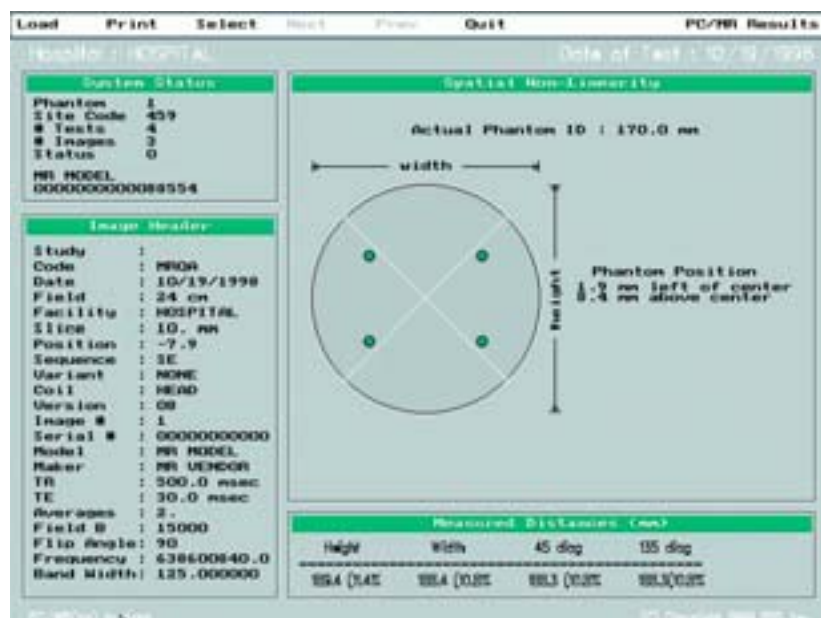


MRI PC/AutoQA™ Software

Model 49-803



Diagnostic Imaging



Program test output screen

Signal-to-noise ratio

This parameter is calculated by a commonly used equation by determining the quotient of the difference in mean values between a central region and the background region, as divided by the standard deviation of the central region.

Geometric distortion

Also referred to as linearity (the ability to image a straight line as a straight line). Influencing this parameter is B_0 homogeneity and x an y gradient linearity. A simplified method of measuring gradient non-linearity can be accomplished by linear determination of the phantom's dimensions.

Uniformity

Vertical and horizontal profiles are generated through the phantom's center. The fractional uniformity is calculated as the percentage of the profile pixels within an acceptable range determined by ± 10 of the central mean.

The integral uniformity is calculated from the profile data as well.

Spatial resolution (pixel size)

This measurement tracks the degree of electronic temporal sampling of the RF signal in the phase encoding (y) and readout direction (x), thus reflecting the sampling matrix fineness. For MRI, the system resolution is determined by the acquisition matrix.

¹ AAPM: Task Group No. 1 (1990) & No. 6 (1992), NEMA® Standards Publications No. MS 2.

- Fast automated MRI analysis for routine QC or acceptance testing¹
- Generates easy to read results with hardcopy output
- Comprehensive trend analysis
- Can be configured with various vendor phantoms including the Magphan™ Phantom
- DICOM® 3.0 compatible; DICOM storage class provider (SCP) application license provided
- Helps fulfill regulatory requirements

Slice width

Slice width is derived from gradient induced resonant excitation regions of the magnetic and RF fields. Methodology for this measurement resembles that for CT, whereby the full-width at half-maximum (FWHM) of the background corrected ramp profile is equivalent to the experimental slice thickness.

