

Inspect and Backup
ISONIC 2007
Portable Digital Dual Channel
Ultrasonic Flaw Detector and Recorder



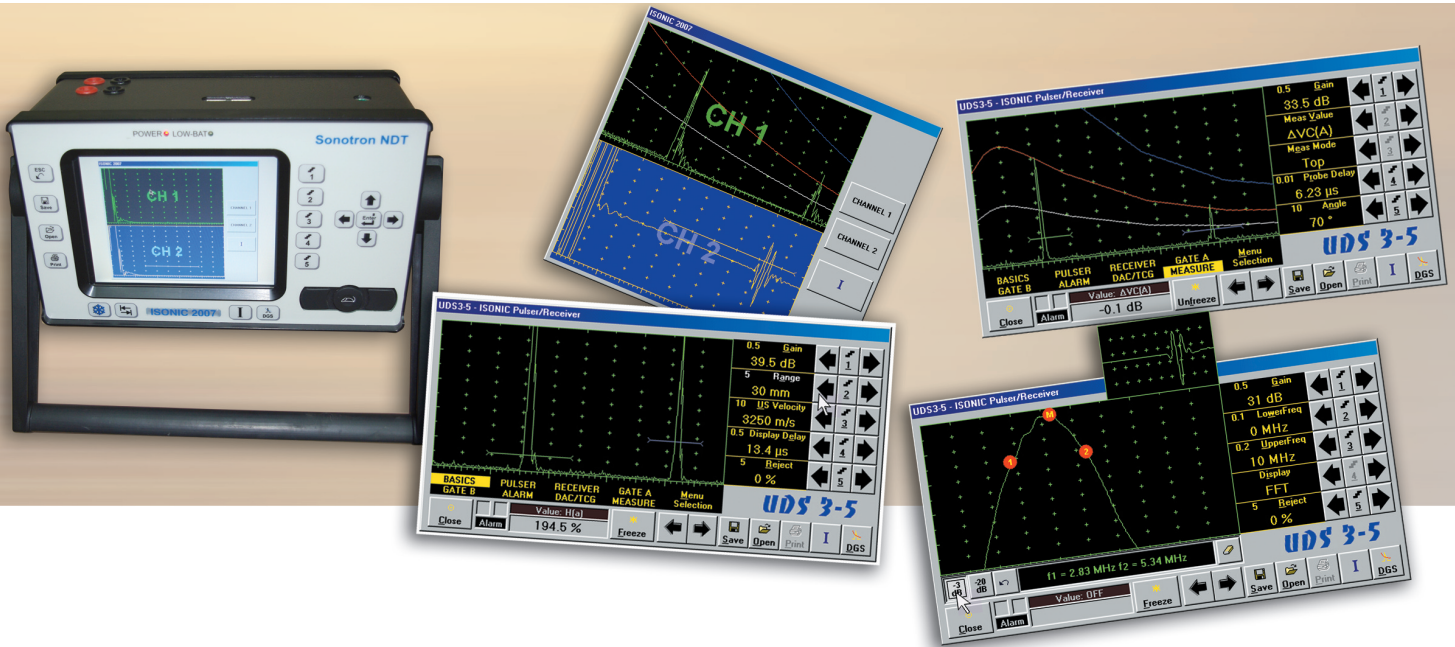
- Large Bright High Resolution Color Touch Screen
- Built-In Encoder Interface
- USB, LAN, VGA outputs
- Huge Data Storage Capability
- Longitudinal, Shear, Guided, and Surface Waves
- A-Scan, B-Scan, CB-Scan, and TOFD

- 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



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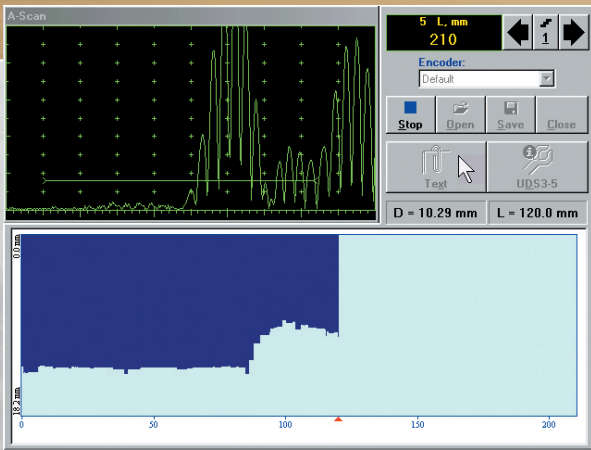


