# Fetal Ultrasound Training Phantom

Models 065-20, 065-36 & 068


ULTRASOUND QUALITY ASSURANCE

USER GUIDE

CIRS

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## INTRODUCTION

The quality of 3D ultrasound images depends upon many factors not least of which is the ability of the sonographer to manually sweep with the transducer at a constant rate of speed during freehand image acquisition. If the sweep is too slow the image may render elongated, if the sweep is to fast the image may be compressed. Most systems provide for adjustment of the resultant 3D image, however the degree of correction is ultimately determined by the experienced eye of the sonographer.

Automated transducers that move the crystal arrays within the probe itself eliminate motion errors associated with manual techniques, but as with any mechanical device they may be subject to wear or malfunction which can translate to image degradation.

## GENERAL PHANTOM DESCRIPTION

The CIRS Model 065-20, 065-36 and 068 Fetal Ultrasound Phantoms were designed to:

- Provide a tissue-equivalent and anatomically appropriate model for ultrasonic surface scanning of fetal morphology
- Enable training and optimization of freehand acquisition techniques
- Demonstrate and evaluate both manual and automatic 3D ultrasound systems

Each fetal model and the surrounding "amniotic fluid" are cast from a proprietary, ultrasonically tissue equivalent, elastometric non-flowing gel. The speed of sound and acoustic attenuation of the fetal model are 1540 m/s and 0.55 dB/cm-MHz respectively. The non-echoic surrounding gel is 1550 m/s and less than 0.10 dB/cm-MHz. The phantoms are sealed in a 10-mil thick transparent envelope that is then housed in rigid plastic for support.

Fetal models may have unique "pockmarks" or blemishes. These blemishes do not diminish the utility of the phantom in any manner.

**Model 065-20**
Fetal Ultrasound
Training Phantom

**Model 065-36**
Fetal Ultrasound
Training Phantom



**Model 068**
Fetal Ultrasound
Biometrics Phantom

## *USE OF THE PHANTOM*

It is recommended that the phantoms be scanned in the supine position. It is recommended that a liberal amount of coupling gel be applied to the surface before scanning.

The phantoms are designed to be compatible with all ultrasound systems; however, every system is different, with regards to transducer dimensions, focal spot, beam width etc. As a result the depth of the fetus from the scan surface may or may not be optimal for clear image acquisition. In the event that the depth is too shallow, a standoff pad may be required (Figure 1).

**Figure 1**

**Figure 2**

**Figure 3**

In the event that the probe does not slide freely, cover the transducer with the elastic mesh provided as shown (Figure 2 & 3).

## *MODEL 065 ULTRASOUND IMAGES*


3D Reconstruction of Model 065-20


2D Facial profile of Model 065-36


2D Abdominal profile of Model 065-36

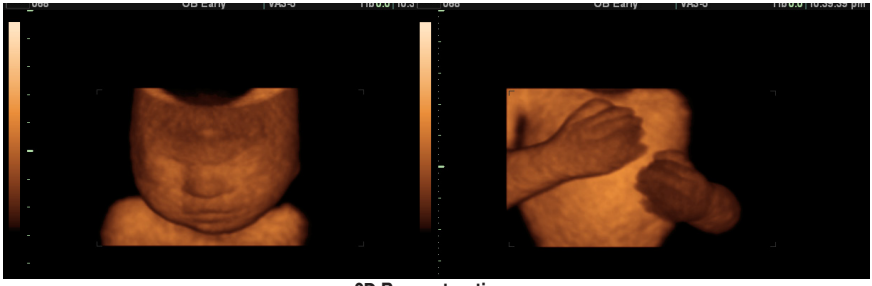
## *MODEL 065 DESCRIPTION & SPECIFICATIONS*

The Model 065-20 and 065-36 accurately represent their gestational ages in external size and dimension but because these phantoms are designed only for 3D surface rendering, they do not include internal anatomic structures or organs of any kind. If you require such structure, contact CIRS to discuss a custom manufacture.

