Multipurpose Tissue/Cyst Ultrasound Phantom
Nuclear Associates Model 84-317

Introduction
The Multipurpose Tissue/Cyst Ultrasound Phantom (Model 84-317) helps provide both quantitative and qualitative information on the performance of all diagnostic ultrasound imaging systems. When used on a regular basis, it promotes uniform system performance, better patient data, and more productive work schedules. Imaging equipment can be evaluated for axial and lateral resolution, vertical and horizontal distance calibration and linearity, and ring down.

This updated and improved phantom is filled with Zerdine®, a solid-elastic, water-based polymer that exhibits echogenic patterns similar to those encountered in human liver parenchyma. Unlike other phantom materials, Zerdine is elastic and is not damaged by heavier scanning pressures. It is also highly-resistant to damage by extreme temperatures.

Specifications

**Phantom body**
- Phantom material: Zerdine®; solid-elastic water-based polymer
  - Freezing point: 0°C
  - Melting point: Above 100°C
  - Storage temperature: 32° to 150°F (0° to 66°C)
- Speed of sound: 1540 m/s ± 6 m/s
- Attenuation coefficient: 0.5 dB/cm/MHz or 0.7 dB/cm/MHz
- Scatter: Mimics healthy liver parenchyma
- Positional tolerance of wires (monofilaments): Stated distance ± 0.10 mm
- Diameter of cylindrical targets: Stated Diameter ± 5%
- Base material: Cork
- Phantom dimensions: 7.87 (w) x 8.26 (h) x 3.15 in (t) (20 x 21 x 8 cm)
- Weight: 7.4 lb (3.36 kg)

**Optional scanning trough**
For scanning with a liquid coupling agent (water or coupling oil)

**Optional carrying case**
This insulated case is large enough to hold the phantom and trough and also protects the phantom from extreme heat or cold

**Optional acoustic standoffs**
A fast, easy, accurate way to bring the focal zone closer to the surface, for enhanced diagnostic detail during ultrasound examinations
- Material: Sonolucent gel
- Dimensions: 10 x 15 cm
- Weight: 1 lb (0.42 kg)

**Optional accessories**
- Scanning Trough (Model 84-318): for Oil and Water
- Carrying Case (Model 89-317): insulated for phantom and trough
- Acoustic Standoff, 1.0 cm (Model 84-325-1000)
- Acoustic Standoff, 2.0 cm (Model 84-325-2000)
- Acoustic Standoff, 3.0 cm (Model 84-325-3000)
- Acoustic Standoff, 4.0 cm (Model 84-325)
- Acoustic Standoff Set, includes all four: 1, 2, 3 and 4 cm (Model 84-325-1234)

**Available model(s)**
- 84-317 Multipurpose Tissue/Cyst Ultrasound Phantom, 0.5 dB/cm/MHz
- 84-317-7000 Multipurpose Tissue/Cyst Ultrasound Phantom, 0.7 dB/cm/MHz
- 84-314 Multipurpose Tissue/Cyst Ultrasound Phantom Kit, consists of phantom (either 0.5 dB/cm/MHz or 0.7 dB/cm/MHz), scanning trough, carrying case, and the “AIUM Quality Assurance Manual”


For more information, receive our full product catalog, or order online, contact Radiation Management Services business of Fluke Biomedical: 440.248.9300 or www.flukebiomedical.com/rms.

Specifications are subject to change without notice.

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84-317-ds rev 2 13 jun 05
General Purpose Multi-Tissue Ultrasound Phantom
Nuclear Associates Model 84-340

Introduction
The Model 84-340 General Purpose Multi-tissue Ultrasound Phantom is constructed from a patented solid elastic material called Zerdine®. Unlike other phantom materials, it is not affected by changes in temperature. It can be subjected to boiling or freezing conditions without sustaining significant damage. It is also more elastic than other materials and allows more pressure to be applied to the scanning surface without subsequent damage to the material.

Applications
At normal room temperature, Zerdine will accurately simulate the ultrasound characteristics found in human liver tissue. It contains dense and cystic masses in a range of sizes, one high-density target, and an assortment of nylon monofilament target groups. It was designed to allow for assessment of linearity, axial and lateral resolution, depth calibration, dead zone measurement, and registration within two different backgrounds of 0.5 and 0.7 dB/cm/MHz. The phantom is protected by an acrylic case and plastic membrane to facilitate scanning and minimize desiccation.