ISONIC 2007 uniquely combines functionality and mobility of high performance single/dual channel portable digital ultrasonic flaw detector with recording, imaging, and data processing capabilities of smart computerized inspection system

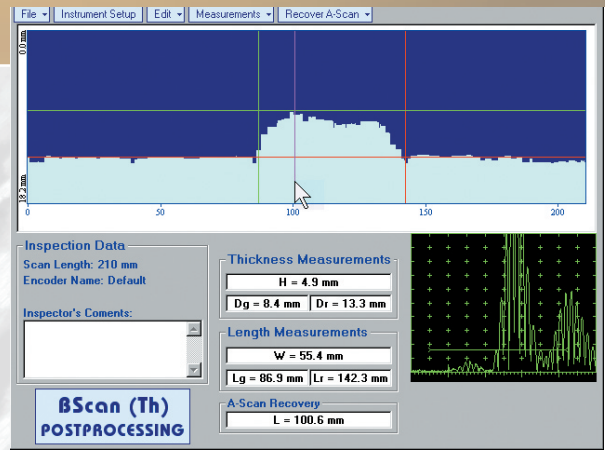
Conventional pulse echo and through transmission A-Scan-based inspection

- ◆ 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/ μ 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 (RBIM) procedures
- ◆ And more... see the technical data page

Single Channel



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

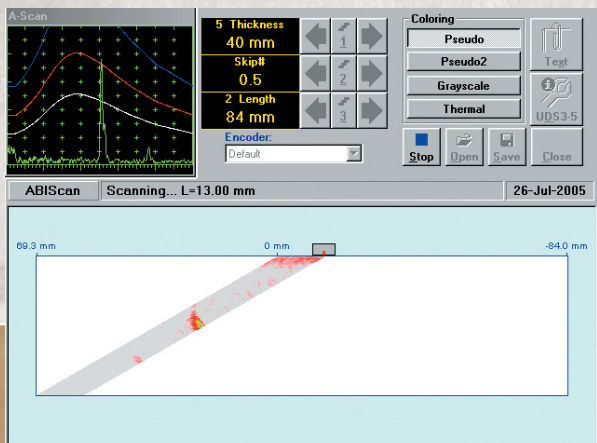
Typical Application: Corrosion detection and characterization

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:

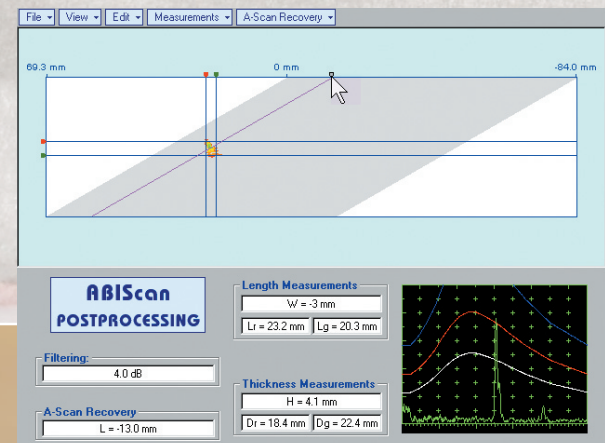
- ◆ Both time-based (real time clock) and true-to-location (built-in incremental encoder interface) modes of data recording are supported
- ◆ Complete sequence of A-Scans is recorded along with B-Scan defects images
- ◆ Off-line evaluation of B-Scan record is featured with:
 - ❑ Sizing of defects at 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

