

# A1550 IntroVisor

IS AN ULTRASONIC FLAW DETECTOR-  
TOMOGRAPH WITH AN ANTENNA ARRAY  
DIGITALLY FOCUSED TO ALL POINTS  
OF VISUALIZED CROSS-SECTION



## ADVANTAGES OF TOMOGRAPHY

### QUICKNESS AND EFFICIENCY

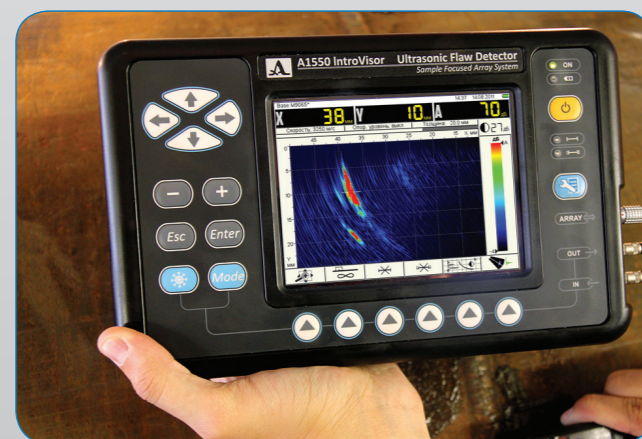
- Efficient and high-performance location of flaws in welding joints, metal objects, plastics and composite materials with documenting results in details.
- The internal structure of the testing objects is represented in real time as cross-section images with 25 frames per second.
- Possibility to perform ultrasonic flaw detection along the welding joint line without cross scanning, due to big aperture of the digitally focused array and scanning with virtual focus on long distances, which considerably reduces time for preparing the near-welding surface, increasing the testing productivity.
- High frame rate on the screen provides scanning speed along the welding joint up to 50 mm/s.

### EASY DATA INTERPRETATION

- Visualization of an inner structure of the testing object as illustrative and accurate cross-section images (B-Scan) in real time with easy-to-use scales of length and depth, which makes the results much easier to analysis.
- Automatic and manual measuring of signal levels and coordinates and sizes of flaws.
- Ranging the distance between images of flaws on the screen.

### TESTING RELIABILITY

- The flaw detector-tomograph works basing on the digitally focused array method (DFA) reconstructing tomograms focused in every point of the cross-section, ensuring the best spatial resolution and maximum sensitivity at the whole visualized area, and also high testing productivity.
- Sensitivity to different types of flaws.
- Images of vertically-oriented flaws.



A LIGHT AND EASY-TO-USE DEVICE IS  
DESTINED FOR RESOLVE MOST TASKS OF  
ULTRASONIC FLAW DETECTION OF METALS  
AND PLASTICS

PROVIDES QUICK, EASY AND RELIABLE  
LOCATION OF FLAWS

THE INTERNAL STRUCTURE OF THE TESTING  
OBJECTS IS REPRESENTED IN REAL TIME  
AS CROSS-SECTION IMAGES TO MAKE  
RESULTS INTERPRETATION MUCH EASIER  
AS COMPARED TO A TRADITIONAL FLAW  
DETECTOR

### EASY TO SET UP AND TO USE

- Simple and user-friendly MENU of settings and configurations for every testing object.
- Intuitive interface with shortcuts to main settings and parameters to master the device in short time.
- Specialists of any qualification level can operate the device, even without introducing training.
- Quick switching between TOMOGRAPH, SCANNER and FLAW DETECTOR modes. DFA is changed to a classic transducer respectively.
- Replaceable acoustic modules of DFAs.



### OMNITUDE AND PORTABILITY

- Operating in tomograph mode (B-Scan) or in traditional flaw detector mode (A-Scan).
- Scanning along welding line (C-Scan) and saving results.
- Small size.
- The device weights only 1,8 kg.
- Easy detachable lithium battery providing 8 hours of work.
- Large color display showing cross-section graphic images, coordinates and signal levels.
- Protective cover and a set of «hands free» belts make this device a handy tool for work in hard-to-reach places.
- Works at the temperature range from  $-10^{\circ}$  to  $+55^{\circ}$  C to perform testing indoor, in laboratories or outside in severe conditions.
- Nonvolatile memory for tomograms and echo-signals with the possibility to overview on a PC without special software.
- USB connection for information output to an external PC.
- Special software for receiving data from the device, processing, documenting in the form of tomograms and echo-signals and archiving.