Specifications

<table>
<thead>
<tr>
<th>Material</th>
<th>Zerdine®*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Solid elastic water-based polymer</td>
</tr>
<tr>
<td>Freezing point</td>
<td>0°C</td>
</tr>
<tr>
<td>Melting point</td>
<td>Above 100°C</td>
</tr>
<tr>
<td>Attenuation coefficient</td>
<td>0.5 dB/cm/MHz; 0.7 dB/cm/MHz</td>
</tr>
<tr>
<td>Speed of sound</td>
<td>1540 m/s</td>
</tr>
<tr>
<td>Scanning well</td>
<td>1 cm deep</td>
</tr>
<tr>
<td>Scanning membrane</td>
<td>Saran</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
</tr>
<tr>
<td>Diameter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vertical plane target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of groups</td>
</tr>
<tr>
<td>Number of targets</td>
</tr>
<tr>
<td>Depth range</td>
</tr>
<tr>
<td>Spacing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Horizontal plane target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of groups</td>
</tr>
<tr>
<td>Number of targets</td>
</tr>
<tr>
<td>Depth range</td>
</tr>
<tr>
<td>Spacing</td>
</tr>
</tbody>
</table>

Resolution targets
Number of arrays | 3 |
| Depths | 3 and 10 cm |
| Axial intervals | 0.5, 1, 2, 3, 4 and 5 mm |
| Horizontal intervals | 1, 2, 3, 4 and 5 mm |

Low contrast targets
Number of targets | 4 |
| Diameter of targets | 2, 4, 6 and 8 mm |
| Depth of targets | 2, 4, 6 and 8 cm |
| Contrast of targets | -15 dB relative to background |

High contrast targets
Number of targets | 4 |
| Diameter of targets | 2, 4, 6 and 8 mm |
| Depth of targets | 2, 4, 6 and 8 cm |
| Contrast of targets | 15 dB relative to background |

Phantom dimensions
7.08 x 5.9 in (18 x 15 cm)
Weight | 17 lb with case (7.73 kg) |

Available model(s)
84-340 General Purpose Multi-tissue Ultrasound Phantom

Tolerances
- Distance between any two wires equals stated ± 0.38 mm
- Cylinder diameters equal state ± 5%

Accuracy of measured parameters
- Speed of sound equals stated ± 3.0 m/s
- Attenuation coefficient equals stated ± 0.02 dB/cm/MHz

Temperature at time of measurement
- Recorded on certification document


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General Purpose Urethane Ultrasound Phantom
Nuclear Associates Model 84-342

The General Purpose Urethane Ultrasound Phantom offers a reliable medium which contains specific, known test objects, making it more accurate than random scannable materials. The phantom enables repeatable, qualitative assessment of ultrasound scanner performance over time. The phantom is constructed from a proprietary urethane matrix, housed within a rigid PVC container with three separate scanning windows. It allows for depth of penetration, uniformity, distance calibration, resolution and lesion detectability assessment. The three scanning surfaces also provide the user with the ultimate in versatility, simplicity and ease of use. The scanning wells permit either water or gel to be used as an acoustic coupling agent.

Specifications

**Phantom material** Proprietary urethane matrix

**Attenuation coefficient** 0.50 dB/cm/MHz ± 0.05 dB/cm/MHz at 5.0 MHz

**Speed of sound** 1430 m/s ± 10 m/s at 20ºC

**Scanning surfaces**
- **Number** 3
  - **Depth of scanning wells** 2 cm

**Housing material** White PVC

**Vertical plane targets**
- **Number of groups** 1
- **Number of targets per group** 10
- **Depth of visualization** 1 and 19 cm
- **Visualized spacing** 20.0 ± 0.38 mm
- **Material** Nylon monofilament, 0.10 mm Ø

**Horizontal plane targets** *(Note: This target group is also the Vertical Plane Target Group)*
- **Number of groups** 1
- **Number of targets per group** 10
- **Depth of visualization** 3 and 10 cm
- **Visualized spacing** 20.0 ± 0.35 mm
- **Material** Nylon monofilament, 0.10 mm Ø

**Axial resolution targets**
- **Number of groups** 2
- **Number of targets per group** 12
- **Depths of visualization** 2, 5, 8 and 11 cm
- **Axial resolution test range** 0.50, 1.0 to 5.0 mm, in 1.00 mm increments
- **Material** Nylon monofilament, 0.10 mm Ø

**Lateral resolution targets**
- **Number of groups** 2
- **Number of targets per group** 6
- **Depths of visualization** 2, 5, 8 and 11 cm
- **Lateral resolution test range** 1.00 to 5.00 mm, in 1.00 mm increments
- **Material** Nylon monofilament, 0.10 Ø

**Anechoic targets**
- **Number of targets** 2
- **Diameter** 8 to 2 mm, in 2 mm increments
- **Depths of visualization** 2, 5, 8, 11, 13 and 16 cm

**Phantom dimensions** 17 x 25.5 x 7 cm thick

**Weight** 12 lb (5.45 kg)

**Available model(s)** 84-342 General Purpose Urethane Ultrasound Phantom, includes carrying case

Diagram showing internal targets

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Near Field Ultrasound Phantom
Nuclear Associates Model 84-350

Introduction
The Model 84-350 Near Field Ultrasound Phantom is constructed from a patented solid elastic material called Zerdine®. Unlike other phantom materials, it is not affected by changes in temperature. It can be subjected to boiling or freezing conditions without sustaining significant damage. It is also more elastic than other materials and allows more pressure to be applied to the scanning surface without subsequent damage to the material.