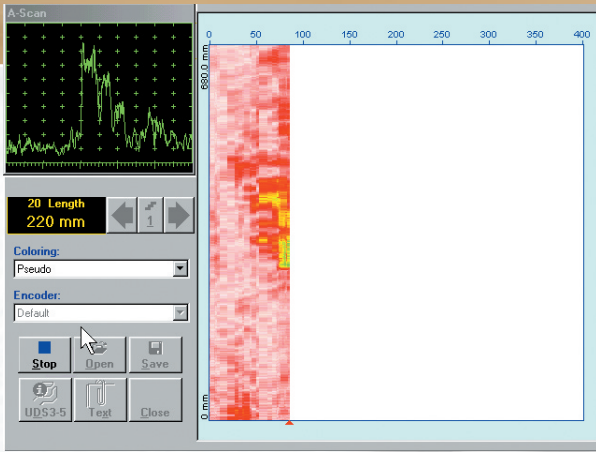
On-Line



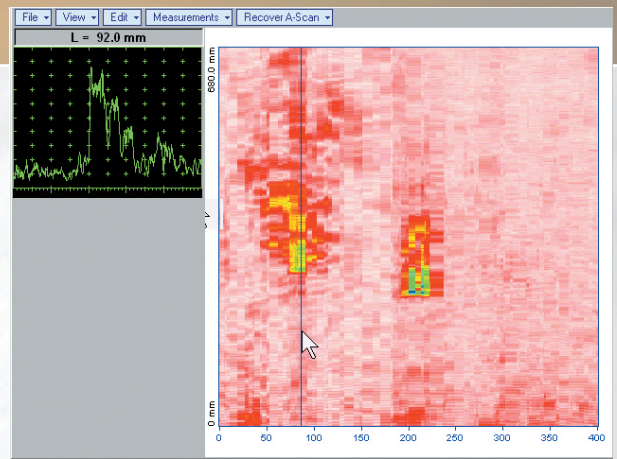
Off-Line



Single Channel



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:

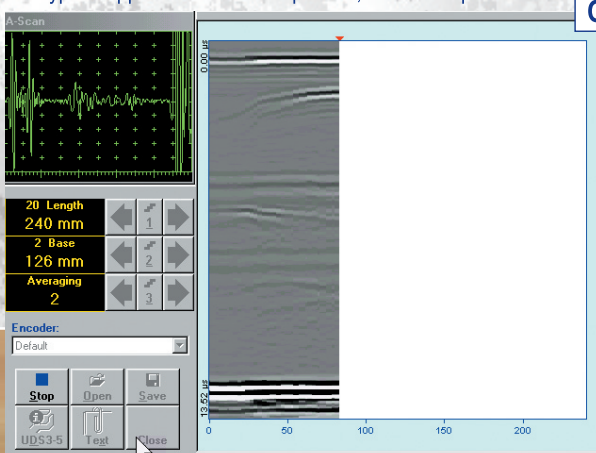
- ◆ Both time-based (real time clock) and true-to-location (built-in incremental encoder interface) modes of data recording are supported
- ◆ Complete sequence of A-Scans is recorded along with CB-Scan defects images
- ◆ Off-line evaluation of CB-Scan record is featured with:
 - Sizing of defects at 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

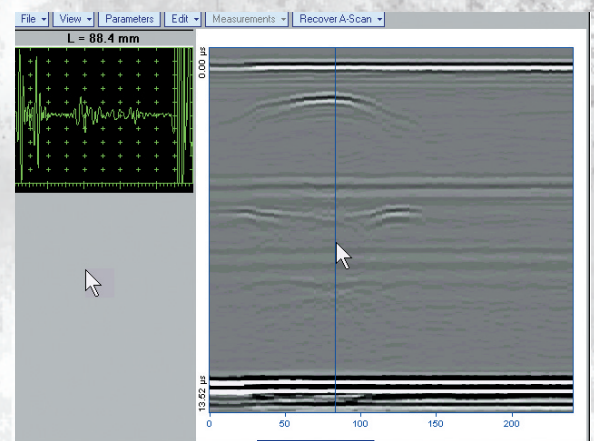
TOFD Inspection – RF B-Scan and D-Scan Imaging:

- ◆ 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

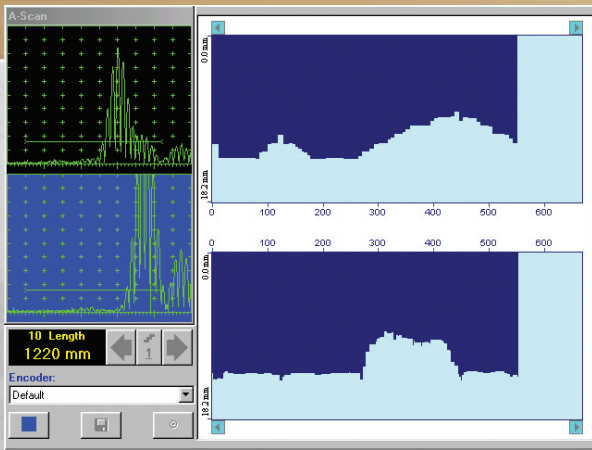


On-Line

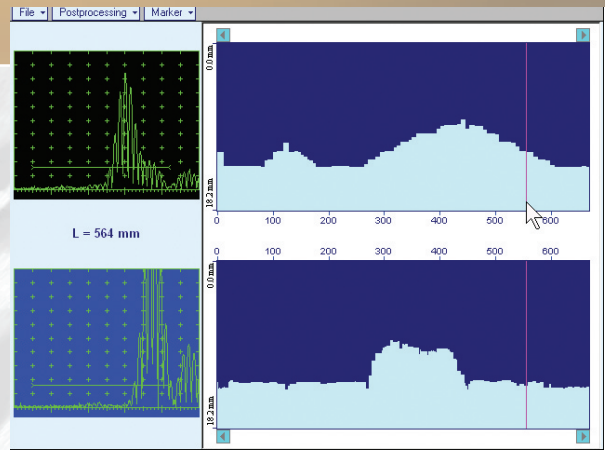


Off-Line

Dual Channel



On-Line



Off-Line

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

- ◆ True-to-location data recording
- ◆ 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

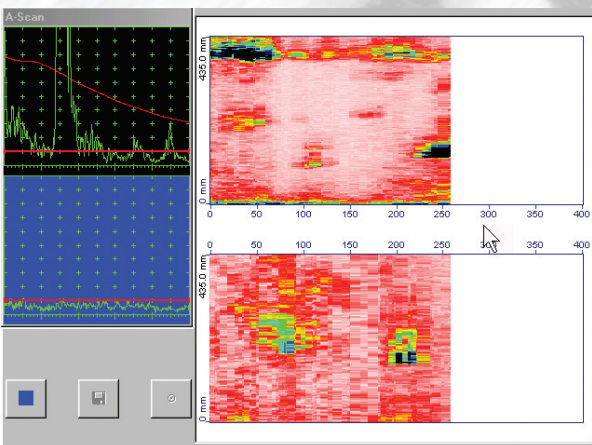
Typical Application: Corrosion detection and characterization

Dual Channel 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:

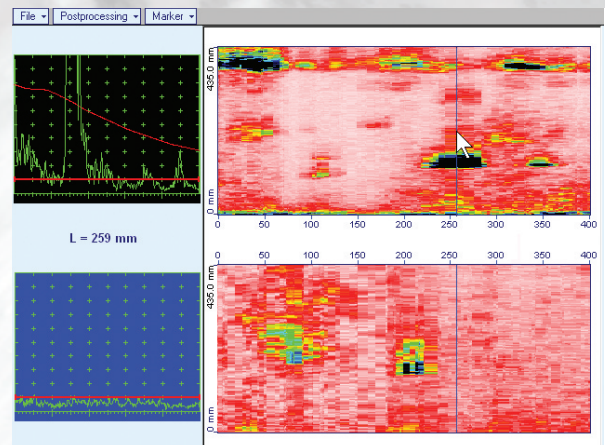
- ◆ True-to-location data recording
- ◆ Complete sequence of A-Scans is recorded along with CB-Scan defects images
- ◆ Off-line evaluation of CB-Scan record is featured with:
 - ❑ Sizing of defects at any location along stored image – coordinates and projection dimensions
 - ❑ Play-back and evaluation 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: High speed long range pulse echo and CHIME inspection of pipes with partially removed insulation, tank shells/plates for pitting, stress corrosion, etc; weld inspection, surface wave inspection