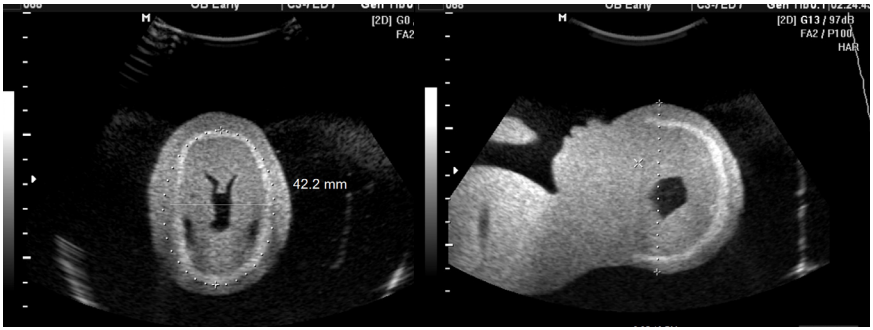
| | MODEL 065-20 | MODEL 065-36 |
|---|---|---|
| DIMENSIONS | 34.3 cm x 22.9 cm x 17.8 cm (13.5" x 9" x 7") | 41 cm x 23 cm x 23 cm (6.4" x 3.6" x 3.6") |
| PHANTOM WEIGHT | 7.5 kg (20 lbs.) | 15.8 kg (42 lbs.) |
| HOUSING MATERIALS | PVC, ABS & Vinyl | |
| PHANTOM MATERIALS | Proprietary Gels | |
| BACKGROUND GEL | Background Medium<br>Attenuation: <0.10 dB/cm-MHz<br>Speed of Sound: 1550 m/s<br>Contrast: Anechoic | |
| FETAL SOFT TISSUE | Attenuation: 0.55 dB/cm-MHz<br>Speed of Sound: 1540 m/s<br>Contrast: Simliar to liver parenchyma | |
| FIELD OF VIEW | 23 cm x 17 cm x 180°C | 20 cm x 30 cm x 180°C |
| OPTIONAL ACCESSORIES | Model 9505: Carry Case for Full Fetal Phantom- 20 weeks | Model 9504: Carry Case for Full Fetal Phantom- 36 weeks |
| PHANTOMS INCLUDE | Fetal Ultrasound Training Phantom<br>Nylon Transducer Cover<br>User Guide<br>12-Month Warranty* | |

*Please note: once any device has been inserted into the phantom (such as biopsy needles, localization wires, etc.) the 12 month warranty will not cover claims related to material desiccation or needle tracking.