Applications
At normal room temperature, Zerdine will accurately simulate the ultrasound characteristics found in human breast tissue. The phantom contains low-scatter masses in a range of sizes and depths, a calibrated volumetric test object, and an assortment of nylon monofilament target groups. It was designed to allow for assessment of linearity, axial and lateral resolution, depth calibration, dead zone measurement, volumetric calibration, and registration. The phantom is protected by an acrylic case and plastic membrane to facilitate scanning and minimize desiccation.

Specifications

<table>
<thead>
<tr>
<th>Material</th>
<th>Zerdine®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Solid elastic water-based polymer</td>
</tr>
<tr>
<td>Freezing point</td>
<td>0°C</td>
</tr>
<tr>
<td>Melting point</td>
<td>Above 100°C</td>
</tr>
<tr>
<td>Attenuation coefficient</td>
<td>0.5 dB/cm/MHz</td>
</tr>
<tr>
<td>Speed of sound</td>
<td>1540 m/s</td>
</tr>
<tr>
<td>Scanning well</td>
<td>1 cm deep</td>
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<tr>
<td>Scanning membrane</td>
<td>Polyurethane</td>
</tr>
<tr>
<td>Targets</td>
<td>Monofilament nylon wire</td>
</tr>
<tr>
<td>Diameter</td>
<td>0.1 mm</td>
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<tr>
<td>Vertical plane target</td>
<td>8 cm</td>
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<tr>
<td>Depth range</td>
<td>8 cm</td>
</tr>
<tr>
<td>Spacing</td>
<td>1 cm</td>
</tr>
<tr>
<td>Resolution targets</td>
<td>Number of arrays 2</td>
</tr>
<tr>
<td>Depths</td>
<td>1.5 and 2 cm</td>
</tr>
<tr>
<td>Axial intervals</td>
<td>0.5, 1, 2, 3, 4 and 5 mm</td>
</tr>
<tr>
<td>Horizontal intervals</td>
<td>1, 2, 3, 4 and 5 mm</td>
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<tr>
<td>Ring down target</td>
<td>1 to 10 mm</td>
</tr>
<tr>
<td>Volumetric test object</td>
<td>Calibrated asymmetric shape</td>
</tr>
<tr>
<td>Spherical cysts</td>
<td>Diameter 5 mm, 3 mm; random distribution</td>
</tr>
<tr>
<td>Phantom dimensions</td>
<td>5.9 x 3.15 in (15 x 8 cm)</td>
</tr>
<tr>
<td>Weight</td>
<td>12 lb with case</td>
</tr>
<tr>
<td>Available model(s)</td>
<td>84-350 Near Field Ultrasound Phantom</td>
</tr>
</tbody>
</table>

Tolerances
- Distance between any two wires equals stated ± 0.38 mm
- Speed of sound equals stated ± 3.0 m/s
- Attenuation coefficient equals stated ± 0.02 dB/cm/MHz

Accuracy of Measured Parameters
- Recorded on certification document

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Prostate Phantoms for Ultrasound-Guided Procedures
Model 84-353 Series

- Ten versatile designs to choose from
- The ideal training devices for ultrasound-guided:
  - Cryosurgery
  - Radioactive seed implantation
  - Needle biopsy

Available model(s)
84-353 Basic Prostate Phantom
84-353-5000 Basic Prostate Phantom with embedded lesion. 0.5 cc ± hypoechoic unless otherwise specified. (Ideal for needle biopsy)
84-353-8123 Basic Prostate Phantom with removable pubic arch simulation. Ideal for permanent seed implantation (disposable)
84-358 Basic Prostate Phantom, non-disposable urethane

These disposable tissue-equivalent phantoms have been developed specifically for practicing procedures which involve scanning the prostate with a rectal probe.

The prostate and the structures simulating the rectal wall, seminal vesicles and urethra, are contained within a 11.5 x 7.0 x 9.5 cm clear acrylic container. A 3 mm simulated perineal membrane enables various probes and surgical tools to be inserted into the prostate.