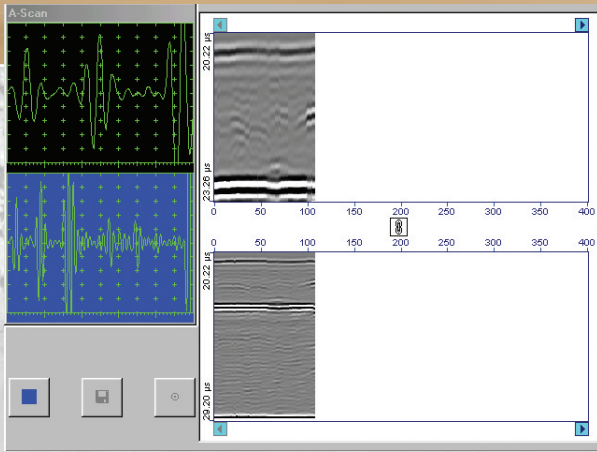
On-Line



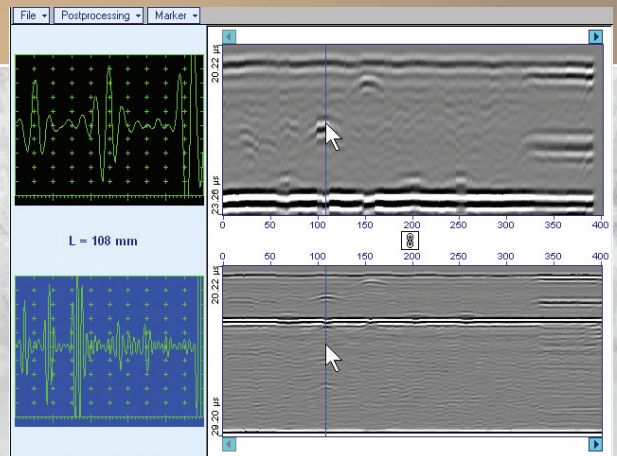
Off-Line



Dual Channel



On-Line



Off-Line

Dual Channel TOFD Inspection – RF B-Scan and D-Scan Imaging:

- ◆ True-to-location data recording
- ◆ 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 Application: high speed automatic/semiautomatic weld inspection

ISONIC 2007 complies with requirements of National and International Codes:

ASME Section I – Rules for Construction of Power Boilers

ASME Section VIII, Division 1 – Rules for Construction of Pressure Vessels

ASME Section VIII, Division 2 – Rules for Construction of Pressure Vessels. Alternative Rules

ASME Section VIII Article KE-3 – Examination of Welds and Acceptance Criteria

ASME Code Case 2235 Rev 9 – Use of Ultrasonic Examination in Lieu of Radiography

Non-Destructive Examination of Welded Joints – Ultrasonic Examination of Welded Joints. – British and European Standard BS EN 1714:1998

Non-Destructive Examination of Welds – Ultrasonic Examination – Characterization of Indications in Welds. – British and European Standard BS EN 1713:1998

Calibration and Setting-Up of the Ultrasonic Time of Flight Diffraction (TOFD) Technique for the Detection, Location and Sizing of Flaws. – British Standard BS 7706:1993

WI 00121377, Welding – Use Of Time-Of-Flight Diffraction Technique (TOFD) For Testing Of Welds. – European Committee for Standardization – Document # CEN/TC 121/SC 5/WG 2 N 146, issued Feb, 12, 2003

Non-Destructive Testing – Ultrasonic Examination – Part 5: Characterization and Sizing of Discontinuities. – British and European Standard BS EN 583-5:2001

Non-Destructive Testing – Ultrasonic Examination – Part 2: Sensitivity and Range Setting. – British and European Standard BS EN 583-2:2001

Manufacture and Testing of Pressure Vessels. Non-Destructive Testing of Welded Joints. Minimum Requirement for Non-Destructive Testing Methods – Appendix 1 to AD-Merkblatt HP5/3 (Germany).– Edition July 1989