## *MODEL 068 ULTRASOUND IMAGES*

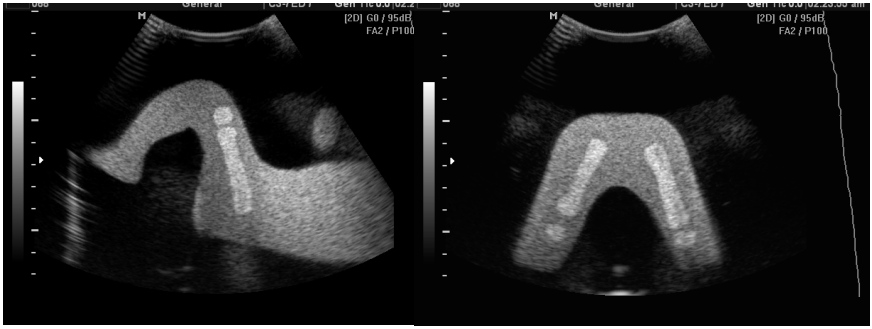


3D Reconstructions

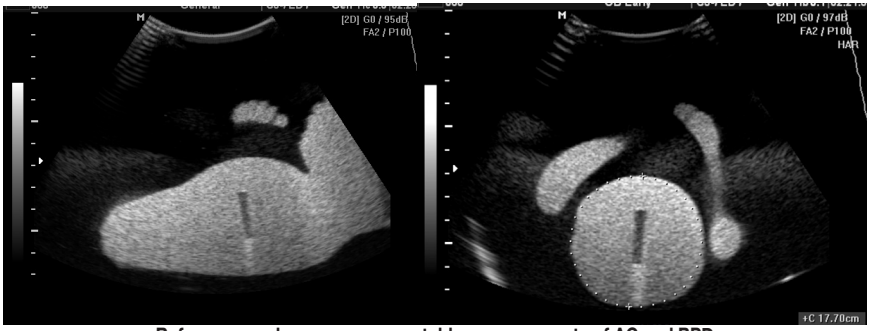



Axial Brain

Sagittal Brain



Longitudinal measurements of femur length



Reference markers ensure repeatable measurements of AC and BPD

Note: Some shadowing at the skull edges will be visible. This shadowing is desgined to create a realistic scanning scenario.

## *MODEL 068 DESCRIPTION & SPECIFICATIONS*

The Model 068 Fetal Ultrasound Biometrics Phantom was designed to facilitate teaching and demonstration of fetal ultrasound examinations. A tissue equivalent full fetal model is suspended in a non-echoic, "amniotic fluid" - like environment. The phantom includes a symmetric head with the upper portion of the skull, right and left brain lobes, lateral and third ventricles, right and left femoral shafts with distal epiphysis. The phantom can also be used for 3D reconstructions, surface rendering and a variety of other applications.

**MATERIAL**
Phantom: Proprietary gels
Housing: PVC, ABS, vinyl

**BACKGROUND**
Attenuation: <0.10 dB/cm-MHz
Speed of Sound: 1550 m/s
Contrast: anechoic

**FETUS**
Attenuation: 0.55 dB/cm-MHz
Speed of Sound: 1540 m/s
Contrast: Similar to liver parenchyma

**BONES**
Attenuation: 0.55 dB/cm-MHz
Speed of Sound: 1540 m/s
Contrast: + 9 dB relative to soft tissue

**BRAIN**
Attenuation: 0.55 dB/cm-MHz
Speed of Sound: 1540 m/s
Contrast: same as soft tissue

**VENTRICLES**
Attenuation: < 0.15 dB/cm-MHz
Speed of Sound: 1550 m/s
Contrast: anechoic

**TARGET BIOMETRIC DIMENSIONS**
BPD: 4.2 cm (10th percentile)
APD: 5.8 cm

**HEAD CIRCUMFERENCE**
16 cm (16th percentile)

**FEMORAL LENGTH**
(Excluding distal epiphysis) 3.8 cm

**ABDOMINAL CIRCUMFERENCE**
(At AP fiducial mark) 17.5 cm

**CROWN TO RUMP LENGTH**
22 cm (approximate)

**OVERALL PHANTOM DIMENSIONS**
35 x 17 x 17 cm

**OVERALL PHANTOM WEIGHT**
8 kg

**NOTE:** All anatomical dimensions are based on normal fetal growth rates for gestational age of 21 weeks.

**REFERENCE:**Hansmann, M. (1985) Ultrasound Diagnosis in Obstetrics and Gynecology, Springer, Berlin.

## *CARE AND HANDLING INSTRUCTIONS*

Before each use of the phantom, perform a visual inspection. The tissue equivalent non-flowing gel used to manufacture these phantoms is water based. If exposed to air it will desiccate, therefore it is important to exercise care when handling the phantom. If the membrane is compromised (in any way), adhesive tape can be used to seal any puncture or tear of the membrane. This will prevent rapid desiccation. If appropriate, contact CIRS immediately regarding possible repairs. (See Warranty) While the membrane has very good vapor permeability properties, a small amount of desiccation over time is normal and will not adversely affect the phantom.