## VISUALIZATION MODES

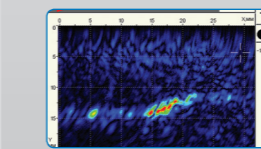
The A1550 tomograph offers five modes of discontinuity flaw image visualization. The mode is selected depending on the purposes of inspection and the object nature. Modes are marked with special symbols as shown below. Here are general description of them:



**Testing object:**  
half-space

**Reflector:** point  
**Sounding:** direct

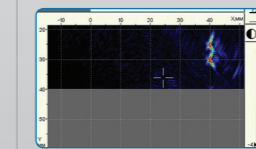
**Purpose:** For objects of irregular shape, without definite thickness, or objects with rough back surface



**Testing object:**  
slab,  
 $10 < d \leq 100$  mm

**Reflector:** point  
**Sounding:** direct and reflected

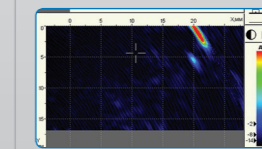
**Purpose:** For plane-parallel objects with known thickness



**Testing object:**  
plate,  
 $d < 10$  mm

**Reflector:** point  
**Sounding:** reflected

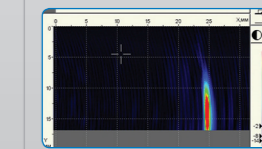
**Purpose:** For plane-parallel objects with known thickness, small thickness objects while finding flaws near the surface



**Testing object:**  
slab or plate,  
 $d \leq 100$  mm

**Reflector:** flat  
**Sounding:** direct and reflected

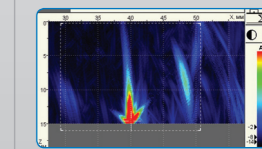
**Purpose:** For detection of vertically-oriented flaws and plain surfaces, mirroring the ultrasound



**Testing object:**  
slab or plate,  
 $d \leq 100$  mm

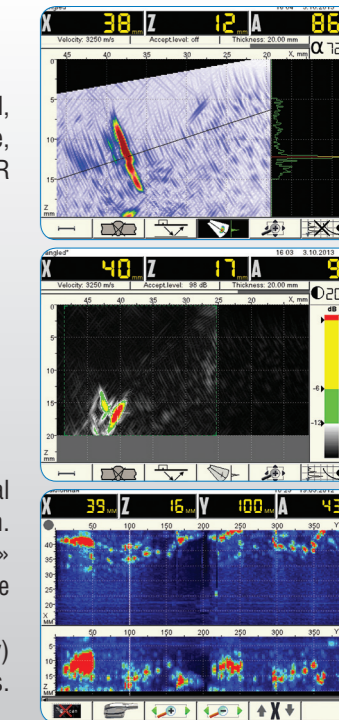
**Reflector:** volumetric  
**Sounding:** direct and reflected

**Purpose:** Universal mode for plane-parallel objects with known thickness and all types of discontinuity flaws



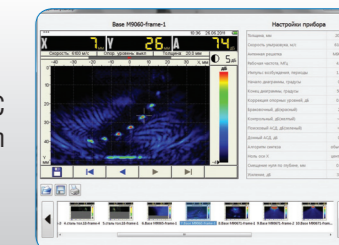
## EXTRA FEATURES

- The A-SCAN function in TOMOGRAPH mode is provided to visualize the A-Scan impulse signal, plotted by a controlled line of the cross-section. It also evaluates the flaw depth and angle of probe, ensuring correct and quick choice of a single transducer when switching to the FLAW DETECTOR mode.
- Measuring signal level and coordinates of reflectors in every point of the tomogram.
- Setting the scale and position of the visualization area in relation to the DFA.
- Two fully adjustable 2D gates for automatic measuring of the flaw coordinates.
- On-line control of a contrast tomogram.
- Choice of a colour tomogram.
- Creating, saving and choosing settings for a specific object.
- Saving and viewing tomograms and echo-signals from the memory.
- Semiautomatic sensitivity calibration by standard samples.
- 2D system of spatial sensitivity adjustment to find and evaluate small flaws according to actual regulating documents and to size flaws up correctly at the whole surface of the object of inspection.
- Inspection in the three-level reflector estimation system: «examination-reporting-acceptance» with colour gradation of the tomogram image levels and automatic comparison to the reference level.
- Scanning along welding line with an antenna array equipped with an encoder (supplied optionally) makes it possible to get a reliable graphic view of the object inner structure in a form of C- and D- Scans.