ISONIC 2007 – Technical Data

Pulse Type*:	Positive Spike Pulse / Positive Square Wave Pulse
Initial Transition*:	≤5 ns (10-90%)
Pulse Amplitude*:	Spike pulse - smoothly tunable (18 levels) 50...400 V into 50 Ω at 4 levels of Excitation Energy Square wave pulse - smoothly tunable (18 levels) 50...400 V into 50 Ω
Pulse Duration*:	Spike pulse - 10...70 ns for 50 Ω load depending on Energy and Damping setup Square wave pulse - 65...600 ns controllable in 5 ns step with driving of both leading edge and trailing edge of the pulse
Energy (Spike Pulse)*:	4 discrete energy values / 40 μJ (min) to 250 μJ (max)
Modes*:	Single / Dual
Damping*:	17 discrete resistances values / 25 Ω min to 1000 Ω max
Internal Matching Coil – Probe Impedance Matching:	16 discrete inductivity values / 2 μH min to 78 μH max
PRF*:	0 Hz - optionally; 0...5000 Hz controllable in 1 Hz resolution
Optional Sync Output / Input*:	Max +5V, τ ≤ 5 ns, t ≥ 100 ns, Load Impedance ≥ 50 Ω
Gain*:	0...120 dB controllable in 0.5 dB resolution
Advanced Low Noise Design*:	93 μV peak to peak input referred to 80 dB gain / 35 MHz bandwidth
Frequency Band*:	0.35...35 MHz Wide Band / 34 Sub Bands
Ultrasound Velocity*:	300...20000 m/s (11.81...787.4 "/ms) controllable in 1 m/s (0.1 "/ms) resolution
Range*:	0.5...3000 μs - controllable in 0.01 μs resolution
Display Delay*:	0...3200 μs - controllable in 0.01 μs resolution
Probe Angle*:	0...90° controllable in 1° resolution
Probe Delay*:	0...70 μs controllable in 0.01 μs resolution - expandable
Display Modes*:	RF, Rectified (Full Wave / Negative or Positive Half Wave), Signal's Spectrum (FFT)
Reject*:	0...99 % of screen height controllable in 1% resolution
DAC / TCG*:	Theoretical - through keying in dB/mm (dB/") factor Experimental - through sequential recording echo amplitudes from variously located equal reflectors 46 dB Dynamic Range, Slope ≤ 20 dB/μs, Capacity ≤ 40 points Available for Rectified and RF Display Standard Library for 18 probes / unlimitedly expandable
DGS*:	2 Independent Gates / unlimitedly expandable
Gates*:	Controllable over whole variety of A-Scan Display Delay and A-Scan Range settings
Gate Start and Width*:	in 0.1 mm /// 0.001" resolution
Gate Threshold*:	5...95% of the A-Scan height controllable in 1% resolution
Measuring Functions – Digital Display Readout*:	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
Freeze Mode (A-Scans and Spectrum Graphs)*:	Freeze All Freeze Peak All signal and spectrum evaluation functions, managing Gates and Gain settings are allowed for frozen signals
Encoder Interface:	Built-in interface for incremental mechanical encoder
Imaging Modes:	Single channel operation: Thickness Profile B-Scan, Cross-sectional B-Scan, Plane View CB-Scan, TOFD Dual channel operation: Thickness Profile B-Scan, Plane View CB-Scan, TOFD
Encoding:	Time-based (built-in real time clock - 0.02 sec resolution) - single channel operation only True-to-location (incremental encoder - 0.5 mm resolution) - single and dual channel operation
Length of one record:	50...20000 mm (2"...800"), automatic scrolling
Method of Record:	Complete raw data recording
Region of Interest:	Controllable over entire Display Delay, Probe Delay, Range, US Velocity and other appropriate instrument settings
Off-Line Image Analysis:	Recovery and play back of A-Scans captured during scanning Echo-dynamic pattern analysis Defects sizing and outlining Converting records into ASCII / MS Excel® / MS Word® format Direct printout of Calibration Dumps, A-Scans, Spectrum Graphs, thickness profile B-Scans, cross-sectional B-Scans, plane view CB-Scans, TOFD maps
Data Reporting:	At least 10000 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
Data Storage Capacity:	Optional - creates and manages data base files capable to store up to 254745 records each and organized as 2D matrix; in database every record includes thickness reading accompanied with corresponding raw data A-Scan and instrument setup
Data Logger:	AMD LX 800 - 500MHz 512 Megabytes 4 Gigabytes
On-Board Computer:	LAN, USB X 2, PS 2, SVGA
RAM:	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")
Flash Memory - Quasi HDD:	Front Panel Sealed Keyboard, Front Panel Sealed Mouse, Touch Screen
Outputs:	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
Screen:	Windows™ XP Embedded
Controls:	Mains - 100...240 VAC, 40...70 Hz, auto-switch; Battery 12V 8AH up to 6 hours continuous operation
Compatibility with the external devices:	IP 53 rugged aluminum case with carrying handle
Operating System:	265×156×121 mm (10.43"×6.14"×4.76") - without battery
Power:	265×156×159 mm (10.43"×6.14"×6.26") - with battery
Housing:	3.150 kg (6.93 lbs) - without battery
Dimensions:	4.580 kg (9.42 lbs) - with battery
Weight:	

* for both channels

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