Specifications

Minimum computer requirements Pentium® processor, 3.5 inch HD floppy drive, DICOM supported system with Microsoft® Windows® 95, interfaces for non-DICOM systems available

Available model(s)

49-803 MRI PC/AutoQA Software

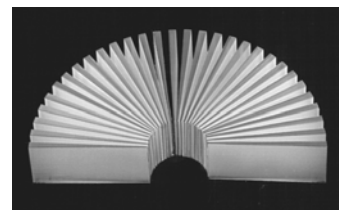
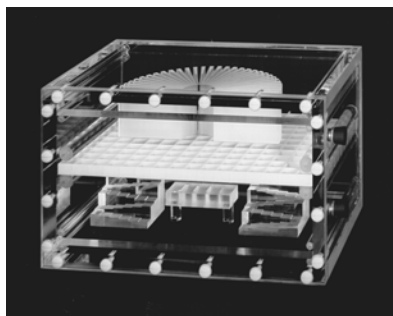
For additional information, please contact Radiation Management Services business of Cardinal Health at 440.248.9300, fax: 440.349.2307, or e-mail: rmsinfo@cardinal.com; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

Specifications are subject to change without notice. MRI PC/AutoQA is a trademark of The Institute of Radiological Image Sciences, Inc. Megphan is a trademark of the Phantom Laboratory. DICOM is a registered trademark of Digital Imaging and Communications in Medicine. Pentium is a registered trademark of Intel Corporation. Microsoft and Windows are registered trademarks of Microsoft Corporation. © Copyright 2003 Cardinal Health, Inc. or one of its subsidiaries. All rights reserved. 49-803-ds rev 1 26 jun 03

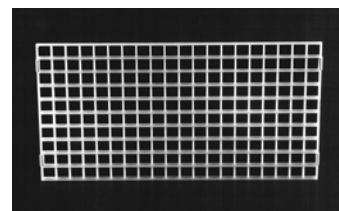
MRI Surface Coil Phantom*

Nuclear Associates Model 76-904

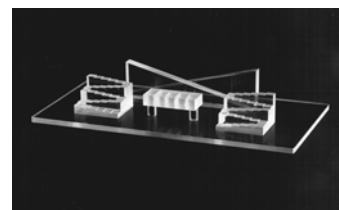
- Specifically designed for comprehensive testing of surface coils
- Provides proper geometry not found in conventional head or body phantoms



Star pattern insert



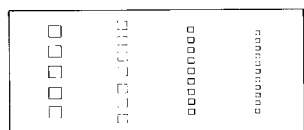
Square grid insert



Five-section insert

Individual phantom inserts and sections permit a wide range of tests

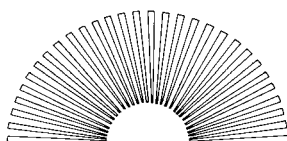
High-resolution hole pattern



Five holes 2.0 x 2.0 mm
Seven holes 1.0 x 1.0 mm
Nine holes 0.75 x 0.75 mm
Eleven holes 0.5 x 0.5 mm
Hole depth 9 mm

Star pattern

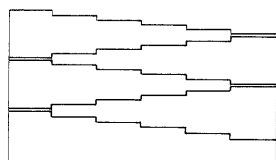
- Qualitative MTF evaluation
 - Resolution
 - Asymmetric resolution
 - Image artifacts



Thirty 3° wedges (60 x 30 mm) covering a 180° fan shape. 0.785 mm gap at narrow end, 3.0 mm gap on wide end

Folded step ramps

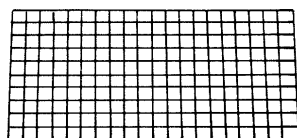
- Slice thickness, profile
- Interslice gap
- Slice orientation evaluation



Step Interval 1 mm
Range 30 mm
Step Size 10 x 10 mm

Square grid

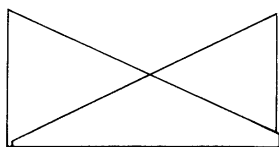
- RF intensity profile
- Magnetic field uniformity
- Gradient linearity
- Aspect ratio



Dimensions 0.50 x 0.50 grid of 12 x 6 x 0.375 in thick

Matching pair of ramps

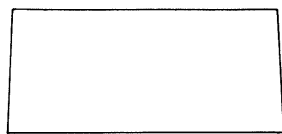
- Precision slice definition evaluation



160 mm run, 40 mm rise
(4:1 ratio). 0.50 in thick

Flood section

- RF signal uniformity
- Single T1 and T2 values



Dimensions 12 (w) x 5 (d) x 6 (h) in

Accurately evaluates:

- High spatial resolution
- RF signal brightness profile
- Slice thickness
- Slice to slice gap
- MTF evaluation
- Magnetic field uniformity
- Gradient linearity
- Image artifacts
- And more!