## SOFTWARE

With our special software ADM-IntroVisor you can send data saved in the device to an external PC so that results of inspection could be processed, documented as tomograms and echo-signals with parameters of inspection and archived afterwards.

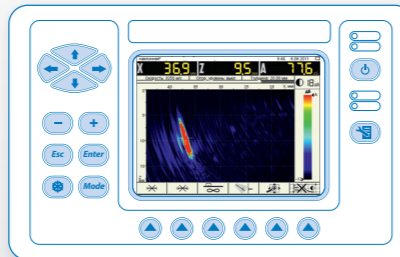


## OPERATION MODES

A1550 IntroVisor has three basic operation modes and a function of setting a configuration for every particular object to be promptly selected later:

### TOMOGRAPH MODE

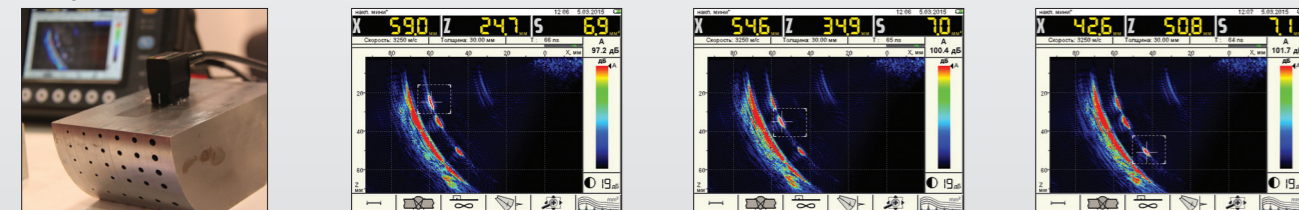
- Provides work with arrays and real-time construction of tomograms. At this mode not only tomogram (B-Scan) is displayed but all service information as well, including gates, cursors, digital indicators etc.
- When a flaw is located, it is evaluated and estimated by the following methods: classical (comparing to the reference reflectors signal amplitude) and by direct point measuring proximately by the flaw image.



#### TWO-DIMENSIONAL DGS - DIAGRAM IN TOMOGRAPH MODE

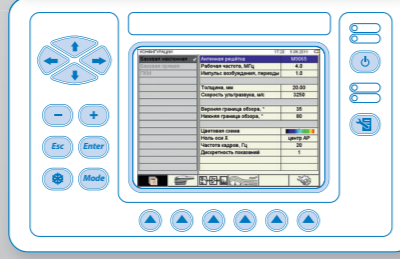
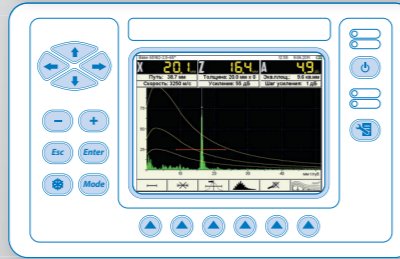
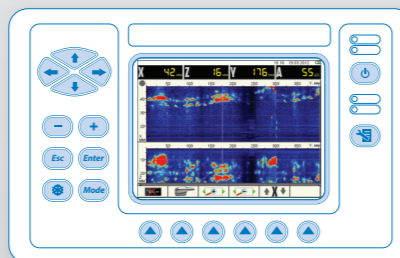
This is automatic calculation of the equivalent area of discontinuity, recounted in flat bottom hole.

This function allows operator to correctly estimate the validity of the detected defects, according to the current normative and methods of ultrasonic testing.



### SCAN MODE

- Provides work with the DFA and the encoder while scanning along a welding joint.
- C- and D-tomograms are displayed in real time.
- When a flaw is located its real size can be evaluated with a cursor moving in three coordinates (distance, length, depth). It makes much easier to get information about the location and conventional length of the detected flaw.
- B-tomograms can be displayed by moving the vertically oriented cursor along the reconstructed image for a graphic view of the inner structure of the testing object.



### FLAW DETECTOR MODE

- At this mode the device operates as a tradition flaw detector with classic normal or angle transducers. Signals are displayed as A-Scan.
- The device has all features of a modern flaw detector (built-in DGS-diagrams, TCG and DAC, multilevel digital monitor, programmable form of the emission pulse, etc).
- This mode provides correct evaluation of detected flaws according to actual regulations and documents.