**Please note**: The presence of small "pockmarks", blemishes, creases or mold seams on the surface of the fetal model (shown below) will not adversely affect your ability to perform ultrasonic scans or biometry measurements. The left buttock has a visible protrusion that is the result of the mold's fill port. This location was chosen to minimize impact on surface rendering applications, and the protrusion is present on all phantoms.




**STORAGE**

For maximum product lifetime, store the phantom in standard room temperature and humidity. Sub-freezing temperatures should be avoided during shipping, as the freeze-thaw cycle may damage housing integrity and displace the targets. High temperatures may accelerate desiccation. If signs of weight loss are seen (such as a sunken scanning surface), contact CIRS for assistance.

**MODEL 068 ONLY**

The design of the Model 068, Fetal Ultrasound Biometrics Phantom, is one that allows the fetus sack to suspend in the rotatable housing without permanent attachment. This design allows for easy cleaning of the membrane near and under the housing cross bars. During transit, the phantom can be jarred and the fetal sack can rotate to show the seam. If this should occur, it can be corrected by the user by holding the rotatable housing and gently maneuvering the fetal sack to hide the seam under the housing cross bars. There are no special tools required. Should you have any concern or hesitation in performing this function, please contact CIRS for an RMA number and return the phantom for repair.

## *WARRANTY*

All standard CIRS products and accessories are warranted by CIRS against defects in material and workmanship for a period as specified below. During the warranty period, the manufacturer will repair or, at its option, replace, at no charge, a product containing such defect provided it is returned, transportation prepaid, to the manufacturer. Products repaired in warranty will be returned transportation prepaid.

There are no warranties, expressed or implied, including without limitation any implied warranty of merchantability or fitness, which extend beyond the description on the face hereof. This expressed warranty excludes coverage of, and does not provide relief for, incidental or consequential damages of any kind or nature, including but not limited to loss of use, loss of sales or inconvenience. The exclusive remedy of the purchaser is limited to repair, recalibration, or replacement of the product at manufacturer's option.

This warranty does not apply if the product, as determined by the manufacturer, is defective because of normal wear, accident, misuse, or modification.

**NON-WARRANTY SERVICE**

If repairs or replacement not covered by this warranty are required, a repair estimate will be submitted for approval before proceeding with said repair or replacement.

**RETURNS**

If you are not satisfied with your purchase for any reason, please contact your local distributor prior to returning the product. Visit https://www.cirsinc.com/distributors/ to find your local distributor. If you purchased your product direct through CIRS, call Customer Service at 800-617-1177, email rma@cirsinc.com, or fax an RMA request form to 757-857-0523. CIRS staff will attempt to remedy the issue via phone or email as soon as possible. If unable to correct the problem, a return material authorization (RMA) number will be issued. Non-standard or "customized" products may not be returned for refund or exchange unless such product is deemed by CIRS not to comply with documented order specifications. You must return the product to CIRS within 30 calendar days of the issuance of the RMA. All returns should be packed in the original cases and or packaging and must include any accessories, manuals and documentation that shipped with the product. The RMA number must be clearly indicated on the outside of each returned package. CIRS recommends that you use a carrier that offers shipment tracking for all returns and insure the full value of your package so that you are completely protected if the shipment is lost or damaged in transit. If you choose not to use a carrier that offers tracking or insure the product, you will be responsible for any loss or damage to the product during shipping. CIRS will not be responsible for lost or damaged return shipments. Return freight and insurance is to be pre-paid.

**WITH RMA NUMBER, ITEMS MAY BE RETURNED TO:**

CIRS
Receiving
900 Asbury Ave,
Norfolk, Virginia, 23513 USA

| PRODUCT | WARRANTY PERIOD |
|---|---|
| Models 065-20, 065-36 & 068 Fetal Ultrasound Training Phantoms | 12 Months* |

*Please note: once any device has been inserted into the phantom (such as biopsy needles, localization wires, etc.) the 12 month warranty will not cover claims related to material desiccation or needle tracking.

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