The use of surface coils in Magnetic Resonance Imaging (MRI) has become an important part of the clinical operations in most MR facilities. Surface coils are preferred in some MR studies, in part, because their use can minimize motion artifacts, obtain high signal-to-noise ratio in the areas closer to the surface, and obtain high resolution images of smaller areas of interest.

This phantom was specifically designed for acceptance testing and routine QC of surface coils. It provides the proper geometry not found in conventional head or body phantoms.

The phantom is constructed of non-magnetic Plexiglas®. It is rectangular in shape, contains three inserts, and is designed to be filled with an MRI signal-producing solution. The void between the inserts provides a fully flooded area.

Specifications

Outer dimensions 13 (w) x 6 (d) x 6.875 in (h) (33.02 x 15.24 x 17.46 cm)

Inner dimensions 12 (w) x 5 (d) x 6 in (h) (30.49 x 12.7 x 15.24 cm)

Weight 7.96 lb (3.61 kg)

Optional accessories

Copper Sulfate, 1 gm/l (Model 76-903-7000)

Available model(s)

76-904 MRI Surface Coil Phantom

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

Specifications are subject to change without notice.
Plexiglas is a registered trademark of Rohm and Haas Company.

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76-904-ds rev 1 10 mar 03

* Developed by Seong Ki Mun, Ph.D., Department of Radiology, Georgetown University Hospital, Washington, DC.

MRI Multipurpose Phantom*

Nuclear Associates Model 76-903

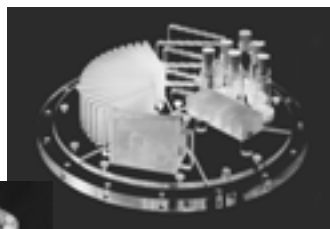
DI

Diagnostic Imaging



Conic section insert

Five-section insert



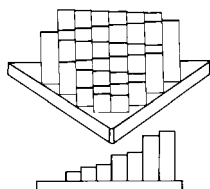
Provides a comprehensive range of tests in one compact unit...

- Slice thickness
- MTF evaluation
- Spatial resolution
- RF signal uniformity
- Magnetic field homogeneity
- And many others

A wide range of tests are provided by individual phantom sections

Folded step ramps

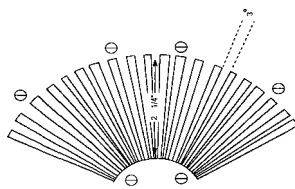
- Slice thickness
- Slice orientation
- Interslice gap



Step Interval 1 mm
Range 36 mm

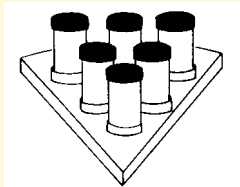
Star pattern

- MTF evaluation
- Horizontal & vertical spatial resolution
- Quadrature setting
- Baseline correction



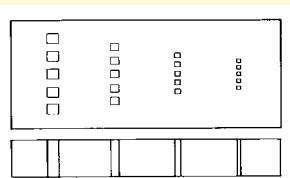
Wedge angle 3°
Number of wedges 20
Fan angle 60°
Wedge length 60 mm
Height 30 mm

T₁ and T₂ solution insert



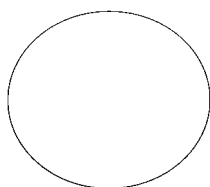
Six 5 cc refillable glass vials with caps
15 mm Ø x 47 mm (h)

High-resolution hole pattern



Four holes 2.0 x 2.0 mm, 1.0 x 1.0 mm, 0.75 x 0.75 mm, 0.5 x 0.5 mm
Hole depth 9 mm

Flood section



Diameter 9 in
Depth 1.25 in

Concentric conic section



Outside diameter 8 in
Number of segments 4

The MRI Multipurpose Phantom monitors the overall performance of an MRI system. The parameters that can be measured include: slice thickness, slice orientation, interslice gap, magnetic field homogeneity, radio frequency signal uniformity, spatial resolution in positive and negative contrast, and modulation transfer function. The phantom can also be used to evaluate quadrature setting, baseline correction, aspect ratio, and single T₁ and T₂ values.