### SETUP MODE

- This mode is used to set and select parameters and working configuration.
- It is possible to create a number of working configurations for various objects of inspection saving them under unique names. The required configuration is selected from the list right at the object.

## TYPES OF DIGITALLY FOCUSED ARRAYS

For various fields of application the A1550 tomograph uses the following arrays:

- **M9060 4.0V0R40X10CL** – 16 elements longitudinal wave array with central operation frequency of 4 MHz and scan zone of  $\pm 50^\circ$ . It is used to test metal and plastic objects.
- **M9065 4.0V60R40X10CS** – 16 elements shear wave array with central operation frequency of 4 MHz and scan zone from  $35^\circ$  to  $80^\circ$ . It is used to test welding joints including austenitic. This array is distinguished by the absence of a large refracting prism.
- **M9170 4.0V60R26X10CS** – 16 elements shear wave with central operation frequency 4 MHz and sector of scanning from  $35^\circ$  to  $80^\circ$ . Used to test the weld joints. Decreased aperture (26x10 mm) is a peculiar feature of the antenna array allowing to inspect various objects in hard-to-reach locations and to minimise preparation of the near-welding surface.
- **M9171 4.0V0R26X10CL** – 16 elements longitudinal wave with central operation frequency 4 MHz and sector of scanning from  $-30^\circ$  to  $+30^\circ$ . Decreased aperture (26x10 mm) is a peculiar feature of the antenna array allowing to inspect various objects in hard-to-reach locations.



Thanks to the DFAs construction the acoustic modules can be replaced as they wear out.

The user can replace a out-worn acoustic module by hands without extra operations. This way ultrasonic testing can be conducted practically non-stop, increasing efficiency.

The replaceable acoustic modules can be fitted to various diameters of pipes, expanding the range of tasks to be solved with the ultrasonic testing.

### FEATURES OF DFA

- Various types of waves can be used:
  - shear waves to testing welding joints with a scan sector covering the whole range of ultrasonic entry angles used by regulating documents;
  - longitudinal waves to testing the main body of metal.
- DFAs are commensurable to traditional transducers so the testing can be started with minimal clearing of the near-welding surface.
- The acoustic module of the DFA can be replaced by hands.
- Quick switching between different types of DFA.
- The DFA can be moved along the welding joint line without cross scanning thanks to large aperture and long distance scanning with a virtual focus. It takes less time to prepare the near-welding surface of welding joints increasing the efficiency.
- DFA can be used with an encoder (supplied optionally).

## DELIVERY SET

A1550 IntroVisor – ultrasonic flaw detector - tomograph

Detachable Lithium accumulator

M9065 4.0V60R40X10CS antenna array

M9060 4.0V0R40X10CL antenna array

M9170 4.0V60R26X10CS antenna array

S3568 2.5A0D10CL normal transducer

S5182 2.5A65D12CS angle transducer

S5096 5.0A70D6CS angle transducer

LEMO 00 – LEMO 00 single cable 1,2 m

USB A – Micro B cable

Power adaptor with cable

Calibrating sample V2/25

Sample UCB 114

Soft cover

Travel bag

## SPECIFICATIONS

Size of image in pixels	256 x 256	Flaw depth measuring range with DFA M9065 and M9170, mm	2 – 300
Tomogram reconstruction interval, mm	0.1 – 2.0	Type / resolution display	TFT / 640 x 480
Operation frequencies, MHz	1.0 – 10.0	Power	lithium
Velocity range, m/s	1000 – 10000	M9060 4.0V0R40X10CL antenna array	accumulator
Gain range, dB	0 – 100	Operation time with the accumulator, h	not less than 7.5
Flaw depth measuring range with a normal transducer S3568 2.5, mm	7 – 7200	Rated power voltage, V	11,1
Flaw depth measuring range with an angled transducers, mm:		Size of the electronic unit, mm	260 x 166 x 80
S5182 2.5	2 – 1600	Weight of the electronic unit, kg	1.8
S5096 5.0	2 – 1300	Operation temperature, °C	from -10 to +55
Flaw depth measuring range with DFA M9060, mm	7 – 300		

# A1550 IntroVisor

AN ALL-PURPOSE PORTABLE ULTRASONIC FLAW DETECTOR-TOMOGRAPH WITH DIGITALLY FOCUSED ARRAY AND TOMOGRAPHIC DATA PROCESSING FOR TESTING OF METALS AND PLASTICS



TO SEE INSIDE METAL...  
IT'S EASY NOW!