load Impedance ≥ 50 Ω</b>
Gain:	<b>0...120 dB controllable in 0.5 dB resolution</b>
Advanced Low Noise Design:	<b>93 μV peak to peak input referred to 80 dB gain / 35 MHz bandwidth</b>
Frequency Band:	<b>0.35...35 MHz Wide Band / 34 Sub Bands</b>
Ultrasound Velocity:	<b>300...20000 m/s (11.81...787.4 "/ms) controllable in 1 m/s (0.1 "/ms) resolution</b>
Range:	<b>0.5...3000 μs - controllable in 0.01 μs resolution</b>
Display Delay:	<b>0...3200 μs - controllable in 0.01 μs resolution</b>
Probe Angle:	<b>0...90° controllable in 1° resolution</b>
Probe Delay:	<b>0...70 μs controllable in 0.01 μs resolution - expandable</b>
Display Modes:	<b>RF, Rectified (Full Wave / Negative or Positive Half Wave), Signal's Spectrum (FFT)</b>
Reject:	<b>0...99 % of screen height controllable in 1% resolution</b>
DAC / TCG:	<b>Theoretical - through keying in dB/mm (dB/" ) factor</b> <b>Experimental - through sequential recording echo amplitudes from variously located equal reflectors</b> <b>46 dB Dynamic Range, Slope ≤ 20 dB/μs, Capacity ≤ 40 points</b> <b>Available for the Rectified and RF Display</b> <b>Standard Library for 18 probes / unlimitedly expandable</b>
DGS:	
Gates:	<b>2 Independent Gates / unlimitedly expandable</b>
Gate Start and Width:	<b>Controllable over the whole variety of A-Scan Display Delay and A-Scan Range</b> <b>in 0.1 mm /// 0.001" resolution</b>
Gate Threshold:	<b>5...95% of the A-Scan height controllable in 1% resolution</b>
Measuring Functions – Digital	
Display Readout:	<b>27 automatic functions / expandable; Dual Ultrasound Velocity Measurement Mode for Multi-Layer Structures; Curved Surface/Thickness/Skip correction for angle beam probes; Ultrasound Velocity and Probe Delay Auto-Calibration for all types of probes</b>
Freeze Mode (A-Scans and Spectrum Graphs):	<b>All measurements functions, managing Gates and Gain settings are available for frozen signals</b>
Encoder Interface:	<b>Built-in interface for incremental mechanical encoder</b>
Imaging Modes:	<b>Thickness Profile B-Scan, Cross-sectional B-Scan, Plane View CB-Scan, TOFD</b>
Encoding:	<b>Time-based or True-to-location (incremental encoder)</b>
Length of one record:	<b>50...20000 mm (2" ...800"), automatic scrolling</b>
Method of Record:	<b>Complete raw data recording</b>
Region of Interest:	<b>Controllable over entire Display Delay, Probe Delay, Range, US Velocity and other appropriate instrument settings</b>
Off-Line Image Analysis:	<b>Recovery of A-Scan sequences, Defects sizing, outlining, pattern recognition</b>
Data Reporting:	<b>Direct printout of Calibration Dumps, A-Scans, Spectrum Graphs, thickness profile B-Scans, cross-sectional B-Scans, plane view CB-Scans, TOFD maps</b>
Data Storage Capacity:	<b>At least 100000 sets including calibration dumps accompanied with A-Scans and/or Spectrum Graphs; At least 10000 sets including calibration dumps accompanied with thickness profile B-Scans or cross-sectional B-Scans or plane view CB-Scans or TOFD maps</b>
Data Logger:	<b>Optional - organizes and manages data base files capable to store up to 254745 records each; every record includes thickness reading accompanied with corresponding raw data A-Scan and instrument setup; records are organized into 2D matrix in database file</b>
On-Board Computer:	<b>AMD LX 800 - 500MHz</b>
RAM:	<b>512 Megabytes</b>
Flash Memory - Quasi HDD:	<b>4 Gigabytes</b>
Outputs:	<b>LAN, USB X 2, PS 2, SVGA</b>
Screen:	<b>6.5" High Color Resolution (32 bit) SVGA 640x480 pixels 133x98 mm (5.24" x 3.86") Sun-readable LCD; Maximal A-Scan Size (working area) - 130x92 mm (5.12" x 3.62")</b>
Controls:	<b>Front Panel Sealed Keyboard, Front Panel Sealed Mouse, Touch Screen</b>
Compatibility with the external devices:	<b>PS 2 Keyboard and Mouse, USB Keyboard and Mouse, USB Flash Memory card, Printer through USB or LAN, PC USB or LAN, SVGA External Monitor</b>
Operating System:	<b>Windows™XP Embedded</b>
Power:	<b>Mains - 100...240 VAC, 40...70 Hz, auto-switch; Battery 12V 8AH up to 6 hours continuous operation</b>
Housing:	<b>IP 53 rugged aluminum case with carrying handle</b>
Dimensions:	<b>265×156×101 mm (10.43"×6.14"×3.98") - without battery</b> <b>265×156×139 mm (10.43"×6.14"×5.47") - with battery</b>
Weight:	<b>2.650 kg (5.83 lbs) - without battery</b> <b>3.580 kg (7.88 lbs) - with battery</b>