The phantom is constructed of non-magnetic materials. It is 9 inches in diameter, with two inserts, and is designed to be filled with an MRI signal-producing solution. One insert is a series of concentric conic sections. The other insert is made up of five sections: one for positive contrast, two for slice evaluation, one for MTF evaluation, one for T₁ and T₂ evaluations.

A void between the sections provides a fully flooded area for signal uniformity.

Specifications

Standard configuration

Sections	Segments provided
Folded step ramps	two 60°
Star pattern	one 120°
T ₁ , T ₂ solution insert	one 60°
High-resolution hole pattern	one 60°
Flood section	one 360°
Concentric conic section	one 360°

Phantom dimensions OD is 9 x 4.5 in (t)

Weight 6.82 lb (3.09 kg)

Optional accessories

Copper Sulfate, 1 gm/l (Model 76-903-7000)

Available model(s)

76-903 MRI Multipurpose Phantom

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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76-903-ds rev 1 10 mar 03

* Developed by Seong Ki Mun, Ph.D., Department of Radiology, Georgetown University Hospital, Washington, DC.

3-D Slice Thickness/ High Contrast Resolution Phantom (AAPM) Model 76-908

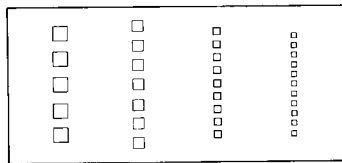
Accurately evaluates:

- High-contrast resolution
- Slice thickness
- Gradient strength
- Slice position/separation
- Resonance frequency
- Designed to conform to AAPM MRI specifications*

Various sections are arranged within a cubical shape to make the phantom truly three-dimensional. It contains slice thickness measuring sections, and a void between the inserts to allow for a signal-producing solution. Slice thickness and resolution information can be obtained in all three directions (transaxial, coronal, and sagittal) without moving the phantom.



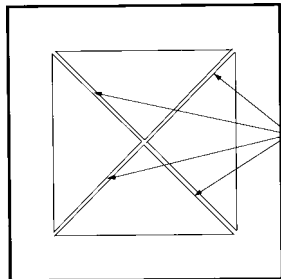
Phantom configuration



Resolution section

Six sections

Square holes: 0.5, 0.75, 0.1, and 0.2 mm
Hole depth: 0.50 in



Slice thickness
1 or 2 mm gap
Slice position/
separation
Gradient strength

Slice thickness
ramp section
Four sections
2 with 1 mm gap
2 with 2 mm gap

Specifications

Dimensions 6 x 6 x 5 in (15.24 x 15.24 x 12.70 cm)

Weight 3.46 lb (1.56 kg)

Optional accessories

Copper Sulfate, 1 gm/l (Model 76-903-7000)

Available model(s)

76-908 3-D Slice Thickness/High Contrast Resolution Phantom (AAPM)

Uniformity/Linearity Phantom (AAPM) Model 76-907

Accurately evaluates:

- Spatial linearity
- Image artifact
- Signal-to-noise
- Resonance frequency
- Quadrature error
- Designed to conform to AAPM MRI specifications*

This large, flat flood phantom can be filled with an MR signal-producing solution. The square grid section contains orientation reference markers, and the flood section has an image artifact cylinder.

Specifications

Dimensions 13 x 13 x 4 in (33.02 x 33.02 x 10.16 cm)

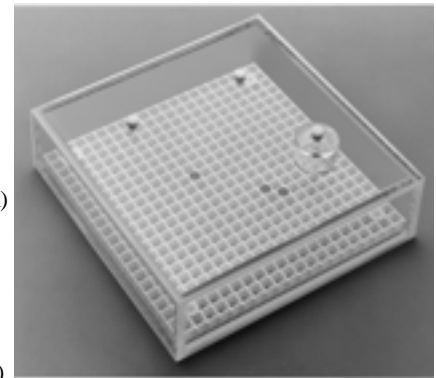
Weight 11.68 lb (5.30 kg)

Optional accessories

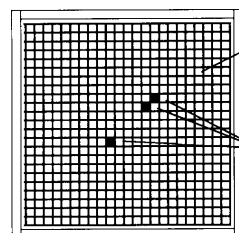
Copper Sulfate, 1 gm/l (Model 76-903-7000)

Available model(s)

76-907 Uniformity/Linearity Phantom (AAPM)



Phantom configuration



Spatial linearity grid

Orientation
references

Square grid section

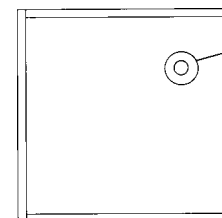


Image artifact
Quadrature error

Signal-to-noise
Resonance
frequency

Flood section

* These phantoms conform to the AAPM Specifications contained in the report: "Quality Assurance Methods and Phantoms for Magnetic Resonance Imaging," issued by the AAPM NMR Task Group No. 1 (article appeared in *Medical Physics*, 17:2 (Mar/Apr 1990). This report has also been co-sponsored by the American College of Radiology MR Committee on Imaging Technology and Equipment.

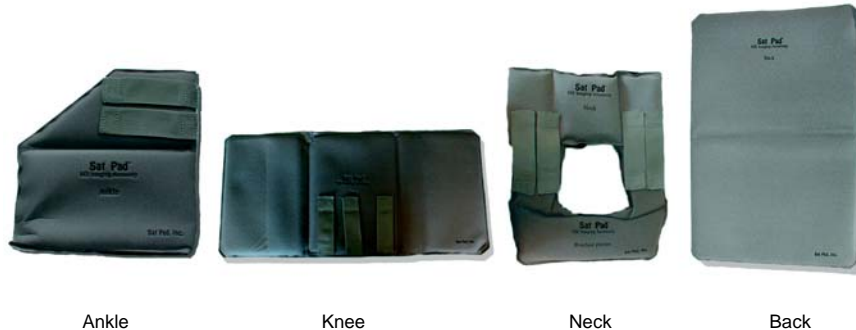
For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA. Specifications are subject to change without notice.

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76-908-ds rev 1 10 mar 03

Sat Pad™

MR Imaging Accessory

Models 76-312 to 76-315



- Cost benefit in comparison to expensive software enhancing technology
- Convenient to use
- Comfortable for patients
- Represents a simple solution to a common problem
- Maximizes MRI performance
- Complementary to MRI software
- Provides for enhanced MRI of joints
- Minimizes artifacts

Introduction

Several MR pulsing parameters are particularly sensitive to the uniformity or homogeneity of the magnetic field. Local inhomogeneity of the magnetic field is created from areas where air and tissue interface. Local inhomogeneities are even more pronounced around areas of great variation in anatomic structure, such as at the neck or ankle.

The quality of MR images from these sensitive pulsing parameters is therefore dependent upon maintaining the homogeneity of the local magnetic field. These images can be enhanced by the use of an MR imaging accessory, Sat Pad, which consists of a pouch filled with non-protonated fluid (perfluorochemical).

Sat Pad functions to provide better quality MRI by restoring the uniformity in the magnetic field by contouring to the anatomy and eliminating the sharp angles. The result is much clearer definition of the targeted anatomy with improved visualization of adjacent structure. Sat Pad is particularly beneficial in both fat saturation and fast spin echo MRI.

Applications

Sat Pad is a magnetic resonance imaging accessory designed to improve the homogeneity of the local magnetic field.

Sat Pad also serves as a comfort pad or stabilizing device to reduce motion artifacts.

Available model(s)

76-312 Sat Pad Neck Kit, consists of neck and brachial plexus pads with 10 disposable pad covers

76-313 Sat Pad Back Kit, consists of back pad with 10 disposable pad covers

76-314 Sat Pad Ankle Kit, consists of ankle pad with 10 disposable foot covers

76-315 Sat Pad Knee Kit, consists of knee pad

Other MRI accessories available, call for a details.

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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